ENVIRONMENTAL IMPACT ASSESSMENT

Second Draft Environmental Impact Assessment Report for the Proposed Construction, Operation and Decommissioning of a Seawater Reverse Osmosis Plant and Associated Infrastructure in Tongaat, Kwazulu-Natal

SECOND DRAFT EIA REPORT

PART B: DRAFT EMPR

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1 INTRODUCTION

This Draft Environmental Management Programme (EMPr) is prepared as part of the requirements of the Environmental Impact Assessment (EIA) Regulations (18 June 2010, as amended) promulgated under the National Environmental Management Act (NEMA) (Act 107 of 1998, as amended). The Draft EMPr is being submitted to the National Department of Environmental Affairs (DEA) as part of the Application for Environmental Authorisation for the proposed Construction, Operation and Decommissioning of a Sea Water Reverse Osmosis (SWRO) Plant and Associated Infrastructure proposed at Tongaat, on the north coast of KwaZulu-Natal, within the eThekwini Municipality (DEA EIA Reference Number: DEA EIA Reference: 14/12/16/3/3/2/652 and NEAS Reference Number: DEA/EIA/0002351/2014). The Project Applicant is Umgeni Water.

This Draft EMPr is being made available to Interested and Affected Parties (I&APs) and Organs of State, as part of the Draft EIA Report, for a 40-day review period. Comments received from stakeholders during this aforementioned review period will be incorporated into the Draft EMPr, where applicable, and thereafter submitted to the KZN DEDTEA for decision-making in terms of the 2010 EIA Regulations. Following the incorporation of comments from stakeholders, this Draft EMPr is intended as a "living" document and should continue to be updated regularly, as needed.

1.1 PROJECT DESCRIPTION

As noted in the Draft EIA Report, Umgeni Water is planning to construct a SWRO plant at Lovu and Tongaat, on the south coast and north coast of the eThekwini Municipality, respectively. The information presented within this Draft EMPr only relates to the proposed Tongaat desalination plant, with the Lovu site being dealt with as part of a separate EIA Process. The proposed plant will produce 150 Ml/day of freshwater when at final capacity, and will have an average inflow rate of 389 Ml/day. The plant will have a lifespan of 20-25 years with the potential of a lifespan extension and may be constructed in two phases over a period of five years, and will occupy an area of approximately 70 000 m^2 (excluding servitudes for pipelines).

The proposed Tongaat desalination plant will consist of the following main infrastructural components:

- Sea water intake and pipelines;
- Sea water pump station;
- Sea water pipeline;
- SWRO desalination plant;
- Brine discharge pipeline;
- Brine diffuser system;
- Potable water pipelines; and
- Power supply infrastructure.

Overall, sea water will be abstracted from the sea via a sea water intake structure positioned approximately 650 m offshore. Pipelines will then transport the intake water to the sea water pump station on shore.
The sea water pump station will then convey the source sea water to the proposed desalination plant site via a short terrestrial pipeline. At the desalination plant, the sea water will undergo reverse osmosis and the desalinated potable water will be stored in two 37.5 Ml above ground reservoir at the operational site. From the reservoir, a pump station and a pipeline will be constructed to transfer potable water to the existing bulk water pipeline located approximately 5 km from the proposed desalination plant site. The brine emanating

from the desalination process will be discharged to a diffuser located offshore, via a bring discharge pipeline. The brine will be discharged via a number of outlet ports in the diffuser.

A detailed description of the proposed project is contained in Chapter 2 of the Draft EIA Report; and a description of the affected environment is provided in Chapter 3 and Chapters 6 to 13 of the Draft EIA Report. Refer to Appendix 1 of this Draft EMPr for the proposed locality of the project.

1.2 AUTHORS OF THE DRAFT EMPr

This Draft EMPr has been compiled by the Environmental Assessment Practitioners and the various specialists on the team involved in the assessment of potential impacts identified during the EIA Process. The name and role of all authors are included in Table 1. The details and expertise of the Environmental Assessment Practitioner and the specialists are provided in Appendix A of the Final EIA Report.

Table 1: EMPr Authors

EIA MANAGEMENT TEAM		
Paul Lochner	CSIR	Project leader and Technical Reviewer (EAPSA) Certified
Annick Walsdorff	CSIR	Project Manager
Rohaida Abed	CSIR	Project Assistant
SPECIALIST TEAM		
Dr. Andrea Pulfrich	Pisces Environmental Services	Marine Ecology Assessment
Simon Bundy	Sustainable Project Developments cc	Terrestrial Ecology Assessment
Dr. Liz Day	The Freshwater Consulting Group	Freshwater Ecology Assessment
Duncan Kael	Acer Africa	Social Impact Assessment
Brett Williams	Safetech	Noise Impact Assessment
Henry Holland	MapThis Trust	Visual Impact Assessment
Dr. Hugo van Zyl	Independent Economic Researchers	Economic Assessment
Len van Schalkwyk	eThembeni Cultural Heritage	Heritage Assessment: Letter for Exemption

2 APPROACH TO PREPARING THE EMPr

A typical EMPr takes the planning and design, construction, operational and decommissioning phases of a project into account. The EMPr is compiled as part of the EIA Process and is an annexure to the project report.

Umgeni Water Particular Specification for Environmental Management of Construction Projects (Version 001, dated February 2010) has been compiled for implementation across all Umgeni Water construction and infrastructure projects in order to avoid and/or manage potential negative impacts. For the proposed project, the Umgeni Water Construction Specification for Environmental Management is applicable and has been included as Appendix 2 of this Draft EMPr. The Umgeni Water specification forms the basis of this Draft EMPr, which has been compiled by the CSIR to include the project specific requirements that are not captured in the specification.

2.1 COMPLIANCE WITH RELEVANT LEGISLATION

In terms of legal requirements, a crucial objective of the EMPr is to satisfy the requirements of Regulation 33 of the NEMA EIA Regulations of 18 June 2010 which came into effect on 2 August 2010. These regulations regulate and prescribe the content of the EMPr and specify the type of supporting information that must accompany the submission of the report to the authorities. An overview of where the requirements are addressed in this Draft EMPr is presented in Table 2.

Table 2: Compliance with Section 33 of the EIA Regulations (Government Gazette 18 June 2010, as amended) and Section 24N of the National Environmental Management Act (Act 107 of 1998)

Requirements of Section 33 of the EIA Regulations (Government Gazette 18 June 2010, as amended) and section 24N of the National Environmental Management Act 1998 (Act 107 of 1998)	**Where it is included in this Draft EMPr?**
a. Details of - (i) the person who prepared the environmental management programme; and (ii) the expertise of that person to prepare an environmental management programme;	Section 1
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 these Regulations, including environmental impacts or objectives in respect of - (i) planning and design; (ii) pre-construction and construction activities; (iii) operation or undertaking of the activity; (iv) rehabilitation of the environment; and (v) closure, where relevant.	Mitigation objectives and management actions columns in Sections 4, 5, 6 and 7 Management objectives and management actions columns in Sections 4, 5, 6 and 7
c. a detailed description of the aspects of the activity that are covered by the draft environmental management programme;	Section 1 of the Draft EMP
d. an identification of the persons who will be responsible for the implementation of the measures contemplated in paragraph (b);	Section 3 of the Draft EMP and Monitoring - Responsibility column of Sections 4, 5, 6 and 7
e. proposed mechanisms for monitoring compliance with and performance assessment against the environmental management programme and reporting thereon;	Monitoring - Methodology column of Sections 4, 5, 6 and 7
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	Sections 4, 5, 6 and 7
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;	Sections 4, 5, 6 and 7
h. time periods within which the measures contemplated in the environmental management programme must be implemented;	Monitoring - Frequency column of Sections 4, 5, 6 and 7
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;	Management actions column of Sections 4, 5, 6 and 7

Requirements of Section 33 of the EIA Regulations (Government Gazette 18 June 2010, as amended) and section 24N of the National Environmental Management Act 1998 (Act 107 of 1998)	Where it is included in this Draft EMPr?
j. an environmental awareness plan describing the manner in which the applicant intends to inform his or her employees of any environmental risk which may result from their work; and risks must be dealt with in order to avoid pollution or the degradation of the environment;	Sections 4, 5, 6 and 7
k. where appropriate, closure plans, including closure objectives.	Not applicable. A closure plan will need to be prepared if and when the facility is decommissioned, in accordance with best practice and legislative requirements applicable at the time.

2.2 CONTENT OF THE DRAFT EMPR

The Draft EMPr includes the findings and recommendations of the EIA Process and specialist studies. However, the Draft EMPr is considered a "live" document and must be updated with additional information or actions during the design, construction, operational and decommissioning phases if applicable.

The Draft EMPr follows an approach of identifying over-arching objectives, accompanied by management actions that are aimed at achieving these objectives. The management actions are presented in a table format in order to show the links between associated objectives, actions, responsibilities and monitoring requirements.

The management plans for the design, construction, operation and decommissioning phases consist of the following components:

- Goal: Over-arching environmental goal proposed for the Tongaat Desalination project.
- Impact: The potential positive or negative impact of the development that needs to be enhanced, mitigated or eliminated.
- Management Objectives: The objectives necessary in order to meet the goal; these take into account the findings of the specialist studies.
- Targets: The criteria or targets that indicate the efficacy of the management plan. The targets should be readily measurable, understandable to the layperson, cost-effective to monitor, and meet legal requirements.
- Mitigation/Management Actions: The actions needed to achieve the objectives, taking into consideration factors such as responsibility, methods, frequency, resources required and prioritisation.
- Monitoring: The key monitoring actions required to check whether the objectives are being achieved, taking into consideration responsibility, frequency, methods and reporting.

2.3 GOAL OF ENVIRONMENTAL MANAGEMENT

The overall goal for environmental management for the proposed Tongaat Desalination project is to construct and operate the project in a manner that:

- Minimises the ecological footprint of the project on the local environment;
- Minimises impacts on fauna, flora and freshwater ecosystems;
- Facilitates harmonious co-existence between the project and other land uses in the area; and

- Contributes to the environmental baseline and understanding of environmental impacts of Desalination Facilities in a South African context.

3 ROLES AND RESPONSIBILITIES

For the purposes of the Draft EMPr, the generic roles that need to be defined are those of the:

- Project Developer (Umgeni Water);
- Umgeni Water Environmental Site Officer;
- Contractor's Environmental Officer;
- Independent Environmental Control Officer (ECO);
- Lead Contractor or Construction Manager;
- Umgeni Environmental Manager;
- Desalination Plant Operations Manager.

It is acknowledged that the specific titles for these functions will vary from project to project. The intent of this section is to give a generic outline of what these roles typically require. It is expected that this will be appropriately defined at a later stage.

3.1.1 Project Developer

The Project Developer (Umgeni Water) is the 'owner' of the project and as such is responsible for ensuring that the conditions of the Environmental Authorisation issued in terms of NEMA (should the project receive such authorisation) are fully satisfied, as well as ensuring that any other necessary permits or licenses are obtained and complied with. It is expected that the Project Developer will appoint an independent ECO, a Construction Manager, a Project Manager during the construction phase, and a Plant Operator for the operational phase.

In line with the Umgeni Water Construction Specification (Version 001, dated February 2010), 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 may on the recommendation of the Engineer and / or Environmental Office order the Contractor to suspend any or all works on site if the Contractor fails to comply with the relevant environmental specifications during the construction phase. The Project Manager will be responsible for maintaining a register of complaints and queries (submitted by members of the public) at the site office. The register will need to be provided to the ECO on a monthly basis.

If Umgeni Water appoints a Plant Operator during the operational phase, the manager must be informed of the required conditions of the Environmental Authorisation that must be satisfied, and incorporate these requirements into the Operational EMPr. Should Umgeni Water transfer ownership of the facility at any time, they will need to transfer the Environmental Authorisation (including any conditions of authorisation) to the new legal entity.

3.1.2 Umgeni Water Environmental Officer

The Umgeni Water Environmental Officer will be responsible for monitoring the implementation and compliance with the Environmental Management Programme and associated documents, including Umgeni

Water Particular Specification for Environmental Management of Construction Projects and any other environmental requirements on a daily basis.

The specific tasks during the construction stage will include (in line with the Umgeni Water Construction Specification, Version 001, dated February 2010):

- Review all reports from the Environmental Specialist/ECO, including sign off on Method Statements.
- Conduct any environmental incident enquiries.
- Ensure induction material includes project appropriate environmental issues.
- Approve training programmes and other awareness initiatives.
- Coordinate or facilitate internal environmental audits.
- Attending site meetings.
- Monitoring the site performance of the project in terms of environmental compliance to the ECO and Project Manager.
- Liaise with the ECO on matters of policy and those requiring clarity and advice.
- Conduct an environmental inspection on completion of the construction period (together with the ECO) and 'sign off' the construction process with the Contractor/Construction Manager.

The Umgeni Water Environmental Officer will also be responsible for overseeing the implementation of the EMPr for the decommissioning phase.

3.1.3 Independent ECO

An independent ECO must be appointed to monitor the compliance of the proposed project with the conditions of Environmental Authorisation (should such authorisation be granted by the DEA) during the construction phase (and possibly the operational and decommissioning phases, depending on the requirements of the DEA). The ECO must also monitor compliance of the proposed project with environmental legislation and recommendations of the EMPr.

The ECO will be responsible for preparing the Final EMPr based on this Draft EMPr, as well as updating the EMPr as and when necessary, and compiling a monitoring checklist based on the EMPr. The ECO will be part of the project team and will need to advise the Engineer on all environmental matters relating to the proposed construction work.

The roles and responsibilities of the ECO should include the following (in line with the Umgeni Water Construction Specification, Version 001, dated February 2010):

- The ECO must undertake periodic environmental audits (using a monitoring checklist) during the relevant phases of the proposed project in order to monitor and record environmental impacts and non-conformances. It is recommended that weekly or bi-weekly environmental audits be undertaken by the ECO during the construction phase.
- Liaison with the authorities.
- Environmental compliance reports must be prepared by the ECO and submitted to the Competent Authority (i.e. DEA) on a regular basis (i.e. monthly during the construction phase or as stipulated by the DEA).
- The ECO must maintain a diary of site visits and audits, a copy of the Environmental Authorisation (should such authorisation be granted by the DEA) and relevant permits for reference purposes, a non-

conformance register, a public complaint register, and a copy of previous environmental audits undertaken.

- The ECO must report any non-conformances within 48 hours of identification of such non-conformance to the relevant manager.
- Prior to the commencement of construction, the ECO must meet on site with the Construction Manager to confirm the construction procedure and designated construction areas. The ECO must brief the Contractor about the requirements of the Environmental Specification and EMPr, as applicable.
- The ECO needs to advise the Project Manager and Engineer / Supervisor about the interpretation, implementation and enforcement of the Environmental Specification and other related environmental matters.
- The ECO should attend site meetings, if required.
- The ECO should conduct an environmental inspection on completion of the construction period and 'sign off' the construction process with the Contractor/Construction Manager.

3.1.4 Lead Contractor or Construction Manager

The lead contractor will be responsible for the following:

- Overall construction programme, project delivery and quality control for the construction of the proposed Desalination Plant project.
- Overseeing compliance with the Health, Safety and Environmental Responsibilities specific to the project construction.
- Promoting total job safety and environmental awareness by employees, contractors and sub-contractors and stress to all employees and contractors and sub-contractors the importance that the project proponent attaches to safety and the environment.
- Ensuring that each subcontractor employ an Environmental Officer (or have a designated Environmental Officer function) to monitor and report on the daily activities on-site during the construction period. The roles of the Subcontractor's EO are to be defined as part of the contract.
- Ensuring that safe, environmentally acceptable working methods and practices are implemented and that sufficient plant and equipment is made available, is properly operated and maintained in order to facilitate proper access and enable any operation to be carried out safely.
- Meeting on site with the Environmental Manager prior to the commencement of construction activities to confirm the construction procedure and designated activity zones.
- Ensuring that all appointed contractors and sub-contractors are aware of this EMPr and their responsibilities in relation to the programme.
- Ensuring that all appointed contractors and sub-contractors repair, at their own cost, any environmental damage as a result of a contravention of the specifications contained in the EMP, to the satisfaction of the Environmental Manager/ECO.
- Suppling method statements for all activities requiring special attention as specified and/or requested by the Project Manager, ECO and/or Engineer during the duration of the Contract.
- Complying with the requirements of the ECO or Umgeni Water EO, as applicable, within the time period specified.

At the time of preparing this EMPr, the appointment of a lead contractor has not been made and will depend on the project proceeding to the construction phase.

3.1.5 Umgeni's Environmental Manager

The responsibility of the Environmental Manager includes overseeing the implementation of the EMPr during the operational phase, monitoring environmental impacts, record-keeping and updating of the EMPr as and when necessary. The Environmental Manager is also responsible for monitoring compliance with the conditions of the Environmental Authorisation that may be issued to Umgeni Water.

During operation, the Environmental Manager will be responsible for:

- Overseeing the implementation of the EMPr and monitoring programmes for the operation phase.
- Reviewing the findings of the monitoring and highlight concerns to management where necessary.
- Ensuring compliance with the Environmental Authorisation conditions.
- Ensuring that the necessary environmental monitoring takes place as specified in the EMPr.
- Updating the EMPr and ensuring that records are kept of all monitoring activities and results.

During decommissioning, the Environmental Manager will be responsible for:

- Overseeing the implementation of the EMPr for the decommissioning phase; and
- Conducting an environmental inspection on completion of decommissioning and 'signing off' the site rehabilitation process.

At the time of preparing this EMPr, the Environmental Manager appointment is still to be made by the proponent. The appointment is dependent upon the project proceeding to the construction phase.

3.1.6 Desalination Plant Operations Manager

The Operations Manager will be responsible for the following:

- Operation of the Desalination Plant.
- Required maintenance of the facility.
- Overall compliance with the EMPr and Environmental Authorisation.

4 MANAGEMENT PLAN FOR DESIGN PHASE

Management Objective/ Target	Management Action	Monitoring Methodology	Monitoring Frequency	Monitoring Responsibility
A. GENERAL CONSTRUCTION ACTIVITIES				
4.1. Clearance of vegetation and disturbance of watercourses/wetlands.				
Ensure that cleared and disturbed areas are rehabilitated timeously and effectively	Develop a rehabilitation programme, taking into consideration rehabilitation of areas affected by the construction of the desalination plant (e.g. secondary forest habitat, wetlands), the potable water pipelines and powerline (e.g. agricultural land, wetlands, watercourses etc.).	▪ Appoint a terrestrial ecologist/botanist and a wetland specialist to advise on rehabilitation programme. ▪ Sign off rehabilitation programme.	▪ Once-off during the planning and design phase.	▪ Project Developer (Umgeni Water) and Umgeni Water Environmental Officer
B. TERRESTRIAL ECOLOGY - COASTAL/DUNE ENVIRONMENT				
4.2. Disturbance of the frontal dune during topographic surveys and geotechnical investigations, leading to slumping and Aeolian driven transgression. **4.3. Disturbance of the supra-tidal beach environment during topographic surveys and geotechnical investigations, leading to variations in beach sediment dynamics**				
Ensure that vegetation that lies seaward of the proposed pump station is maintained and possibly enhanced	Compile a dune management protocol for any activity proposed to undertaken on the frontal dune or on the beach for the proposed project (i.e. topographic surveys, geotechnical investigations, etc.). This protocol should include, where applicable, recommendations for stabilisation and re-vegetation (including the type of species to be used during the re-vegetation), as well as vehicular and pedestrian traffic control recommendations.	▪ Appoint a suitable qualified specialist to compile the dune management protocol. ▪ Conduct an audit prior to the commencement of the construction phase to verify if a dune management protocol has been compiled, reviewed and approved by Umgeni Water, and kept on file.	▪ Once-off during the planning and design phase.	▪ Project Developer (Umgeni Water) and Umgeni Water Environmental Officer
4.4. The redirecting of surface and sub-surface flow due to the construction of the stormwater and drainage systems in and around the SWRO plant is likely to affect the state of the frontal dune				
The maintenance of recharge of the frontal dune cordon. Ensure that there is no significant alteration in rates or volumes of inflow of freshwater to the frontal dune cordon.	Incorporate consideration of subsurface flow rates and the position of the freshwater lens at points close to the dune into final design.	▪ Ensure that this is taken into consideration during the planning and design by	▪ Once-off during the planning and design phase/geotechnical	▪ Project Developer (Umgeni Water) and

Management Objective/ Target	Management Action	Monitoring Methodology	Monitoring Frequency	Monitoring Responsibility
	In and around the proposed SWRO plant, stormwater management planning should allow for the distribution of surface flow from the site in a manner akin to that presently evident. Conduct a baseline assessment of sub surface freshwater flows associated with the frontal dune cordon to inform the Stormwater Management Plan	reviewing the signed, approved reports, designs or minutes of meetings.	assessments of the structures.	Umgeni Water Environmental Officer
C. Terrestrial Ecology and Mesic Environments				
4.5. Disturbance of secondary forest habitat, leading to potential slumping				
Maintain present grades encountered around this forested area (scrub forest and secondary vegetation evident in the south west) and prevent slumping should senescence arise within this vegetation community	Incorporate a retaining system into the design. Active replanting under a horticultural regime may be incorporated into the planning and construction phase in order to establish a semi natural system, reflective of typical dune forest systems within the region.	▪ Appoint a terrestrial ecologist to advise on the status of the secondary forest system in this area. ▪ Ensure that this is taken into consideration during the planning and design by reviewing the signed, approved reports, designs or minutes of meetings.	▪ Once-off during the planning and design phase.	▪ Project Developer (Umgeni Water) and Umgeni Water Environmental Officer
4.6. Disturbance of surface areas will alter general seral traits (vegetation succession) within sites not presently under cultivation or intended to be under cultivation following construction, leading to exotic weed invasion.				
Reduce the establishment and spread of alien invasive plants during the proposed project and as a result of the proposed project activities, such as disturbance of the surface areas.	Compile an Alien Invasive Vegetation Management Plan for implementation during the construction and operation phase of the proposed project, which takes into account relevant Environmental Specifications for the control and removal of these species. The plan must include recommendations for removal	▪ Appoint a relevant specialist to compile an Alien Invasive Vegetation Management Plan, in collaboration with Umgeni's ECO. ▪ Ensure that this is taken into consideration during	▪ Once-off before starting the construction phase.	▪ Project Developer (Umgeni Water) and Umgeni Water Environmental Officer ▪ Project Developer (Umgeni Water) and

Management Objective/ Target	Management Action	Monitoring Methodology	Monitoring Frequency	Monitoring Responsibility
	of alien species, disposal of the removed species and re-vegetation species to be used.	the planning and design phase by reviewing the signed, approved management plan.		Umgeni Water Environmental Officer
	If possible, plan construction of the powerline such that it does not take place after rehabilitation activities for other aspects (e.g. pipeline) in this area.	▪ Sign off construction plan	▪ Prior to construction	▪ Project Developer (Umgeni Water) and Umgeni Water Environmental Officer
4.7. Potential ousting of localised fauna from refugia and resulting potential mortalities during construction.				
Avoidance of ousting of localised fauna from refugia or mortalities associated with disturbance of fauna.	The prudent alignment of all pipelines and powerlines to ensure the avoidance of potential faunal refugia including steeper slopes and thickets of vegetation (if and where such associations are identified, no matter how small), may reduce the incidence of mortalities or ousting of species from specific areas.	▪ Ensure that this is taken into consideration during the planning and design of the pipelines by reviewing the signed, approved reports, designs or minutes of meetings.	▪ Once-off during the planning and design phase.	▪ Project Developer (Umgeni Water) and Umgeni Water Environmental Officer
	A preliminary review of sites prior to construction will allow for the identification of fauna that may be traversing or be present within particular areas, prior to the commencement of the construction phase.	▪ Appoint a relevant specialist to undertake a review of the final project sites in order to identify the likely presence of fauna. The review plan must also specify specific actions to address any faunal presence that arises within the development footprint.	▪ Once-off during the planning and design phase, prior to construction.	▪ Project Developer (Umgeni Water) and Umgeni Water Environmental Officer

Management Objective/ Target	Management Action	Monitoring Methodology	Monitoring Frequency	Monitoring Responsibility
4.8. Potential hazard to, in particular, avian species, as a result of the power lines serving the proposed desalination facility.				
Reduction in bird mortalities or changes in behaviour on account of establishment of powerlines.	Bird flight diverters should be included in the design and positioned where powerlines traverse valleys or extensive open fields, are proximal to open water or wetland environments and lie adjacent to scarps.	▪ Ensure that this is taken into consideration during the planning and design of the power lines by reviewing the signed, approved reports, designs or minutes of meetings.	▪ Once-off during the planning and design phase.	▪ Project Developer (Umgeni Water) and Umgeni Water Environmental Officer
D. FRESHWATER IMPACTS				
4.9. Destruction of wetlands on the desalination plant				
Rehabilitation of a swathe of wetlands downstream of the desalination plant and management of these as near-natural wetland systems (as opposed to agricultural lands).	▪ Implement the offset measures outlined in Chapter 8 Section 8.8 ("Development of a wetland offset plan for the proposed Tongaat desalination plant" - the conceptual details of this rehabilitation have been calculated as a formal offset that allow for their rehabilitation to a PES Category C or better) o Rehabilitate a swathe of wetlands between the site and the coast, and purchase additional land for this purpose. o Dissipate subsurface and surface drainage from the north eastern portion of the desalination plant site into these wetlands, via a series of specifically designed dissipation trenches constructed and maintained along the upstream (i.e. road) edge of each wetland portion so as to allow the broad dissipation of flow into the wetland, and	▪ Purchase of specific areas of land for the required offsets ▪ Undertake a detailed hydrological study that identified stormwater and dewatering volumes and flood flows. ▪ Design the various required stormwater management structures/ detailed engineering specifications for the infiltration trenches, the berm or the outflows from the receiving offset site under South Beach Road. ▪ Ensure that a wetland ecologist and a botanist are appointed to design the rehabilitation	▪ Once-off during the planning and design phase.	▪ Project Developer (Umgeni Water) and Umgeni Water Environmental Officer

Management Objective/ Target	Management Action	Monitoring Methodology	Monitoring Frequency	Monitoring Responsibility
	encourage wetland function in these areas; o Existing cultivated crops would need to be replaced with locally indigenous wetland vegetation, the species composition of which should be established in consultation with a botanist with local knowledge; o Maintenance of wetland areas would need to be ongoing, and allow for alien plant removal as well as the maintenance of infiltration trenches, prevention and management of erosion, and the maintenance of extensive plant cover; o The rehabilitated wetland extent, design, links with the stormwater management plan and development interface must be finalized during the detailed design phase of the project, with close collaboration between the wetland ecologist, the site and/ or design engineer and a botanical specialist; o An ecological corridor, vegetated with locally indigenous vegetation, must be established along the north eastern boundary of the site, in a band of width 20m minimum, extending to the undeveloped land on the upslope side of the property – the purpose of this would be to maintain a level of ecological connectivity between the lower wetland	programme by reviewing the signed, approved plan.		

Management Objective/ Target	Management Action	Monitoring Methodology	Monitoring Frequency	Monitoring Responsibility
	areas and the upland portions of the catchment, not-withstanding the acknowledged high level of fragmentation that is already associated with the impact of roads. If security fencing is used to secure the site, then this corridor should be outside of the fenced area.			
Prevent concentrated runoff onto beach. Ensure that downstream wetlands (including the agricultural areas) are impacted by neither too much concentrated runoff, nor by diversion of runoff.	Plant design should incorporate measures that allow collection of groundwater flows upstream of the built structures of the desalination plant, and their diversion and subsequent infiltration across the full width of the existing two wetland basins downstream of the built structures.	▪ Appoint a wetland specialist to work with stormwater engineer to design suitable infiltration devices. ▪ Review the signed, approved plans, designs or minutes of meetings.	▪ Once off during the design cycle and prior to the commencement of construction.	▪ Project Developer (Umgeni Water) and Umgeni Water Environmental Officer
Minimise impacts of catchment hardening on rehabilitated and downstream wetland function	Design and implement a stormwater management plan to control the velocity, quantity and quality of runoff from the site - implementation of so-called Sustainable Urban Design (SUD) principles (e.g. infiltrations areas, minimising hardened surfaces, ensuring that at least the velocity of runoff as a result of direct precipitation on the site does not increase compared to pre-development levels)	▪ Wetland specialist to work with stormwater engineer to design suitable infiltration devices ▪ Sign off the stormwater management plant ▪ Conduct a baseline assessment (hydrology) of on-site and downstream wetland condition and extent (based on ground-truthed aerial photography)	▪ Prior to construction	▪ Project Developer (Umgeni Water) and Umgeni Water Environmental Officer

Management Objective/ Target	Management Action	Monitoring Methodology	Monitoring Frequency	Monitoring Responsibility
4.10. Dewatering effects resulting in sedimentation and water quality pollution in downstream wetlands as well as possible wetland drawdown				
Prevent drawdown of wetlands downstream or those earmarked for rehabilitation.	Deep excavation would need to incorporate cut-off sleeves or other devices that separate upland groundwater inflows from the excavated area, and allow for their passage and subsequent infiltration / diffusion downstream of the site, without resulting in erosion of downstream wetlands.	▪ Appoint a wetland specialist to approve the efficacy of proposed mitigation designs ▪ Include design to prevent wetland drawdown during dewatering – e.g. upstream shuttering. ▪ Sign-off approved plans, designs and minutes of meetings.	▪ Prior to construction	▪ Project Developer (Umgeni Water) and Umgeni Water Environmental Officer
4.11. Disturbance to and potential loss of hillslope seep wetlands, creating a raised mound of disturbed conditions associated with the potable water pipeline and disturbances to watercourses				
Minimise disturbance to hillslope seep wetlands, channelled valley bottom wetlands and to Watercourses along pipeline route.	Carry out an accurate delineation of wetland habitat during the determination if the final alignment. Where possible, shifting the pipeline alignment so as to by-pass hillslope seep wetlands. Where the channel is considered significantly incised as a result of head cut erosion, include of a low gabion weir structure across the channel at the point of crossing, to flatten an artificially steepened channel gradient.	▪ Appoint a wetland specialist to work with the engineering team to re-align the pipeline where possible. ▪ The final proposed alignment of the river crossing should be ground-truthed with an aquatic ecologist and a botanist to ensure that the proposed mitigation measures remain relevant and effective against the likely impacts associated with the intervention	▪ Prior to construction	▪ Project Developer (Umgeni Water) and Umgeni Water Environmental Officer

Management Objective/ Target	Management Action	Monitoring Methodology	Monitoring Frequency	Monitoring Responsibility
		▪ Sign-off approved plans, designs and minutes of meetings.		
4.12. Disturbance to the Mdloti Estuary and its associated floodplain and valley bottom wetlands (zones A – E), as a result of construction-associated pollution, during horizontal drilling of the potable water pipeline				
Minimise disturbance to the Mdloti Estuary associated with the river crossing of the pipeline route. Minimise damage associated with runoff and contamination	A detailed topographical survey of the full route of the pipeline from the outer edge of Zone E to a distance at least 400m beyond the southern (right hand bank) crossing, to ensure that the proposed approach will be technically feasible, given the steep gradient on the right hand bank Pre-construction disturbance associated with exploratory drilling / test hole excavation must be addressed, so that disturbed areas are returned to their pre-test condition or better.	▪ Sign off on topographical survey ▪ On-site visual inspection to ensure that all test holes must be refilled and shaped to pre-impact levels.	▪ Once off prior to finalisation of alignment ▪ Post exploratory drilling activities	▪ Project Developer (Umgeni Water) and Umgeni Water Environmental Officer
	The pipeline must be aligned as close as technically possible to the N2, without compromising the channelled valley bottom wetland that runs alongside the N2 The final proposed alignment of the river crossing should be ground-truthed to ensure that the proposed mitigation measures remain relevant and effective against the likely impacts associated with the intervention; Horizontal drilling must be used to reduce trampling / damage to wetlands on the left hand (northern) bank of the estuary, as well as	▪ Appoint an aquatic specialist to work with the engineering team to re-align the pipeline where possible. ▪ Sign off final alignment	▪ Once off prior to finalisation of alignment ▪ Once off prior to construction	▪ Project Developer (Umgeni Water) and Umgeni Water Environmental Officer ▪ Aquatic specialist

Management Objective/ Target	Management Action	Monitoring Methodology	Monitoring Frequency	Monitoring Responsibility
	to facilitate crossing beneath the estuary channel. Thus horizontal drilling must take place through Zones E, D and A. Trenching could take place in Zones B and C, if technically desirable.			
4.13. Alignment of the transmission line				
Minimise disturbance to watercourses, including wetlands, drainage lines and the Mdloti Estuary associated with the construction of the transmission line.	Carry out an accurate delineation of wetland habitat during the determination if the final alignment. Support structures should be located only in Zones C and B, and on the hillslope on the southern side of the estuary channel. This means that the lines would have to span from the outside edge of the Mdloti buffer area (50m beyond Zone E) to the outer edge of Zone C. Figure 8.16 (Chapter 8 Aquatic specialist study) shows that if the current position of the powerline alignment in this area was shifted south by about 30m, then the powerlines could extend from beyond the buffer to Zone C without difficulty The final proposed alignment of the transmission line within the approved corridor should be ground-truthed with an aquatic ecologist and a botanist to ensure, where possible, avoidance of watercourses, drainage lines, wetlands etc.	▪ Appoint a wetland/ freshwater specialist and a botanist to work with the engineering team to determine the final alignment of the powerline. ▪ Sign-off approved plans, designs and minutes of meetings.	▪ Prior to construction	▪ Project Developer (Umgeni Water) and Umgeni Water Environmental Officer

Management Objective/ Target	Management Action	Monitoring Methodology	Monitoring Frequency	Monitoring Responsibility
	Finalise alignment to avoid as far as possible areas where lines cannot overpass riparian zones and areas of indigenous vegetation within 30m of a watercourse.			
		▪	▪	▪
4.14. Cumulative Impact: Contribution to large-scale loss of coastal wetlands as a result of wetland impacts at desalination plant and pump station sites and further degradation of downstream wetlands				
Offset the significant residual impacts associated with development of the desalination plant on admittedly degraded coastal wetland areas	Identify suitable wetland areas for offset mitigation. Compile a rehabilitation programme (including extent of offsite wetland to be rehabilitated based on extent of wetland to be lost) and agree on timing. Offset rehabilitation should ideally actively improve the condition of similar or more threatened wetland habitat, to a condition that is better than Category D – that is, Category C or better. Possible targets for offset mitigation could include the existing agricultural wetlands downstream of the southern portion of the proposed desalination plant site or the (degraded) FEPA valley bottom wetlands located to the north of the proposed plant, which might be rehabilitated as far as their beach outlets or other similar alternative wetlands that will meet offset requirements.	▪ Appoint a wetland ecologist and a botanist to design the rehabilitation programme. ▪ Sign-off approved plans, designs and minutes of meetings.	▪ Prior to construction	▪ Project Developer (Umgeni Water) and Umgeni Water Environmental Officer

Management Objective/ Target	Management Action	Monitoring Methodology	Monitoring Frequency	Monitoring Responsibility
E. MARINE ECOLOGY				
4.15. Effects of blasting on turtles, marine mammals, macrophytes, invertebrates and fish communities during the construction phase				
Every precaution will be taken to minimize effects of blasting, if applicable, on marine ecology during the construction phase.	Establish a rigorous Blasting Method Statement/Protocol in accordance with SANS standards, with adherence to all public safety requirements and which minimise the environmental effects of shock waves. The blasting protocol should include additional mitigation measures such as possibly bubble curtains, acoustic harassment devices or acoustic deterrent devices to warn away species to the presence of danger or small charges (fishing salutes) before the blast to scare away any animals in the area.	▪ Sign off blasting method statement/protocol.	▪ Once off prior to construction.	▪ Project Developer (Umgeni Water), Contractor and Umgeni Water Environmental Officer
	Once blasting method has been finalized, undertake overpressure calculations to estimate the impact of the blast on fish and marine mammals. Use results to set up the limits of the Danger Zone, Exclusion Zone and Safety Zone.	▪ Appoint a relevant specialist to undertake overpressure calculations and to set up limits of Zones. ▪ Sign off reports.	▪ Once off prior to the blasting activities	▪ Project Developer (Umgeni Water) ▪ Project Developer (Umgeni Water), Marine specialist and Umgeni Water Environmental Officer
4.16. Impact on biota associated with increases in porewater salinity beyond the sacrificial mixing zone as a result of discharge of high density saline brine.				
Minimise impact on marine biota as a result of increased salinity beyond the sacrificial mixing zone.	Ensure sufficient mixing of the discharged brine with the receiving water body by adjusting the discharge configuration appropriately. Limit increased salinity to the mixing zone.	▪ Ensure that this is taken into consideration and included in the design of the proposed facility by reviewing signed minutes of meetings or signed reports.	▪ Prior to commissioning of the facility.	▪ Project Developer (Umgeni Water), Marine specialist and and Umgeni Water Environmental Officer

Management Objective/ Target	Management Action	Monitoring Methodology	Monitoring Frequency	Monitoring Responsibility
4.17. Impingement and entrainment of organisms at the intake structure/ Changes in water circulation at the inlet structure due to the abstraction of large volume of seawater				
Minimize impingement and entrainment at the intake structure. Minimize changes in water circulation at the intake structure	Ensure that intake velocities are kept below ~0.15 m/s to enable fish and other organisms to escape the intake current. Include screens as part of the designs for the intake structure.	▪ Ensure that this is taken into consideration and included in the design of the proposed facility by reviewing signed minutes of meetings or signed reports.	▪ Prior to commissioning of the facility.	▪ Project Developer (Umgeni Water) and Umgeni Water Environmental Officer
	Conduct an entrainment study.	▪ Ensure that an entrainment study is conducted and taken into consideration and included in the design of the proposed facility by reviewing signed minutes of meetings or signed reports. ▪ Use the protocol recommended in Section 316(b) of the US EPA federal Clean Water Act.	▪ Prior to commissioning of the facility.	▪ Project Developer (Umgeni Water) and Umgeni Water Environmental Officer
4.18. Disturbance and destruction of subtidal sandy biota during pipeline laying, excavation and rock blasting for riser pits				
Minimise disturbance and destruction of subtidal sandy biota during pipeline laying, excavation and rock blasting for riser pits	Lay pipeline in such a way that required rock blasting is kept to a minimum	▪ Appoint a relevant specialist ▪ Ensure that this is taken into consideration and included in the design by signing off the final route.	▪ Prior to commissioning of the facility.	▪ Project Developer (Umgeni Water), Marine specialist and Umgeni Water Environmental Officer

Management Objective/ Target	Management Action	Monitoring Methodology	Monitoring Frequency	Monitoring Responsibility
4.19. Increased salinity and temperature in the mixing zone affects biota.				
Establish the effects of the discharge on marine communities.	Establish a baseline of shallow subtidal invertebrate macrofaunal communities.	▪ Undertake a grab sampling survey of benthic macrofauna in a pre-established grid around the discharge position. ▪ Ensure that a relevant specialist has been appointed to undertake the required sampling by conducting a review of the appointment letter and the results of the survey.	▪ For at least 2 years before the commencement of construction ▪ Before construction	▪ Project Developer (Umgeni Water) and Appointed Specialist ▪ Umgeni Water Environmental Manager
F. VISUAL IMPACTS				
4.20. Potential visual impacts associated with construction activities.				
Reduce visual intrusion of overall construction activities (i.e. project wide).	Ensure plans are in place to control and minimise erosion risks, to minimise fire hazards and dust generation and to rehabilitate cleared areas as soon as possible.	▪ Review the signed, approved reports/plans, designs or minutes of meetings.	▪ During the design cycle and prior to the commencement of construction.	▪ Project Developer (Umgeni Water)
4.21. Potential visual intrusion and landscape impact of the proposed project on the surrounding visual receptors and landscape.				
Reduce the visual intrusion and landscape impact of the desalination plant site on the surrounding visual receptors and landscape.	Design the desalination plant (with emphasis on reducing its discordance with the surrounding landscape) in such a way that the industrial aspects are effectively minimized through architecture, landscaping and vegetation. The design should also take cognizance of the future plans for the area which would locate the plant in a residential/tourism/recreation corridor. The exterior design of the desalination plant should include screening of industrial	▪ Contract an architect and landscape architect ▪ 3D modelling of the desalination plant design layout should be used to monitor the effectiveness of the layout in minimizing visual intrusion on existing seaviews ▪ Ensure that this is taken into consideration during	▪ During the design cycle and prior to the commencement of construction.	▪ Project Developer (Umgeni Water) and Appointed Architects ▪ Project Developer (Umgeni Water) and

Management Objective/ Target	Management Action	Monitoring Methodology	Monitoring Frequency	Monitoring Responsibility
	features/structures such as chemical storage tanks and service facilities, as well as the substation from public views. Tall structures should be placed in such a way that their intrusion on sea views is minimized or avoided (e.g. for views from Shaka Estate).	the planning and design of the proposed project by reviewing the signed, approved reports, designs or minutes of meetings.		Umgeni Water Environmental Officer
	Tall trees (preferably a variety of tree types and heights) of local native species (i.e. indigenous vegetation), should be incorporated into the Desalination Plant design where possible (i.e. generously used as a buffer around the plant as well as between buildings and structures where possible).	▪ Develop local plant sources and nurseries for vegetative erosion control materials. Use local native species whenever possible. Select species appropriate for the use, the site, and the bioregion.	▪ During design cycle and before construction commences.	▪ Project Developer (Umgeni Water)
	Security fencing should be placed between the desalination plant and the buffer of vegetation (rather than around the outside of the buffer area). Signage should be minimized and in keeping with the surroundings. A consistent and appropriate colour and architectural scheme should be used for buildings. Non-reflective paint should be used for metal surfaces.	▪ Ensure that this is taken into consideration and included in the design of the proposed facility by reviewing signed minutes of meetings or signed reports and designs.	▪ Prior to commissioning of the facility.	▪ Plant Manager and Umgeni Water Environmental Manager
	Building, façade and gardens/vegetation buffer should be maintained.	▪ Building, structures and garden maintenance plan should be developed by the architect and landscape architect.	▪ During design cycle and before construction commences.	▪ Project Developer (Umgeni Water)

Management Objective/ Target	Management Action	Monitoring Methodology	Monitoring Frequency	Monitoring Responsibility
		▪ Ensure that a building and garden maintenance plan is compiled by reviewing the signed, approved report and plan.	▪ Once-off during the planning and design phase.	▪ Project Developer (Umgeni Water) and Umgeni Water Environmental Officer
4.22. Potential impact of night lighting of structures and buildings associated with the desalination plant on the surrounding nightscape and visual receptors.				
Reduce the impact of night lighting of structures and buildings associated with the desalination plant on the surrounding nightscape and visual receptors	A lighting plan for the proposed desalination plant that demonstrates that project lighting is effectively shielded from surrounding and adjacent properties must be prepared with the design plans of the plant. The plan should ▪ minimize light spill onto neighbouring properties and glare ▪ provide for temporary lighting during the construction and decommissioning phases of all components of the project ▪ minimize contribution to light pollution (night glow) of the regional nightscape.	▪ A lighting specialist should be contracted to design the lighting plan for the project. ▪ Ensure that a lighting specialist is appointed to design the lighting of the plant by reviewing the signed, approved management plan or reports.	▪ During design cycle and before construction commences. ▪ Once-off during the planning and design phase.	▪ Project Developer (Umgeni Water) ▪ Project Developer (Umgeni Water) and Umgeni Water Environmental Officer
4.23. Potential visual intrusion of transmission lines on the views of sensitive visual receptors in the region.				

Management Objective/ Target	Management Action	Monitoring Methodology	Monitoring Frequency	Monitoring Responsibility
Reduce the visual intrusion of the powerlines on views of sensitive visual receptors in the region.	Careful location of towers, i.e. locate towers in such a way as to maximize the screening effect of existing topography and avoid where possible locations where towers will be exposed against the skyline (e.g. avoid hill or ridge tops). Use wooden towers if possible since these have a more rural feel to them than lattice towers. Minimise the use of strain towers (used where the power line changes direction of more than 3°) since these towers are larger and more visually intrusive than normal tower.	▪ Ensure that this is taken into consideration during the planning and design of the proposed project by reviewing the signed, approved reports, designs or minutes of meetings.	▪ Once-off during the planning and design phase.	▪ Project Developer (Umgeni Water) and Umgeni Water Environmental Officer
G. NOISE IMPACTS				
4.24. Impact of noise on the surrounding noise sensitive areas.				
Reduce the impact of noise on surrounding noise sensitive areas.	All buildings should be constructed to acoustically contain as much of the noise emissions as possible. This will include choosing equipment with the lowest noise emissions if a choice is available, construct building out of solid walls of at least 200mm thickness of at least a sound reduction index (Rw) of Rw55-60. All ventilation outlets are properly attenuated. The pump station equipment must be below ground level and the ventilation exit points should be fitted with sound attenuation devices.	▪ Ensure that this is taken into consideration during the planning and design of the proposed project by reviewing the signed, approved reports, designs or minutes of meetings.	▪ Once-off during the planning and design phase.	▪ Project Developer (Umgeni Water) and Umgeni Water Environmental Officer

Management Objective/ Target	Management Action	Monitoring Methodology	Monitoring Frequency	Monitoring Responsibility
	All high pressure pumps should be installed in an enclosed building where sound attenuation properties have been considered for the walls, roofs and access doors.			
H. SOCIAL AND ECONOMIC IMPACTS				
4.25. Permanent loss of land and housing associated with the construction of the desalination plant				
Ensure suitable compensation is provided for loss of land and housing	Provide compensation for losses incurred - compensate land owners at a market related prices. In cases where the entire properties are not required, land owners should be provided with the option of keeping the remaining sections of land or selling the property in its entirety. In the event of the land owner not wishing to keep any section of an affected property, Umgeni Water should purchase the entire property.	▪ Engage in negotiations with land owners ▪ Audit proof of negotiations and minutes of meetings (kept on file) for verification purposes. ▪ Project proponent to ensure that the agreed upon compensation is paid and that there are no grievances from affected parties	▪ Prior to construction.	▪ Project Developer (Umgeni Water) ▪ ECO and Umgeni Water Environmental Officer ▪ Project Developer (Umgeni Water)
4.26. Temporary loss of agricultural land associated with the construction of the potable water pipeline and transmission line				
Reduce the impact of temporary loss of agricultural land	Compensate affected land owners for any losses. Compile a construction schedule for the pipeline and powerline Project proponent in conjunction with affected land owners is to identify when the construction of pipelines and power lines should take place (i.e. place the potable water pipeline/transmission line	▪ Engage in negotiations with land owners ▪ Audit proof of negotiations and minutes of meetings (kept on file) for verification purposes. ▪ Project proponent to ensure that the agreed upon compensation is paid and that there are no	▪ Prior to the construction of the pipelines and power lines through areas of sugarcane.	▪ Project Developer (Umgeni Water) ▪ ECO and Umgeni Water Environmental Officer ▪ Project Developer (Umgeni Water)

Management Objective/ Target	Management Action	Monitoring Methodology	Monitoring Frequency	Monitoring Responsibility
	following the harvesting of sugarcane on the affected land so as to reduce losses)	grievances from affected parties ▪ Sign off construction schedule for the proposed pipeline and powerline		▪ ECO and Umgeni Water Environmental Officer
4.27. Increased demand for electricity				
Where possible, minimise electricity usage	Make use of alternative energy as far as possible (solar power for lighting, etc.).	▪ Sign off minutes of meetings and energy saving programme.	▪ Once off	▪ Project Developer (Umgeni Water)
I. HERITAGE IMPACTS				
4.28. Impacts on maritime underwater cultural heritage				
Prevent damage and destruction to maritime underwater cultural heritage (MUCH) of significance.	Undertake a magnetometer survey of the area, including a buffer zone around the area to be affected by the off-shore components. Contact Amafa/Heritage KwaZulu-Natali and the identified palaeontologist/ archaeologist if any MUCH features are located so that a systematic and professional investigation can be undertaken. Sufficient time should be allowed to remove/collect (if avoidance is not possible) such material before construction re-commences.	▪ Ensure that a relevant specialist has been appointed to undertake the survey. Sign off the survey report.	▪ Once off prior to construction	▪ Project Developer (Umgeni Water) and Umgeni Water Environmental Officer

5 MANAGEMENT PLAN FOR CONSTRUCTION PHASE

Management Objective/ Target	Management Action	Monitoring Methodology	Monitoring Frequency	Monitoring Responsibility
A. GENERAL CONSTRUCTION ACTIVITIES				
5.1. Impacts associated with construction footprint				
Limit the construction footprint to the minimum required and rehabilitate disturbed areas timeously.	Limit construction footprint to minimum required - Only use the most essential working corridor. Clearly demarcate the construction site prior to the commencement of construction. "No-go" areas must be demarcated clearly (using fencing and/or appropriate signage, cordoning off) before construction commences.	▪ Visual inspections to ensure footprint is kept to a minimum.	▪ Weekly	▪ ECO, Umgeni Water Environmental Officer and Contractor
	Areas that are impacted beyond the actual building site must be re-vegetated as soon as possible.	▪ Visual inspection	▪ As required	▪ ECO, Umgeni Water Environmental Officer and Contractor
	Ensure rehabilitation is undertaken timeously and according to the rehabilitation programme.	▪ Visual inspection and audit of the approved plan	▪ Daily to Weekly	▪ ECO, Umgeni Water Environmental Officer and Contractor
	Ensure conformance with the Alien Invasive Vegetation Management Plan (note that spraying of the sites must be done at a minimum of once per month)	▪ Visual inspection and audit of the approved plan	▪ Weekly	▪ ECO, Umgeni Water Environmental Officer and Contractor
5.2. Accidental spillage or leakage of fuel, chemicals, or lubricants may cause water or sediment contamination and/or disturbance to the surrounding environment.				
Minimize accidental spillage or leakage of fuel, chemicals, or lubricants that may cause water or sediment contamination and/or disturbance to the environment.	Have good house-keeping practices in place.	▪ Monitor the implementation of the management action to ensure compliance as far as possible. ▪ Monitor via site audits and record non-compliance and incidents.	▪ Weekly on an on-going basis throughout construction period. ▪	▪ ECO, Umgeni Water Environmental Officer and Contractor
	Maintain equipment to ensure that no oils, diesel, fuel or hydraulic fluids are spilled.	▪ Draw up a schedule for inspections and maintenance. ▪ Audit maintenance log sheets and records, and report non-compliance.	▪ Once-off prior to the commencement of construction and updated as required. ▪ Weekly	▪ Contractor and Project Developer (Umgeni Water) ▪ ECO, Umgeni Water Environmental Officer and Contractor

Management Objective/ Target	Management Action	Monitoring Methodology	Monitoring Frequency	Monitoring Responsibility
		Generate an inspection checklist to carry out the audits.		
	The Contractor should compile a Method statement for refuelling/servicing activities under normal and emergency situations. ▪ A designated (impervious) area for refuelling/maintenance purposes. No vehicle maintenance or refuelling on beach. ▪ Drip trays or similar impervious materials must also be used during refuelling/servicing, especially during emergency procedures. ▪ Training of staff to ensure proper transfer and refuelling.	▪ Review and sign off refuelling/servicing procedure ▪ Monitor the placement and designation of the area for refuelling at the site camp via visual inspections. ▪ Monitor the refuelling/servicing process (visual inspection) and record the occurrence of any spillages. Record and report non-compliance and incidents. ▪ Audit attendance registers	▪ Once-off prior to the commencement of the construction phase. ▪ Weekly ▪ As required during refuelling and servicing activities. ▪ Monthly	▪ Umgeni Water Environmental Officer ▪ ECO and Umgeni Water Environmental Officer ▪ Contractor and Umgeni Water Environmental Officer ▪ Contractor and Umgeni Water Environmental Officer
	Use drip trays under all equipment and plant parked.	▪ Conduct site inspections and visually determine the presence of any oil spills and the usage of drip trays.	▪ Daily	▪ Umgeni Water Environmental Officer
	Used oils and lubricants are to be contained and correctly disposed of off-site.	▪ Ensure that material emanating from maintenance work is retrieved, and contaminated material is removed. The contaminated material must be collected by a Contractor and disposed of at a registered waste disposal site designated for this purpose. ▪ Carry out site audits to verify the proof of disposal of the contaminated material and waybills kept on file.	▪ In the event of spillages. ▪ Weekly	▪ ECO, Umgeni Water Environmental Officer and Contractor ▪ ECO, Umgeni Water Environmental Officer and Contractor

Management Objective/ Target	Management Action	Monitoring Methodology	Monitoring Frequency	Monitoring Responsibility
	The Contractor must compile a Spill Contingency Plan or Response Method Statement and take into account any existing specifications, as well as lessons learnt from the similar construction projects (if applicable).	▪ Approve and sign off Spill Response Method Statement.	▪ Once-off (and thereafter updated as required during the construction phase).	▪ Contractor and Project Developer (Umgeni Water)
	Any spilled fuel, oil or grease must be immediately cleaned up, and the contaminated material must be removed and disposed at a registered hazardous waste disposal facility.	▪ Monitor the occurrence of spills and the management process. Record all spills and lessons learnt.	▪ Weekly audits	▪ ECO, Umgeni Water Environmental Officer
	Ensure that all construction vehicles have a spill kit (peatsorb/ drip trays) onboard in the event of a spill.	▪ Monitor via site audits and record incidents and non-compliance.	▪ Weekly	▪ ECO, Umgeni Water Environmental Officer
	The Contractor must ensure that adequate spill containment and clean-up equipment are provided on site for use during spill events.	▪ Monitor via site audits and record incidents and non-compliance.	▪ Weekly	▪ ECO, Umgeni Water Environmental Officer
5.3. Waste Management				
Ensure waste is managed in an environmentally sound manner.	Segregation of hazardous waste from general waste to be in place. Hazardous waste must be stored temporarily on site in suitable (and correctly labelled) waste collection bins and skips (or similar). Waste collection bins and skips should be covered with suitable material, where appropriate.	▪ On-site inspection of waste segregation and storage.	▪ Weekly	▪ ECO, Umgeni Water Environmental Officer
	Frequent collection and disposal of hazardous waste to a licenced hazardous waste disposal facility must be in place. An approved Contractor must be appointed to collect and dispose the hazardous waste.	▪ Auditing of construction site to ensure compliance to legislation and conformance to own procedures. ▪ Monitor waste disposal slips and waybills via site audits and record non-compliance and incidents.	▪ Monthly	▪ ECO, Umgeni Water Environmental Officer
	Ensure that adequate containment structures are provided for the storage of dangerous goods and hazardous materials on site. Appropriate bund areas must be provided for the storage of these materials. Bund areas should contain an impervious surface in order to prevent spillages from entering the ground.	▪ Monitor the storage and handling of dangerous goods and hazardous materials on site (i.e. condition of bunding and containment structures) via site audits and record non-compliance and incidents.	▪ Weekly	▪ ECO, Umgeni Water Environmental Officer

Management Objective/ Target	Management Action	Monitoring Methodology	Monitoring Frequency	Monitoring Responsibility
5.4. Potential spillage of effluent (from portable sanitation facilities for construction personnel).				
Reduce the spillage of domestic effluent and the impact thereof on the environment.	Ensure that normal sewage management practices are implemented during construction such as regularly emptying toilets and ensuring safe transport and disposal of sewage.	▪ Monitor via site audits and record non-compliance and incidents (including incidents that nearly occur).	▪ Monthly	▪ ECO and Umgeni Water Environmental Officer
	Ensure that all domestic effluent/waste water is disposed safely at an appropriate, licenced facility by an appointed (suitable) service provider. Ensure that no discharge of waste water to the land surface is permitted. Proof of disposal (i.e. waybills) must be kept on file.	▪ Monitor waybills and disposal slips via site audits and record non-compliance and incidents.	▪ Monthly	▪ ECO and Umgeni Water Environmental Officer
	Carry out environmental awareness training to ensure that all personnel on-site are aware of environmental requirements and only make use of the provided facilities for sanitation purposes.	▪ Carry out Environmental Awareness Training. ▪ Conduct audits of the signed attendance registers.	▪ Once-off training and ensure that all new staff are inducted. ▪ Monthly	▪ Contractor, Umgeni Water Environmental Officer and ECO ▪ ECO and Umgeni Water Environmental Officer
	Ensure that sufficient toilet facilities are provided on site (one facility for every 10 persons working on the site).	▪ Monitor via site audits and record non-compliance and incidents.	▪ Monthly	▪ ECO and Umgeni Water Environmental Officer
	Ensure that the toilet/sanitation facilities are maintained in a clean, orderly and sanitary condition.	▪ Monitor via site audits and record non-compliance and incidents.	▪ Daily	▪ Umgeni Water Environmental Officer and Contractor
	Ensure that the toilet/sanitation facilities are regularly serviced and emptied.	▪ Monitor via site audits and record non-compliance and incidents.	▪ Monthly	▪ ECO and Umgeni Water Environmental Officer
	Ensure that the site camp and toilet/sanitation facilities are placed outside areas susceptible to flooding and beyond 32 m of the estuary.	▪ Monitor the placement of the site camp and sanitation facilities via site audits and record non-compliance and incidents.	▪ Monthly	▪ ECO and Umgeni Water Environmental Officer
5.5. Impact on the regional water balance as a result of increased water usage.				
Reduce water usage during construction.	Water conservation to be practiced in line with Water Saving Policies as follows:	▪ Monitor via site audits and record non-compliance and incidents.	▪ Monthly	▪ Umgeni Water Environmental Officer and ECO

Management Objective/ Target	Management Action	Monitoring Methodology	Monitoring Frequency	Monitoring Responsibility
	▪ Cleaning methods utilised for cleaning vehicles, floors, etc. should aim to minimise water use (e.g. sweep before wash-down). ▪ Ensure that regular audits of water systems are conducted to identify possible water leakages.			
	Contractor to carry out environmental awareness training for all new staff with a discussion on water usage and conservation.	▪ Conduct audits of the signed attendance registers.	▪ Monthly	▪ ECO and Umgeni Water Environmental Officer
B. MARINE ECOLOGY				
5.6. Disturbance and destruction of nearshore macrofauna during pipeline installation as a result of excavations for marine risers.				
Minimize disturbance and destruction of nearshore macrofauna during pipeline construction as a result of excavations for marine risers.	Restrict construction footprint to minimum required.	▪ Visual inspections.	▪ Once-off prior to construction and as required during the construction phase.	▪ ECO, Umgeni Water Environmental Officer and Contractor
5.7. Disturbance and destruction of subtidal sandy biota during pipeline laying, excavation and rock blasting for risers pits				
Minimize disturbance and destruction of subtidal sandy biota during pipeline laying, excavation and rock blasting.	Restrict disturbance of the seabed to the smallest area possible.	▪ Monitor the implementation of management action to ensure compliance as far as possible. ▪ Verify that the proposed project construction area is determined prior to the commencement.	▪ On an on-going basis throughout construction period. ▪ Once-off prior to construction and as required during the construction phase.	▪ ECO and Construction Manager ▪ ECO, Umgeni Water Environmental Officer and Contractor
5.8. Effects of blasting on turtles, marine mammals, macrophytes, invertebrates and fish communities during the construction phase				
Minimize effects of blasting on marine biota during the construction phase.	Ensure that all blasting activities are conducted in accordance with the approved Blasting Method Statement/Protocol.	▪ Monitor the implementation of management action to ensure compliance as far as possible. ▪ Inspections to be carried out before any blasting events during the	▪ Prior to any blasting undertaken throughout construction period. ▪ Before and after blasting activities.	▪ ECO and Construction Manager ▪ ECO, Umgeni Water Environmental Officer and Construction Manager

Management Objective/ Target	Management Action	Monitoring Methodology	Monitoring Frequency	Monitoring Responsibility
		construction phase. This must also be written into the safety requirements of the Contract.		
	Restrict blasting to the absolute minimum required.	▪ Monitor the implementation of management action to ensure compliance as far as possible. ▪ Verify that the proposed project construction area is determined prior to the commencement.	▪ On an on-going basis throughout construction period. ▪ Before and after blasting activities.	▪ ECO and Construction Manager ▪ ECO, Umgeni Water Environmental Officer and Contractor
	Avoid onshore blasting during the breeding season of shore-birds.	▪ Monitor via site audits and record incidents and non-compliance.	▪ Before and after blasting activities.	▪ Umgeni Water Environmental Officer
	Ensure that an effective public notification programme is in place to inform nearby residents of the planned blasting schedules.	▪ Keep proof of notification and public participation on file on site. ▪ Verify if public notification of blasting schedules has been undertaken by reviewing proof of notification. ▪ Maintain an incidents/complaints register, in which any complaints from the public must be logged. The date, time, nature of complaint, name of complainant and corrective actions must be logged for all complaints. Complaints must be investigated and, if appropriate, acted upon.	▪ Prior to blasting events. ▪ Prior to blasting events. ▪ During complaints/incidents	▪ Project Developer (Umgeni Water) and Contractor ▪ ECO, Umgeni Water Environmental Officer and Contractor ▪ ECO, Umgeni Water Environmental Officer and Contractor
	Set up a watch plan for observers stationed throughout the safety zone. Limit blasting to periods when there are no marine mammals present in the immediate vicinity (approximately 2-km radius).	▪ Visually search the area for 30 minutes before blasting commences and postpone the blasting should a marine mammal, turtle or flocks of swimming and diving birds be spotted within a 2-km radius around the blasting point.	▪ 30 minutes before blasting commences	▪ Project Developer (Umgeni Water), ECO and Umgeni Water Environmental Officer

Management Objective/ Target	Management Action	Monitoring Methodology	Monitoring Frequency	Monitoring Responsibility
	Schedule the blasting programme to allow scavengers feeding on dead fish to have left the area before the next blasting event.	▪ Monitor via site audits.	▪ As required subsequent to blasting activities.	▪ Umgeni Water Environmental Officer and ECO
	All fish and mammal specimens that are killed during blasting should be collected, with data on their positions relative to the blast location, and submitted to the relevant researchers who may have use for them for scientific purposes.	▪ Monitor via site audits.	▪ As required subsequent to blasting activities.	▪ Umgeni Water Environmental Officer and ECO
5.9. Deposition of excavated sediments in the surf-zone will smother benthic communities on both unconsolidated and hard substrata down-current of the construction site.				
Minimize disturbance and destruction of subtidal sandy biota during construction activities.	Ensure that excavated sediments are only discharged down-current of the construction site.	▪ Monitor the implementation of management action to ensure compliance as far as possible. ▪ Monitor the disposal of sediment via visual inspections.	▪ Daily on an on-going basis throughout the construction period. ▪ During sediment disposal	▪ ECO and Construction Manager ▪ Umgeni Water Environmental Officer and ECO
	Deposit sediments from excavations as far down the shore as possible to ensure their rapid removal by wave action.	▪ Monitor the disposal of sediment via visual inspections.	▪ During sediment disposal	▪ Umgeni Water Environmental Officer and ECO
	No excavated sediments are to be deposited above the high water mark.	▪ Monitor the disposal of sediment via visual inspections.	▪ During sediment disposal	▪ Umgeni Water Environmental Officer and ECO
	Excavation operations should be kept to a minimum wherever possible by careful planning and scheduling of trenching activities (e.g. during low tide periods only).	▪ Ensure that excavation planning is taken into consideration during the planning and design phase by reviewing signed minutes of meetings or signed reports.	▪ On-going inspection during the construction phase and at the end of the construction phase.	▪ Contractor and Umgeni Water Environmental Officer
C. TERRESTRIAL ECOLOGY - COASTAL/DUNE ENVIRONMENT				
5.10. Disturbance of the frontal dune in the event of human activities carried out in that area (i.e. topographic surveys and geotechnical investigations), leading to slumping and Aeolian driven transgression.				
Minimise the disturbance of the frontal dune and associated slumping and transgression.	Maintain and enhance vegetation in affected areas, where applicable, through both cordoning and planting of the area in order to prevent undue destabilisation of the dune frontage.	▪ Undertake visual inspection to ensure cordoning off is in place. ▪ Undertake visual inspections via site audits to ensure that planting is taking	▪ Daily ▪ Daily	▪ ECO and Construction Manager ▪ ECO and Construction Manager

Management Objective/ Target	Management Action	Monitoring Methodology	Monitoring Frequency	Monitoring Responsibility
Limit ramifications (such as increased mobility of the dune system) for the general stability of the affected area in the medium to long-term.		place and record incidents and non-compliance. ▪ Monitor compliance with the dune management protocol via site audits and record any non-compliance.	▪ weekly	▪ ECO and Umgeni Water Environmental Officer
5.11. Disturbance of the supra-tidal beach associated with topographical survey and geotechnical investigation during the design phase, leading to variations in beach sediment dynamics.				
Minimise and limit disturbance of the supratidal beach environment (where possible) as it is linked to the dune form and the surrounding estuarine environment.	Ensure pipeline is buried at depth greater than 5m below amsl or within the underlying dolerite geology within the beach and supratidal beach environment.	▪ Verify that the pipelines are laid at a depth greater than 5 m below mean sea level by undertaking visual inspections during site audits and reporting any non-compliance.	▪ As required during the construction phase.	▪ Umgeni Water Environmental Officer and Contractor
5.12. The redirecting of surface and sub-surface flow due to the construction of the stormwater and drainage systems in and around the SWRO plant is likely to affect the state of the frontal dune.				
Maintenance of recharge of the frontal dune cordon will require some consideration of the subsurface geology and geohydrology within the SWRO plant as well as the dune slack, proximal to the frontal dune cordon. Ensure that there is no significant alteration in rates or volumes of inflow of freshwater to the frontal dune cordon.	Incorporate consideration of subsurface flow rates and the position of the freshwater lens at points close to the dune into final design. In and around the proposed SWRO plant, stormwater management planning should allow for the distribution of surface flow from the site in a manner akin to that presently evident.	▪ Monitor maintenance (visual inspection) of freshwater inflow into the dune cordon through various mechanisms including monitoring of sub surface flow regimen and identification of vegetation senescence in and around the dune environment	▪ Monthly	▪ ECO and Construction Manager
5.13. Increased slumping and transgression on the dune face and changes in the beach profile due to potential traffic across the dune face at the present access to the beach.				
Reduce levels of traffic across the dune face at the present access point in order to minimize disturbance of dune crusting	Manage pedestrian traffic through the dune cordon and collate traffic to stabilised points. Identify and use the most essential working corridor for the construction phase.	▪ Monitor traffic – visual inspection.	▪ Ongoing during the construction stage	▪ ECO and construction manager

Management Objective/ Target	Management Action	Monitoring Methodology	Monitoring Frequency	Monitoring Responsibility
(induration) and trampling of vegetation	Carry out Environmental Awareness Training for all new staff in terms of impacts of unnecessary traffic on the dune cordon.	▪ Conduct audits of the signed attendance registers.	▪ Monthly	▪ ECO and Umgeni Water Environmental Officer
D. TERRESTRIAL ECOLOGY - MESIC ENVIRONMENTS				
5.14. Disturbance of secondary forest habitat and associated potential alteration of slopes, associated with the establishment of the SWRO plant (to the south west of the proposed site) and with the establishment of the potable water pipeline to the north west of the SWRO plant.				
Minimise disturbance of secondary forests and alteration of slopes	Stabilise the affected land and maintain a "forest form" in keeping with the present seral processes.	▪ Visual inspection	▪ Monthly	▪ ECO and Construction Manager
5.15. Disturbance of the general surface environment along the potable water pipelines and at the location of the towers for the powerlines. Alteration of edaphics at depth may result in variation in soil nutrient levels, permeability and related factors.				
Minimise disturbance of the general surface environment. Reduction in alteration of edaphics at depth and on the surface as a result of excavations.	During trenching for pipelines, the soil horizons (O, A and B) should be identified and stockpiled accordingly. During backfilling, stockpiled materials should be re-established in accordance with the prevailing horizons.	▪ Monitor the excavations and stockpiling process throughout the construction phase via visual site inspections. Record non-compliance and incidents.	▪ Daily	▪ ECO and Construction Manager
	All stockpiles must be protected from erosion and stored on flat areas where run-off will be minimised.	▪ Visual site inspections. Record non-compliance and incidents.	▪ Daily throughout the construction phase	▪ ECO and Umgeni Water Environmental Officer
	Compile a Method Statement for stormwater management and erosion control during the construction phase.	▪ Sign off method statement	▪ Once-off prior to the commencement of the construction phase.	▪ ECO and Umgeni Water Environmental Officer
	Ensure that adequate stormwater management and erosion control is implemented.	▪ Visual site inspections. Record non-compliance and incidents.	▪ Daily	▪ ECO and Umgeni Water Environmental Officer
5.16. Disturbance of surface areas will alter general seral traits (vegetation succession) within sites not presently under cultivation or intended to be under cultivation following construction. As such these areas may be predisposed to exotic weed invasion.				
▪ Re-instatement of natural succession processes on disturbed lands. ▪ Reduce the establishment and spread of alien invasive plants	Ensure sound vegetative cover where land does not revert to cultivation (i.e. using a rapid germination species such as a mix of graminoids (*Digitaria spp; Eragrostis spp*) or active vegetation with appropriate herb and woody species).	▪ Monitor the re-vegetation process via visual site inspections. ▪ Record non-compliance and incidents.	▪ Daily ▪ As required	▪ ECO and Construction Manager

Management Objective/ Target	Management Action	Monitoring Methodology	Monitoring Frequency	Monitoring Responsibility
as a result of disturbance of surface areas.	All stockpiled material must be maintained and kept clear of weeds and alien vegetation growth by undertaking regular weeding and control methods.	▪ Visual inspections	▪ Weekly	▪ ECO and Umgeni Water Environmental Officer
5.17. Erosion caused by alterations in topography and establishment of a more significant grade on slopes.				
▪ Reduce erosion caused by changes in topography and increased slope grading. ▪ Retention of prevailing natural topography at localised level and avoidance of increased grades leading to erosion potential increase.	Where extensive cut and fill operations are evident and it is clear that slopes will be excessive (approximately more than 18°), appropriate engineering interventions should be considered to address potential erosion risks. Where slopes are not subject to redress by engineering interventions, the use of geofabric stabilising materials or re-vegetation of embankments should be set in place.	▪ Undertake visual inspections via site audits and record incidents and non-compliance.	▪ Weekly or as required during the stabilisation activities.	▪ ECO, Umgeni Water Environmental Officer and Contractor
5.18. Alteration of the immediate topography along construction areas (and pipeline/powerline routes) leading to the creation of a low lying depression where the soils are collapsible. Such topographical variance will also serve to alter general ecological traits in and around these areas.				
▪ Avoidance of depressions with collapsible soils. Address slumping of soils where required.	Identify areas where there is evidence of collapsed soils and low lying depressions following cessation of the construction phase. Address possible infilling or rectification of extensive depressions or variations in topography.	▪ Undertake visual inspections via site audits and record incidents and non-compliance.	▪ As required and necessary post construction.	▪ ECO, Umgeni Water Environmental Officer and Contractor
5.19. Loss and removal of Indigenous Vegetation and Habitats				
▪ Minimise the loss of indigenous vegetation.	Search and rescue of indigenous species must be undertaken and, where possible, these species must be relocated to a suitable nursery or relocated to an alternate location within the site or used for rehabilitation, in consultation with conservation authorities and relevant specialists.	▪ Appoint a suitable Search and Rescue Specialist/ Contractor to undertake search, rescue and translocation.	▪ Once-off prior to construction.	▪ Contractor or Specialist and ECO
	Permission must be obtained from the provincial authorities to destroy or remove any protected plant species.	▪ Project Developer to ensure that the relevant permits and licenses are applied for and obtained.	▪ Once-off prior to vegetation removal of protected species.	▪ Project Developer (Umgeni Water)

Management Objective/ Target	Management Action	Monitoring Methodology	Monitoring Frequency	Monitoring Responsibility
5.20. Potential ousting of localised fauna from refugia and resulting potential mortalities.				
▪ Avoidance of ousting of localised fauna from refugia or mortalities associated with disturbance of fauna.	Review of sites prior to construction to identify fauna that may be traversing or be present within particular areas. Depending upon the nature of species that may be identified, specific actions can be taken to address any faunal presence that arises within the development footprint.	▪ Undertake visual inspections (based on the review undertaken during the design phase) via site audits and record incidents and non-compliance.	▪ Where and when identified during the construction phase.	▪ ECO, Umgeni Water Environmental Officer and Contractor
	Monitoring and post clearance review of potential refugia to be undertaken. Identified species to be flushed or captured and removed if required	▪ Undertake visual inspections via site audits and record incidents and non-compliance.	▪ During monitoring procedures during construction stage	▪ ECO, Umgeni Water Environmental Officer and Contractor
	Carry out Environmental Awareness Training for all new staff regarding the presence of fauna and bird species and their reliance on the dunes, estuary and other mesic environments.	▪ Conduct audits of the signed attendance registers.	▪ Monthly	▪ Contractor, Umgeni Water Environmental Officer and ECO
▪ Reduction in bird mortalities or changes in behaviour on account of establishment of powerlines.	Monitor and verify the placement of bird flight diverters	▪ Visual inspections undertaken during audits	▪ Once off	▪ Contractor, Umgeni Water Environmental Officer and ECO
E. ESTUARINE ENVIRONMENT				
5.21. Increased estuarine turbidity due to construction activities in the vicinity of the Mdloti estuary				
Prevent increased turbidity due to inputs of sediment and avoid contamination in the estuary as a result of the construction activities. Protect against erosion.	Where necessary, use sandtraps and geotextile blankets to prevent sediment entry to estuary waters.	▪ Monitor the implementation of the use of sandtraps and geotextile blankets and report non-compliance. ▪ Monitor turbidity if obvious inputs from construction site during rainfall.	▪ On-going basis throughout the construction period. ▪ If rainfall events do result in impact, then monitor estuarine turbidity daily for 5 days.	▪ ECO, Umgeni Water Environmental Officer and Contractor ▪ ECO and Project Developer (Umgeni Water)

Management Objective/ Target	Management Action	Monitoring Methodology	Monitoring Frequency	Monitoring Responsibility
	Re-vegetate the impacted areas as soon as possible. Following the installation of the proposed pipelines/powerline, re-vegetate the surface with a fast growing coastal grass such as *S. secundatum*.	▪ Undertake visual inspections via site audits to ensure re-vegetation is taking place in line with the approved re-vegetation specification and record incidents and non-compliance.	▪ Throughout the construction phase. ▪ During re-vegetation and following re-vegetation the condition of these areas should be monitored every two weeks to determine success of re-vegetation and take appropriate measures to improve this as necessary.	ECO, Umgeni Water Environmental Officer and Contractor
F. FRESHWATER ECOLOGY				
5.22. Water quality pollution, sedimentation and the passage of aquatic alien vegetation into wetlands downstream of the site as a result of drainage / runoff from the site **5.23. Erosion of downstream wetlands draining onto the beach, and possible increased beach saturation levels**				
Minimise passage of sediment and other material from the disturbed site into downstream areas/watercourses during site clearing / construction: TSS should not increase. Prevent concentrated runoff onto beach.	Restrict construction through wetland areas and watercourses to the dry season. Implement temporary stilling ponds or other devices as per contractor's Method Statements sized so as to collect all dewatering and construction phase runoff from disturbed areas and to prevent passage of sediment-laden dewatered material or sediment-rich runoff into watercourses. Manage clean runoff from cut-off drains upslope so as to bypass any construction areas and to ensure that it does not collect additional sediments or construction-associated contaminants.	▪ Establish Target TSS or turbidity during construction. ▪ Visually inspect water for signs of turbidity – upstream and downstream assessment sites should be used. Monitor upstream (groundwater) and water passing out of site for TSS or turbidity ▪ Install v-notch or similar at culverts on South Dune Road to allow monitoring of flow / water level	▪ Prior to construction ▪ Weekly during construction ▪ Weekly during construction	▪ ECO, Construction Manager

Management Objective/ Target	Management Action	Monitoring Methodology	Monitoring Frequency	Monitoring Responsibility
5.24. Disturbance to the hydrology and condition of wetlands downstream of South Dune Road as far as the beach, as a result of tunnelling of the proposed brine discharge and seawater intake pipelines to the proposed pump				
Prevent further degradation of wetlands along marine pipeline route (address any disturbance of wetland areas and return to pre-impact condition or improve present condition).	Ensure photographic record of watercourses condition is available prior to and after construction. Ensure disturbed areas are rehabilitated by reshaping, stabilising and planting with hardy, appropriate indigenous vegetation after construction	▪ On-site inspection by wetland ecologist with engineer and ECO or similar, prior to and after construction phase, to assess extent of wetland/watercourses rehabilitation and to snag items for further input. ▪ Draw up a list of appropriate species in consultation with the botanical specialist.	▪ Once-off pre- and post construction	▪ ECO, Construction Manager
5.25. Destruction of wetlands on the desalination plant				
Rehabilitation of the mapped naturally perennial wetland on site to a PES Category D, to address stormwater functions and rehabilitation of upslope links as specified.	Assess extent of wetland rehabilitation and snag items for further input	▪ On-site inspection by wetland ecologist with engineer and ECO or similar	▪ Post construction	▪ ECO, Construction Manager
5.26. Disturbance to and potential loss of hillslope seep wetlands, creating a raised mound of disturbed conditions **5.27. Disturbance of channelled valley bottom wetland/drainage lines**				
Minimise disturbance to identified wetlands/watercourses along pipeline route	Where crossing of the proposed potable water pipeline through wetlands (seeps of depressional wetlands, channelled valley bottom wetland) is unavoidable, mitigation should allow for the following: ▪ Prior to construction, channel banks should be cleared of invasive alien vegetation in a corridor of width at least 30m across the channel, using methods appropriate to a location on a watercourse	▪ On-site visual inspection	▪ Weekly during the construction phase	▪ ECO, Construction Manager

Management Objective/ Target	Management Action	Monitoring Methodology	Monitoring Frequency	Monitoring Responsibility
	▪ The profile at the crossing point should be as it was prior to construction (no raised mound/protrusion above ground/channel level along the pipeline) – i.e. dispose of excess spoil appropriately ▪ Where the seep or valley bottom is on a steep slope, the disturbed area should be replanted with appropriate indigenous grasses or sedges to effect stability.			
	General construction impact control measures to include in all construction along the potable water pipeline routes: ▪ Topsoil should be replaced after construction, taking note of the above requirement ▪ The disturbance zone in these areas should be kept to a minimum – ideally, no greater than 15m including stockpile areas ▪ No stockpiles and construction material within 40m of any watercourse, or in such a way that they will contaminate those areas through uncontrolled runoff or wind erosion. ▪ Demarcate construction disturbance zone clearly before any construction along the pipeline route begins ▪ Undertake construction of the pipeline in the dry season, when damage to wetland areas as a result of churning up of muddy areas is least likely. ▪ Dewatering of water accumulating in the pipeline trenches should be designed to allow collection of sediment and control of runoff velocities, ideally promoting diffuse infiltration of dewatered liquids, rather than channelled flow into watercourses.	▪ On-site visual inspection	▪ Weekly during the construction phase	▪ ECO, Construction Manager

Management Objective/ Target	Management Action	Monitoring Methodology	Monitoring Frequency	Monitoring Responsibility
	▪ Ensure pipeline does not result in creation of raised mound along its route – remove and appropriately dispose of excess spoil. ▪ All construction-associated waste (litter, excess pipes, spoil, etc.) should be removed from the construction area, and from any watercourse or other sensitive ecosystems. ▪ Contaminated construction wastewater to be bunded and disposed of appropriately. ▪ Contractor to implement specific measures to reduce the likelihood of construction materials falling into the river below. ▪ Affected areas (e.g. newly exposed groundwater, construction spoil, sediment) to be removed / addressed			
	▪ Plan for required rehabilitation (reshaping and planting) where passage through these areas is unavoidable ▪ All disturbed banks should be planted with appropriate locally indigenous vegetation, sufficient to ensure bank stability ▪ Implement alien clearing programme.	▪ Photographic record to be kept of pipeline alignment, showing pre- and post-construction condition. ▪ Visual monitoring of establishment of plants and alien clearing	▪ Once-off pre- and post construction ▪ One year after construction	▪ Contractor and ECO ▪ Umgeni Water Environmental Officer and ECO
Minimise disturbance to drainage lines along the powerline route as a result of installation of support towers and line stringing, including tree clearing	▪ Construction sites must be accessed via existing roads only, and watercourses must be crossed at existing crossings only ▪ Cleared areas within 30m on either side of a minor watercourse must be maintained free of alien vegetation.	▪ On-site visual inspection	▪ Weekly during the construction phase	▪ ECO, Construction Manager

Management Objective/ Target	Management Action	Monitoring Methodology	Monitoring Frequency	Monitoring Responsibility
5.28. Disturbance to the Mdloti Estuary and its associated floodplain and valley bottom wetlands (zones A – E) , as a result of construction-associated disturbance and pollution, during horizontal drilling of the potable water pipeline				
Minimise disturbance to the Mdloti Estuary associated with the river crossing of the pipeline route	▪ All site preparation, laydown and drilling operations should take place outside of the wet season; ▪ The extent of areas subject to construction phase disturbance must be minimised – laydown areas should utilise existing roads or otherwise disturbed areas (e.g. the recently excavated pipeline route itself, on either side of the crossing); ▪ Demarcated the disturbance corridor with temporary fencing. ▪ Maintain areas outside of the corridor as "no go" areas, unless under the express supervision of the ECO and in order to execute rehabilitation measures; ▪ Method statements must be developed prior to the start of operations to outline clear and practical measures to prevent the passage of any construction waste into the estuary or its wetland / riparian margins. Such measures must include: o Requirements to recycle bentonite and minimise its passage to waste; o Requirements to dispose of spoil outside of the 1:100 year floodline of this (or any other) watercourse and such that it will not impact negatively on any ecosystem of conservation importance ; o Requirements to dispose of any waste that has no beneficial use outside of the 1:100 year floodline to the sewers or other recognised official waste disposal site; ▪ Following construction, the disturbance corridor as well as the no go areas must be assessed and areas where compaction, waste contamination or	▪ On-site visual inspection	▪ Weekly during the construction phase	▪ ECO, Construction Manager

Management Objective/ Target	Management Action	Monitoring Methodology	Monitoring Frequency	Monitoring Responsibility
	other impacts likely to affect long-term ecological function have occurred should be identified and restored to their pre-impacted condition or better – rehabilitation measures should include ripping of compacted soils and replanting with locally indigenous wetland and/or estuarine species as recommended by a botanical specialist; ▪ A 30 m wide swathe along the length of the pipeline must be rehabilitated as natural wetland, by appropriate shaping and planting with indigenous vegetation – this swathe may be shifted to merge with the similar swathe required as mitigation for the powerline, to create a more effective consolidated zone; the landscaping and planting of this zone should be overseen by a wetland ecologist, and cover of 60% appropriate indigenous vegetation must be achieved by the end of the construction process; ▪ Furthermore, the CEMP for this activity should specify measures to ensure that stockpiles and construction material are not located such that they will contaminate the river or any watercourse through uncontrolled runoff or wind erosion. The edge of the road between zones D and C (Chapter 8 Aquatic ecology study - Figure 8.10) should be used for such purposes.			
5.29. Disturbance to the Mdloti Estuary and its associated floodplain and valley bottom / seep wetlands as a result of installation of the powerline. Disturbance effects could include localised infilling of the floodplain, possible disturbance to the flight paths of wetland birds				
Minimise disturbance to the Mdloti Estuary associated with the river crossing of the powerline route	▪ The entire section of the Mdloti estuary and its associated wetlands must be maintained free of	▪ On-site visual inspection	▪ Weekly during the construction phase	▪ ECO, Construction Manager

Management Objective/ Target	Management Action	Monitoring Methodology	Monitoring Frequency	Monitoring Responsibility
	alien vegetation within a band 50m in length along the channel; ▪ Woody vegetation that is felled for the installation of the powerlines and as part of the above recommendations must be removed from within the 1:100 year floodline of the river; ▪ All construction material associated with the implementation of the proposed project must be removed from the (1:100) year floodplain on completion of the project; ▪ Construction within the floodplain should take place outside of the main wet season; ▪ The estuary channel and associated wetlands must be demarcated as no-go areas during construction; ▪ Any areas of the channel, its banks or the associated wetlands that are damaged during construction should be reinstated to their pre-construction condition or better – allowance should be made for ripping of compacted areas, reshaping and potentially replanting to address disturbance impacts if they occur; ▪ A 30 m wide swathe along the length of the powerline must be rehabilitated as natural wetland, by appropriate shaping and planting with indigenous vegetation – this swathe may be shifted to merge with the similar swathe required as mitigation for the pipeline, to create a more effective consolidated zone; the landscaping and planting of this zone should be overseen by a wetland ecologist, and cover of 60% appropriate indigenous vegetation must be achieved by the end of the construction;			

Management Objective/ Target	Management Action	Monitoring Methodology	Monitoring Frequency	Monitoring Responsibility
	▪ All construction-associated material and waste / litter should be removed from the floodplain following construction; ▪ No construction site camps / stockpiles / vehicle storage areas should be allowed within Zones A, B, D or E (Refer to Chapter 8 Aquatic ecology study Figure 8.10), and if located in B they should be on bunded soil such that any leaks or spills can be completely removed and the area rehabilitated			
5.30. Possible disturbance to drainage lines and Mdloti estuary as a result of plant clearing during the construction of the transmission line				
Minimise disturbance to watercourse and minimise alien plant establishment due to poor alien clearing practices	▪ Implement alien clearing programme along transmission line corridors o Identify alien vegetation that must be cleared (e.g. gums) o Cleared areas within 30m on either side of a minor watercourse must be maintained free of alien vegetation. o Maintain the entire section of the Mdloti estuary/river and its associated wetlands free of alien vegetation within a band 50m in length along the channel at the point of crossing. o Remove alien vegetation from beneath transmission lines o Maintain areas free of aliens but allow for the establishment of indigenous vegetation	▪ Visual inspection to identify and address areas where invasive vegetation (as defined in NEMBA) occurs.	▪ Monthly during construction	▪ Contractor and ECO
	▪	▪	▪	
	▪	▪	▪	
Rehabilitate riverine or floodplain areas disturbed during construction.	▪ Any areas of the channel, its banks or the associated wetlands as far as the 8 m contour that are damaged during construction should be reinstated to their pre-construction condition or	▪ Photographic record to be kept of crossing area, showing pre- and post-construction condition	▪ Once off pre-construction and following construction	▪ Contractor, Umgeni Water Environmental Officer and ECO

Management Objective/ Target	Management Action	Monitoring Methodology	Monitoring Frequency	Monitoring Responsibility
	better – allowance should be made for ripping of compacted areas, reshaping and potentially replanting to address disturbance impacts if they occur			
G. HERITAGE IMPACTS				
5.31. Impact of the Heritage Resources (Archaeology and Palaeontology)				
Prevent damage and destruction to fossils, artefacts and materials of heritage significance.	Carry out general monitoring of excavations for potential fossil heritage, artefacts and material of heritage importance during construction of the powerline between La Mercy and Mt Moreland and of the potable water pipeline between La Mercy and Waterloo reservoirs.	▪ Monitor excavations and construction activities for archaeological and palaeontological materials and report the finds accordingly.	▪ Daily during excavation work.	▪ Contractor and ECO
	All work must cease immediately, if any human remains and/or other archaeological, palaeontological and historical material are uncovered. Such material, if exposed, must be reported to the nearest museum, archaeologist/ palaeontologist and to the Amafa/Heritage AKwaZulu-Natali (or the South African Police Services), so that a systematic and professional investigation can be undertaken. Sufficient time should be allowed to remove/collect such material before construction re-commences.	▪ Appoint a heritage specialist ▪ Contact Amafa/Heritage KwaZulu-Natali and the identified palaeontologist/ archaeologist if any heritage features are uncovered.	▪ Once off prior to construction starting ▪ As required/necessary during construction.	▪ Contractor, Umgeni Water Environmental Officer and ECO
	Should middens, or subterranean archaeological material be exposed during construction activities (i.e. entry and exit pit), a Phase Two assessment will have to determine their significance and appropriate mitigation	▪ Contact Amafa/Heritage KwaZulu-Natali and the identified palaeontologist/ archaeologist if any heritage features are uncovered.	▪ As required/necessary during construction.	▪ Contractor, Umgeni Water Environmental Officer and ECO
H. VISUAL IMPACTS				
5.32. Potential visual impact of the proposed project construction activities				
Reduce the visual impact of construction activities (i.e. project wide).	Maintain good housekeeping on site to avoid litter and minimize waste. Strict adherence to demarcated boundaries.	▪ Visual inspection.	▪ Daily (day and night)	▪ Contractor and Umgeni Water Environmental Officer

Management Objective/ Target	Management Action	Monitoring Methodology	Monitoring Frequency	Monitoring Responsibility
	Establish and implement a rehabilitation and erosion control plan. Establish and implement a dust and fire control plan.			
Minimise light pollution such as glare and light spill (light trespass) at the desalination plant and pump station site	Implement a lighting plan. ▪ Use light fixtures that shield the light and focus illumination on the ground (or only where light is required) to ensure that light spill does not occur onto adjacent properties. ▪ Use minimum lamp wattage within safety/security requirements. ▪ Avoid elevated lights within safety/security requirements. ▪ Where possible, use timer switches or motion detectors to control lighting in areas that are not occupied continuously (if permissible and in line with minimum security requirements). ▪ Switch off lights when not in use in line with safety and security.	▪ Visual inspection ▪ Complaints referring to lighting at night should be documented, investigated and resolved.	▪ Daily ▪ When complaints are received.	▪ Project Developer (Umgeni Water)
5.33. Potential visual impact of construction activities associated with the desalination plant				
Reduce the visual intrusion and landscape impact of a desalination plant and pump station on the surrounding visual receptors and landscape.	Construction site screens and vegetation buffers should be put up on boundaries between the desalination plant site and immediate neighbours in order to effectively screen sensitive visual receptors near the boundary from construction work at the plant.	▪ Conduct visual inspections during site audits to verify the placement and condition of construction site screens and vegetation buffers at the required boundaries.	▪ At the commencement of construction ▪ Thereafter Bi- weekly	▪ Construction Manager and Project Developer (Umgeni Water) ▪ Umgeni Water Environmental Officer and ECO
5.34. Potential visual impact of construction activities associated with the buried pipeline and powerline on sensitive visual receptors.				
Reduce visual impact of construction activities associated with buried pipelines and powerline installation on sensitive visual receptors.	Maintain good housekeeping on site to avoid litter and minimise waste.	▪ Rubble/litter/waste removal and disposal to be monitored throughout construction.	▪ Weekly or bi-weekly	▪ Contractor and ECO
	Demarcate construction boundaries and minimise areas of surface disturbance.	▪ Verify that the proposed project construction area and access routes are determined and clearly	▪ Once-off prior to construction and as	▪ ECO, Umgeni Water Environmental Officer and Contractor

Management Objective/ Target	Management Action	Monitoring Methodology	Monitoring Frequency	Monitoring Responsibility
	Minimise vegetation and ground disturbance and take advantage of existing clearings.	demarcated prior to the commencement of the construction phase by undertaking visual inspections. ▪ Monitor the construction footprint, ground disturbance and vegetation removal processes during building activities and report any non-compliance.	required during the construction phase. ▪ On-going basis throughout the construction period and on completion of the plant construction.	▪ ECO and Umgeni Water Environmental Officer
	Strip, stockpile, and stabilize topsoil from the site before excavating earth for the construction of the facility.	▪ Monitor the stockpiling process throughout the construction phase via site inspections. Record non-compliance and incidents.	▪ Daily	▪ ECO and Umgeni Water Environmental Officer
	Rehabilitate temporary areas cleared during construction. Mulch vegetation matter from vegetation removal and spread over fresh soil disturbances to aid in rehabilitation process. Leave the project area in a condition that protects soil and surface materials, both on and off site, against erosion and instability.	▪ Conduct site visits and visual inspections.	▪ Weekly	▪ ECO, Umgeni Water Environmental Officer and Contractor
I. NOISE IMPACTS				
5.35. Direct Impact of the construction noise on surrounding communities				
Prevent unnecessary impacts on the surrounding communities by ensuring that the construction noise emissions (including piling and blasting noise) is limited and mitigated.	All construction operations should only occur during daylight hours if possible.	▪ Construction activities to be monitored and managed (as well as included in the tender contract).	▪ Daily	▪ Contractor, ECO and Umgeni Water Environmental Officer
	Ensure that all operators of construction equipment receive proper training in the use of the equipment. Ensure that the equipment is serviced regularly (Generate an inspection checklist to carry out the audits).	▪ Verify that operators of construction equipment receive proper training in the use of the equipment by auditing proof of training certificates and training attendance registers.	▪ Monthly	▪ Contractor, ECO and Umgeni Water Environmental Officer

Management Objective/ Target	Management Action	Monitoring Methodology	Monitoring Frequency	Monitoring Responsibility
		▪ Audit maintenance log sheets and records.	▪ Monthly	
	All blasting and piling driving, if required, should only occur during the day. Blasting should only occur during the hottest part of the day to take advantage of unstable atmospheric conditions.	▪ Piling and blasting operation times to be monitored and managed (as well as included in the tender contract).	▪ Daily	▪ Contractor and Umgeni Water Environmental Officer
	All reverse noise emitting warning devices on mobile vehicles should be set as low as possible.	▪ Site inspections	▪ Daily	▪ Umgeni Water Environmental Officer and ECO
	Conduct an environmental noise monitoring survey during the construction phase to assess the impact and recommend further actions if required, and to ensure that the day time noise does not exceed 45dB (A) and the night time noise does not exceed 35 dB(A) at the site boundary for rural districts and 50 dB(A) during the day and 40 dB(A) during the night for suburban districts with little road traffic.	▪ Project Developer to appoint a noise specialist to the noise survey during the construction phase. ▪ Monitor noise as per SANS 10103:2008.	▪ Once off ▪ Quarterly throughout the construction period.	▪ Project Developer (Umgeni Water) ▪ Project Developer (Umgeni Water) and Noise Specialist
5.36. Impact of the construction noise on fauna (e.g. birds and other animals)				
Prevent unnecessary impacts on fauna by ensuring that the construction noise emissions are limited and mitigated.	Limit vehicle speeds of construction plant and vehicles and limit the construction footprint.	▪ Monitor traffic control measures and report non-compliances.	▪ Daily	▪ Contractor and Umgeni Water Environmental Officer
	The construction staff should be made aware of the presence of fauna within the proposed project area, the impacts of faunal disturbance, the general speed limits on site and potential crossings.	▪ Carry out Environmental Awareness Training. ▪ Conduct audits of the signed attendance registers.	▪ Once-off training and ensure that all new staff are inducted. ▪ Monthly	▪ Contractor, Umgeni Water Environmental Officer and ECO ▪ ECO and Umgeni Water Environmental Officer
J. SOCIAL AND ECONOMIC IMPACTS				
5.37. Impacts on fishing and on tourism and recreation				
Limit impacts on commercial and recreational fishing and on tourism and recreation	Inform the main commercial and recreational fishing associations (e.g. ski boat clubs) operating in the area as well as local residents and bodies representing	▪ Send registered mail with email follow up (and retain proof on file) in order to	▪ 3 to 6 months before commencement of construction and	▪ Project Developer (Umgeni Water)

Management Objective/ Target	Management Action	Monitoring Methodology	Monitoring Frequency	Monitoring Responsibility
	tourism and recreation about the nature and timing of construction and operational activities should the project proceed.	inform the main commercial and recreational fishing associations. ▪ Verify if the main commercial and recreational fishing associations have been informed of the proposed construction and operational activities by reviewing the proof of notification kept on file.	ongoing as the project progresses. ▪ During the construction phase.	▪ ECO and Umgeni Water Environmental Officer
	Provide information to local media (newspapers and radio stations) informing the public of access restrictions and exclusion zones.	▪ Retain proof of correspondence on file.	▪ 3 to 6 months before commencement of construction and ongoing as the project progresses.	▪ ECO and Umgeni Water Environmental Officer
5.38. Impacts associated with expenditure on the construction of the project				
Maximise positive impacts associated with expenditure on the construction of the project.	Maximise positive impacts through tendering, procurement and employment policies.	▪ Applicant to draw up plans in keeping with their policies. ▪ Audit the approved plans kept on file for verification purposes and review the results of the major procurement process.	▪ Yearly auditing of achievement of socio-economic benefit goals with corrective actions if needed.	▪ Project Developer (Umgeni Water) ▪ Umgeni Water Environmental Officer
	Set targets for use of local labour and maximise opportunities for the training of unskilled and skilled workers. Implement retraining and skills development programmes	▪ Conduct audits of the signed training attendance registers and targets.	▪ Monthly	▪ Umgeni Water Environmental Officer and ECO
	Applicant to draw up plans in keeping with their policies. ▪ Use local sub-contractors where possible, with priority given to currently market garden employees (in the event that they do not continue market gardening in a new location). ▪ Explore ways to enhance local community benefits with a focus on broad-based BEE.	▪ Audit the approved plans kept on file for verification purposes and review the results of the major procurement process. ▪ Audit achievement of socio-economic benefit goals with corrective actions if needed.	▪ Once off ▪ Yearly	▪ Project Developer (Umgeni Water) ▪ Umgeni Water Environmental Officer

Management Objective/ Target	Management Action	Monitoring Methodology	Monitoring Frequency	Monitoring Responsibility
5.39. Impacts on property value				
Limit impacts on property values	Engagement with all of the estate agencies operational in Desainagar, La Mercy and Tongaat Beach in order to establish and meet their informational needs in order for them to more precisely understand the nature and implications of what is being proposed. It is likely, for example, that a high quality graphical representation or 3-D model of the plant would assist estate agents in understanding the project and being able to more accurate convey what the project would entail to potential buyers.	▪ Sign off minutes of meeting and 3D model.	▪ 3-6 months before commencement of construction	▪ ECO and Umgeni Water Environmental Officer
5.40. Impacts associated with the presence of construction workers				
Limit impacts associated with the presence of workers and work seekers including those associated with negative impacts on social structures and increased 'social ills' such as increased crime levels, increased alcohol and drug use, increased teenage and unwanted pregnancies, increased prostitution and increases in sexually transmitted diseases (STDs).	The applicant should establish a Monitoring Forum for the project. The Forum should be established before the construction phase commences and should include key stakeholders, including representatives from the local community, local councillors, local police and the contractor. The role of the Forum would be to monitor the project and the implementation of the recommended mitigation measures.	▪ Applicant and contractor to make contact with stakeholders, agree on protocols, set up mechanism, and draw up plans in keeping with their policies. ▪ Verify if a Monitoring Forum has been set up prior to the commencement of the construction phase by auditing minutes of initiation meetings and proof of correspondence.	▪ Ongoing ▪ Prior to the commencement of construction phase.	▪ Project Developer (Umgeni Water) and Contractor ▪ ECO and Umgeni Water Environmental Officer
	The applicant and the contractors should, in consultation with representatives from the Monitoring Forum, develop a Code of Conduct for the project (including what types of behaviour and activities by workers are not permitted, wearing name tags and high visibility vests) in agreement with surrounding land owners and residents. For example, access on land that is not part of the development will not be allowed (no short cuts by workers going from home to site over land that is not part of the project).	▪ Applicant and contractor to make contact with stakeholders, agree on protocols, set up mechanism, and draw up plans in keeping with their policies. ▪ Verify if a Code of Conduct has been developed in consultation with the Monitoring Forum prior to the commencement of the construction phase by auditing minutes of initiation	▪ Ongoing ▪ Prior to the commencement of construction phase.	▪ Project Developer (Umgeni Water) and Contractor ▪ ECO and Umgeni Water Environmental Officer

Management Objective/ Target	Management Action	Monitoring Methodology	Monitoring Frequency	Monitoring Responsibility
	Inform land owners prior to accessing their land	meetings, proof of correspondence and the approved signed code of conduct. ▪ Proof of communication		
	The applicant and the contractor should implement an HIV/AIDS awareness programme for all construction workers at the outset of the construction phase. Ensure there is easy access to HIV and AIDS related information and condoms for all workers involved with the proposed project	▪ Carry out Environmental Awareness Training, which addresses the aspect of HIV/AIDS awareness. ▪ Conduct audits of the signed attendance registers and availability of information pamphlets and condoms.	▪ Once-off training and ensure that all new staff are inducted. ▪ ▪ Monthly	▪ Contractor, Umgeni Water Environmental Officer and ECO ▪ ECO and Umgeni Water Environmental Officer
	The contractor should make necessary arrangements to enable workers from outside the area to return home over weekends and or on a regular basis during the construction phase. This would reduce the risk posed by non-local construction workers to local family structures and social networks.	▪ Ensure that this is undertaken during the construction phase by auditing site attendance registers and log sheets.	▪ Bi-monthly	▪ ECO and Umgeni Water Environmental Officer
5.41. Reduced road safety				
Strive for zero road traffic incidents	Develop and implement a traffic management plan. Place suitable signage warning of construction activities and construction vehicles.	▪ Visual inspection to ensure that the traffic management plan is enforced.	▪ Daily throughout construction period.	▪ ECO and Umgeni Water Environmental Officer
5.42. Increased pressure on road infrastructure				
Ensure that increased pressure on road infrastructure does not lead to a deterioration in road conditions	Establish the carrying capacity of the roads to be used by construction and heavy duty vehicles. Prior to construction, engage with the relevant road authorities (KZN Department of Transport, eThekwini Municipality and any other relevant road authority) to jointly monitor road conditions during the construction period. Establish a set route which will be used by heavy duty vehicles so as to limit potential damages.	▪ Monitor road conditions throughout the construction process. ▪ Visual inspection to ensure that all heavy duty vehicles use the agreed upon route.	▪ Weekly throughout construction period.	▪ ECO and Umgeni Water Environmental Officer
5.43. Increased dust emissions				

Management Objective/ Target	Management Action	Monitoring Methodology	Monitoring Frequency	Monitoring Responsibility
Limit dust emissions from construction activities	Exposed soil should be sprayed by water tanker to reduce dust (ensure that dust suppression techniques are implemented)	▪ Visual inspections.	▪ On-going basis throughout the construction phase	▪ ECO and Umgeni Water Environmental Officer
5.44. Increased likelihood of fire				
Ensure no fires are caused by construction activities	Do not allow any fires in any of the project work areas. Ensure fire extinguishers and firefighting equipment are available at all project works areas and that they are serviced. Identify designated smoking areas. Induct all new staff on fire safety and firefighting responsibilities/activities.	▪ Visual inspection ▪ Audit of service records ▪ Audit of training attendance registers	▪ Daily ▪ Monthly ▪ Monthly	▪ ECO and Umgeni Water Environmental Officer ▪
5.45. Temporary loss of agricultural land				
Reduce the impact of temporary loss of agricultural land	Clear the servitude, and place the potable water pipeline following the harvesting of sugarcane on the affected land so as to reduce losses. Ensure that the affected areas are rehabilitated immediately after the pipeline has been laid.	▪ Ensure potable water pipeline/powerline are constructed as per agreed schedule. ▪ Visual inspection to ensure rehabilitation occurs.	▪ As required during the construction of the pipelines and power lines through areas of sugarcane. ▪ Once off post construction	▪ Project Developer (Umgeni Water) ▪ ECO and Umgeni Water Environmental Officer ▪

6 MANAGEMENT PLAN FOR THE OPERATIONAL PHASE

Management Objective/ Target	Management Action	Monitoring Methodology	Monitoring Frequency	Monitoring Responsibility
A. TERRESTRIAL ECOLOGY - OTHER MESIC ENVIRONMENTS				
6.1. Potential for the pipeline and power line routes to revert to secondary vegetation form if management interventions are required.				
Prevention of secondary vegetation form in areas where interventions are required during the operational phase.	Implement vegetation management regime with exotic weed control measures. Manage pipeline and powerline servitudes and land under the management of the SWRO operator for secondary seral growth to facilitate management and maintenance operations, while also allowing for the preservation and enhancement of natural seral processes.	▪ Monitor the presence of alien invasive species on the proposed project site via visual inspections and take action to remove and control these species in line with the approved Alien Invasive Vegetation Management Plan.	▪ Monthly through the operational phase.	▪ Umgeni Water Environmental Officer or Environmental Manager
6.2. Potential hazard to, in particular, avian species, as a result of the power lines serving the proposed desalination facility.				
Reduction in bird mortalities or changes in behaviour on account of establishment of powerlines.	Monitor behavioural changes and avian mortalities along powerlines. Such monitoring may include inter alia, the recording of bird collisions and mortalities identified along powerline routes (where they may occur), as well as consideration of behavioural changes in the murmuration of barn swallows in and around the Mount Moreland area. Presently, monitoring of the impact of the King Shaka Airport on avifauna is undertaken and as such, this monitoring could be expanded to take account of the proposed powerlines.	▪ Inspections and keep records	▪ Throughout the operational phase.	▪ Umgeni Water Environmental Officer or Environmental Manager
6.3. Potential ecological change of the areas in and around the proposed SWRO plant due to the increase in anthropogenically driven disturbance associated with the operation of the facility				

Management Objective/ Target	Management Action	Monitoring Methodology	Monitoring Frequency	Monitoring Responsibility
Reduce potential ecological change which will in turn impact on existing cultivated lands, giving rise to secondary seral growth forms.	Implement an Exotic weed control plan as part of a vegetation and site management regime. Establish a species register from site visit and identify co-ordinates for areas of existing and potential invasion. Ensure prompt removal of alien invasive vegetation found on site.	▪ Monitor the presence of alien invasive species on the proposed project site via visual inspections and take action to remove and control these species in line with the approved Alien Invasive Vegetation Management Plan.	▪ Post construction and ongoing during the operations phase on monthly or seasonal basis	▪ ECO and operations manager
	The removed alien invasive vegetation should be immediately disposed at a suitable waste disposal facility and should not be kept on site for prolonged periods of time, as this will enhance the spread of these species.	▪ Monitor the removal of the alien vegetation found on site via visual inspections.	▪ As necessary during the construction phase.	▪ Umgeni Water Environmental Officer
	Ensure compliance with relevant Environmental Specifications for the control and removal of these species.	▪ Monitor the presence of alien invasive plants during the construction phase.	▪ Weekly	▪ ECO and Umgeni Water Environmental Officer
B. MARINE ECOLOGY				
6.4. Impingement and entrainment of organisms at the intake structure/ Changes in water circulation at the inlet structure due to the abstraction of large volume of seawater				
Minimize impingement and entrainment at the intake structure. Minimize changes in water circulation at the intake structure	Adjust intake velocities to keep it below ~0.15 m/s to enable fish and other organisms to escape the intake current.	▪ Audit intake velocity records.	▪ Prior to commissioning of the facility and monthly.	▪ Project Developer (Umgeni Water) and Umgeni Water Environmental Officer
6.5. Increased salinity and temperature in the mixing zone affects biota.				
Establish the effects of the discharge on marine communities.	Confirm the performance of the discharge system in limiting increased temperature and salinity to the mixing zone by sampling.	▪ Using a conductivity-temperature-depth (CTD) probe, monitor extent of brine footprint to validate near-field model predictions and ensure that the diffuser is performing to the expected specifications.	▪ On commencement of the operational phase and for the duration and extent necessary to determine an effluent profile under all operational scenarios.	▪ Project Developer (Umgeni Water) and Appointed Specialist

Management Objective/ Target	Management Action	Monitoring Methodology	Monitoring Frequency	Monitoring Responsibility
	Monitor shallow subtidal invertebrate macrofaunal communities to assess recovery of the impacted communities following construction, as well as responses of the communities to a continuous hypersaline discharge.	▪ Undertake a grab sampling survey of benthic macrofauna in a pre-established grid around the discharge position. ▪ Ensure that a relevant specialist has been appointed to undertake the required sampling by conducting a review of the appointment letter and the results of the survey.	▪ Annually for a period of at least 4 years	▪ Project Developer (Umgeni Water) and Appointed Specialist ▪ Umgeni Water Environmental Manager
	Ensure sufficient mixing of the discharged brine with the receiving water body by adjusting the discharge configuration appropriately.	▪ Ensure that this is taken into consideration and included in the design of the proposed facility by reviewing signed minutes of meetings or signed reports.	▪ Prior to commissioning of the facility.	▪ Plant Manager and Umgeni Water Environmental Manager
6.6. Effects of brine discharge on biota (biocide plume, Reduction in dissolved oxygen concentrations, antiscalants, acidic or alkaline cleaning solutions, Heavy metals, Excessive bacterial regrowth in the brine after chlorination)				
Avoid pollution of coastal waters and associated impacts on marine biota. Comply with the Coastal Water Discharge Permit conditions. Establish an invaluable database on brine effluent impacts for future developments of this nature.	Implement a monitoring programme of brine discharge effluent to comply with discharge permit conditions (temperature, salinity, residual chlorine, bacterial numbers, dissolved oxygen levels, biocide and co-pollutant concentrations). Undertake intermittent chlorination of the intake water to prevent bacterial regrowth in the brine. Ensure that residual chlorine is suitably neutralised with sodium bisulfite (SBS) - residual chlorine in the brine discharge must be below 3 µg/ℓ. Use of a biocide (sodium hypochlorite) to inhibit biological growth in the pipelines and on the screens. If biocide dosing proves ineffective in controlling marine growth then undertake pigging of intake and discharge pipelines.	▪ Undertake Whole Effluent Toxicity testing of the discharge for a full range of operational scenarios (i.e. shock-dosing, etc.). ▪ Monitor effluent for heavy metals, residual chlorine, DO, bacterial levels. ▪ Check corrosion levels of plant constituent parts and the physical integrity of the intake and outlet pipes and diffuser. ▪ Report any non-compliance and take necessary action to rectify the exceedance of concentrations if and when required.	▪ On commencement of the operational phase and for the duration and extent necessary to determine an effluent profile under all operational scenarios. ▪ 6-monthly ▪ 6-12 monthly ▪ When required	▪ Project Developer (Umgeni Water) and Appointed Specialist (Water Quality Monitor)

Management Objective/ Target	Management Action	Monitoring Methodology	Monitoring Frequency	Monitoring Responsibility
	Aerate the effluent prior to discharge to avoid aggravation of hypoxic conditions near the seabed through use of SBS. Avoid the use of nutrient-enriching antiscalants, and use antiscalants with low toxicity to aquatic invertebrate and fish species. Ensure that a good corrosion resistance (i.e. corrosion rate is <0.1 mm/a (UNEP 2008)) Develop a contingency plan that examines the risk of contamination, and considers procedures that must be implemented to mitigate any unanticipated impacts (e.g. mixing zone larger than expected under certain conditions).			
	Consult with relevant officials and experts prior to substituting any chemicals or procedures to ensure that appropriate controls and mitigation measures are implemented prior to any such substitution (e.g. use of DBNPA must include appropriate design of the brine basin so as to ensure greater and sufficient dilution of the DBNPA residuals in the effluent stream and higher degradation rate before discharge.)	▪ Sign off minutes of meetings or reports.	▪ When required	▪ Project Developer (Umgeni Water) and Appointed Specialist (Water Quality Monitor)

Management Objective/ Target	Management Action	Monitoring Methodology	Monitoring Frequency	Monitoring Responsibility
C. VISUAL IMPACTS				
6.7. Landscape impact of the desalination plant on an agricultural landscape that is surrounded by mixed residential and coastal resorts. **6.8. Visual intrusion of a desalination plant on existing views of sensitive visual receptors in the region.**				
Reduce visual intrusion of the desalination plant and pump station on the views of sensitive visual receptors as well as its impact on the surrounding landscape. Reduce the cumulative landscape impact	Monitor effectiveness of the rehabilitation plan for temporarily cleared areas and erosion scarring. Rehabilitation of temporary cleared construction areas such as laydown areas should commence as soon as possible after they are not required anymore.	▪ Conduct site visits and inspections during the operational phase in order to verify and monitor the effectiveness of the rehabilitation plan via visual inspections.	▪ Monthly or as recommended by the appointed landscape architect	▪ Plant Manager and Umgeni Water Environmental Manager
	Building, façade and gardens/vegetation buffer should be maintained. A garden, building (facades and roofs) and structure/signage/ fencing maintenance plan should be in place	▪ Carry out inspections of the proposed desalination plant and surrounding garden/buffer zone and report any non-compliance.	▪ Annually	▪ Plant Manager and Umgeni Water Environmental Manager
	Monitor the effectiveness of architectural design of the desalination plant and vegetation to ▪ screen the public from industrial aspects ▪ fit in as the landscape changes from rural to mixed urban-industrial ▪ reduce visual intrusion on visual receptors that are changing in sensitivity over time.	▪ Conduct site visits in the surrounding neighbourhood such as Shaka Estate, Desainagar and La Mercy, the M4 as well as the beaches of Desainagar and La Mercy and assess the effectiveness of the architectural design at screening the public from views of industrial structures.	▪ At the end of the construction phase and thereafter bi-annually during the operational phase	▪ Plant Manager and Umgeni Water Environmental Manager
6.9. Visual intrusion of the power line and pipeline routes on the existing views of sensitive visual receptors in the region.				
Minimise visual intrusion of powerline and pipeline routes on existing views of sensitive receptors.	Verify and monitor the effectiveness of the rehabilitation and erosion control plan	▪ Conduct site visits and inspections.	▪ Bi-annually	▪ Plant Manager and Umgeni Water Environmental Manager

Management Objective/ Target	Management Action	Monitoring Methodology	Monitoring Frequency	Monitoring Responsibility
6.10. Impact of night lighting of the desalination plant and pump station on the nightscape of the surrounding region.				
Reduce impact of night lighting	Monitor the effectiveness of the lighting plan to minimize light spill and glare.	▪ Visit surrounding viewpoints. In particular ensure that lights near the boundary of the plant are effectively screened and directed so that minimal light falls into neighbouring properties and that residents in the surrounding landscape are not affected by glaring lights from the plant. ▪ Complaints referring to lighting at night should be documented, investigated and resolved.	▪ At the end of the construction phase and the start of the operational phase. ▪ When complaints are received.	▪ Plant Manager and Umgeni Water Environmental Manager ▪ Project Developer (Umgeni Water)
D. NOISE IMPACTS				
6.11. Impact of the operational noise on the surrounding communities				
Limit noise emissions resulting from operational activities.	Choose equipment that has a lower noise emission than comparative equipment.	▪ Ensure that this is taken into consideration and included in the design of the proposed facility by reviewing signed minutes of meetings or signed reports and designs.	▪ Prior to commissioning of the facility.	▪ Plant Manager and Umgeni Water Environmental Manager
	Conduct an environmental noise monitoring survey during the operational phase to ensure that the day time noise does not exceed 45dB (A) and the night time noise does not exceed 35 dB(A) at the site boundary for rural districts and 50 dB(A) during the day and 40 dB(A) during the night for suburban districts with little road traffic.	▪ Project Developer to appoint a noise specialist to the noise survey during the operational phase. ▪ Monitor noise levels as per SANS 10103:2008.	▪ Once off ▪ Every 2 years	▪ Project Developer (Umgeni Water) ▪ Project Developer (Umgeni Water) and Noise Specialist
	Limit vehicle speeds (especially for supply and waste removal vehicles) in and around the plant.	▪ Monitor traffic control measures and report non-compliances.	▪ On-going during plant operation	▪ Plant Manager

Management Objective/ Target	Management Action	Monitoring Methodology	Monitoring Frequency	Monitoring Responsibility
E. AQUATIC ECOLOGY				
6.12. Abnormal operational phase damage / breakdown, involving leakage of saline water into freshwater wetlands				
Prevent damage to aquatic ecosystems as a result of leaked salt water or concentrated freshwater flow into wetlands, triggering erosion and further degradation	Ensure that the pump station is equipped with telemetry to provide early warning of drop in pressure or other signs of pipe leakage or rupture. Implement pipeline monitoring programme In extreme circumstances of plant dieback, excavate saline soils and replace. If erosion of drainage lines has been triggered, repair of knick points should be undertaken, as appropriate and if necessary in consultation with a wetland specialist.	▪ Take immediate steps to identify and rectify leaks or ruptures identified through telemetry or similar approaches ▪ Conduct annual inspections along pipeline to identify areas where dead vegetation or other signs of saline water leaks are evident ▪ Appoint wetland specialist and sign off report.	▪ Ongoing ▪ Annual ▪ As required	▪ Plant Manager
6.13. Malfunction of the rehabilitated wetlands in the event of ineffective rehabilitation and poor maintenance **6.14. Possible long-term accumulation of water on the site and re-establishment of wetlands, in the event that drainage systems for cuts into groundwater were not maintained**				
Ensure environmental health of the rehabilitated wetlands (on site and off site) Maintain wetlands in PES Condition D or better	Monitor rehabilitated wetlands and ensure it has been rehabilitated to a PES Category D, to address stormwater functions and rehabilitation of upslope links as specified. Ongoing alien clearing programme	▪ Visual inspection, assessments of PES and mapping of rehabilitated wetland extent off ground-truthed GOOGLE imagery	▪ Two yearly	▪ Project Developer (Umgeni Water) and Umgeni Water Environmental Officer
6.15. Erosion of downstream wetlands draining onto the beach, and possible increased beach saturation levels				
Erosion of downstream wetlands draining onto the beach, and possible increased beach saturation levels	Install v-notch or similar at culverts on South Dune Road to allow monitoring of flow / water level	▪ Monitor flow / water level	▪ Monthly for two years	▪ Project Developer (Umgeni Water) and Umgeni Water Environmental Officer

Management Objective/ Target	Management Action	Monitoring Methodology	Monitoring Frequency	Monitoring Responsibility
6.16. Increased runoff of surface water from hardened surfaces, compounding construction/ design phase impacts of increased volumes of water into downstream areas as a result of groundwater dewatering				
Minimise impacts of catchment hardening on rehabilitated and downstream wetland function	Assess downstream drainage areas to identify areas of erosion Assess on-site and downstream wetland condition and extent to identify whether hydrological management is meeting mitigation objectives	▪ Visual inspection ▪ Ground-truthed aerial photography	▪ Annual – throughout operational phase ▪ Two-yearly for first 4 years after development	▪ Project Developer (Umgeni Water) and Umgeni Water Environmental Officer
6.17. Disturbance as a result of access for tree clearing and/or repairs of lines and support towers				
Minimise disturbance of the Mdloti estuary and wetlands during maintenance operations.	Access to the powerline corridor must be via existing watercourse crossings – no new ad hoc crossings may be created; Disturbed areas of the (previously) rehabilitated wetlands must be returned to their design condition; Any areas of the Mdloti River estuary channel, its banks or the associated wetlands that are damaged during construction should be reinstated to their pre-construction condition or better – allowance should be made for ripping of compacted areas, reshaping and potentially replanting to address disturbance impacts if they occur; Maintenance clearing of indigenous vegetation within 30m of a watercourse should ideally not take place, and the lines should pass above such vegetation.	▪ On-site visual inspection	▪ Weekly	▪ Project Developer (Umgeni Water) and Umgeni Water Environmental Officer
F. SOCIAL AND ECONOMIC IMPACTS				
6.18. Impacts associated with expenditure on the operation of the project				
	Maximise positive impacts through tendering, procurement and employment policies.	▪ Applicant to draw up plans in keeping with their policies.	▪ Yearly auditing of achievement of	▪ Project Developer (Umgeni Water)

Management Objective/ Target	Management Action	Monitoring Methodology	Monitoring Frequency	Monitoring Responsibility
Maximise positive impacts associated with expenditure on the operation of the project.		▪ Audit the approved plans kept on file for verification purposes and review the results of the major procurement process.	socio-economic benefit goals with corrective actions if needed.	▪ Umgeni Water Environmental Manager
	Set targets for use of local labour and maximise opportunities for the training of unskilled and skilled workers.	▪ Conduct audits of the signed training attendance registers and targets.	▪ Monthly	▪ Umgeni Water Environmental Manager
	Use local sub-contractors where possible, with priority being given to people currently making use of the land.	▪ Applicant to draw up plans in keeping with their policies. ▪ Audit the approved plans kept on file for verification purposes and review the results of the major procurement process.	▪ Yearly auditing of achievement of socio-economic benefit goals with corrective actions if needed.	▪ Project Developer (Umgeni Water) ▪ Umgeni Water Environmental Manager
	Explore ways to enhance local community benefits with a focus on broad-based BEE.	▪ Applicant to draw up plans in keeping with their policies. ▪ Audit the approved plans kept on file for verification purposes and review the results of the major procurement process.	▪ Yearly auditing of achievement of socio-economic benefit goals with corrective actions if needed.	▪ Project Developer (Umgeni Water) ▪ Umgeni Water Environmental Manager
G. GENERAL OPERATION				
6.19. Accidental spillage or leakage of fuel, chemicals, or lubricants may cause water or sediment contamination and/or disturbance to the surrounding environment.				
Minimize accidental spillage or leakage of fuel, chemicals, or lubricants that may cause water or sediment contamination and/or disturbance to the environment.	Have good house-keeping practices in place.	▪ Visual inspections	▪ Weekly	▪ Plant manager and Umgeni Water Environmental Manager
	Maintain equipment to ensure that no oils, diesel, fuel or hydraulic fluids are spilled.	▪ Draw up a schedule for inspections and maintenance. ▪ Audit maintenance log sheets and records, and report non-compliance. Generate an inspection checklist to carry out the audits.	▪ Once-off prior to commissioning and updated as required. ▪ Weekly	▪ Plant manager and Umgeni Water Environmental Manager

Management Objective/ Target	Management Action	Monitoring Methodology	Monitoring Frequency	Monitoring Responsibility
	Compile a Method statement for refuelling/servicing/chemical transfers activities under normal and emergency situations. ▪ A designated (impervious) area for refuelling/maintenance/chemical transfer purposes. ▪ Drip trays or similar impervious materials must also be used during refuelling/servicing, especially during emergency procedures. ▪ Training of staff to ensure proper transfer and refuelling.	▪ Review and sign off refuelling/servicing/chemical transfer procedure ▪ Monitor the refuelling/servicing/ chemical transfer process (visual inspection) and record the occurrence of any spillages. ▪ Audit attendance registers	▪ Once-off prior to commissioning ▪ As required during refuelling and servicing activities. ▪ Monthly	▪ Umgeni Water Environmental Officer ▪ Plant manager ▪ Plant manager
	Use drip trays under all equipment and plant parked.	▪ Conduct site inspections and visually determine the presence of any oil spills and the usage of drip trays.	▪ Daily	▪ Umgeni Water Environmental Officer
	Used oils and lubricants are to be contained and correctly disposed of off-site.	▪ Ensure that material emanating from maintenance work is retrieved, and contaminated material is removed. The contaminated material must be collected by a Contractor and disposed of at a registered waste disposal site designated for this purpose. ▪ Carry out site audits to verify the proof of disposal of the contaminated material and waybills kept on file.	▪ In the event of spillages. ▪ Weekly	▪ Plant manager and Umgeni Water Environmental Manager
	Compile a Spill Contingency Plan or Response Method Statement and take into account any existing specifications, as well as lessons learnt from the similar construction projects (if applicable).	▪ Approve and sign off Spill Response Method Statement.	▪ Once-off (and thereafter updated as required during the operation phase).	▪ Plant manager and Umgeni Water Environmental Manager

Management Objective/ Target	Management Action	Monitoring Methodology	Monitoring Frequency	Monitoring Responsibility
	Any spilled fuel, oil or grease must be immediately cleaned up, and the contaminated material must be removed and disposed at a registered hazardous waste disposal facility.	▪ Monitor the occurrence of spills and the management process. Record all spills and lessons learnt.	▪ Weekly audits	▪ Plant manager and Umgeni Water Environmental Manager
	Ensure that all construction vehicles have a spill kit (peatsorb/ drip trays) onboard in the event of a spill.	▪ Monitor via site audits and record incidents and non-compliance.	▪ Weekly	▪ Plant manager and Umgeni Water Environmental Manager
	Ensure that adequate spill containment and clean-up equipment are provided on site for use during spill events.	▪ Monitor via site audits and record incidents and non-compliance.	▪ Weekly	▪ Plant manager and Umgeni Water Environmental Manager
6.20. Waste Management				
Ensure waste is managed in an environmentally sound manner.	Segregation of hazardous waste from general waste to be in place. Hazardous waste must be stored temporarily on site in suitable (and correctly labelled) waste collection bins and skips (or similar). Waste collection bins and skips should be covered with suitable material, where appropriate.	▪ On-site inspection of waste segregation and storage.	▪ Weekly	▪ Plant manager and Umgeni Water Environmental Manager
	Frequent collection and disposal of hazardous waste to a licenced hazardous waste disposal facility must be in place. An approved Contractor must be appointed to collect and dispose the hazardous waste.	▪ Auditing of construction site to ensure compliance to legislation and conformance to own procedures. ▪ Monitor waste disposal slips and waybills via site audits and record non-compliance and incidents.	▪ Monthly	▪ Plant manager and Umgeni Water Environmental Manager
	Ensure that adequate containment structures are provided for the storage of dangerous goods and hazardous materials on site. Appropriate bund areas must be provided for the storage of these materials. Bund areas should contain an impervious surface in order to prevent spillages from entering the ground.	▪ Monitor the storage and handling of dangerous goods and hazardous materials on site (i.e. condition of bunding and containment structures) via site audits and record non-compliance and incidents.	▪ Weekly	▪ Plant manager and Umgeni Water Environmental Manager

7 MANAGEMENT PLAN FOR DECOMMISSIONING

Management Objective/ Target	Management Action	Monitoring Methodology	Monitoring Frequency	Monitoring Responsibility
A. TERRESTRIAL ECOLOGY - OTHER MESIC ENVIRONMENTS				
7.1. Deficit in edaphic material as a result of the removal of the infrastructure associated with the pipeline (requiring the import of material to address such deficit). Further potential alteration of the seral processes associated with the surface vegetative cover as a result of the removal or demolition of the proposed pipelines and SWRO facility.				
Reduce the deficit in edaphic material as a result of the removal of the pipeline infrastructure, as well as reduce the alteration of seral processes.	Management of the affected land following decommissioning should be undertaken to allow for reversion of land to cultivation, an alternate land use or reversion to a sere in line with local vegetation dynamics.	▪ Undertake visual inspections via site audits to ensure rehabilitation is taking place and record any non-compliance.	▪ As required during the decommissioning phase.	▪ Umgeni Water Environmental Officer and Contractor
B. MARINE ECOLOGY				
7.2. Submerged pipelines and associated structures act as artificial reefs				
Submerged structures offer a new settling substrate for hard bottom species	Leave pipeline in place post closure to prevent unnecessary disturbance of the seabed and associated communities.	▪ None	▪ None	▪ None
C. FRESHWATER ECOLOGY				
7.3. Disturbance to Watercourses and wetlands				
Minimise disturbance to watercourses and wetlands during decommissioning operations.	Treat wetlands and Watercourses as no-go areas and fenced off Respect Ecological setback lines and include them in no-go area Removal of built structures, rubble, waste such that disturbed areas do not result in run off of sediment rich or otherwise contaminated water into adjacent sensitive areas Decommissioning involving demolition of structures on site must include measures to trap	▪ Implement measures as per Construction Phase, but including additional mitigation or amendments, motivated for on basis of past experience or technology changes	▪ Ongoing throughout the decommissioning phase	▪ ECO and Umgeni Water Environmental Officer

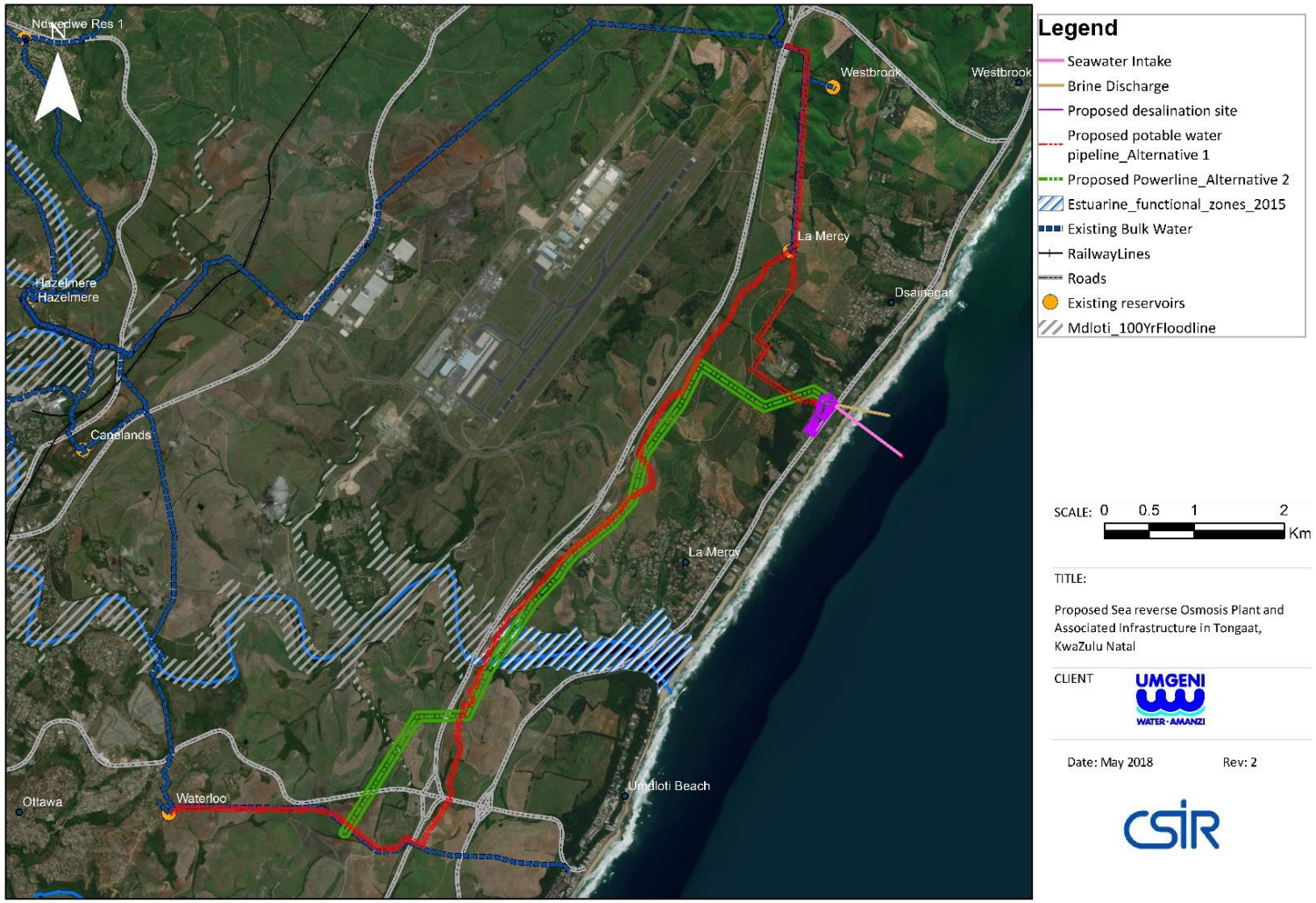
Management Objective/ Target	Management Action	Monitoring Methodology	Monitoring Frequency	Monitoring Responsibility
	sediments on site, and should be carried out during the dry season only Revegetate areas of bare soil, unless followed immediately by new construction			
D. VISUAL IMPACTS				
7.4. Potential visual impact of decommissioning activities associated with the proposed project on sensitive visual receptors.				
Reduce the visual impact of decommissioning activities (i.e. project wide) associated with the desalination plant.	Monitor adherence to the approved rehabilitation plan to rehabilitate cleared areas as soon as possible using local plant sources and nurseries. Monitor adherence to the erosion control plan. Monitor adherence to dust and fire control plans.	▪ Conduct site visits and inspections during the rehabilitation phase.	▪ Daily	▪ Contractor and Umgeni Water Environmental Officer
	Site screens should be put up on required boundary with the desalination plant site. Ensure that these are adequate to screen decommissioning activities from sensitive visual receptors living adjacent to the boundary.	▪ Ensure that residents who live near the boundary will be screened from most decommissioning work. ▪ Conduct visual inspections during site audits to verify the placement of site screens at the required boundaries.	▪ At the commencement of decommissioning ▪ Weekly	▪ Contractor and Project Developer (Umgeni Water) ▪ Umgeni Water Environmental Officer and ECO
	Maintain good housekeeping on site to avoid litter and minimise waste.	▪ Visit the decommissioning sites and ensure good housekeeping is maintained.	▪ Daily	▪ Contractor and Umgeni Water Environmental Officer
	Demarcate decommissioning boundaries and minimise areas of surface disturbance. Monitor the decommissioning sites for strict adherence to demarcated boundaries.	▪ Conduct site visits and inspections to conduct audits.	▪ Daily	▪ Contractor and Umgeni Water Environmental Officer
	Minimise vegetation and ground disturbance and take advantage of existing clearings.	▪ Verify that the proposed project decommissioning area and access routes are determined and clearly demarcated prior to the commencement of the	▪ Once-off prior to decommissioning and as required during the decommissioning phase. ▪ On-going basis throughout the	▪ ECO, Umgeni Water Environmental Officer and Contractor ▪ ECO and Umgeni Water Environmental Officer

Management Objective/ Target	Management Action	Monitoring Methodology	Monitoring Frequency	Monitoring Responsibility
		decommissioning by undertaking visual inspections. ▪ Monitor the decommissioning footprint, ground disturbance and vegetation removal processes during building activities.	decommissioning period.	
7.5. Visual Impact of decommissioning activities at night				
Minimise lighting impact at night	Key mitigation measures to minimize light pollution such as glare and light spill (light trespass): ▪ Light fixtures that shield the light and focus illumination on the ground (or only where light is required) should be used to ensure that light spill does not occur onto adjacent properties. ▪ Use minimum lamp wattage within safety/security requirements. ▪ Avoid elevated lights within safety/security requirements. ▪ Where possible, use timer switches or motion detectors to control lighting in areas that are not occupied continuously (if permissible and in line with minimum security requirements). ▪ Switch off lights when not in use in line with safety and security.	▪ Complaints referring to lighting at night should be documented, investigated and resolved.	▪ When complaints are received.	▪ Project Developer (Umgeni Water)
E. NOISE IMPACTS				
7.6. Impacts of decommissioning noise on sensitive receptors.				
Prevent unnecessary impacts on the surrounding environment and NSAs by ensuring that the decommissioning noise emissions (including piling and blasting noise) is limited and mitigated.	Ensure that all operators of decommissioning equipment receive proper training in the use of the equipment and that the equipment is serviced regularly.	▪ Verify that operators of decommissioning equipment receive proper training in the use of the equipment by auditing proof of training certificates and training attendance registers.	▪ Monthly	▪ Contractor, ECO and Umgeni Water Environmental Officer

Management Objective/ Target	Management Action	Monitoring Methodology	Monitoring Frequency	Monitoring Responsibility
		▪ Generate an inspection checklist to carry out the audits. Audit maintenance log sheets.		
	All decommissioning operations should only occur during daylight hours if possible.	▪ Decommissioning activities to be monitored and managed (as well as included in the tender contract).	▪ Daily	▪ Contractor, ECO and Umgeni Water Environmental Officer
	All reverse noise emitting warning devices on mobile vehicles should be set as low as possible.	▪ Ensure that this is taken into consideration during the design phase by reviewing signed minutes of meetings or signed reports and designs.	▪ Prior to the decommissioning phase	▪ Umgeni Water Environmental Officer and ECO
	Conduct an environmental noise monitoring survey during the decommissioning phase to ensure that the day time noise does not exceed 45dB(A) and the night time noise does not exceed 35 dB(A) at the site boundary for rural districts and 50 dB(A) during the day and 40 dB(A) at night for semi-rural districts.	▪ Project Developer to appoint a noise specialist to the noise survey during the decommissioning phase. ▪ Verify that a noise specialist is appointed to conduct the noise survey during the decommissioning phase and review findings of the survey. ▪ Monitor noise as per SANS 10103:2008.	▪ Prior to decommissioning. ▪ Prior to decommissioning. ▪ Quarterly throughout the decommissioning period.	▪ Project Developer (Umgeni Water) ▪ Umgeni Water Environmental Officer and ECO ▪ Project Developer (Umgeni Water) and Noise Specialist
F. WATER CONSERVATION				
7.7. Increased water usage during the decommissioning phase				
Reduce water usage during decommissioning.	Water conservation to be practiced in line with Energy Saving Policies as follows: ▪ Cleaning methods utilised for cleaning vehicles, floors, etc. should aim to minimise water use (e.g. sweep before wash-down).	▪ Monitor via site audits.	▪ Monthly	▪ Umgeni Water Environmental Officer and ECO

Management Objective/ Target	Management Action	Monitoring Methodology	Monitoring Frequency	Monitoring Responsibility
	▪ Ensure that regular audits of water systems are conducted to identify possible water leakages.			
	Carry out environmental awareness training with a discussion on water usage and conservation.	▪ Carry out Environmental Awareness Training. ▪ Conduct audits of the signed attendance registers.	▪ Once-off training and ensure that all new staff are inducted. ▪ Monthly	▪ Contractor, Umgeni Water Environmental Officer and ECO ▪ ECO and Umgeni Water Environmental Officer
G. GENERAL				
Ensure best land-use for the area	Ensure further engagement with the relevant authorities and landowners on the potential use of the facility in the case of decommissioning, as given that the surrounding area is largely residential in nature it is unlikely that an industrial land use would be appropriate.	▪ Ensure minutes of meeting are taken and signed off.	▪ Prior to the decommissioning phase	▪ Project Developer (Umgeni Water) ▪ Umgeni Water Environmental Officer and ECO

Appendix A – Locality Map



Appendix B – Umgeni Water Particular Specification for Environmental Management of Construction Projects (Version 001, dated February 2010)

UMGENI WATER

PARTICULAR SPECIFICATION FOR ENVIRONMENTAL MANAGEMENT OF CONSTRUCTION PROJECTS

Version 001 **Dated: 2010-02-12**

INDEX

APENDICES

1 SCOPE

This specification is additional to the South African Bureau of Standards Standardized 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 effect 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 the specification. All aspects of these SABS requirements which are relevant to environmental management during construction contracts will apply.

2.2 PRINCIPLES

- 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 minimize the impact on affected parties.
- Minimization of areas disturbed by construction activities will minimize 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 (eg hazardous, airborne, liquid and solid), waste disposal practices, noise regulations, road traffic ordinance etc.
- All effort should be made to minimize, 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 (eg Quality Assurance Inspector) or Consultant designed 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 on an ongoing basis, immediately after selected construction activities (eg backfilling of a trench) are completed. This allows for passive rehabilitation (ie natural re-colonization 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, ie promote rapid vegetation establishment.

Riparian Vegetation – Vegetation occurring on the banks of a river or stream (ie 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 is 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 200mm shall be deemed as topsoil.

Veld – This is defined for the purpose of this specification as unimproved natural vegetation areas (eg 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 (ie conservation and aesthetics). Concept embraces utilizing 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 Contract 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 Office order the Contractor to suspend any or all works on site if the Contractor or his Sub-Contractor / 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 advise 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 performance of the project in terms of environmental compliance to the ECO and Project Manager as per the pro-forma attached as Appendix C
- Liaises with the ECO and / or Engineering and Scientific Services 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 utilized 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 tiimeously of any foreseeable activities which will require input from the Environmental (Control) Officer

The Contractor will conduct all activities in a manner that minimizes 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 of 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
Fertilizers, 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, 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 thereto.

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
- 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	R1 500
Working outside of the demarcated servitude	R2 000
Failure to stockpile topsoil correctly	R2 000
Failure to stockpile topsoil correctly	R1 500
Failure to stockpile materials in designated areas	R1 000
Pollution of water bodies (including increased suspended solid loads)	R2 000
Failure to provide adequate measure to control stormwater runoff	R1 000
Failure to provide adequate sanitation	R 750
Unauthorized removal of woody vegetation	R3 000
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	R3 000
Failure to rehabilitate disturbed areas within the specified time-frame	R3 000
Any other contravention of the project specific specification	R2 000
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 ECO with a layout design of the site indicating the position of all the following, as applicable; offices, ablution facilities, storage areas, workshops, laboratories, batching plant, particulate matter stockpile area (ie 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 wastewater. All accommodation is 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 minimize 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 minimize 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 100m of a water body or drainage channel or on a flood plain unless approved by the ECO 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

PSZA 3.1 SANITATION

Portable chemical toilets are to be utilized 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 100m from any point of work, but not closer than 50m to a water body.

PSZA 3.2 SOLID WASTE FACILITIES

Facilities for solid waste collection are to be provided. These are to be at least 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 designed 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.

PSZA 3.3 COOKING AND HEATING FACILITIES

No open fires will be allowed anywhere on site.

Contained fires (ie 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

PSZA 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 manufacturer's 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 undercover 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 200ℓ 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 aboveground storage tanks to ensure the timeously identification of faults.

Collection containers (eg 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.

PSZA 4.2 CONTROL OF POLLUTANTS

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

Contaminated runoff and wastewater is to be directed into a collection system (eg sump, attenuation dam, PVC porta-ponds etc) for treatment or collection and disposal. The final collection point (eg 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 wastewater, 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 the ECO for acceptance upon award of the Contract.

Any spillages, irrespective of their size, are to be contained and cleaned up immediately. Umgeni Water's ECO 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 specialized clean-up techniques and / or products may be required depending on the spill. This will be instructed by the ECO. These will be to the Contractor's cost.

The Contractor shall ensure that all plant is in good working order. Hydrocarbon (eg 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 hours.

PSZA 5 GENERAL

Site staff are not permitted to use any open water body or other natural water source (eg 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 utilizing that spring.

PSZA 6 MEASUREMENT AND PAYMENT

Measurement and payment for compliance with Clauses PSZA 1 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

PSZB 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 (ie steeper than 1:4) or less if friable material is present
- Indigenous bush / forest
- Close proximity (ie 50m 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 utilization of that method in favour of a more environmentally acceptable one, proposed either by himself or the Employer.

PSZB 1.2 CONSTRUCTION PROGRAMME

The Contractor will programme construction so as to minimize the impact on the environment and provide this programme to the ECO for perusal and acceptance at the onset of the contract period. The ECO is to be 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 authorization 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 ECO 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 15m will apply for machine excavation unless otherwise indicated in the project specification. A maximum width of 6m 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 (eg pipelines, access road, etc) will be by means of wooden stakes. These stakes will be at least 1m high, painted white and placed at least every 15m 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 ECO.

PSZB 4 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

PSZB 5.1 CLEARANCE

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

Prior to the commencement of any vegetation clearing or tree felling activities, the Contractor is to timeously inform and confirm areas to be cleared on site with the 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 area.

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

PSZB 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 50mm are to be cut into lengths not exceeding 2400mm.

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

PSZB 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 200mm 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 (ie replaced immediately on the area where construction is complete), rather than stockpiling it for extended periods. This is feasible for progressive construction (eg pipelines), but not necessarily so for reservoirs, site establishments, dams, etc.

Topsoil stockpiles are not to exceed 2m in height.

Topsoil stockpiles are to be maintained in a weed free condition (ie 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 weeks 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 period 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) Ration 1:1) is to applied at an application rate of 6 kg/ha (see PSZC 5.3 for sowing times), unless otherwise instructed in the project specification. Fertilizer is to be applied as per PSZC 5.2.

PSZB 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.

PSZB 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 root ball.

Replanting

- A hole 500mm larger in diameter than the anticipated root ball 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 expel air from the planting hole. Place the tree in its new hole making sure the top surface of the root ball is level with the ground level. Place a hose pipe in the hole and leave it running whilst extra soil is added around the root ball.
- 'Compact' the tree in the hole and attach tree stays for stabilization.

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

PSZB 6.1 BACKFILL MATERIAL

With reference to SABS 1200 DB Sub-Clause 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.

PSZB 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 authorized. 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 Sub-Clause 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 ECO and Project Manager.

In certain cases, for example to help stabilize 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 250mm 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 (ie 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

PSZB 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.

PSZB 8.2 APPROPRIATE USE OF PLANT

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

PSZB 9 DEALING WITH WATER ON WORKS

PSZB 9.1 DISINFECTION OF POTABLE WATER INFRASTRUCTURE

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

PSZB 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 ECO:

- Use of groundcover or grass.
- Construction of cut-off berms (earth and / or rock –pack) – these are to be angled across the contour and normally would approximate an angle of 30º from the bisector of the contour.
- Placing of brush wood on bare surface.
- Pegging of wattle trunks or branches along the contour.
- Hard landscaping, eg 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 (ie grounted stone pitching / rock pack / reno mattress) area to dissipate water velocity and to control and prevent erosion.

Stormwater 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 does not 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 it does not affect compliance with the technical specification.

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

Liquid wastes will not be disposed of to stormwater 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 sub-standard 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 (eg 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. 5 000ℓ) equipped with a pump and hose (minimum 30m) which shall be permanently on site, unless otherwise stated in the project specification.

PSZB 13 USE AND MAINTENANCE OF ACCESS FACILITIES

PSZB 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).

PSZB 13.2 FENCING

Temporary fencing is to consist of 1,2m bonnox fencing, or similar, suitably tensioned and supported on 1.8m fencing standards at 3m intervals, with all necessary straining posts and stays.

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

PSZB 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 authorized by the ECO 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 4m) 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 of as identified by the Engineer in conjunction with the ECO, 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 un-rehabilitated 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.

PSZB 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 utilizing 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 500mm) 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 sub-soil over spoil material.
- Placement of stripped topsoil on sub-soil.
- Grassing of topsoil in terms of Clause PSZC 4 of this specification.

The Contractor is to familiarize 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 the reinstatement and rehabilitation criteria, the Contractor is to provide the following information to the ECO 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 (ie blast rock / excavated rock / soft shale / sub-soil 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 500mm) 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 sub-soil over spoil material.
- Placement of stripped topsoil on sub-soil.
- Grassing of topsoil in terms of Clause PSZC 4 of this specification.

PSZB 16 NUISANCE

PSZB 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 stabilizers 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.

PSZB 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 fore-warned 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 ECO, 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.

PSZB 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.

PSZB 16.4 INTERFERENCE WITH NEGHBOURS 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.

PSZB 16.5 DISRUPTION OF SERVICES

Disruption of services, eg 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

PSZB 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 sub-surface 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.

PSZB 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 run-off and wastewater.
- 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 of 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 m³ 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 1200D)

Grassing of Temporary Topsoil Stockpiles

i) Supply of materials and planting as specified m²
ii) Maintenance by watering, weeding and fertilizing m²

d) Landscape Preservation and Conservation of Flora

Transplanting of trees / shrubs of main stem girth:

a) Up to 400mm Sum
b) Over 400mm 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 **Unit**

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

g) Nuisance

Dust

Control of dust as specified shall be scheduled in the applicable SABS 1200 Specification.

h) Special Environments

Wetlands

Removal of vegetation with intact root zone (minimum depth 150mm) m²

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 utilized, the concept is to utilize 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 (Sub-Clause 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 ECO 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, refueling spills etc., is to be excavated to the depth of contaminant penetration, placed in 200ℓ drums and removed to an appropriate landfill site.

PSZC 2 FINISHING

PSZC 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 (eg pipeline servitude), provided that that rock does not exceed 250mm in maximum dimension and is placed in a manner consistent with the natural surrounds as indicated by the ECO or 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 150mm prior to the replacement of topsoil.

PSZC 2.2 TOPSOILING

Topsoil is to be replaced to a minimum depth of 100mm, unless otherwise specified in the project specification (eg 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, sub-soil or similar material may be used that may be a suitable substrate after addition of soil improving substances, eg 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 are 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 re-vegetated to the specified standard.

This standard is deemed to be an 85% cover with no areas in excess of 0.04m²/m² remaining unvegetated.

Re-vegetation shall match the vegetation type which previously existed (eg 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 50mm 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 utilized, they are to be planted at 200mm centres. The fertilizer shall be applied as per PSZC 5.2. During summer, 25mm of irrigation shall be applied each week until reasonable (60%) groundcover has been obtained. During winter 15mm of irrigation shall be applied each week until reasonable (60%) groundcover 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 utilized, it shall be laid as specified in the project specification. The fertilizer 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 re-grassing 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 ECO, 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, eg 100m x 100m = 10 000m² = 1ha. All fertilizer and seeding rates used in this specification are with respect to hectares.

PSZC 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.)

PSZC 5.2 FERTILIZER

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

The rate of application will be :

- 200kg/ha in the Coastal Hinterland areas
- 300kg/ha in the Midlands and Coastal areas

PSZC 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.

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

PSZC 5.4 ESTABLISHMENT AND MAINTENANCE

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

During winter (where annual rye grass is specified) 15mm of irrigation shall be applied each week until reasonable (60%) groundcover 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.

PSZC 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 :

PSZC 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 love grass	10
Chloris gayana	Rhodes grass	10
Digitaria eriantha	Smuts' finger grass	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 love grass	10
Chloris gayana	Rhodes grass	5
TOTAL		**25**

PSZC 5.2.2 Coastal Hinterland

Grass Species	Common Name	General Application Rate (kg/ha)
Eragrostis tef	Teff	5
Eragrostis curvula	Weeping love grass	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 love grass	10
Chloris gayana	Rhodes grass	5
Cenchrus ciliarus	Blue buffalo grass	2
Cynodon dactylon	Couch/Kweek/Star grass	3
TOTAL		**30**

PSZC 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 love grass	10
Chloris gayana	Rhodes grass	10
Digitaria eriantha	Smuts' finger grass	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 love grass	10
Chloris gayana	Rhodes grass	5
Paspalum notatum	Lawn paspalum	2.5
TOTAL		**27.5**

PSZC 5.6 SEEDING METHODS

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

All seed supplied should be labeled 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.

PSZC 5.6.1 Hydro-Seeding

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 5m³/ha (≈100 x 50kg fertilizer bags/ha).

PSZC 5.6.2 Hand-Broadcasting

Fertilizer, at the appropriate rate, is to be distributed by hand in a manner to ensure that there is an even spread of fertilizer 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 be 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 fertilizer have been applied to incorporate these elements into the topsoil.

PSZC 5.7 GENERAL

Where there is a possibility of neighbourhood livestock grazing in 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 600mm by 600mm square by 700mm 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 65ºC. Where possible, any available topsoil should be placed in the hole at the level where the tree root ball will rest. A handful

(half-a-cup) of each Super Phosphate 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 root ball 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 water 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 timer stake planted in the ground to a depth of at least 500mm. The stake shall have a minimum diameter of 35mm and shall be at least 300mm higher than the planted tree.
- Water retaining basins of at least 500mm diameters are to be formed around each tree.
- The Contractor is to apply at least 10ℓ 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 400mm by 400mm square by 500mm deep and that the tree stakes and ties are not required.

PSZC 7 ALIENT PLANT CONTROL

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

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

The ECO 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 150mm depth	m²
Hand trimming	m²
ii) Topsoiling	
Replacement of topsoil to minimum depth of 100mm or such other depth as specified in the project specification	m²
Scarification of replaced topsoil to depth of 50mm and final hand trimming using spaces and rakes	m²
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
Fertilizer (2:3:2) (supplied, placed and mixed into the soil)	ton
iii) Vegetation Re-Establishment	
Hand-broadcasting with appropriate grass seed mix Deemed to be inclusive of soil preparation and improvements, materials and labour as Specified in PSZC 5	m² or ha

Hydro-seeding with appropriate grass seed mix m² or ha
Deemed to be inclusive of soil preparation and improvements, materials and labour as Specified in PSZC 5

Sprig planting m² or ha
Deemed to be inclusive of soil preparation and improvements, materials and labour

Plug planting m² or ha
Deemed to be inclusive of soil preparation and improvements, materials and labour

Instant turf m² or ha
Deemed to be inclusive of soil preparation and improvements, materials and labour

Maintenance m² or ha
Deemed to be inclusive of watering, weeding, etc.

b) Landscaping

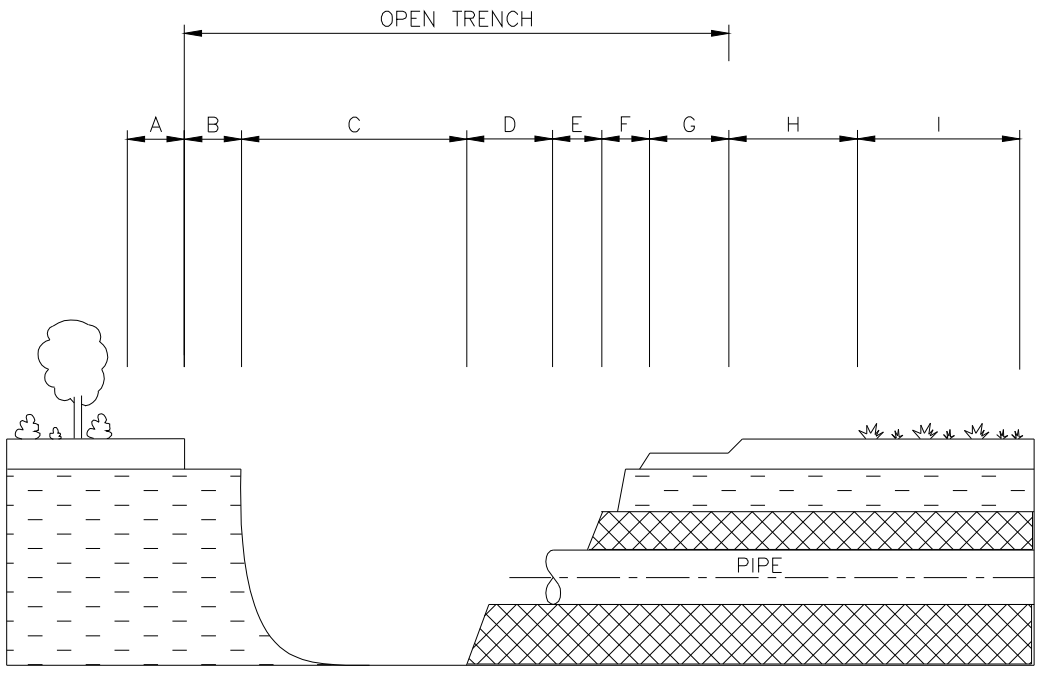
i) Planting of trees in bag sizes:
   a) up to and including 10ℓ Sum
   b) over 10ℓ up to and including 20ℓ Sum
   c) over 20ℓ Sum

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

PAGE

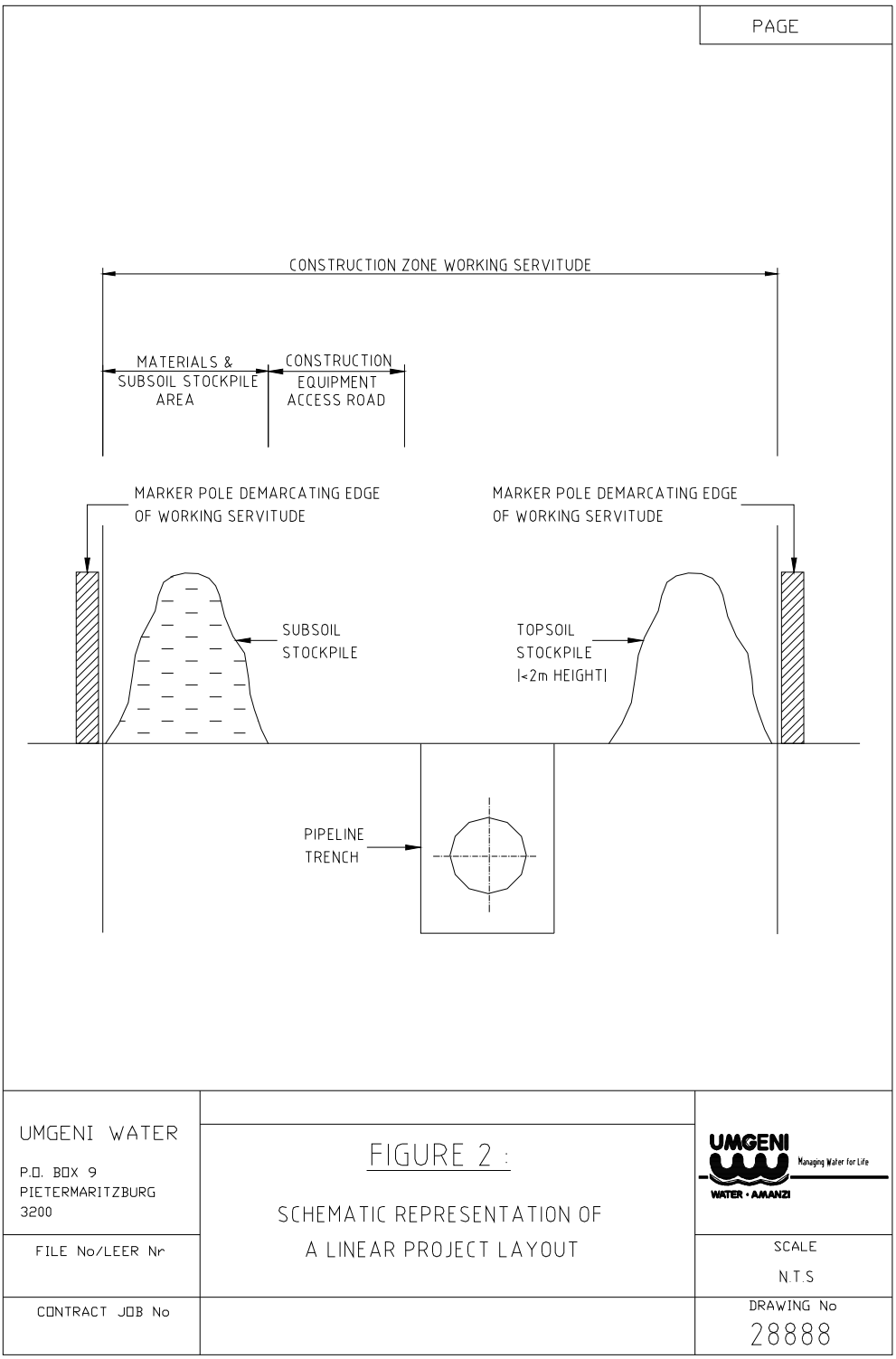


KEY

A	CLEARING & GRUBBING
B	STRIP TOPSOIL
C	TRENCHING
D	PLACING OF BEDDING
E	PIPELAYING & SELECTED FILL
F	REPLACEMENT OF SUB SOIL
G	BEGINNING OF TOPSOIL REPLACEMENT
H	REPLACEMENT OF TOPSOIL TO ORIGINAL LEVEL (ie. REINSTATED TRENCH)
I	REVEGETATION ie. REHABILITATION
	VEGETATION
	TOPSOIL
	SUBSOIL
	SELECTED FILL & BEDDING

UMGENI WATER P.O. BOX 9 PIETERMARITZBURG 3200	FIGURE 1 SCHEMATIC REPRESENTATION OF THE DEFINITION OF AN 'OPEN TRENCH'	UMGENI Managing Water for Life WATER • AMANZI
FILE No/LEER Nr		SCALE N.T.S.
CONTRACT JOB No		DRAWING No 28887

Figure 2: Drawing No. 24248



APPENDIX B

PUBLIC COMPLAINTS REGISTER

DATE	COMPLAINANTS 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 DAT

GOOD PERFORMANCE REPORT

List 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

Appendix C – List of Authorities for Permits

1. Off Road Vehicle Permits to Access the coastal zone

- DEA: Ocean and Coasts
- The Deputy Director: Integrated Coastal Management
- Physical Address: 2nd Floor, East Pier Building, East Pier Road, V & A Waterfront, Cape Town
- Postal Address: P.O. Box 52126, V & A Waterfront, 8002

Application to be copied to:

- Mr Omar Parak - Sub-directorate: Coastal and Biodiversity Management
- KZN Department of Economic Development, Tourism and Environmental Affairs
- Physical Address: Private Bag X9059, Pietermaritzburg, 3200
- Tel: 033 355 9438

2. Applications for the release of agricultural land should be made to:

- Mashudu Marumbini - Land Use and Soil Management
- Department of Agriculture, Forestry and Fisheries
- Private Bag X 120, Gezina, Pretoria, 0001

3. Applications for the clearance of "natural forest" or "protected trees" should be made to:

- Mr W Rozani - Directorate: Forestry Management (KZN)
- Department of Agriculture, Forestry and Fisheries
- Private Bag X 9029, Pietermaritzburg, 3201

4. Applications for protected trees in terms of the 1974 Provincial Nature Conservation Ordinance KZN should be made to:

- Ezemvelo KZN Wildlife
- Postal Address: P.O. Box 13053, Cascades, 3202
- Physical Address: Queen Elizabeth Park, 1 Peter Brown Drive, Montrose, Pietermaritzburg, KwaZulu-Natal Province OR 5 Stellawood Road, Umbilo, Durban, KZN
- Telephone: 033 845 1968 or 031 274 6900
- Fax: 033 845 1747
- E-mail: permits@kznwildlife.com

5. Applications for Water Use Licence should be made to:

- Department of Water and Sanitation
- Physical Address: 88 Field Street, Southern Life Building, 7th Floor, Durban, 4000
- Postal Address: PO Box 1018, Durban, 4000

6. Applications for Coastal Water Discharge Permit should be made to:

- Department of Environmental Affairs: Branch Oceans and Coasts
- Director: Coastal Pollution Management
- Physical Address: 2nd Floor, East Pier Building, East Pier Road, V & A Waterfront, Cape Town
- Postal Address: P.O. Box 52126, V & A Waterfront, 8002
- Email: cwdp@environment.gov.za