

REPORT

GENERIC ENVIRONMENTAL MANAGEMENT PROGRAMME FOR WATER AND SANITATION ACTIVITIES, UGU DISTRICT MUNICIPALITY, KZN



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GLOSSARY OF TERMS

Audit

A verification process that is used to obtain information regarding the implementation of the EMPr. It is an objective tool used to make improvements at the workplace.

Biophysical Environment

All aspects of the natural environment including physical features such as watercourses, groundwater and soils as well as the biological features such as plants and animals.

Bunding

An impervious containment system for potential spillages from tanks / containers stored on site. The bunded area shall have a capacity greater than 110% of the total tankage contained. The bunding shall be constructed of a material impermeable and resistant to the stored material.

Client

Ugu District Municipality is regarded as the client.

Construction Activity

A construction activity is any action taken by the Client, a contractor, his sub-contractors, suppliers or personnel during a construction process.

Contractor

Persons or companies appointed on behalf of the client to undertake construction or operational activities, as well as their sub-contractors and suppliers.

Construction camp

The area allocated for the establishment of equipment, repair area, ablution facilities, lie down and rest areas, etc. It also serves as the central point for the storage of fuel, construction material and contractor offices.

Decommissioning

In relation to waste treatment, waste transfer or waste disposal facilities, means the planning for and management and remediation of the closure of a facility that is in operation or that no longer operates.

Environmental Authorisation

Environmental Authorisation obtained in terms of the National Environmental Management Act (NEMA) Act 108 of 1998 and the associated EIA Regulations.

Environmental Control Officer (ECO)

Individual appointed by the Client and/or Project Manager and who is responsible for monitoring compliance with the implementation of the Environmental Authorisations, permits and licenses and the EMPr, ensuring liaison between Ugu District Municipality, the contractor and Authorities and reporting on the verified compliance with the EMPr.

Environmental Site Officer (ESO)

An environmentally knowledgeable or qualified person nominated by the appointed contractor and/or client who will ensure the day-to-day implementation of the EMPr by contractors.

Environmental Management Programme (EMPr)

A plan or programme that seeks to achieve a required end state and describes how activities, that have or could have an adverse impact on the environment, will be mitigated, controlled and monitored. The EMPr provides the environmental requirements during the operation, construction and decommissioning / closure phases to the Client and any agent, consultant, contractor and sub-contractors acting on behalf of the Client to ensure that environmental aspects are addressed adequately to prevent or minimise environmental impacts (pollution or degradation) as a result of the activities or proposed activities at the

pumpstations, water treatment or waste water treatment facilities. The EMPr also provides for general instructions that should be included in a contract document for any construction or decommissioning / closure phases of any of the facilities under Ugu District Municipality's responsibility. The EMPr also details the organisational structure required to ensure the effective implementation of the EMPr and measures to monitor and improve the application of the EMPr.

Environment

The environment means the surroundings within which humans exist and that could be made up of water, air, soil, sand, plants and animals.

Environmental Aspect

An environmental aspect is any component of a contractor's construction activity that is likely to interact with and on the environment.

Environmental Impact

An impact or environmental impact is the change to the environment, whether desirable or undesirable, that will result from the effect of an activity. An impact may be the direct or indirect consequence of a construction, operational or decommissioning activity.

Environmental Consultant

An independent consultant that is appointed by the Client to compile an Environmental Management program and to undertake environmental audits or Control Officer Functions.

Environmental Specifications

Instructions and guidelines for specific activities designed to help prevent, reduce and/or control the potential environmental implications of these activities during the operational, construction or decommissioning / closure phases of the facilities.

Facilities

Emphasis to all pump stations, WTW and WWTW under the jurisdiction and responsibility of Ugu District Municipality.

Fauna

Any and all animals identified within or outside of the operational or project areas. Animals may not be harmed in any way.

Flora

All species of plants that are found in a particular region, habitat, or time period within or outside of the operational or project areas.

Hazardous Substance

Any substance that poses a significant risk to health and safety, property or the environment. These substances have been classified under the SABS Code 0228: *'The Identification and Classification of Dangerous Goods and Substances'*. Hazardous substances / materials are those that are potentially: poisonous, flammable, carcinogenic or toxic. Some examples of hazardous substances / materials:

- a. diesel, petroleum, oil, bituminous products;
- b. chlorine;
- c. cement;
- d. chemicals such as solvent based acids, alkalines;
- e. lubricants such as oil and greases;
- f. pesticides, herbicides; and
- g. LP gas.

Hazardous Waste Landfill Site

A waste disposal site that is designed managed and permitted by DWA or DEA to allow for the disposal of hazardous waste.

Incident

The occurrence of a pollution or degradation event that will have a direct or indirect effect on the environment e.g. surface water, groundwater, soils, ambient air as well as plants, animals and humans.

Invasive Alien Species

An Alien Species is a species that has been intentionally or unintentionally introduced to a location, area, or region where it does not occur naturally. An Invasive Alien Species is an alien species that causes, or has the potential to cause, harm to the environment, economies, or human health (Global Invasive Species Programme).

Land owner

The individual, company, entity, Tribal Authority, Local Municipality or Ugu District Municipality that legally owns the land.

Mitigation measures

Mitigation seeks to address poor or inadequate practices, procedures, systems and/ or management measures by the implementation of preventative and corrective measures to reduce, limit, and eliminate adverse or negative environmental impacts or improve the positive aspects.

Permit

An official document giving someone authorization to do something, eg. Existing permits under old Water Act for the operations and discharge related to existing Ugu DM water infrastructure projects.

Project

This refers to any new construction activities associated with the proposed facilities.

Project Manager (PM)

Project Manager or Representative of the Client, responsible for overall management of the construction phase of a project, operational phase or decommissioning/closure of WTW and WWTW. Duties also include the management of all Contractors.

Record of Decision (R.o.D)

NEMA (National Environment Management Act) states that before certain listed development activities can be undertaken, an EIA must be conducted and Environmental Authorisation obtained. The Department of Environmental Affairs and Development Planning is responsible for evaluating applications in terms of the EIA Regulations. This written decision is now called either an Environmental Authorisation or Environmental Refusal and is listed in a Record of Decision (RoD)

Rehabilitation

Rehabilitation is defined as the return of a disturbed area, feature or structure to a state that approximates to the state (where possible) that it was before disruption, or to an improved state.

Remediation

The management of a contaminated site to prevent, minimise, or mitigate harm to human health or the environment

Servitude

A right which Ugu District Municipality holds over another property for a right of passage, pipeline or storm water servitude. The servitude is registered against the title deeds and binding on successive owners in perpetuity.

Social Environment

Persons likely to be directly or indirectly affected by construction activities during a project, operational activities, or activities during the decommissioning phase.

Solid Waste

Means all solid waste, including domestic and office waste (food, paper, plastic), waste from operations e.g. empty chemical containers, dried sludge as well as waste from the construction and / or decommissioning phases, chemical waste, excess cement/concrete, inert building rubble, packaging, timber, tins and cans.

Sustainable development / sustainability

The integration of social, economic and environmental factors into planning, implementation and decision-making so as to ensure that development serves present and future generations.

Topsoil

The layer of soil covering the earth which provides a sustainable environment for the germination of seeds, allows water penetration, and is a source of micro-organisms and plant nutrients.

Watercourse

A river or spring; a natural channel or depression in which water flows regularly or intermittently; a wetland, lake or dam into which, or from which, water flows; and any collection of water which the Minister may, by notice in the Gazette, declare to be a watercourse.

Waste

Any substance, material or object, that is unwanted, rejected, abandoned, discarded or disposed of, or that is intended or required to be discarded or disposed of, by the holder of that substance, material or object, whether or not such substance, material or object can be re-used, recycled or recovered.

Workforce

The entire project team including people employed by the Client or the contractor, persons involved in activities related to a project, persons present at or visiting construction areas (including permanent contractors and casual labour), personnel in charge of- or tasked with maintenance of WTW or WWTW, or all employees and contractors involved in the decommissioning phase.

GLOSSARY OF ACRONYMS

ADWF:	Average Dry Weather Flow
AE:	Acceptable Exposure
BOD:	Biochemical Oxygen Demand
BPEO:	Best Practical Environmental Option
CIGMAT:	Centre Grouting Materials and Technology
COD:	Chemical Oxygen Demand
DAEA:	Department of Agriculture and Environmental Affairs
DAEA&RD	Department of Agriculture, Environmental Affairs and Rural Development
EDTEA	Department of Economic Development, Tourism and Environmental Affairs
DEA:	Department of Environmental Affairs
DMR:	Department of Mineral Resources
DOJ:	Department of Justice
DPW:	Department of Public Works
DWS:	Department of Water and Sanitation
DWF:	Dry Weather Flow
EA:	Environmental Authorisation
ECA:	Environment Conservation Act
ECO:	Environmental Control Officer
EEC:	Estimated Environmental Concentration
EER:	Engineer, Environmental Representative
EIA:	Environmental Impact Assessment
EMPr:	Environmental Management Programme
FOG:	Fat, Oil and Grease
HD:	Household Density
HR:	Hazard Rating
HSE:	Health, Safety and Environment.
I:	Infiltration
LCC:	Life Cycle Cost
LCCA:	Life Cycle Cost Analysis
NEMA:	National Environmental Management Act
NWA:	National Water Act
O & M:	Operation and Maintenance
OD:	Oxidation Pond
OHS:	Occupational Health and Safety
PDWF:	Peak Dry Weather Flow
PE:	Project Engineer
PL:	Pipe Length
PLH:	Pipe Length per House Hold
PS:	Primary and Secondary Treatment
RBC:	Rotating Biological Contactors
SG:	Specific Gravity
SP-STD:	Special Standard
STD:	General Standard
TSS:	Total Suspended Solids
UPVC:	Unplasticised Poly Vinyl Chloride
UV:	Ultra Violet
WSA:	Water Service Act
WTW:	Water Treatment Works
WWF:	Wet Weather Flow
WWTW:	Wastewater Treatment Works

1. INTRODUCTION

In terms of the Water Services Act (Act 107 of 2007), the Ugu District Municipality is a Water Service Authority and is responsible for providing water services, including water supply and sanitation. As part of fulfilling their role of being a Water Services Authority, the Ugu District Municipality is responsible for the operation and maintenance of its numerous Water Treatment Works (WTW) and Waste Water Treatment Works (WWTW).

An “Environmental Management Programme” is a plan or programme that sets out guidelines that describe how activities that have or could have an adverse impact on the environment, will be mitigated, controlled, and monitored and subsequently achieve a required operational and/or end state. The EMPr addresses the environmental impacts during the design, construction, operational and decommissioning/closure phases of a project. The purpose of a generic EMPr provides for preventative, corrective and best practice measures to ensure that activities related to construction, operation and/or closure of a facility and associated activities are done in an environmentally responsible way and are sustainable.

The EMPr, prepared by Triplo4 Sustainable Solutions, concerns the implementation of a generic Environmental Management Program and mitigation measures related to Water and Waste Water Treatment Sanitation Facilities. It sets out conditions for managing environmental impacts of proposed, future developments and rectification of past environmental impacts where the development was/is not a listed activity under the legislated EIA Regulations (2010) or does not trigger an EIA or Basic Assessment.

This EMPr is developed to ensure the sustainable implementation, operation and closure / decommissioning of proposed or operational water treatment or waste water treatment works within Ugu District Municipality that:

- Are currently not meeting the requirements of sub-sections (1), (2), (3), and (14) of Section 28 (Duty of Care and Remediation of Environmental Damage) of NEMA.
- At the time of planning and implementation, some facilities did not or would not require environmental authorisation and/or an environmental management programme i.e. capacities for construction or expansion of the works are below the EIA Regulation thresholds or were implemented under the Water Act (54 of 1956).

Due consideration has been given to the development in terms of the planning, construction, operational and/ or decommissioning or closure phases whilst considering the environment and needs of interested and affected parties.

Due regard must be given to environmental management during the entire lifecycle stage of a project. Environmental specifications, conditions and/or recommendations are provided to ensure:

- Minimising the extent of environmental impact during the life of the project, commencing from planning through to closure.
- Ensuring appropriate rehabilitation of areas affected by construction and operation.
- Preventing and remediating long term environmental degradation.

1.1. BACKGROUND INFORMATION

Ugu Municipality is in the process of developing a generic Environmental management Plan for water and Sanitation related activities. The purpose of the EMPr is to provide clear and comprehensive advice on the scope, role and content of Environmental Management plans (EMP) for managing environmental impacts of proposed, future developments and/or rectification of past environmental impacts where the development was/is not a listed activity under the legislated EIA Regulations or does not necessarily trigger an EIA.

Ugu District's core function is water and sanitation within the six local Municipalities under the jurisdiction of Ugu District Municipality:

- Hibiscus Coast
- Umzumbe
- uMuziwabantu
- Vulamehlo
- uMdoni
- Ezingqoleni

Please see figure below depicting the various local municipalities within Ugu District Municipality.

Figure 1-1: Ugu District Municipality – Local Municipalities



	Umuziwabantu Local Municipality		Vulamehlo Local Municipality
	Ezingqoleni Local Municipality		Umzumbe Local Municipality
	Hibiscus Coast Local Municipality		Umdoni Local Municipality

Therefore the EMPr should provide a guideline for development based on the above mentioned function that may have negative implication on the environment. The intended audience consists of developers, planners, environmental management professionals, community stakeholders, municipalities and decision makers. This document must describe the role of the EMPr in environmental impact assessment (EIA) and

planning for ecologically sustainable development within the framework of existing legislation and environmental management policies.

1.2. SCOPE OF THE ENVIRONMENTAL MANAGEMENT PROGRAMME

This document describes the role of the EMPr in environmental impact assessment (EIA) and planning for ecologically sustainable development within the framework of existing legislation and environmental management policies.

The EMPr will be used as a binding document between the Ugu Municipality and appointed contractors and all other persons involved in the execution of activities related to water and wastewater treatment activities in Ugu District Municipality. These conditions must be adhered to for the duration of planning, construction, operation, maintenance and decommissioning.

This EMPr addresses the following phases of the development:

(a) The Construction Phase (including Planning and Pre-construction)

The planning phase is the ideal opportunity to incorporate pro-active measures to ensure that environmental impacts are avoided and mitigated from the outset. Proper planning during this phase can ensure that the likelihood of certain impacts taking place is minimised. The bulk of the impacts which may occur during the construction phase will have immediate effect (e.g. noise-, dust- and pollution / waste generation). If the site is monitored on a continual basis during the construction phase, it is possible to identify these impacts as they occur. These impacts will then be mitigated through the implementation of the measures described in the EMPr.

(b) The Operational Phase

The impacts, which are anticipated during the operational phase are deemed to be most significant, and are those impacts which may result from inappropriate management of the facility, operational failure and maintenance backlogs. By taking pro-active measures during the operation of the plant, potential environmental impacts emanating during the operational phase will be minimised. In particular, monitoring and reporting of effluent quality as well as surface and ground water quality and indicators of aquatic health downstream of the WWTW, will be required during operation.

(c) The Decommissioning Phase

The decommissioning of facilities brings with it, its own set of environmental impacts. The decommissioning process will entail the removal of the equipment and materials from the existing facilities/structures, and taking appropriate action to ensure that the sites are left in a suitable condition. In this regard the condition of the sites should not limit the future land-use in line with current land-use zoning and rights. Some of the materials used and stored at the existing facilities will likely be spilled resulting in potential contamination at the site. This chapter of the report outlines the activities and impacts associated with the decommissioning of existing facilities. Potential impacts associated with decommissioning are assessed, and appropriate mitigatory measures proposed to minimise potential negative impacts, and enhance potential project benefits.

As mentioned above, this generic EMPr sets out conditions for planning and managing the three potential stages of the lifecycle of the water and sanitation facilities in a sustainable manner, ensuring compliance with the legislative requirements. Section 6 has therefore been sub-divided in the following way:

1. **Section A:** the operation and running of existing treatment works;
2. **Section B:** the construction of a new treatment works or construction at an existing treatment works;
3. **Section C:** the decommissioning and closure of an existing treatment works.

The intended stakeholders consist of developers, planners, environmental management professionals, community stakeholders, municipalities and decision makers.

Note: For projects that have received Environmental Authorisation for activities at a specific plant, cognisance of existing conditions contained within the RoD and existing management plans as legally binding documents need to be taken into account to ensure on-going compliant environmental management of the plant. Environmental Authorisation is provided based on a review of the Basic Assessment Report, by the competent authority. This authorisation includes a RoD which states the legally binding terms and conditions that must be met as part of the environmental authorisation. The RoD defines specific conditions that must be met and should be considered in addition of the use of this EMPr. Non-compliance with conditions set out in the RoD may result in the withdrawal of the Environmental Authorisation, the issuing of remedial actions to address the non-compliance, including an order to cease all activities until the remediation is complete, as well as criminal or civil proceedings on the holder of the environmental authorisation.

1.3. OBJECTIVES OF THE ENVIRONMENTAL MANAGEMENT PROGRAMME

The EMPr plays a vital role in the implementation of consistent and continued environmental management for the duration of a projects life cycle.

Specifically, the EMPr:

- Ensures compliance with regulatory authority stipulations and guidelines which may be local, provincial, national and all related legislation thereof.
- Ensures that there is sufficient allocation of resources on the project budget so that the scale of EMPr-related activities is consistent with the significance of project impacts
- Ensures compliance with legislation and regulations which may be national, provincial or local.
- Outlines the functions and responsibilities of responsible persons.
- Verifies environmental performance through information on impacts as they occur.
- Outlines mitigation measures and environmental specifications which are required to be implemented for all phases of a project in order to minimise the extent of environmental impacts, and to manage environmental impacts associated with the proposed project.
- Creates awareness and specifies measures to prevent long-term or permanent environmental damage or degradation.
- Establishes monitoring methods for environmental management practices for Water and Sanitation plants.
- Ensures that all health and safety regulations are adhered to.
- Proposes methods to monitor compliance with the EMPr and subsequent reporting.
- Specifies timeframes within which measures set out in the EMPr must be implemented.
- Encourages good management practices through planning and commitment to environmental issues;
- Defines how the management of activities and their impact on the environment is to be reported and how performance should be evaluated;
- Provides practical environmental conditions / requirements to:
 - Minimise disturbance of the natural environment;
 - Ensure water resource protection;
 - Prevent or minimise all forms of pollution;
 - Protect indigenous flora and fauna;
 - Prevent soil erosion and facilitate the re-vegetation of affected areas;
 - Ensure the maintenance of newly vegetated areas;
 - Restrict noise disturbance;
 - Ensure compliance with all applicable laws, regulations, standards and guidelines for the protection of the environment; and
 - Provide for the best practical means available to prevent or minimise adverse environmental impacts.
- Develops waste management practices based on prevention, minimisation, recycling, treatment or disposal of waste;

- Defines the arrangements that will be put in place to ensure that the mitigation measures are implemented by including recommendations of the roles and responsibilities of the project proponent, environmental management team and contractors;
- Describes all monitoring procedures required to identify impacts on the environment; and
- Trains the Owner of the project, its employees and contractors with regard to their environmental obligations.
- Provides an environmental awareness plan.
- Responds to changes in project implementation not considered in the EIA.
- Responds to unforeseen events.
- Provides feedback for continual improvement in environmental performance.

1.4. RESPONSIBILITY FOR ENVIRONMENTAL MANAGEMENT WITHIN UGU DISTRICT

The Management Authority responsible for environmental authorisation and compliance within the Ugu District is the KZN Department of Economic Development, Tourism and Environmental Affairs (EDTEA).

Table 1-1: KZN EDTEA Environmental Authority Contact Detail

Name of Authority	Department of Economic Development, Tourism and Environmental Affairs		
Contact Person	Sabelo Ngcobo		
Telephone Number	039 682 2045	Fax Number	039 682 3325
Mobile number		Email	Sabelo.ngcobo@kzndard.gov.za

The details of the Environmental Representative for Ugu Municipality regarding the implementation, maintenance, monitoring and reporting requirements related to this EMP, are as per table 1.2. Any queries and/or concerns regarding implementation and compliance with the conditions must be addressed with the relevant representative.

Table 1-2: Ugu Environmental Authority Contact Detail

Name of Authority	Ugu District Municipality – Environmental Services		
Contact Person	Khethiwe Dlamini		
Postal Address	PO Box 33, Port Shepstone, 4240		
Telephone Number	039 688 3382	Fax Number	039 688 3559
Mobile Number	076 145 7334	E-mail	Khethiwe.Dlamini@ugu.gov.za

1.5. STRUCTURE OF THE ENVIRONMENTAL MANAGEMENT PROGRAMME

A decision support matrix has been provided to make this EMP more user-friendly. For ease of use, the matrix is colour-coded for WTW and WWTW facilities that are operational (blue), going to be constructed (green), or decommissioned (red). The environmental impact and mitigation tables have been shaded to correspond to this colour system. For example, for the construction of a new wastewater treatment plant, follow the 'New Plant' (green) section of the decision matrix. Once all steps in the matrix have been followed and necessary documentation and approval received refer to the 'Construction' part of this EMP (conveniently coloured in green) for environmental impacts, and associated mitigation measures and action plans, encountered during construction of a new treatment facility.

To ensure mitigation measures are implemented during the appropriate lifecycle stages, the detailed environmental management programme section (Section 6) of the EMP has been divided into the following sub-sections:

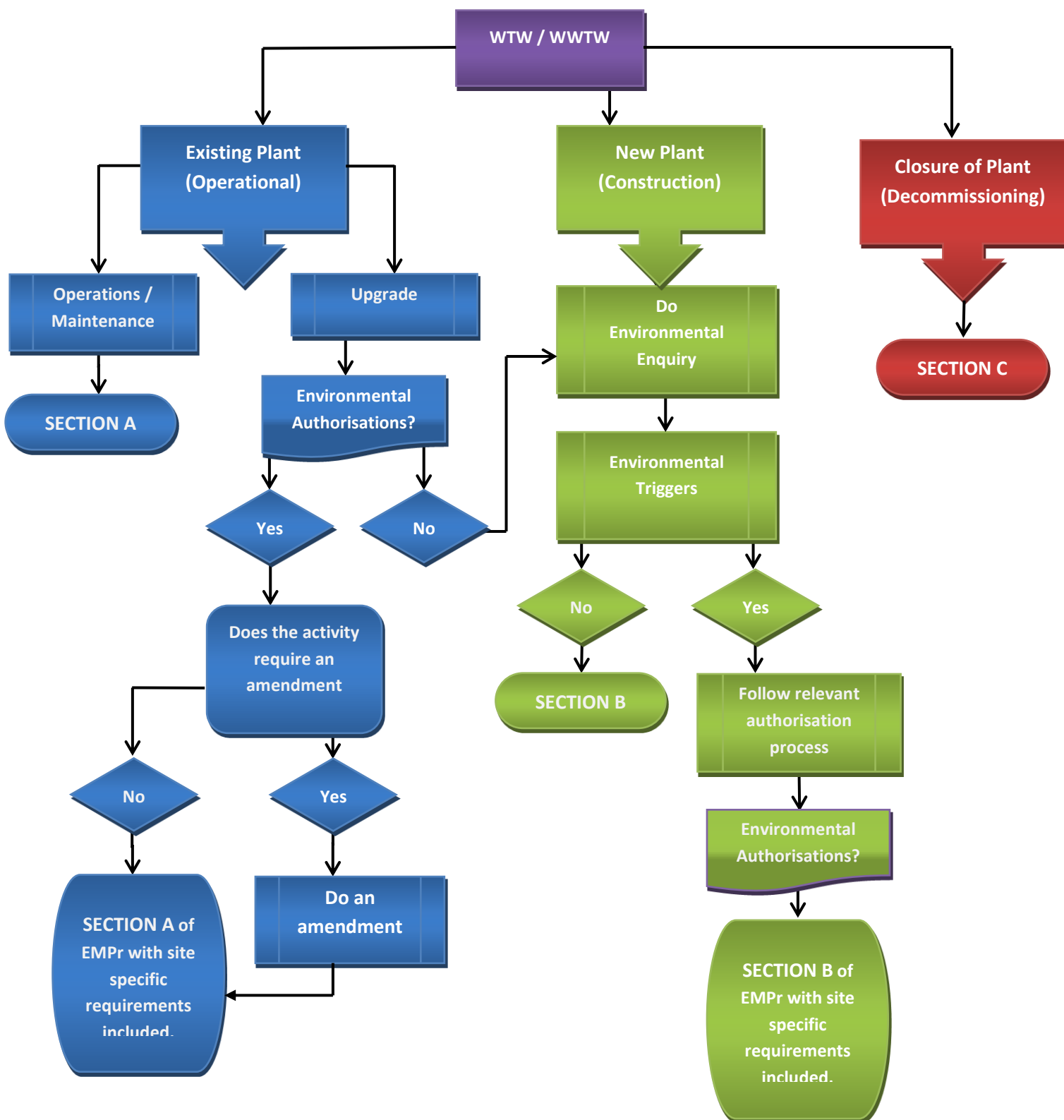
- **Section A:** Operation which applies to the operation and daily running of those WWTW and WTW which are in operation.
- **Section B:** Construction which applies to new WTW or WWTW and existing TW which are requiring alterations in the form of some sort of construction activities to take place.

- **Section C:** Closure applies to the WTW or WWTW which are going to be closed down and made redundant.

Refer to the Decision Support Matrix below for guidance on which part of the EMPr to refer to.

Should a project scope fall within existing infrastructure (Section A - blue phase), investigations into existing environmental authorisations and licenses should be undertaken and if amendments thereof required. If no authorisations exist, then Section B (green phase) is to be followed. New infrastructure should be assessed via an environmental enquiry and in terms of NEMA and EIA Regulations 2010 for potential triggers. An Environmental Enquiry involves a liaison with authorities (EDTEA and DWA) inclusive of a formal written motivation to obtain principle support and environmental requirements for the proposed project based on the scope of activities, potential impacts and mitigation thereof and proposed site layout/alternatives. Decommissioning is Section C (red phase).

Figure 1-2: Decision Support Matrix for WTW and WWTW



2. APPLICABLE LEGISLATION, GUIDELINES AND DOCUMENTATION

This document describes the role of the EMPr to existing RoDs, permits, licenses and EMP's in environmental assessment and planning for ecologically sustainable development within the framework of existing legislation and environmental management policies.

South Africa is a constitutional democracy, which means the constitution and Bill of Rights are the supreme law. Our Constitution guarantees certain human rights, and is one of the most progressive in the world. In line with a constitutional democracy everyone has responsibilities.

South Africa has a myriad of laws

In terms of The Constitution of the Republic of South Africa (Act No. 108 of 1996) everyone has the right:

- to clean water;
- to an environment that is not harmful to their health or well-being and to have the environment protected, for benefit of present and future generations, through reasonable legislation and other measures that prevent pollution and ecological degradation, promote conservation and secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.

The overarching legislative framework that governs all environmental activities is the National Environmental Management Act (No 107 of 1998). NEMA aims to provide for co-operative environmental governance by establishing principles for decision-making on matters affecting the environment, institutions that will promote co-operative governance and procedures for co-ordinating environmental functions exercised by organs of state; to provide for certain aspects of the administration and enforcement of other environmental management laws; and to provide for matters connected therewith. NEMA can help deal with problems at a municipal level and enables one to determine whether proper Integrated Environmental Management (IEM) procedures have been followed.

Accompanying NEMA is a set of Specific Environmental Management Acts (SEMA's). Known by the abbreviation of SEMA's, Specific Environmental Management Acts, all fall under the auspices of the overarching National Environmental Management Act (NEMA). To date five SEMA's have been promulgated, with the most recent one being Waste Act in 2008. The full list of SEMA's are:

1. National Environmental Management: Protected Areas Act (57 of 2003), known as the NEM:PAA
2. National Environmental Management: Biodiversity Act (10 of 2004), known as the NEM:BA
3. National Environmental Management: Air Quality Act (39 of 2004), known as the NEM:AQA
4. National Environmental Management: Integrated Coastal Management Act (24 of 2008), known as the NEM:ICM
5. National Environmental Management: Waste Act (59 of 2008), known as the NEM:WA

The Environmental Impact Assessment Regulations were published in Government Notice R543 to R546 (June 2010), and promulgated in terms of Chapter 5 of the National Environmental Management Act. The purpose of the regulations is to regulate the procedure and criteria relating to the submission, processing and consideration of, and decision on, applications for environmental authorisations for the commencement of activities in order to avoid detrimental impacts on the environment, or where it cannot be avoided, ensure mitigation and management of impacts to acceptable levels, and to optimise positive environmental impacts, and for matters pertaining thereto.

Section 28 of NEMA (Duty of care and remediation of environmental damage) states that every person who causes, has caused or may cause significant pollution or degradation of the environment must take reasonable measures to prevent such pollution or degradation from occurring, continuing or recurring, or, in so far as such harm to the environment is authorised by law or cannot reasonably be avoided or stopped, to minimise and rectify such pollution or degradation of the environment.

This EMPr must be read in conjunction with any Environmental Authorisation (once issued) for the proposed development sites and any other relevant documentation by provincial government, national

government and Ugu District Municipality. These could include but not be limited to: a general water use license, waste management license, conditions for establishment and health permits for sanitation from provincial health officials.

The EMPr submitted as requirements for any environmental assessment has to be complied with as per the EIA Regulations and/or other relevant legislation. That EMPr must take precedence and must NOT be replaced by this Generic EMPr which was developed as a guideline in terms of Section 28 of NEMA.

All site-specific and project-specific authorisations supersede this generic EMPr.

2.1. APPLICABLE ENVIRONMENTAL LEGISLATION

The following Environmental legislation was considered, in the evaluation of the activities and development of the EMPr. It must be noted that only some sections of Acts have been listed below, these were deemed pertinent and specific to the scope of this EMPr. These Acts must be considered and adhered to in their entirety at all times.

The list of applicable legislation and permits provided is intended to serve as a guideline only and is not exhaustive.

Table 2-1: Applicable Environmental Legislation

Legislation	Section	Relates to
The Constitution (No 108 of 1996)	Chapter 2	Bill of Rights.
	Section 24	Environmental rights.
National Environmental Management Act (No 107 of 1998 [as amended])	Section 2	Defines the strategic environmental management goals and objectives of the government. Applies through-out the Republic to the actions of all organs of state that may significantly affect the environment.
	Section 24	Provides for the prohibition, restriction and control of activities which are likely to have a detrimental effect on the environment.
	Section 28	The developer has a general duty to care for the environment and to institute such measures as may be needed to demonstrate such care.
	Section 30	Deals with the control of emergency incidents, including the different types of incidents, persons responsible for the incidents and reporting procedures to the relevant authority.
National Environmental Management: Waste Act (No 59 of 2008)		Provides for specific waste management measures and the remediation of contaminated land.
		Regulations for waste management licensee activities
National Environmental Management: Biodiversity Act (No 10 of 2004)		Provides for the management and conservation of biodiversity, protection of species and ecosystems, and sustainable use of indigenous biological resources
National Environmental Management: Air Quality Act (No 39 of 2004)	Section 32	Control of dust
	Section 34	Control of noise
	Section 35	Control of offensive odours
National Environmental Management: Integrated Coastal management Act (No 24 of 2008)		Establishes a system of integrated coastal and estuarine management in order to promote the conservation of the coastal environment.

National Heritage Resources Act (No 25 of 1999) and regulations	Section 34	No person may alter or demolish any structure or part of a structure which is older than 60 years without a permit issued by the relevant provincial heritage resources authority.
	Section 35	No person may, without a permit issued by the responsible heritage resources authority destroy, damage, excavate, alter, deface or otherwise disturb any archaeological or paleontological site.
	Section 36	No person may, without a permit issued by the South African Heritage Resource Agency (SAHRA) or a provincial heritage resources authority destroy, damage, alter, exhume, remove from its original position or otherwise disturb any grave or burial ground older than 60 years which is situated outside a formal cemetery administered by a local authority. "Grave" is widely defined in the Act to include the contents, headstone or other marker of such a place, and any other structure on or associated with such place.
	Section 38	This section provides for Heritage Impact Assessments (HIAs), which are not already covered under the ECA. Where they are covered under the ECA the provincial heritage resources authorities must be notified of a proposed project and must be consulted during the HIA process. The Heritage Impact Assessment (HIA) will be approved by the authorising body of the provincial directorate of environmental affairs, which is required to take the provincial heritage resources authorities' comments into account prior to making a decision on the HIA.
Occupational Health and Safety Act (No 85 of 1993)	Section 8	General duties of employers to their employees
	Section 9	General duties of employers and self-employed persons to persons other than their employees
National Water Act (No 36 of 1998) and regulations	Section 19	Prevention and remedying the effects of pollution
	Section 20	Control of emergency incidents
	Section 21	Licenses for water use – most important of those include discharge & abstraction licenses
Water Services Act, No 108 of 1997		Details the duties and responsibilities of water services provider, regarding provision, registrations, charging, etc
Hazardous Substances Act (No 15 of 1973) and regulations		Provides for the definition, classification, use, operation, modification, disposal or dumping of hazardous substances
National Forests Act, No 84 of 1998		Protection & prohibition of destruction of natural forests
Nation Veld & Forest Fire Act		Provides for a variety of institutions, methods and practices to prevent and combat veld, forest and mountain fires.
Conservation of Agricultural Resources Act, No 43 of 1983		Provides for the conservation of natural agricultural resources in order to promote the conservation of soil, water sources and vegetation; and for combating weeds and invasives.
National Road Traffic Act		Provides for controlling transport of dangerous goods,

(No 93 of 1996)		hazardous substances and general road safety
Development Facilitation Act, No 67 of 1995		Provides for planning and development. Regulated by the KZN Planning & Development Act and Municipal Bylaws.
Local Government Transition Act, No 61 of 1995		Provides for re-structuring of local government.
South African Qualifications Authority Act (58 of 1995)		Provides for the development and implementation of a National Qualifications Framework and for this purpose to establish the South African Qualifications Authority; and to provide for matters connected therewith
Skills Development Act of 1998		To promote development of skills
Occupational Health and Safety Act (No 85 of 1993) and regulations		Addresses occupational health and safety aspects
Municipal Systems Act (No 32 of 2000)		To provide for the core principles, mechanisms and processes that are necessary to enable municipalities to move progressively towards the social and economic upliftment of local communities, and ensure universal access to essential services that are affordable to all.
Promotion of access to information Act (No 2 of 2000)		To promote access to information
Promotion of Administrative Justice Act (No 3 of 2000)		To promote administrative justice

There may be some legislation that has been repealed, but could have been relevant at the time of commencing with the relevant activity. Should this be the case e.g. ROD issued in terms of ECA or permit in terms of the Water Act 1956, please refer to relevant transitional arrangements as per new, relevant Acts:

Table 2-2: Repealed Environmental Acts

Legislation	Section	Relates to
Environment Conservation Act (No 73 of 1989)		To control environmental conservation.
Atmospheric Pollution Prevention Act (No 45 of 1965)		To control and manage air pollution
Water Act		To consolidate and amend the laws relating to the control, conservation and use of water for domestic, agricultural, urban and industrial purposes.
Fertilizers, Farm Feeds, Agricultural Remedies and Stock Remedies Act (No 36 of 1947)		Fertilisers & pesticides – control & registered operators, disposal
Explosives Act (No 26 of 1956)		Blasting operators, storage of explosives
Sea shore Act (21 of 1935)		To control the sea shore
Marine Pollution (Control		To prevent all, (including oil) pollution of the sea

and Civil Liability) Act (No 6 of 1981)

The potential environmental impacts associated with current and proposed projects are required to be considered in compliance with the EIA Regulations (2010) as well as all the SEMA's, especially the National Environmental Management: Waste Act (No 59 of 2008). It must also be noted that the list of Acts and their associated regulations must be frequently updated to ensure that all assessments are done according to and comply with the most current legislation.

Table 2-3: Current Environmental Legislation

Regulations and Guidelines
Environmental Impact Assessment Regulations, 2010
Internal Guideline: Generic Water Use Authorisation Application Process, August 2007 by DWA
The General Policy on Environmental Conservation (January 1994)
Policy on Hazardous Waste Management (September 1994)
Regulation No. R2834 of 1985 in terms of the Water Act, No 54 of 1956
Minimum Requirements for the Handling, Classification and Disposal of Hazardous Waste, DWA, 2nd edition 1998
Minimum Requirements for Waste Disposal by Landfill, DWA, 2nd edition 1998
General information on sludge co-disposal on landfill, DWA, March 2007
Permissible utilisation and disposal of treated sewage effluent, DWA, May 1978
Construction regulations promulgated under the OHS Act, in 2003
WRC Wastewater Risk Abatement Plan: A Guideline to plan and manage towards safe and compliant wastewater collection and treatment in South Africa (2010)
Small Waste Water Treatment Works DPW Design Guidelines, Department of Public Works (2012)
Ugu District Municipality Water Services Department Wastewater Risk Abatement Plan: Incident Management Protocol (2011)

Table 2-4: Current Municipal By-Laws

By-Laws
Ugu District Municipality Water and Sanitation Services By-Laws (2009).
Ugu District Municipality Water Services By-Laws (2005)
Hibiscus Coast Municipality Environment Conservation By-Laws (2007)
Hibiscus Coast Municipality, Department of Cleansing and Maintenance, Solid Waste By-Laws (2008)
Hibiscus Coast Municipality Fire Brigade By-Laws (2004)
Umdoni Municipality Municipal Code (2006)
Umdoni Municipality Fire Brigade By-Laws (2007)
Margate Transitional Local Council Environment Conservation By-Laws (1998)

Some of the listing notices that may trigger the need for application for environmental authorisation are listed in Appendix A. Activities that trigger Listing Notices 1 or 3 will require a Basic Assessment, and activities that trigger Listing Notice 2 will require a full Environmental Assessment. The full listing notices of the EIA Regulations (2014), published in Government Notice R983 to R985 (8 December 2014), must be consulted for any current construction or expansion activities.

2.2. Effluent and sludge disposal

It is important when considering the different water treatment technologies available, to at that stage also identify appropriate waste disposal and/or management options (including monitoring) for all the waste streams.

Costs associated with the disposal of residues/sludges include disposal cost (based on volume and nature) and transportation cost (distance to transport to disposal site). Risks associated with the disposal of water treatment sludges relate to sludge stability, disposal site design and location, the constituents in the sludge and their hazardousness, possible groundwater pollution, pollution of surface runoff as well as valuable land surface area taken up by surface disposal (DWAf, 2007).

Contact of disposed sludge with water (ground and surface) should be prevented or where prevention is not possible be minimised. Thus, the disposal site should be above the groundwater table, underlain by an impermeable layer (synthetic liner) or layer of low permeability (unfractured bedrock or clay) and contoured and capped following closure. DWS Minimum Requirements provide details on requirements for waste disposal in terms of classification, site selection, leachate generation and capturing, lining, monitoring etc. the potential effects of mixing different waste streams must also be considered (DWAf, 2007).

2.2.1. DWS and sludge disposal

Another factor that needs to be taken into account is the legal disposal of sludge and effluent. Prior to the promulgation of the Integrated Coastal Management Act, 2008 (Act No. 24 of 2008) (ICMA), the disposal of land-derived effluent into the coastal environment through pipelines were controlled and regulated by the Department of Water and Sanitation (DWS) under the National Water Act, 1998 (Act No. 36 of 1998) (NWA). DWS adopted the precautionary principle with regard to the disposal of sludges from oil & grease traps. This principle considers all waste streams to be deemed hazardous until proven otherwise.

Ugu Municipality can however delist the above-mentioned waste for disposal at a General Landfill Site (G:B+) provided that the sludge is classified according to the Minimum Requirements for Handling, Classification and Disposal of Hazardous Waste (Department of Water Affairs and Forestry, Second edition: 1998) and the results forwarded to this Department for written approval.

2.2.2. DEA and Coastal discharge of Land-Based Effluent

With regard to coastal discharge of land based effluent, Water Services Development Plans that need to be prepared by a water services provider (e.g. local municipality) under the Water Services Act (Act No. 108 of 1997), as part of the Integrated Development Plans in terms of the Local Government Transition Act (Act No. 209 of 1993), can be extended to include the discharge of land-based effluent (DEA, 2014).

The discharge of sludge arising from effluent treatment facilities (e.g. primary, secondary and tertiary) must be in accordance with the Minimum Requirements for Waste Disposal by Landfill (DWAf, 1998) and the 'Sludge Guidelines' (1998 as amended in 2000) of the DWS or any future updates of such policies or guidelines (DEA, 2014).

An industry, discharging effluent to a municipal WWTW or directly to the coastal environment (or applying for a permit to do so), will be required to provide a detailed description of the waste stream in terms of both volume (quantity) and quality (i.e. listing all substances present and their concentrations and loads) (DEA, 2014). Where industries discharge effluent to a WWTW, the water services provider is responsible for obtaining this information from the industry concerned. The DEA or local authority may also require a detailed inventory of the raw materials, as well as process material, used by an industry (DEA, 2014).

A permit application for the discharge of land-based effluent to the coastal environment will only be considered where a discharge system is designed, constructed and operated in accordance with recognised scientific, hydraulic and structural guidelines in order to meet environmental quality objectives (DEA, 2014). Potential impacts on the receiving environment must be investigated in both the near and far field, taking into account other anthropogenic activities and waste inputs so as to address possible synergistic and/or cumulative effects. Guidelines in this regard are provided in 'Operational Policy for the disposal of land-derived water containing waste to the marine environment of South Africa' (2004) (DEA, 2014).

2.2.3. Disposal Options for Waste/Residue

DWAF (2007) provides the following are possible disposal options for waste/residue:

Settling ponds: For low strength streams with small sludge volumes. Consider additional volume required in design capacity. Discuss ultimate destiny and liability with authorities.

Dumps: For more solid type waste (dewatered). Consider surface area required, leachability (remobilisation of constituents), and possible groundwater pollution.

Off-site: Smaller quantities and hazardous waste types should be disposed to an authorised waste disposal site in the area. Disposal cost depends on volume of sludge to be removed and transported, the distance to be transported and disposal cost.

3. ENVIRONMENTAL MANAGEMENT PROGRAMME

3.1. EMPr Methodology

The methodology adopted is that of an Environmental Management Programme (EMPr) as described in the Integrated Environmental Management (IEM) Guidelines published by the Department of Environmental Affairs in 1992 as well as Section 33 of the EIA Regulations, 2010.

The Generic EMPr has been structured to include:

- Specific goals of the Environmental Management Programme;
- Details of management actions;
- Parties responsible for carrying out management recommendations;
- Timing and duration of management actions;
- Personnel training and financial obligations; and
- Guidelines for monitoring and auditing of compliance.

The EMPr specifies the minimum requirements to be implemented as per the scope of works and scope of the EMPr, in order to minimise and manage the potential environmental impacts and ensure sound environmental management practices.

The provisions of this EMPr are binding on the Ugu District Municipality during the life of the project, thus until decommissioning and closure. It is essential that the EMPr requirements be carefully studied, understood, implemented, and adhered to at all times.

To simplify the EMPr requirements, each aspect related to the EMPr has been addressed below. Each action within the EMPr is supported by the priority of when the specific action will need to be implemented. Each of these aspects is briefly described below for ease of reference.

ENVIRONMENTAL ASPECT

This section highlights the various aspects associated with the project i.e. the Applicant / Contractor's activities that will interact with the environment.

ENVIRONMENTAL MEASURES AND ACTION PLANS

This section indicates the actions required to either prevent and/or minimise the potential impacts on the environment that is associated with the project.

TIMEFRAMES

This section in the table indicates when the actions for that specific aspect must be implemented and/or monitor.

RESPONSIBILITY

This section indicates the party responsible for implementing the environmental measures and action plans laid out in the EMPr.

4. MANAGEMENT AND COMPLIANCE MONITORING

4.1. ORGANISATIONAL STRUCTURE, ROLES AND RESPONSIBILITIES

4.1.1. ORGANISATIONAL STRUCTURE

The Project Manager is ultimately responsible for ensuring compliance with the environmental specification and upholding Ugu District Municipality's Environmental commitment to 100% compliance with all National, Provincial and local legislation that relates to management of this environment. This includes compliance to all environmental regulatory and good management practice requirements for the duration of projects, in order to ensure effective minimisation of all environmental impacts. The PM is also responsible for the overall management and implementation, administration and enforcement of the EMPr. All major decisions must be approved by the Project Manager.

The Project Engineer, appointed by Ugu District Municipality, reports directly to the Project Manager and oversees all technical aspects of the various projects. The Engineer oversees construction programmes and all construction activities performed by the Contractor, and as such also any EMP implementation, EMP compliance and environmental related activities, issues and impacts.

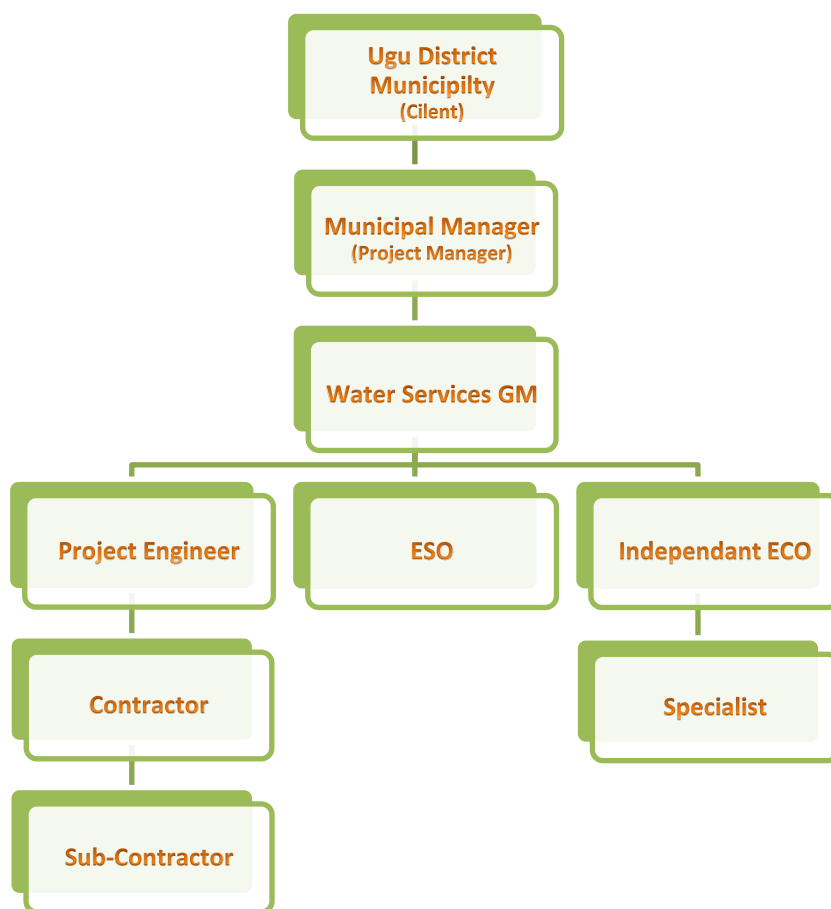
It is the Contractor's role to implement and comply with recommendations and conditions of the EMPr at all times.

Ugu District Municipality, the Contractor or Project Engineer shall appoint an Environmental Site Officer (ESO) for the duration of a construction period. The ESO shall be a senior member of the Ugu District Municipality, the construction company or on-site team and have overall environmental management responsibilities for the site. The ESO shall monitor the activities of the Main Contractor and all subcontractors, and shall ensure that mitigation measures contained in this document are implemented and adhered to. The ESO shall liaise with the Environmental Control Officer (ECO), where applicable, on a regular basis to inform the ECO of the adherence to and effectiveness of the prescribed management measures. In the absence of an ECO, an ESO will take on the duties of an ECO. It is recommended that each facility has a person designated to the duties of an ESO.

The ECO shall be appointed by the Applicant or Project Engineer. All further duties of the ESO and ECO shall be relevant as detailed in the EMP and Section 2.1.

The ECO must be independent, and be appointed by the Client or Project Engineer. All further duties of the ESO and ECO shall be relevant as detailed in the EMPr and Section 4.1.2. The ECO must fulfil an advisory consultancy, monitoring and reporting role with regard to overseeing the effective implementation and updating of the EMPr. The ECO must also make recommendations for addressing EMPr and/or environmental legal non-compliances. The ECO is also responsible for liaising with the relevant Environmental Authorities on any environmental issues to confirm their requirements, as and when required and communicating such requirement to the Project Manager and/or Engineer.

Formal responsibilities are necessary to ensure that key procedures are executed. Specific responsibilities of the Project Manager, Engineer, Contractor, Environmental Site Officer and Environmental Control Officer are as detailed below.

Figure 4-1: Organogram of formal responsibilities and reporting structure for UDM

4.1.2. ROLES AND RESPONSIBILITIES

PROJECT MANAGER (PM)

The Project Manager must:

- Be fully conversant with the Generic EMPr for the project;
- Ensure that the Project Engineer and the Contractor/Operator are aware of all specifications, legal constraints, standards and procedures pertaining to the project specifically with regard to the environment;
- Ensure that all stipulations within the EMPr are communicated and adhered to by the Project Engineer and the Contractor/Operator;
- Arrange information meetings for or consults with I&AP's about the impending construction activities;
- On the recommendation of the Engineer and / or Environmental Officer, order the Contractor to suspend any or all works on site if the Contractor or his Sub-Contractor / Supplier fails to comply with the said specifications;
- Order the removal of any person(s) and/or equipment in contravention of the specifications of the EMPr.
- All of the issues described and discussed in this document will require monitoring, and it will be the responsibility of Ugu District Municipality to undertake this monitoring according to the specifications of this EMPr.
 - To draft and implement a monitoring programme to assess compliance with the EMP.
 - To appoint an Environmental Control Officer (ECO) during the Construction Phases.
 - To undertake the monitoring of operations during the operational phase. Any problems that are

identified or encountered must be reported to Ugu District Municipality management so that appropriate action may be taken to rectify the situation

- Monitor the implementation of the EMPr throughout the project by means of regular site visits and meetings
- Monitor and verify that environmental impacts are kept to a minimum
- Review and approve construction methods where necessary;

Maintain a register of complaints and queries by members of the public at the site office.

ENGINEER

The Engineer must:

- Enforce the environmental specification on site;
- Monitor and ensure compliance with the requirements of the specification;
- Assess 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 and to be reported to project meetings;
- Liaise with the Project Manager and Contractor/Operator on matters concerning the environment
- Prevent actions that will harm or may cause harm to the environment, and take steps to prevent pollution of the site
- Implement remedial measures in the event of pollution incidents or environmental impacts
- Ensure the documentation, 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.

ENVIRONMENTAL CONTROL/SITE OFFICER

The Environmental Control/Site Officer must:

- Be familiar with the recommendations and mitigation measures of the associated EMPr for the project.
- Ensure site protection measures are implemented on site.
- Ensure that the Principal Contractor, sub-contractors, construction teams and the Principal Agent are in compliance with the EMPr at all times during Phases I and II of the project.
- Monitor all site activities weekly for compliance.
- Conduct monthly audits of the site according to the EMPr, and report findings to the Principal Agent/Contractor.
- Recommend corrective action for any environmental non-compliance at the site.
- Compile a monthly report highlighting any non-compliance issues as well as progress and compliance with the EMPr prescriptions. These monthly reports are to be submitted to the Client and the Principal Agent.
- Conduct once-off training with the Contractor on the EMPr and general environmental awareness.

It must be noted that the responsibility of the ECO is to monitor compliance and give advice on the implementation of the EMPr and not to enforce compliance. Ensuring compliance is the responsibility of the Principal Agent and the SHE Officer.

CONTRACTOR

The Contractor must:

- Be fully conversant with the EMPr;
- Provide information on previous environmental management experience and company environmental policy in terms of the relevant forms contained in the Contract Document.
- Supply method statements timeously for all activities requiring special attention as specified and / or requested by the Project Manager, Environmental Officer and/or Engineer during the duration of the Contract.
- Be conversant with the requirements of this environmental specification/ EMPr. Brief all his/ her staff about the requirements of the environmental specification;
- Comply with requirements of the Environmental 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 project, 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.
- Ensure that he informs the Engineer timeously of any foreseeable activities which will require input from the Environmental Officer.

The Contractor will conduct all activities in a manner that minimizes disturbance to the natural environment as well as directly affected residents and the public in general.

4.2. TRAINING AND ENVIRONMENTAL AWARENESS

It is important to ensure that the Contractor has the appropriate level of environmental awareness and competence to ensure continued environmental due diligence and ongoing minimisation of environmental harm. Training needs should be identified based on the available and existing capacity of site personnel (including the contractors and sub-contractors) to undertake the required EMPr management actions and monitoring activities. It is vital that all personnel are adequately trained to perform their designated tasks to an acceptable standard.

The environmental training is aimed at:

- promoting environmental awareness;
- informing the contractor of all environmental procedures, policies and programmes applicable;
- providing generic training on the implementation of environmental management specifications; and
- providing job-specific environmental training in order to understand the key environmental features of the construction site and the surrounding environment.

Training will be done in a verbal format. The training will be a once-off event. In addition to training, general environmental awareness must be fostered among the project's workforce to encourage the implementation of environmentally sound practices throughout its duration. This ensures that environmental accidents are minimised and environmental compliance maximized.

In addition to training, prior to commencement of the construction phase, training must also be carried out during the operational phase. Training during this phase must focus on all operational aspects of the facilities. This must include thorough training on emergency and incident management. The Ugu Incident Management Protocol (Appendix H) must be read by all relevant staff and employees, including casual employees. They are to familiarise themselves with what constitutes a pollution emergency protocol and the procedures to be followed when an emergency arises. All employees must be fully conversant on all aspects of their plants, in conjunction with this EMPr.

4.3. EMPr COMPLIANCE MONITORING

Cognisance must be taken of the National Environmental Management Act, Act No. 107 of 1998 (S.28). In terms of these acts those responsible for environmental damage must pay the repair costs, both to the environment and human health, and implement preventative measures, to reduce or prevent further pollution and or environmental damage. Compliance with all other applicable legislation is required.

Environmental monitoring is the continuous evaluation of the status of the environment and condition of environmental elements. Its purpose is to detect change that takes place in the environment over time and involves the measuring of physical, social and economic variables associated with development impacts. Monitoring will be undertaken by the Applicant, Permits and/or Licenses as per licensing conditions and

relevant authority requirements. The ECO shall audit the site for compliance with the monitoring specifications / requirements.

In this regard, monitoring measures stipulated in this document pertain to, but are not restricted to:

- Wastewater treatment
- Erosion control
- Waste management
- Rehabilitation of disturbed areas

Environmental auditing is the process of comparing the impacts predicted with those that have actually occurred during implementation. Performance audits will ensure that the monitoring was correctly undertaken and that compliance was achieved.

The ESO shall monitor the works on a day to day basis and shall report any problems in terms of adherence with the EMPr directly to the Engineer and ECO.

Environmental Inspections and Audits shall be undertaken by the ECO with the assistance of the ESO on a monthly basis during the Construction Phase. The ESO shall have all necessary documentation available during the audits. The results of these audits will be included in EMPr Compliance Reports to be submitted to the municipality, the consulting engineers and the appointed contractor.

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

- There is evidence of contravention of clauses within the boundaries of the site and wetlands;
- Environmental damage ensues due to negligence;
- The Contractor ignores or fails to comply with corrective or other instructions issued by the Project Manager or Engineer within a specified time; and
- The Contractor fails to respond adequately to complaints from the public.

Application of a penalty clause will apply for incidents of non-compliance (See Section 4.5 for details).

4.4. COMPLIANCE REPORTING PROCEDURES

Identifying, recording and reporting complaints and environmental incidents further ensures the monitoring and auditing of environmental compliance and assessment of performance against the actual and perceived environmental aspects and impacts on site.

4.4.1. DOCUMENTATION

The following documentation must be kept on site in order to record compliance with the EMPr:

- Record of Complaints
- Non-conformance Reports
- Written Corrective Action Instructions
- Notification of Emergencies and Incidents.

The following inspection sheet and report templates are recommended and included in Appendices B-E respectively.

- Project Start Up Inspection Sheet
- Routine Site Inspection Sheet
- Construction Site Decommissioning Inspection Sheet
- Site Inspection Report Structure

4.4.2. COMPLAINT RECORDS

The Contractor must record any complaints received. The lodged complaint must be brought to the attention of the ECO/PM who will respond accordingly. The following information will be recorded:

- *Details of complainant*
- *Time, date and nature of the complaint*
- *Response and investigation undertaken*
- *Actions taken and by whom*

The complaints must be communicated to the Site Manager and ECO who will respond accordingly. An investigation must ensue and a response to the complainant must be provided within seven working days.

All environmental incidents occurring on the site will be recorded by the Contractor / ECO and submitted to the PM and copied to the EDTEA. The following information will be documented:

- *Time, date, location and nature of the incident*
- *Actions taken and by whom*
- *Response to complainant*
- *Close Out.*

The ECO, in conjunction with the Engineer and Contractor, will identify and authorise remediation action where necessary.

The following additional information may be added to the complaints and incident records:

- *Party/parties responsible for causing complaint/incident*
- *Additional corrective or remedial action taken and/or to be taken to address and to prevent reoccurrence of the complaint/incident*
- *Timeframes and the parties responsible for the implementation of the corrective or remedial actions*
- *Procedures to be undertaken and/or penalties to be applied if corrective or remedial actions are not implemented*
- *Copies of all correspondence received regarding complaints/incidents*

As mentioned, EMPr compliance is the responsibility of all the parties that make up the project team. Similarly all these parties have a role to play in EMPr compliance monitoring and reporting in accordance with the authority structure. For example, sub-contractors must monitor their own compliance and report any discrepancies, non-compliances or incidents to the contractor, while the contractor must in turn monitor the sub-contractor compliance. In turn, the ESO must monitor the Contractor's EMPr compliance on a day-to-day basis while the ECO has the role to undertake regular site inspections and audits and prepare audit reports.

The above records will form an integral part of the Contractors' Records. These records will be kept with the EMPr, and will be made available for scrutiny if so requested by the Client or Project Manager.

Outlined below are steps relating to increasing severity of environmental problems, which will be implemented. The principle is to keep as many issues within the first few steps as possible.

• **Step 1**

The ECO discusses the problem with the contractor or guilty party, and they work out a solution together. The ECO records the discussion and the solution implemented.

• **Step 2**

The ECO or Ugu District Municipality observes a more serious infringement, and notifies the guilty party in writing, with a deadline by which the problem must be rectified. All costs will be borne by the contractor.

• **Step 3**

The ECO shall order the contractor to suspend part, or all, of the works. The suspension will be enforced until such time as the offending party/parties, procedure or equipment is corrected and/or remedial measures put in place if required. No extension of time will be granted for such delays and all cost will be borne by the contractor.

• Step 4

Breach of contract - One of the possible consequences of this is the removal of a contractor and/or equipment from the site and/or the termination of the contract, whether a construction contract or an employment contract. Such measures will not replace any legal proceedings that Ugu District Municipality may institute against the contractor.

4.5. NON-COMPLIANCE, PENALTIES AND 'SUSPENDED WORK' ORDERS

The Engineer, in consultation or on the advice of the ECO, shall issue penalties ('spot fines') if the Contractor infringes environmental specifications set out in this EMP. The Contractor shall be advised in writing of the nature of the infringement and the amount of the spot fine. The Contractor shall be liable for the fine and it is his responsibility to recover the fine from the relevant employee. The Contractor shall also take the necessary steps (e.g. training) to prevent a recurrence of the infringement.

The Contractor is also advised that the imposition of spot fines does not replace any legal proceedings the authorities, landowners and/or members of the public may institute against the Contractor. Spot fines shall be between R100.00 and R20 000.00, depending upon the severity of the infringement. A list of typical EMP non-compliance incidents for which penalties may incur and associated fine value is included in Appendix F. For each subsequent similar offence, the penalty may, at the discretion of the Engineer or ECO be doubled in value to the maximum value to be determined by the Engineer and ECO.

This list may be amended provided it is formally issued to the Contractor prior to an incident for which a penalty is imposed. The decision on when to impose a penalty will be at the discretion of the Engineer or ECO and will be final. In addition to the spot fine, the Contractor shall be required to make good any damage caused as a result of the infringement at his own expense.

4.5.1. LIST OF INFRINGEMENTS THAT RESULT IN SPOT-FINES

A preliminary list of infringements for which spot fines can be imposed is as follows:

- Using any areas outside the working areas without permission
- Clearing and/or levelling areas outside of the working areas
- Spillage onto the ground or water bodies of oil, diesel, etc.
- Picking/damaging plant material
- Damaging/killing animals/birds
- Untidiness and litter at camp
- Inappropriate use of bins and poor waste management on site
- Making fires on site
- Discharging effluent and/or storm water onto the ground or into surface water
- Repeated contravention of the specifications or failure to comply with instructions
- Additional fines as determined by the ECO and added to this list
- Damage to any identified heritage sites.

A more comprehensive list of incidents and associated penalty values is provided in Appendix E. The Engineer shall retain records for spot fines issued. Monies for the spot fines will be deducted from the Contractor's monthly certificate. The penalty imposed will be per incident. Unless otherwise stated in the project specification, the penalties imposed per incident or violation will be a set amount.

The Engineer at his own discretion, or on recommendation from the ECO, may also order the Contractor to place on hold or suspend part or all the works if the Contractor repeatedly causes damage to the environment by not adhering to the EMP (i.e. more than 3 cases of infringements). The suspension will be enforced until such time as the offending actions, procedure or equipment is corrected. No extension of time will be granted for such delays and all costs will be borne by the Contractor. Work may also be placed on hold if a heritage artefact or feature or grave is uncovered or to prevent a potential significant incident from occurring or spreading.

4.6. METHOD STATEMENTS

Method Statements indicate how the Contractor will achieve compliance with environmental legislation, good management practice and the Environmental Specifications during the construction phase. Method Statements may be required for any identified specific activity or group of activities for which it is considered necessary to implement a detailed method to mitigate potential environmental impacts. In addition to the Method Statements identified in this EMP, the Contractor, Engineer and/or ECO may require additional Method Statements for effective environmental management and as the project unfolds.

4.6.1. PROCEDURES AND CONTENT

The Contractor shall submit written Method Statement to the Engineer for approval, and shall only implement a Method Statement once he has received the Engineer's approval in writing. On receipt of a Method Statement the Engineer shall forward a copy thereof to the ECO. Both the Engineer and ECO shall review the Method Statement and come to an agreement as to whether the Method Statement is acceptable or requires amendments.

The Method Statement shall state clearly:

- Timing of activities
- Materials to be used
- Equipment and staffing requirements
- Proposed construction procedure designed to implement the relevant environmental specifications
- The system to be implemented to ensure compliance with the above
- Other information deemed necessary by the Contractor, Engineer and/or ECO.

The Method Statement shall be submitted at least 14 working days prior to the projected commencement of work on an activity, to allow the Engineer and ECO time to study and approve the Method Statement. The Engineer shall strive to review and approve the Method Statement within 7 working days of receipt thereof.

Once a Method Statement is approved it is binding and the Contractor must therefore ensure that all activities to which the approved Method Statement applies are carried out accordingly.

Due to changing circumstances, it may be necessary to modify Method Statements. In such cases, the proposed modifications must be reviewed by the RE and ECO. The Contractor may only implement a revised Method Statement once he receives formal written approval from the RE to do so. The Contractor must also obtain approval from the RE for any deviation from a Method Statement.

The ECO and RE must retain records of any amendments to any Method Statement and ensure that the most current version of all Method Statements is being used.

4.6.2. REQUIRED METHOD STATEMENTS

Method Statements that are identified and required from the Contractor in terms of this EMP may cover, for example, the following activities:

- Location, layout and preparation of the construction camp(s) and materials storage areas
- Location, layout and preparation of cement/concrete batching facilities including the methods employed for the mixing of concrete and the management of runoff water from such areas
- Storm water management plan
- Contaminated water management plan, including the containment of runoff and polluted water
- Incidence Response Method Statements (including details of methods for fuel spills and clean-up operations)
- Solid waste management and removal of waste from site
- Traffic diversions (only to be done in consultation with Ugu Traffic Authority).

As mentioned, additional Method Statements may be identified and required by the Contractor, Engineer and/or ECO as the project unfolds.

4.7. AUDITING AND REVIEW

Annual internal environmental audits of this EMPr are advised. This is to ensure that the EMP is implemented and allows for ongoing impacts to be tracked so that the effectiveness of the mitigation can be measured. Recommendations arising from these audits must be implemented by Operations. External audits must be determined by Operations.

This EMPr and all associated risks associated with the operating activities is to be reviewed every 3-5 years in consultation with the SHEQ Co-ordinator. This period is to be confirmed, and must be decided upon by Operations. The EMPr should be reviewed in case of changes to the process and following new infrastructure development, such as infrastructure upgrade/operational treatment processes have changed or at least every 3-5 years (whichever of these comes first).

4.8. LIMITATIONS AND ASSUMPTIONS REGARDING ASSESSMENT AND MITIGATING OF IMPACTS

The assumption is that all significant issues have been identified during the development of the EMPr.

Environmental issues, concerns and development constraints were identified using professional judgement, project information, experience of similar projects, a review of available literature, site visits and consultation with the Client and authorities.

The significance of environmental issues was evaluated and mitigation and management measures were identified as part of the EMPr development.

The effectiveness of the EMPr is limited by the level of adherence to the conditions set forth in this report by the Applicant and the various contractors and agents acting on behalf of the Applicant.

It is further assumed that compliance with the EMPr will be monitored and audited on a regular basis as set out in the EMPr. It should also be noted that this EMPr is a dynamic document that should be continually updated, as and when required. Also, the Ugu District Municipality Incident Management Protocol and the WRC Wastewater Risk Abatement Plan must be referred to in addition to this EMPr. The Incident Management Protocol sets out procedures to be followed in the event of an emergency which may result in, or increase the risk of septic tank effluent, discharge or disposal of effluent or sewer or Community Waste Management System effluent to the environment.

5. SUMMARY OF ACTIVITIES AND ASPECTS CAUSING IMPACTS

The current operational and proposed construction of WTW and WWTW can potentially result in negative impacts on the receiving environment. These potentially significant negative impacts have been identified and summarised by the Environmental Assessment Practitioner (EAP).

Site layout and design
Energy
Storm water
Safety and security
Activities close to sensitive areas
Erosion
Water pollution
Wetland impacts
Alien vegetation
Waste management
Wastewater/effluent disposal
Noise, dust and odours
Irresponsible role-players

The above-mentioned aspects can potentially cause negative impacts that may occur during the planning, construction, operational or decommissioning phases of the proposed project:

In order to prevent and/or minimise these impacts, care must be taken with, *inter alia*, the disposal of waste, spillage, storage, noise and dust control, selection of sites, preservation and re-establishment of indigenous vegetation, sediment management, the demarcation of sensitive areas and management of the different phases of construction and operation. This can be achieved by effective implementation of the necessary mitigation measures as stipulated in this EMPr. With adequate management, the associated risks and significant negative impacts of the proposed project can be minimized and/or entirely negated. These will all be dealt with in this EMPr.

6. STATUS QUO

Ugu District Municipality currently caters to all its water and sanitation needs via 18 WTWs and 21 WWTWs. This section provides information on the current status of these sites, drawn from 2012 Blue and Green Drop Assessments, and site visits.

6.1. Blue Drop and Green Drop Findings

During the 2012 Blue Drop Assessment Ugu District Municipality achieved 92.55% with 3 of the systems awarded with a Blue Drop. Two of the three Blue Drops were obtained where Umgeni Water acted as the bulk water services provider.

The Ugu District Municipality has shown commendable improvement across the majority of systems, which is acknowledged with a **municipal Green Drop score of 73.91%**. The municipality was well represented at the assessments with operational staff from each WWTW and the maintenance team in attendance to provide site specific information. Officials demonstrated good team work and a willingness to engage on issues where compliance could be improved. The municipality is congratulated on achieving **Green Drop Certification** status for Red Desert.

A good framework has been developed to promote continual improvement in compliance with the Green Drop criteria. Better use of the results of the operational and compliance sampling programme would facilitate the optimal operation of each WWTW in accordance with design specifications and promote improved treatment performance. Information should be made available timeously to the operational staff. The municipality is encouraged to verify the classification of their WWTWs and review the availability of process controller skills at the respective plants.

W₂RAPs are in place and include the following planning elements: institutional, monitoring, maintenance, and procurement – each with roles and responsibilities, stakeholders, Gantt chart. Generic action plan addresses the collector system, treatment plant, sludge management and disposal. Plan includes mitigation actions, responsibility, deadline and budget. The W₂RAP are not signed off by the top management. The success of the risk awareness is already evident with 17 of 20 WWTWs in low or moderate risk positions. Two (2) plants reside in **high risk** space (Murchison Hospital and Melville).

The Regulator is of opinion that Ugu holds potential to be on par with the top performers in the Province, and could achieve such with support and active involvement by senior management. Ugu is advised to focus in particular on remedying the effluent quality of the high-capacity plants (Umbango, Umzinto and Uvongo), in order to raise the Green Drop score >80% in GWSA 2014/15.

Green Drop findings:

1. Seven (7) of 20 treatment plants exceed hydraulic design capacity, which compromises effluent quality and result in overload of the plant equipment
2. One (1) of 20 systems was not assessed as result of lack of information and uncertainty regarding the status of the plant. Ugu to note the comment above.
3. Zero (0) of the treatment plants complied to effluent quality requirements – this is the most critical contributing factor that prevented Ugu from reaching an overall GD score of >80%
4. The majority of plants do not comply with Regulation 17, technical skills
5. The majority of medium term plans did not have sufficient budget or workplans to inform implementation
6. Inspection reports lacking on sewer networks
7. A number of plants do not analyse for the full spectrum of constituents, as per basic CRR analysis and/or per authorised requirement
8. The majority of systems do not comply with KPA 7.1 requirement (relating to design Capacity).

6.2. Site Visit

A number of sites of specific importance were identified early on in the project by talking to relevant authorities as well as consulting the GIS Maps of the sites. They are the sites which tend to have the most environmental requirements. A site visit was conducted by Mr. Kushela Naidoo, Mrs. Hantie Plomp and Ms. Felicity Swanepoel on the 16th of October 2013 and followed by subsequent visits. Managers at the sites as well as workers were spoken to in order to recognise where the problem areas lay and where the system

was working well. The site visits gave Triplo4 valuable information on site specific aspects and focus areas for the generic EMP.

Issues that were noted at the different sites visited are listed below:

1. Umtamvuna Water Works (30° 53' 36"S, 30° 08' 57"E)

- Storage and use of Hazardous substances (especially Chlorine);
- Alien Invasive Vegetation;
- Lack of Training & Awareness on General Environmental Aspects;
- No knowledge or site of environmental authorisations;
- Lack of Personal Protective Equipment (PPE) and safety procedures;
- Lack of spill kits;
- Diesel bowser: management of potential pollution (valve was left open);
- Material storage;
- Waste disposal, including fluorescent lighting;
- Environmental Incidents recording and reporting.

2. Umtamvuna Pump Station (30° 53' 41"S, 30° 07' 07"E)

- Preservation of wetlands and rivers;
- Safety equipment including fire extinguishers were outdated and maintenance period had expired;
- Lack of alien invasive plant control;
- No records of PCB verification;
- Procedures for waste management, including Oils and maintenance;
- Environmental Incidents recording and reporting.

3. Palm Beach Waste Water Treatment Works (30° 57' 57"S, 30° 16' 26"E)

- Poor storm water management resulting in overflows and pollution;
- Occurrence of erosion;
- Significant overflow of sewage resulting in major pollution and health hazards;
- Removal and disposal of waste products including dried sludge;
- Security of the site, gates left open and unattended;
- Alien invasive plant control;
- Very poor house-keeping – area is overgrown;
- Environmental Incidents recording and reporting.
- Disposal of waste from the site including screenings and sewage sludge disposed to Municipal skips;
- Lack of proof of environmental authorisations, sludge classification, monitoring.

4. Gamalakhe Waste Water Treatment Works (30° 48' 46"S, 30° 20' 29"E)

- Ablution facilities on site need upgrading;
- Safety equipment is not available to staff;
- Oxygen and emergency equipment is out of date and needs replacing and to be placed at appropriate locations;
- Lack of alien invasive plant control;
- Major breakdown over extended period;
- Environmental Incidents recording and reporting;
- Disposal of waste generated on the site;
- Lack of monitoring of environmental parameters;
- Legal documentation could not be produced.

6.3. Photographic Evidence

Below is photographic evidence of the findings:

	
Alien Invasive plant species need attention on all sites that were visited.	Marijuana plants growing on the sites should be removed.
	
A petrol bowser used for the generator seems to be well bunded.	On a closer inspection it can be seen that the valve for the bunded area has been left open and therefore if a spillage had to occur the bunded area will be of no use.
	
All fire extinguishers seen on site needed servicing.	Here it can be seen that the date of the next service has expired.
	
Chlorine rooms on sites were lacking in ventilation and adequate signage.	Safety gear and equipment in case of an emergency was also absent.

	
Litter on the sites needs to be better maintained.	Litter can be seen strewn on all sites.
	
Sewage overflows onto the grass at this site and in to the River during times of heavy rainfall.	This overflow pipe releases itself onto the grass below where it then washes into the river.
	
Before entering the treatment plant the solid waste materials are removed by this sieve.	The waste which is removed is placed in this skip and taken to a landfill site.
	
Access to the Treatment works is not secure and gates can be seen left open and unattended.	Easy access from the river can be gained to the site by use of an open gate. There are often children playing in this area which becomes a serious safety hazard.

6.4. Limitations

Information was sourced from outdated reports and the site visits were conducted shortly after appointment (October 2013). More intensive and current assessments of all WTWs and WWTWs need to be conducted. These assessments need to incorporate technical and financial data to give a better understanding of the problems occurring at the various sites.

7. BENEFITS OF IMPLEMENTING THIS EMPr

7.1. Benefits to the Municipality

Implementation of this EMPr and the mitigation measures herein will benefit Ugu Municipality by identifying current and potential problems, providing measures to mitigate these problems and ultimately identify sites that require immediate attention.

From an economic perspective, identifying and mitigating problems occurring at each of the sites will lead to huge savings in the long term. Take for example, the eradication of invasive plant species. Although implementing a rigorous removal programme will be costly the Municipality, it will also mean that, in future, invasive plants will not be as extensive as they are now, requiring much less in terms of cost for maintaining invasive-free sites.

Having limited and secure to site will prevent unauthorised access to the site, which will lead to reduced cases of vandalism and theft. This, in turn, will lead to reduced costs for the clean-up and replacement of stolen equipment.

This EMPr will be a binding document on all contractors working on water- and sanitation-related projects within the Municipality. Contractors will be working with best practice guidelines. This will greatly enhance the calibre of work and environmental management on all sites.

Implementing this EMPr will result in long-term savings for the Municipality, and these savings can be used towards improving and expanding service delivery throughout Ugu District Municipality.

7.2. Benefits to the Community

Implementation of this EMPr will decrease the likelihood of incidents, such as overflows and spills, occurring. This will result in considerable savings for the Municipality, as well as no negative effects from the spillages, such as health risks. Incident will be managed with least impact to the receiving environment and its surrounding community.

The costs of repairing damages or replacing stolen equipment can be directed towards service delivery which will greatly improve living conditions within the Municipality. Also, community opinion of the Municipality and its management will be greatly improved.

8. DETAILED ENVIRONMENTAL MANAGEMENT PROGRAMME

This Section provides environmental specifications that must be adhered to during construction, operational and decommissioning phases of the Ugu District Municipality's Water and Sanitation Projects. It is essential that all listed specifications are considered and appropriately incorporated into the planning, design and/or contract documentation, and adhered to during the respective phases of the project.

The listed environmental specifications should be regarded as the minimum range of environmental constraints, controls, procedures and/or standards. They should not be regarded as exhaustive and therefore improvements and/or amendments should be made where reasonable and required.

Such requirements may be identified by stakeholders and/or other interested and affected parties, upon which the EMPr and the relevant environmental specifications may require revision. Environmental specifications have been listed in tables in the sub-sections as per the following phases:

- Operational phase
- Construction phase
- Decommissioning phase

For each specification the responsible monitoring party/parties is indicated.

This section has been compiled using the following sources:

Arcus GIBB (2010); DWA and WRC (2010); EIMS (2011); PEP (2011); PPC (2011); RHDHV (2012); South African National Parks (no date); MSA (2013); Ugu District Municipality (2012); Ugu District Municipality (2011); Umgeni Water (2012); Umgeni Water (2015) and WRC (2006).

WASTEWATER TREATMENT WORKS OPERATION

TREATMENT STAGE

Inflow sewage enters treatment plant and is thereafter transported through screening and grit removal processes. Flow is then transported to aeration chambers for bacterial treatment, to the clarifier for removal of suspended solids, to the chlorine contact tank for disinfection. The sludge collected from these processes is deposited onto drying beds to allow for drainage. Treated effluent is then channelled through a gravity pipe and discharged into the sea.

INLET HEAD WORKS AND SCREENING CHAMBER

The inlet head works receive inflow sewer from the pump station. The inlet works are equipped with standard stainless steel screens as well as hand rakes for the removal of debris which collects on the screens. The flow is split into three receiving channels of the grit chamber in the adjoining stage. Measurements include sludge quantities and records include the dates of removal of the sludge.

ENVIRONMENTAL ASPECT	MEASURES AND ACTION PLAN	TIMEFRAME	RESPONSIBILITY
Flooding or broken manhole covers cause an ingress of storm water into pipelines	Manholes must be designed to be above flood level.	Daily	Plant Supervisor ECO
	Monitor flow measurements		
	Implement storm water management		
High flows of industrial effluent caused by deliberate pollution or lack of pre-treatment	Consult by-laws on industrial effluent		
	Monitor flow measurements and COD		
	Conduct industrial effluent study		
Blockages and overflows caused by high flows or dumping of objects in pipes	Conduct regular maintenance		
	Monitor operations records to determine whether blockages or overflows are expected		
	Implement jetting programs		

GRIT CHAMBER

The grit chamber is divided into three compartments to allow for the favourable hydraulic conditions for the removal of silt and other heavy sediments in the sewer. The three chambers are used interchangeably and simultaneously to cater for the variations in the hydraulic loading and ease of maintenance such as the removal of silt as per schedule

ENVIRONMENTAL ASPECT	MEASURES AND ACTION PLAN	TIMEFRAME	RESPONSIBILITY
Ineffectual or unsafe disposal of screenings and	Use of sludge drying beds	Daily	

grit due to lack of clarity on the disposal and lack of equipment	Consult operations records		Plant Supervisor
	Designation of sludge disposal sites		

FLOW MEASUREMENT

There are three inflows into the plant and each of them is measured using a digital meter which covers the trend over the 24hour period. The total inflow coming into the plant can be verified by balancing the flow measurements from the collector pump stations.

ENVIRONMENAL ASPECT	MEASURES AND ACTION PLAN	TIMEFRAME	RESPONSIBILITY
Flow and load variations that exceed design capacity caused by changing weather patterns or catchment activities	Maintain an effective flow measurement and implement flow balancing	Daily	Plant Supervisor
	Monitor flow measurements		
	Process control training		

ACTIVATED SLUDGE SYSTEMS/AERATORS

The flow from the grit chambers is then split in three ways as it enters the aeration chambers. The aeration allows for the rapid growth of bacteria and subsequently the formation of settleable solids. Measurements include MLSS, COD, pH, NH3, and NO3. The running hours of the pumps are also measured to inform the maintenance schedule.

ENVIRONMENAL ASPECT	MEASURES AND ACTION PLAN	TIMEFRAME	RESPONSIBILITY
High concentration of microbial concentration caused by the malfunction of the aerators	Effective maintenance and inspections	Daily	Plant Supervisor
	Monitor free chlorine concentrations		
	Planned maintenance schedule		

CLARIFIER

The flow from the aerators is transferred into the clarifier for the removal of suspended solids. The sludge is withdrawn periodically as per the operational plan while scum is also removed from the water surface. Maintenance plan targets the gearbox at the centre of the manhole as well as general removal of sludge in the overflow chambers.

ENVIRONMENAL ASPECT	MEASURES AND ACTION PLAN	TIMEFRAME	RESPONSIBILITY
Septic conditions can promote filamentous growth, low DO on the influent to the aeration basin, can cause septic conditions to a digester or make it harder to dewater primary sludge and increase polymer demand.	Routinely check settleable solids in and out of clarifier, sludge moisture, sludge pumping cycle and sludge blanket depth.	Daily	Plant Supervisor
	Weirs, skimmers, draw down tubes and rakes all need regular maintenance		

SLUDGE DRYING BEDS

The sludge which is collected from the process is deposited on sludge drying beds which have been designed to allow for drainage. Measurements and records include total solids, drying time per bed, thickness of sludge layer added, date of application and climatic conditions.

ENVIRONMENTAL ASPECT	MEASURES AND ACTION PLAN	TIMEFRAME	RESPONSIBILITY
Soil pollution at disposal sites due to high levels of pollutants	Apply shock treatment	Weekly	Plant Supervisor
	Sludge quality records		
	Implement soil monitoring program		
Washing away of sludge during rainy spell caused by pollution of water bodies by sludge	Ensure that there is run-off protection at both disposal and storage site	Monthly	
	Plant operations manual		
	Implement storm water management		

EFFLUENT DISCHARGE

Treated effluent from the plant is channelled through a gravity pipe and discharged into the sea. It should be noted that the effluent is also sampled and tested at this stage for compliance with DWS effluent quality standards.

ENVIRONMENTAL ASPECT	MEASURES AND ACTION PLAN	TIMEFRAME	RESPONSIBILITY
Poor quality effluent being discharged into stream caused by process failure or no quality control at various stages	Allow for shock treatment and return of effluent as well as testing before disposal	Daily	Plant Supervisor
	Quality monitoring records		
	Implement quality monitoring program		
Pollution at receiving rivers caused by high levels of pollutants in effluent	Test water quality upstream and downstream of receiving river	Daily	
	Quality monitoring records		
	Conduct effluent environmental impact studies		

INTEGRATED POND SYSTEMS

ENVIRONMENTAL ASPECT	MEASURES AND ACTION PLAN	TIMEFRAME	RESPONSIBILITY
Insufficient primary pond capacity leading to overloading due to poor design or excessive storm water ingress	Conduct regular plant audit to verify plant capacity	Daily	Plant Supervisor
	Monitor flow measurements		
	Implement flow balancing measures		
Ponds overgrown with reeds due to poor maintenance	Implement maintenance plans	Monthly	ECO
	Consult plant maintenance records		

	Planned maintenance and general housekeeping		
Excessive algal growth due to poor maintenance and process flaws	Implement algal control initiatives	Monthly	
	Conduct plant audits		
	Planned maintenance and housekeeping		
Animals and community entering the pond area can be caused by access violations by outsiders	Enforce access restrictions and inspect premises	Daily	
	Plant inspection records		
	Plant fencing and erect restrictive signage		

SEWAGE TRANSPORTATION AND PUMP STATIONS

ENVIRONMENTAL ASPECT	MEASURES AND ACTION PLAN	TIMEFRAME	RESPONSIBILITY
Blockages along conveyance pipes caused by poor designs or dumping of large objects into system. Backed-up effluent may burst pipes or find the first point of escape	Respond to all fault reports	Monthly	Plant Supervisor ECO
	Planned maintenance records		
	Implement jetting program		
Power failures due to normal or emergency work on power grid	Use VTS draw trucks	Daily	
	Consult operational records		
	Install standby generators		
Inadequate redundancy or standby pumps due to poor planning or design	Install standby equipment	Monthly	
	Planned maintenance records		
Level switches and controls are out of order caused by poor maintenance	Control centre telemetry monitoring	Daily	
	Telemetry audit reports		
	Routine maintenance and telemetry monitoring		
Baskets and screens not cleaned due to lack of resource planning	Regular inspections and ensure that the disposal method is formalized	Daily	
	Routine maintenance and inspection records		
	Conduct routine inspections		
Odour problems caused by not regularly cleaning works	Shock treatment	Daily	
	Routine operations records		
	Monitor retention times and process		

MAINTENANCE AND MANAGEMENT

WETLAND REHABILITATION

The presence of wetland soils and the importance of the channel as a functioning stream within the drainage network necessitate the mitigation against impacts that are likely to occur during the construction of pipelines, in order to protect the integrity of the immediate and downstream environment.

ENVIRONMENTAL ASPECT	MEASURES AND ACTION PLAN	TIMEFRAME	RESPONSIBILITY
Construction activities will detrimentally affect wetland habitats	Once construction is completed, implement the guidelines for the rehabilitation of disturbed wetland/riparian areas as detailed in Appendix G.	Post construction	ECO

WASTEWATER COLLECTION AND RETICULATION

Effective management of the wastewater collection has a number of benefits. By decreasing the potential for contamination by leakage from the reticulation system, health and environmental hazards can be reduced and consumer confidence can be upheld.

ENVIRONMENTAL ASPECT	MEASURES AND ACTION PLAN	TIMEFRAME	RESPONSIBILITY
Hazards and hazardous events that can have an impact on the collection and reticulation of wastewater and that should be taken into consideration as part of a hazard assessment include: • Sewage discharges due to – Leakages in the sewer reticulation system due to lack of maintenance or replacement of deteriorated infrastructure; – Damaging of the sewer reticulation system due to construction activity; – Human interference, in regards to abuse of materials discarded into sewers causing blockages, vandalism, etc. • Industrial discharges – uncontrolled and unknown discharge of chemicals into sewer system, for which the treatment plant may not be equipped or which can damage the reticulation system	Develop and implement an operations and maintenance reticulation plan, that includes infrastructure replacement, regular inspections and monitoring of the reticulation.	Annually	PM Plant Supervisor
	Ensure that planning regulations include ensuring that geographical and updated knowledge base of the location of sewer system is maintained and readily available to prevent damages to services.	Bi-annually	
	Ensure that data and information management systems are current, accurate and have appropriate functionality.	Bi-annually	
	Ensure that there is effective monitoring of industrial activities which have wastewater implications and adherence to their permitted activities / discharge quality	Monthly	

leading to leakages and blockages; – Chemical pollution into environment through leakages in the sewer reticulation system due to lack of maintenance. • Ingress of storm water or losses of potable water into sewer system • Through human error – Resulting in the unintentional cross-connection of wastewater or storm water pipes to the distribution system or through illegal or unauthorized connections.	Promote awareness in the community of the impact of human activity on wastewater system and potential hazard implications.	Bi-annually	
	Implementation of control measures for effective management of the collection and reticulation of wastewater must include: • Registration of chemicals use and potential discharge • Designated and limited use of certain chemicals; • Specific protective requirements (e.g., pre-treatment by removal of certain chemicals or dilution of wastewater generated by certain types of industries); • Control of human activities to prevent access to or vandalism of reticulation system and to reduce abuse of system (community awareness programmes identifying action and potentially resultant health & environmental reaction/hazard; • Land use planning procedures, use of planning and environmental regulations to regulate potential polluting developments and reduce damages to services by construction activity through prior knowledge of where the services are located; • Undertaking effective operations and maintenance activities, timeous replacement of old or aging infrastructure, regular inspection and monitoring of the conditions of and flow within the reticulation, i.e. blockages, leak detection programmes; • Diversion of local storm water flows; • Runoff interception; • Security to prevent tampering; • Implementing cross-connection devices; • Implementation of bylaws and control systems to discourage abuse of sewer systems; and • Integrated development planning, including spatial development plans, storm water management plans, water demand management plans, etc.	Weekly	
Further hazards and hazardous situations that can have an impact on sewer pump stations and that	Implementation of control measures for effective protection of sewer pump stations must include: • Ensuring working alarm and failure monitoring equipment, ready	Weekly	

should be taken into consideration as part of a hazard assessment include: • Human access / absence of exclusion areas; • Through human error – Inadequate health and safety precaution taken by staff at the treatment works ▪ Safety clothing ▪ Effective and adequate sanitary behavior, i.e. washing of hands, drinking from secure and sanitary facilities • Failure of alarms and monitoring equipment • Power failures Uncontrolled discharge from tankers along the reticulation system.	access to spares and back systems (i.e. power supply, spare pumps) • Routine checks and monitoring • Security from access by animals • Security to prevent unauthorized access and tampering		
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TREATMENT

Hazards may be introduced during treatment, or hazardous circumstances may allow contaminants to pass through treatment in significant concentrations, which is then released into the receiving environment as treated effluent.

ENVIRONMENTAL ASPECT	MEASURES AND ACTION PLAN	TIMEFRAME	RESPONSIBILITY
Examples of potential hazards and hazardous events that can have an impact on the performance of wastewater treatment include the following: • Flow and load variations that exceed their design limits • Ineffectual / unsafe disposal of screenings and grit • Inappropriate or insufficient treatment processes, including disinfection • Insufficient or inadequate maintenance,	Examples of generic treatment control measures include: • Use of approved water treatment chemicals and materials; • Control of water treatment chemicals; • Process controls; • Availability of backup systems; • Water treatment process optimization, including – chemical dosing – flow rate • Security to prevent unauthorized access and tampering.	Weekly	Plant Supervisor

i.e. lack of periodical desludging of settling tanks, fall railings, basic housekeeping, lack of regular condition inspection of equipment, motors, electrical units and infrastructure, etc. • Inadequate backup or support resources (infrastructure, financial, human resources) • Process control failure and malfunction or poor reliability of equipment • Use of unapproved or contaminated water treatment chemicals and materials • Chemical dosing failures • Inadequate mixing • Failure of alarms and monitoring equipment • Power failures or extended interruptions • Accidental and deliberate pollution • Natural disasters			
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SEWAGE COLLECTION AND PRELIMINARY TREATMENT

This component comprises of the safe transport of wastewater to a treatment facility, where removal of rags, sticks, floatables, grit and grease takes place that is likely to cause maintenance or operational problems with the treatment operations, processes and ancillary systems.

ENVIRONMENTAL ASPECT	MEASURES AND ACTION PLAN	TIMEFRAME	RESPONSIBILITY
Sewage transport and pump stations Common problems reported on sewage pump stations, which in could lead to hazardous situations, include: • Blockages • Power failures • Inadequate redundancy/standby on pumps	Replace existing systems with more appropriate and current materials, i.e. changing from the old clay and concrete piping to uPVC and AC piping.	Weekly	Engineer Plant Supervisor
	Ensuring availability of backup power generation (generators, battery operated lights, solar panels etc., at the critical components, due to unstable electricity supply.		
	Having standby equipment (pumps etc.) available to put into action when breakage of equipment or maintenance breaks prevents the main equipment from being in use.		

• Pumps that are unsuitable for sewerage - certain types of pumps give chronic problems • Level switches and controls are out of order • Baskets and screens are not cleaned • Odour problems.			
Screenings removal The removal of screenings is typically achieved through either manual coarse and fine screens or mechanical screens, or a combination of screens. These screenings represent a biohazard and must be disposed in a responsible manner, without risk to the environment or threat to public health.	Regular inspections to ensure that screenings are being removed reliably and effectively from the influent wastewater, if not, they can impact on the performance of down-stream processes and in the final effluent, which could lead to a hazardous situation. Ensure that the disposal method of the screenings and grit have been formalised as a procedure, where necessary registered and permitted (i.e. burial, incineration, etc.), are being applied, are appropriate to the specific location and that adequate safety precautions such as restricted access, etc. are put in place. Ensure that medical waste and other classified waste is discharged at classified sites suitable for hazardous material intake and processing.	Weekly	Plant Supervisor
Grit removal The removal of grit and detritus is achieved either manually using grit channels or using vortex grit tanks with mechanical equipment. Similar to screenings it has a biohazard potential and the grit/detritus must be disposed without risk to the environment or threat to public health. Ineffectual grit removal can cause operational problems in downstream processes by: • Shortening the life of mechanical equipment such as pumps • Accumulating in downstream unit processes, decreasing their efficiency	Regular inspections to ensure that grit is being removed reliably and effectively from the influent wastewater, this includes checking that grit removal pumps and associated grit separation equipment are functioning and maintained. Ensure that the disposal method of the screenings and grit have been formalised as a procedure, where necessary registered and permitted (i.e. burial, incineration etc.), are being applied, are appropriate to the specific location and that adequate safety precautions such as restricted access, etc. are put in place.	Weekly	Plant Supervisor
Flow measurement Flow measurement forms a critical element of	Instituting effective stock-on hand and stock control procedures, by ensuring that critical replacement equipment is kept in stock and replaced when taken	Weekly	Plant Supervisor

the system. Continuous flow measurement assists in the planning for daily peaks and, in conjunction with the water quality data can be used to calculate the plant load and corresponding discharge loads. Ineffectual or non-existent flow measurements lead to potential hazards as the lack of, or incorrect flow information may lead to ineffectual management of the treatment process. This may result in insufficient treatment or overloading conditions causing failure of the treatment process. Common problems relating to ineffectual flow measurement are due to: • Removal of flow sensors and electronic counters and delays in replacing • Vandalism • Lack of calibration of meters • Lack of maintenance of flow sensors • Lack of trained skilled process controllers to execute flow measurements	from stock, rather than obtaining items once they are broken.		
	Restricted access.		
	Regular maintenance schedules including the calibration of meters.		
	Development of sites rosters and flow measurement schedules.		
	Training of process controllers to take and record readings and feed into management systems.		

PRIMARY TREATMENT

This component comprises of the removal of a portion of the suspended solids and organic matter, with or without chemical addition or filtration.

ENVIRONMENTAL ASPECT	MEASURES AND ACTION PLAN	TIMEFRAME	RESPONSIBILITY
Flow balancing Although not necessarily required at all WWTW, wastewater flow balancing can assist in dealing with peak flow/load conditions and optimization of the treatment efficiency. The hazard potential existing in the situation where flow balancing is required but not available, relates to the overloading of the system and thus ineffectual	Maintaining effective flow measurement and record keeping to determine the extent and need for flow balancing.	Weekly	Engineer
	Developing control procedures for dealing with situations of temporary overloading, temporary diversions to secure attenuating holding facilities, i.e. tanks, etc.	Bi-annually	Plant Supervisor

treatment or even severe cases spillage/overflowing, which creates an immediate health hazard.			
Primary Settling Most of the potential for hazardous situation with primary settling tanks would relate to the infrastructural condition of the settling tanks	Institute effective preventative maintenance programmes. Operational requirements such as routine de-sludging and optimal flow division amongst the available structures.	Weekly	Plant Supervisor
Ponds (Primary ponds) Some plants make use of a pond system for primary wastewater treatment either followed by an integrated pond treatment system or secondary treatment systems. Poor preliminary treatment (specifically screenings removal), poor operations (no facility to remove sludge) and sometimes poor maintenance are some of the basic problems, which impact the effectiveness of the treatment process.	Screenings should be removed before the wastewater enters the primary pond • Instituting sludge removal procedures on a periodical basis and ensuring that removed sludge is disposed of responsibly and safely (Refer to section 2.5 of WRC Wastewater Risk Abatement Plan for details on sludge management and disposal). • Developing effective maintenance procedures and schedules.	Weekly	Plant Supervisor

SECONDARY TREATMENT

This component relates to the removal of biodegradable organic matter, suspended solids and nutrients (nitrogen, phosphorus). Disinfection may also be included in the definition of conventional secondary treatment.

ENVIRONMENTAL ASPECT	MEASURES AND ACTION PLAN	TIMEFRAME	RESPONSIBILITY
Biofilters (Trickling Filters) Trickling filters are robust secondary treatment systems and have been widely used in South Africa. The problems experienced by trickling filters mainly relate to distribution failure (poor flow distribution), equipment failure (poor condition of rotating distribution arms), blockages, leakages, and short circuiting. Clogging of the filters may also occur under certain conditions, significantly reducing the efficiency of the filters.	Developing effective maintenance methods which include but are not limited to flushing surface media, removing weeds and debris, cleaning and adjusting distribution arms and turning over of the surface media with hand tools.	Monthly	Plant Supervisor
	Developing effective procedures for de-commissioning and re-commissioning, to ensure safe operation, which include work permit and lockout procedures	Annually	PM Engineer ECO Plant Supervisor

Activated sludge Strict guidelines and conditions control the management and disposal of sludge as this technology constitute a biohazard through the sewerage borne micro-organisms (pathogens). Ineffectiveness of activated sludge (AS) systems are of linked to the following common problems: • Poor competency of operational staff on the plant • Mechanical aerators and mixers are not in working order • Return activated sludge pumps are out of order • Clarifiers are not operated adequately to achieve solids separation; • Sludge withdrawal for RAS (return AS) and WAS (waste AS) is not according to schedules; • Reactor mixed liquor solids concentration (Mixed liquor suspended solids - MLSS) is too low or too high; • Activated sludge reactors are oversized / undersized; • Process configuration are not correctly applied or executed according to design and wastewater characteristics (food: microorganism ratios); • Excessive foam and scum formation; and • Industrial loads, in particular shock loads, impacting on activated sludge performance.	Management of the process rather than specific hazard related control measures would include ensuring that all personnel are adequately trained, accredited and competent, in line with the requirements of the legislation.	Monthly	Plant Supervisor ECO ESO
	Clearly demarcating the sludge disposal areas and ensure that restrictive access is maintained.		
	Set up procedures for continuous groundwater and surface water monitoring, as well as soil condition monitoring at various soil depths		
	Ensure effective erosion control measures, where necessary		
	Ensure sound management practices at the disposal site to regulate disposal		
	Do not allow disposal on sandy soils, and ensure that disposal is at a safe distance from water bodies etc.		
	Nitrogen should be considered in the guideline for sludge disposal because it poses a bigger threat than the metals		
	Guidelines should be set for DLD specifically. (Refer to section 2.5 of WRC Wastewater Risk Abatement Plan for details on sludge management and disposal).		
Integrated pond systems	Develop effective maintenance procedures and schedules and ensure that		

Common problems associated with integrated ponds systems which lead to ineffective treatment and thus poses a hazard risk are: • Inadequate screenings removal • Overloading • Insufficient primary pond capacity with inconvenient or inadequate sludge removal • Floating aerators not working, due to age or lack of maintenance • Leaking ponds and unlined ponds causing seepage into ground water • The ponds not maintained (overgrown with reeds, etc.) • Animals and the neighbouring community have access to the ponds • Excessive algal growth, impacting the effluent quality exiting from the pond	they are implemented.	Weekly	Plant Supervisor
	Lining of ponds to prevent contamination of groundwater and surface run-off.		
	Effective and safe sludge removal.		
	Basic housekeeping and care for terrain.		
	Restricted access.		

TERTIARY TREATMENT

This component relates to the removal of residual suspended solids (after secondary treatment), usually by granular medium filtration or microscreens. Nutrient removal may also occur under this definition. Disinfection is typically part of tertiary treatment. Maturation ponds or wetland systems may also reside under this section due to its 'final polishing' functionality.

ENVIRONMENTAL ASPECT	MEASURES AND ACTION PLAN	TIMEFRAME	RESPONSIBILITY
Chlorination The poor performance of chlorine disinfection poses a serious hazard risk as this process typically acts as the final barrier between the plant and downstream water users. Inadequate disinfection constitutes a direct threat to public health. Disinfection problems and potential hazards related to chlorination	Develop and implement stringent control mechanism and procedure regarding the use of chlorine and preferable not using gaseous chlorine systems.		Engineer
	Review of system design and management processes to ensure that system design is effective and safe, specifically if there are changing circumstances in terms of operational requirements and receiving influent quality. At minimum the system should be reviewed on an annual basis.		Plant Supervisor
	Developing effective maintenance procedures and schedules and ensure that they are implemented.		ESO

include: - Chlorine gas cylinders are empty and are not replaced, stand-by cylinders for exchange is not held in stock; - HTH is used to replace the chlorine gas dosing system, but is not regularly replaced/replenished; - Over and under dosing of chlorine gas; - Chlorine system design and installation is flawed; - Chlorine dosing is done on partially- or poorly treated wastewater and released directly into a stream; - Chlorination equipment is removed or by-passed; and - Chlorine contact tanks are partially filled with sludge. - Incorrectly designed chlorination building, inappropriate or non-functioning ventilation systems, emergency showers etc.	Ensuring that the implementation of regular sampling and testing to measure the effectiveness of chlorination. Sampling and testing procedures are known and prescribed, but are not necessarily implemented.		
Maturation ponds Poor performance of maturation ponds could also constitute a threat to public health, if the ponds, specifically it they were intended to provide a degree of disinfection. Problems, which can lead to hazardous situations, include: - Unrestricted access by people and animals, due to lack of access control - Inadequate sludge removal causing maturation ponds to be partially filled with sludge - The maturation ponds are overgrown	Develop effective maintenance procedures (infrastructural, mechanical & electrical) and schedules and ensure that they are implemented; Effective and safe sludge removal. Basic housekeeping and care for terrain. Restricted access through fencing and education of surrounding community as to the health and safety dangers posed by accessing these areas. Ensuring effective retention time.		Engineer ESO Plant Supervisor

with vegetation			
Algal growth causes plant effluent quality compliance problems			

ADVANCED TREATMENT

Advanced treatment is defined as the additional treatment needed to remove suspended, colloidal and dissolved constituents remaining after conventional treatment. Treatment requirements are becoming more stringent as potential toxic and biologically active constituents are being limited. Often, existing secondary process units are being refitted and new advanced treatment facilities constructed to meet stricter standards and for reuse requirements or direct potable reuse applications.

ENVIRONMENTAL ASPECT	MEASURES AND ACTION PLAN	TIMEFRAME	RESPONSIBILITY
Advanced treatment may be associated with the following impacts: - Scaling and corrosion due to precipitation of inorganic salts - Sensitivity to effluent quality, e.g. high TSS or grease build up can plug treatment systems and result in high headlosses and inefficient operation - Disposal of concentrated waste streams from membrane processes - High competency of operational staff is required on the plant	Competent control and management of the process.	Monthly	Engineer ESO Plant Supervisor
	Ensure that all personnel are adequately trained, accredited and competent, in line with the requirements of the legislation.		
	Use of appropriate chemical and polymers to optimize treatment efficiency.		
	Advanced treatment options are effluent specific and pilot testing is a prerequisite to foresee and prevent possible problems.		

EFFLUENT RETURNED TO CATCHMENT

Most of the potential hazards relating to the discharge of effluent into the receiving resource environment, either through direct discharge or through irrigation, relate to ineffective treatment, which thus creates a hazard potential to either the downstream user of the river and or environment. The expected constituents that are being removed via the various process units include: suspended solids, biodegradable organics, nutrients (phosphorus, nitrogen or both), pathogens, colloidal and dissolved solids, volatile organic compounds and odours.

ENVIRONMENTAL ASPECT	MEASURES AND ACTION PLAN	TIMEFRAME	RESPONSIBILITY
Hazards may be introduced post-treatment, or hazardous circumstances may allow contaminants to enter the treated effluent. This is often linked to unsafe operating practices of	Monitor water quality upstream and downstream of discharge point, which would provide an indicator of potential contamination, when compared to the quality monitoring during and at the end of the process, just prior to discharge.	Weekly	ECO
	Use of natural barriers, such as wetland polishing, or sand filters, can assist in		ESO

locating sludge disposal, or stock piling of screenings to close to the discharge channel, allow for the potential re-infection of the treated water.	further improving effluent quality if necessary.		Plant Supervisor
	For irrigation with wastewater, controls measures could include: • Ensure that sampling and testing is taking place prior to use to ensure that it complies with the safety and legal requirements • Additional disinfection can take place prior to use, through inline chlorination of the irrigation system where necessary		

WASTEWATER RECLAMATION AND REUSE

The inclusion of planned water reclamation, recycling and reuse in water resource systems reflects the increasing scarcity of water sources to meet societal demands, technological advancement, increased public acceptance and improved understanding of public health risks. Concerns about potential health effects are slowly being outweighed by plans and technologies that cater for reuse beyond agriculture and landscape irrigation, groundwater recharge for repelling saltwater intrusion and non-potable industrial uses.

ENVIRONMENTAL ASPECT	MEASURES AND ACTION PLAN	TIMEFRAME	RESPONSIBILITY
Hazards associate with wastewater reuse are numerous and need to be controlled effectively: • Surface and groundwater contamination of not controlled; • Marketability of crops and public acceptance • Public health concerns related to pathogen transmission, especially enteric viruses; • Constituents related to scaling, corrosion, biological growth and fouling; • For most developing countries, the presence of intestinal nematodes (Ascaris, Tricuris, hookworms); • Cross-connection of potable and reclaimed water lines; and • Toxicity organic chemicals in reclaimed water.	Water quality guidelines for the specific reuse categories, whereby each category have suggested levels of treatment, minimum reclaimed water quality, water monitoring and setback distances.	Bi-annually	PM
	Implement regulations or strategies that encourage responsible reuse as alternative water resource and water conservation, but with primary focus on public health.		Engineer
	Accept that the practice of using reclaimed wastewater is not risk-free, and plan according to the risk applicable to the reuse application.		ECO
	Define the acceptable level of risk as per the regulatory agency responsible for health and environmental risk management and endorsement by the public as part of integrated water resource management.		ESO
	Avoid consumption of uncooked crops.		Plant Supervisor
	Optimize design of ponds system to include a series of pond systems with higher surface area.		
	Safety measures for non-potable reuse applications to include: • Separate storage and distribution systems for potable water • Use of color-coded pipes (normally purple) and labels to distinguish reclaimed water from potable water piping • Cross connection and back flow prevention devices • Periodic use of tracer dyes to detect occurrence of cross contamination		

	in potable supplies Irrigation during off hours to minimize human contact.		
MAINTENANCE ACTIVITIES			
Maintenance of the pipeline may be required during the operational phase.			
ENVIRONMENAL ASPECT	MEASURES AND ACTION PLAN	TIMEFRAME	RESPONSIBILITY
Maintenance activities may require power outages or water interruptions, which can cause inconveniences to affected communities	Any maintenance activities that require water interruptions must be undertaken at night when demand for water is low.	Ongoing	Plant Supervisor
EQUIPMENT			
ENVIRONMENAL ASPECT	MEASURES AND ACTION PLAN	TIMEFRAME	RESPONSIBILITY
Process control failure leading to failed treatment caused by the breakdown of equipment	Effective maintenance	Ongoing	Plant Supervisor
	Planned maintenance schedule		
Failure of alarms and monitoring equipment due to lack of maintenance or normal breakdown	Telemetry monitoring at control centre	Daily	
	Planned maintenance		
Power failures and extended interruptions caused by breakdowns or inadequate maintenance by electricity authority	Standby power generators	Daily	
	Periodically test all standby suppliers		
Accidental and deliberate pollution that may be caused by acts of arson, fraud and sabotage	Restricted access to treatment works	Daily	
	Monitor plant access records		
	Enforce by-laws and penalties		
Inadequate backup resources due to poor resource planning or design flaws	Design specifications and maintenance	Ongoing	
	Consult operations manual		
	Planned maintenance		

WATER TREATMENT WORKS OPERATION

CONVEYANCE SYSTEMS

PIPELINES AND SCOURING

ENVIRONMENTAL ASPECT	MEASURES AND ACTION PLAN	TIMEFRAME	RESPONSIBILITY
Rapid release of water from pipelines (Uncontrolled release of water to the environment) due to pipeline fracture/ erosion and theft of valves.	Telemetry reports with onsite inspections and investigations	Ongoing	Plant Supervisor
	Flow monitoring and onsite inspections/reports		
	Risk register		
	WQ and SASS monitoring and assessment during release as and when required prior, during and post release		
Release of water from pipelines (Controlled release of water to the environment)	Telemetry reports with onsite inspections and investigations		
	Flow monitoring and onsite inspections/reports		
	Risk register		
	WQ and SASS monitoring and assessment during release as and when required prior, during and post release		
Floods due to wash-away and raw-water Ingress. Rapid release of water from pipelines due to external impacts	Incidents and/or disaster management procedure- rehabilitation and remediation of incident reporting as per standard operational procedures		
	Insurance and disaster fund to ensure cost of rehabilitation is covered		

RESEVOIRS, PUMPSTATIONS AND SERVITUDES

ENVIRONMENTAL ASPECT	MEASURES AND ACTION PLAN	TIMEFRAME	RESPONSIBILITY
Unauthorised access to infrastructure and security concerns	Clear signage indicating private land and possible prosecution for unauthorised access	Ongoing	Plant Supervisor
	Routine inspections on site access and on infrastructure that are prone to vandalism and theft		

	If feasible, security guards must be present on all sites		
Maintenance and repair of damaged and vandalised infrastructure or equipment	Telemetry reports with onsite inspections and investigations		
	Reporting as per standard operational procedures		
	Flow monitoring and onsite inspections/reports		
	Risk register		
Vegetation invasion	Regular servitude and site maintenance		
	Grass cutting		
	Ongoing alien invasive vegetation removal programme		
Pumpstations	Record, monitor and evaluate		
	Incident report		

MAINTENANCE MATERIALS, STORAGE AND DISPOSAL

ENVIRONMENAL ASPECT	MEASURES AND ACTION PLAN	TIMEFRAME	RESPONSIBILITY
Spills and contamination from inadequate liquids (hydrocarbons and toxic waste) used during pipeline repairs	Incident record	Ongoing	Plant Supervisor
	Monthly SHEQ reports		
	Safe disposal certificates		
	Storage, control, removal and disposal/recycle (sort at source)		
Storage and usage of fire control and prevention equipment	Incident record		
	Monthly SHEQ reports		
	Safe disposal certificates		
	Storage, control, removal and disposal/recycle (sort at source)		
Corrosion from hydrochloric acid due to incorrect storage of chlorine	Chlorine compounds must never be stored together with organic material such as oil or grease, nor with flammables such diesel, paraffin or petrol		
	To avoid rapid decomposition, hypochlorite solutions must be kept at the lowest possible temperatures and exposure to direct sunlight must be avoided		
	Liquid chlorine containers must also be stored at the lowest practical temperature and away from any external heat source, including direct sunlight. If the chlorine containers are exposed to high temperatures, the chlorine will expand and eventually cause the container to rupture should the temperature rise too high. However, if chlorine containers are kept at temperatures of 10°C or less, the flow of chlorine will be sluggish and erratic. Ideally they should be stored and used at between 18°C and 25°C with this temperature being lower		

	than the chlorinator to avoid condensation in the chlorinator		
	The maximum chlorine abstraction rates of chlorine gas or liquid from containers must be observed at all times		
Accidental spills during handling of chlorine	When handling chlorine all necessary precautions must be taken and the required personal protective equipment must be worn at all times when working with connections to chlorine containers		
	Accidental spills or leaks must be contained and cleaned up using recommended methods in accordance with legal and safety requirements		
	Suppliers of chlorine products and chlorine dosing equipment can provide information on the safe handling of chlorine products and equipment		

CHEMICALS HANDLING

ENVIRONMENTAL ASPECT	MEASURES AND ACTION PLAN	TIMEFRAME	RESPONSIBILITY
Corrosion from hydrochloric acid due to incorrect storage of chlorine	Chlorine compounds must never be stored together with organic material such as oil or grease, nor with flammables such as diesel, paraffin or petrol	Ongoing	Plant Supervisor
	To avoid rapid decomposition, hypochlorite solutions must be kept at the lowest possible temperatures and exposure to direct sunlight must be avoided		
	Liquid chlorine containers must also be stored at the lowest practical temperature and away from any external heat source, including direct sunlight. If the chlorine containers are exposed to high temperatures, the chlorine will expand and eventually cause the container to rupture should the temperature rise too high. However, if chlorine containers are kept at temperatures of 10°C or less, the flow of chlorine will be sluggish and erratic. Ideally they should be stored and used at between 18°C and 25°C with this temperature being lower than the chlorinator to avoid condensation in the chlorinator		
	The maximum chlorine abstraction rates of chlorine gas or liquid from containers must be observed at all times		
Accidental spills during handling of chlorine	When handling chlorine all necessary precautions must be taken and the required personal protective equipment must be worn at all times when working with connections to chlorine containers		
	Accidental spills or leaks must be contained and cleaned up using recommended methods in accordance with legal and safety requirements		
	Suppliers of chlorine products and chlorine dosing equipment can provide		

	information on the safe handling of chlorine products and equipment		
Health risks from exposure to fluoride chemicals	Treatment plant operators must use proper handling techniques to avoid overexposure to fluoride chemicals		
	Dusts are a particular problem when sodium fluoride and sodium fluorosilicate are used		
	The use of PPE must be required when any fluoride chemical is handled or when maintenance on fluoridation equipment is performed		

SOLID WASTE

ENVIRONMENAL ASPECT	MEASURES AND ACTION PLAN	TIMEFRAME	RESPONSIBILITY
Solid waste disposal and removal during construction/replacement and repair	Monthly SHEQ reports	Ongoing	Plant Supervisor
	Safe disposal certificates		
	Storage, control, removal and disposal/recycle (sort at source)		
	Composting of organic waste		

ENVIRONMENAL ASPECT	MEASURES AND ACTION PLAN	TIMEFRAME	RESPONSIBILITY
Inlet chamber failure while transporting raw water from the Surge tank to the plant	Routine maintenance	Ongoing	Plant Supervisor
Inlet valve failure while transporting raw water from the Surge tank to the plant	Routine maintenance		
Cracks within splitter box	Planned maintenance		
Pipeline leak	Shut off valve at raw water source off-take		
	Planned maintenance, flow meters for monitoring (at the inlet of the plant)		
	Strainer to prevent inlet flow meter damage		
	Community reporting/involvement		
Leakage from abstraction impoundment	Planned maintenance		

PRE-TREATMENT, PRE-OXIDATION & MIXING

ENVIRONMENAL ASPECT	MEASURES AND ACTION PLAN	TIMEFRAME	RESPONSIBILITY
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Odour generation from pre-chlorination process	Monitoring	Ongoing	Plant Supervisor
Contamination of surrounding environment from accidental spillage from pre-chlorination process	Use of PPE		
	Accidental spills or leaks must be contained and cleaned up using recommended methods in accordance with legal and safety requirements		
Contamination of surrounding environment from accidental spillage from connecting and disconnecting of chlorine drums	Air quality must be monitored and waste taken to appropriate landfill		
Odour generation from accidental spillage from connecting and disconnecting of chlorine drums	Air quality must be monitored and waste taken to appropriate landfill		
Contamination of surrounding environment from accidental spillage from bentonite dosing	Flow cut off switch		
	Planned maintenance		
Contamination of surrounding environment from accidental spillage from bentonite slurry makeup	Dust extractor		
	Planned maintenance		
Damage to pumps, valves or other mechanical equipment due to screens failure	Planned maintenance		
	Screenings normally consist of grass, weeds, wood, etc. and could be disposed of in landfills or could be burned.		

CLARIFICATION

ENVIRONMENTAL ASPECT	MEASURES AND ACTION PLAN	TIMEFRAME	RESPONSIBILITY
Excessive noise generation from clarifier operation	Procedures must be followed	Ongoing	Plant Supervisor
	Planned maintenance		
	Routine inspections		
Over-usage of electricity and generation of GHG emissions from operation of electrical machinery (pulley belts, drive shafts, vacuum fans, pumps, compressor)	Planned maintenance		
	Routine inspections		
	Air quality monitoring		
Water leakage due to cracks in clarifier walls	Structural inspections		
	Routine inspections		
Loss of control of water reticulation from pumps/valves	Risk register		
	Routine inspections		
Excessive noise generation from operation of compressors/blowers	Planned maintenance		
	Acoustic controls		

Accidental spillage from cleaning of clarifiers	Planned maintenance		
DISINFECTION			
ENVIRONMENAL ASPECT	MEASURES AND ACTION PLAN	TIMEFRAME	RESPONSIBILITY
Accidental spillage during the pre-chlorination process	Planned maintenance	Ongoing	Plant Supervisor
	Routine monitoring/inspections		
Accidental spillage from connecting and disconnecting of chlorine drums	Planned maintenance		
	Routine monitoring/inspections		
	Training use BA and PPE		
FILTRATION			
ENVIRONMENAL ASPECT	MEASURES AND ACTION PLAN	TIMEFRAME	RESPONSIBILITY
Water leakage during operation of rapid gravity filter beds	Planned maintenance	Ongoing	Plant Supervisor
	Monitoring/inspections		
CLEAR WELLS / RESEVOIRS			
ENVIRONMENAL ASPECT	MEASURES AND ACTION PLAN	TIMEFRAME	RESPONSIBILITY
Leakage/overflow from potable water reservoirs	Planned maintenance	Ongoing	Plant Supervisor
	Monitoring/inspections		
MACHINERY AND WORKSHOPS			
ENVIRONMENAL ASPECT	MEASURES AND ACTION PLAN	TIMEFRAME	RESPONSIBILITY
Excessive noise generation from operation of compressors	Planned maintenance	Ongoing	Plant Supervisor
Consumption of non-renewable resources from operation of compressors	Planned maintenance		
Release of GHG emissions from operation of compressors	Planned maintenance		
Consumption of non-renewable resources from	Planned maintenance		

operation of standby generator			
Release of GHG emissions from operation of compressors	Planned maintenance		
Accidental spills from servicing and re-fuelling of standby generators	Training		
Accidental spills from servicing of transformers	Specialized equipment		

WATER TREATMENT RESIDUE MANAGEMENT AND SLUDGE DISPOSAL

ENVIRONMENAL ASPECT	MEASURES AND ACTION PLAN	TIMEFRAME	RESPONSIBILITY
Accidental spills from centrifuge failure/process interruption	Planned maintenance	Ongoing	Plant Supervisor
Accidental spills from collection of centrifuged sludge	Follow procedures		
	Contractor management		
	Training		
Sludge production/accumulation due to accidental spills from dysfunctional de-sludge valves	Planned maintenance		
Accidental spills from cleaning of thin sludge tanks	Planned maintenance		
Accidental spills from cleaning of poly tank – Sludge Plant	Planned maintenance		
Accidental spills from cleaning of thick sludge holding tanks	Planned maintenance		
Odour generation from water treatment residue disposal sludge	Air quality must be monitored and waste taken to appropriate landfill		
	Monitoring		
Release of nutrients into fresh water during water treatment residue disposal sludge	Water Quality Monitoring		
	Risk Register		
Failure of embankment during water treatment residue disposal	SHE inspections checklist		
Eutrophication or reduced ecosystem functioning from accidental disposal to surrounding environment during water treatment	Water Quality and SASS 5 routine monitoring		

sludge disposal			
Eutrophication from algal scum	These residues must be disposed of in sludge lagoons, to an existing sewage works, or dumped on waste heaps		
	The dried algae can also be composted and then disposed of in landfill, etc.		
Pollution and contamination of surrounding environment from inappropriate discharge of chemical wastes into natural watercourses	It is good practice to clean the day holding tanks on a regular basis and the residues can be drained into the filter wash water/sludge system where it will find its way in the sludge lagoons		
	The residues must not be discharged in a natural watercourse as they could have a high pollution potential, for example slugs of the residues could change the pH conditions in small pools dramatically		
Pollution and contamination of surrounding environment from inappropriate disposal of rejects and concentrates	Rejects and concentrates must be disposed of in appropriate manner using appropriate disposal methods		
Contamination of surface and underground water sources waste regenerant from the ion exchange process	Great care must be exercised in the disposal of waste regenerant		
	Ensure approved waste disposal method must be followed		
Groundwater pollution from improper disposal of brines from desalination plant and wastes from reverse osmosis plant	Disposal of brines from seawater desalination can be discharged into the sea		
	Brackish water desalination disposal is normally done through evaporation from evaporation ponds		

WASTE AND EFFLUENT MANAGEMENT

ENVIRONMENTAL ASPECT	MEASURES AND ACTION PLAN	TIMEFRAME	RESPONSIBILITY
Contamination of surrounding environment and waste generation from disposal of used chemical bags	Chemical bags must be disposed of in the appropriate and approved manner	Ongoing	
Release of contaminants from discharge of effluent to surface water	Water Quality monitoring		Plant Supervisor
	Routine maintenance		
	Community reporting/involvement		

HOUSE KEEPING

ENVIRONMENTAL ASPECT	MEASURES AND ACTION PLAN	TIMEFRAME	RESPONSIBILITY
Accidental spills/discharge to the environment during housekeeping activities	Training	Ongoing	Plant Supervisor
	Awareness		
	Monitoring of contractor		
Consumption of non-renewable resource from housekeeping activities	Database tracking for usage		
	Training		
	Awareness		

ADMINISTRATION, ABLUTION AND VEHICLE FLEET

ENVIRONMENTAL ASPECT	MEASURES AND ACTION PLAN	TIMEFRAME	RESPONSIBILITY
Consumption of non-renewable resource from the use of electrically powered lights and office equipment	Database tracking for usage	Ongoing	Plant Supervisor
	Training		
	Awareness		
Release of GHG emissions from use of electrically powered lights and office equipment	Database tracking for usage		
	Training		
	Awareness		
Release of GHG emissions from use of air conditioning units	Database tracking for usage		
	Training		
	Awareness		
Generation of waste from use of paper, cardboard, plastic, glass, etc.	Database tracking for usage		
	Training		
	Awareness		
Generation of hazardous waste from use of printer cartridges	Database tracking for usage		
	Training		
	Awareness		
Generation of hazardous waste from use of batteries	Database tracking for usage		
	Training		
	Awareness		
Generation of hazardous waste from use of light bulbs	Database tracking for usage		
	Training		

	Awareness		
Generation of hazardous waste from discarding of IT equipment	Database tracking for usage		
	Training		
	Awareness		
Consumption of non-renewable resource from use of water in kitchens, toilets and hand basins	Database tracking for usage		
	Training		
	Awareness		
Release of effluent due to leakage from onsite septic tanks	Planned maintenance		
	SHE inspections		
Release of methane due to leakage from onsite septic tanks	Planned maintenance		
	SHE inspections		
Eutrophication and decreased ecosystem functioning due to release of nitrogen from leakage from onsite septic tanks	Planned maintenance		
	SHE inspections		
Consumption of non-renewable resource from operation of fleet vehicles	Planned maintenance		
	Database tracking		
Release of GHG emissions from operation of fleet vehicles	Planned maintenance		
	Database tracking		

CONSTRUCTION

PRE-CONSTRUCTION PHASE

The pre-construction or planning management plan is to be used as a guide during the planning, design and detailing of the development components. This part of the plan is to be referenced by all involved in decision making during the planning and design phases.

EMPr TRAINING

This is a critically important process and should be done thoroughly so that all staff and personnel entering the site understand that there is an EMPr and its implications. A signed record of all who attended this training should be kept. It is important to do this training in the person's language of choice and a translator should be used if needed.

ENVIRONMENTAL ASPECT	MEASURES AND ACTION PLAN	TIMEFRAME	RESPONSIBILITY
Personnel not trained in environmental awareness and compliance can pose significant risk in ensuring environmentally safe and sound construction practices.	The Contractor shall arrange for Environmental and Heritage Awareness Training programmes for the personnel on site, to the satisfaction of the Park Manager and ECO, and familiarise his/her/its employees with the contents of this EMP, either in written format or verbally.	Prior to construction	PM ESO ECO Contractor

CONTRACT AREAS

These are pre-determined and clearly demarcated areas under responsibility of the contractor during the construction period.

ENVIRONMENTAL ASPECT	MEASURES AND ACTION PLAN	TIMEFRAME	RESPONSIBILITY
Unconfined construction activities can lead to degradation of the surrounding natural environment	The ECO must indicate/point out to contractors the areas that they will have in their possession for the duration of the contract (this shall include access roads to be used, construction lay-down areas, materials storage and delivery requirements, contractors' offices, operational demarcation etc.).	Prior to construction	ECO ESO Contractor
	Aspects pertaining to temporary housing for persons involved in the project shall also be included.		
	A material delivery and storage area should be demarcated.		
	The facility must be planned and laid out in such a way that the total footprint area is minimised.		

TRAFFIC IMPACTS

Installation of pipelines within road reserves may require that one lane of a certain road be closed for the period of construction there. It should be noted that roads that have narrow areas with major bends can be dangerous during construction if traffic is not adequately controlled.

ENVIRONMENTAL ASPECT	MEASURES AND ACTION PLAN	TIMEFRAME	RESPONSIBILITY
Construction activities within, or in close proximity to, road reserves can negatively impact traffic flow	Provide a Method Statement that describes all construction access, route, traffic and transportation requirements and management.	Prior to construction	PM Engineer ECO Contractor
	Submit the Method Statement to the Engineer, ECO, and if required the Ugu Transport Authority, for their approval.		
	The planning of the construction programme must be cognisant of the traffic impacts.		
	Liaise with the Ugu Traffic Authority on envisaged traffic impacts.		
	Obtain approval from the Ugu Transport Authority for any traffic diversions or road closures.		
	Inform residents two weeks prior to construction of any proposed road Closures		
	Ensure that detours and appropriate signage are available for to traffic prior to closing and initiating construction.		

ROAD REHABILITATION

Portions of pipelines may be installed within the road itself. Construction within the road must be done in consultation with the Ugu Transport Authority.

ENVIRONMENTAL ASPECT	MEASURES AND ACTION PLAN	TIMEFRAME	RESPONSIBILITY
Poorly planned pipeline route alignments can lead significant damage of the road reserve and adjacent natural environment	Roads must be planned to deviate around significant trees and Red Data Species marked out in an approved manner by the ECO.	During planning	PM Contractor
	Obtain approval from the Ugu Transport Authority prior to any construction within the road itself.		
	Ensure that any road that has been excavated for pipeline installation is rebuilt to a standard that is in line with the initial condition of the road.		
	Prepare a Method Statement for the construction and post construction reconstruction of roads that have been excavated for the installation of the pipeline in consultation with eThekweni Transport Authority.		

SENSITIVE ECOLOGY

An ecological specialist must be consulted with regard to clearly delineating sensitive areas, and if required, an approach to continuing construction within these sensitive areas.

ENVIRONMENTAL ASPECT	MEASURES AND ACTION PLAN	TIMEFRAME	RESPONSIBILITY
The damage or destruction of ecologically sensitive areas can result in legal action and or severe fines imposed by the Environmental Authority	Prior to the commencement of construction, the proposed site/s and roads, must be inspected by the responsible Environmental Authority (where necessary)	During planning	ECO
	Confirm the absence of Red Data Book Species		ESO
	Relocate, demarcate or recommend conservation / preservation measures for any identified ecologically "sensitive" and/or protected species and areas		Contractor
	Point out and/or demarcate all ecologically "sensitive" areas to the contractors (e.g. red data habitats & species, rivers, streams, drainage lines, wetlands, sensitive soils, steep slopes and areas susceptible to erosion).		

VEGETATION CLEARING

An ecological specialist must be consulted with regard to determining what types of vegetation can be removed.

ENVIRONMENTAL ASPECT	MEASURES AND ACTION PLAN	TIMEFRAME	RESPONSIBILITY
Removal of "sensitive" or protected species can be damaging to the natural food chains in the area	The natural vegetation encountered on the site is to be conserved and left as intact as possible.	During planning	ECO
	Only trees and shrubs directly affected by the works, and such others as may be approved by the ECO in writing, may be felled or cleared.		ESO
	A firebreak shall be cleared and maintained around the perimeter of the site camp/s and office sites where necessary.		Contractor
	The extent of all construction site footprints will be minimised and limited to existing and / or already disturbed areas wherever possible.		
	The areas needing to be cleared and the degree of clearing required will be determined and demarcated in consultation with the ECO before clearing begins.		
	The Contractor may not deface, paint or otherwise mark and / or damage natural features / vegetation on the site, unless agreed beforehand with the ECO.		
	Any features / vegetation defaced by the Contractor will be restored to the		

	satisfaction of the ECO.		
	The ECO must be present during vegetation clearing.		

WETLAND DESIGN CONSIDERATIONS

Planning and pre-construction phases must take into account the proximity of construction activities to wetlands, and appropriately design site plans.

ENVIRONMENTAL ASPECT	MEASURES AND ACTION PLAN	TIMEFRAME	RESPONSIBILITY
Construction activities in close proximity to wetlands can have a significant impact on these wetlands	Ensure that the design of pipelines includes an appropriate concrete casing for the portion of the pipeline traversing the wetland. This casing must ensure protection from damage to the pipeline and associated requirements for repair.	During planning	PM
	A Method Statement for work across the wetland must be prepared and approved by Ugu Environmental Department prior to construction commencing.		ECO ESO

HERITAGE AREAS

A heritage specialist must be consulted with regard to identifying and clearly delineating sensitive heritage areas, and if required, an approach to continuing construction within these sensitive heritage areas.

ENVIRONMENTAL ASPECT	MEASURES AND ACTION PLAN	TIMEFRAME	RESPONSIBILITY
Archaeological and heritage sites are protected under law, and non-compliance can result in legal action or severe fines being imposed.	In known archaeological sensitive areas the South African Heritage Resources Agency (SAHRA) must inspect all above-mentioned contract areas.	During planning	ECO
	Confirm the absence of archaeological sites and/or artefacts.		ESO
	Relocate, demarcate or recommend further conservation / preservation actions and measures for any identified archaeologically “sensitive” area and/or artefacts prior to the commencing of any work at these sites.		Contractor
	Point out and/or demarcate all archaeologically “sensitive” areas to the contractors.		
	Historical and Archaeological Sites: If any artefact on site is uncovered, work in the immediate vicinity shall be stopped immediately.		
	The Contractor shall take reasonable precautions to prevent any person from removing or damaging any such article and shall immediately upon discovery thereof inform the ECO of such discovery.		

	The South African Heritage Resources Agency (SAHRA) or the National Monuments Council shall be contacted such that an archaeological consultant can be appointed to excavate and record the site.		
	Work may only resume once clearance is given in writing by the archaeologist.		
	No stones/rock or any material may be removed from any site in the park without approval by the ECO, and after confirmation that materials do not form part of a cultural site.		

SITE ESTABLISHMENT

Construction camps and staff accommodation facilities on the site will be required to be established in appropriate locations prior to the commencement of construction, preferably within already disturbed areas. After completion of the contract, these areas will be required to be rehabilitated.

ENVIRONMENTAL ASPECT	MEASURES AND ACTION PLAN	TIMEFRAME	RESPONSIBILITY
Sites that are not properly designed have significant impact on the surrounding environment	Before construction can begin, the Contractor shall submit a site layout plan to the ECO for approval.	During planning	ECO
	Site layout plan must include: • Site access (including entry and exit points). • All material and equipment storage areas (including storage areas for hazardous substances such as fuel and chemicals). • Construction offices and other structures. • Security requirements (including temporary and permanent fencing, and lighting) and accommodation areas for security staff. • Solid waste collection facilities and waste treatment facilities for litter, kitchen refuse, sewage and workshop-derived effluents. • Storm water control measures. • Provision of potable water and temporary ablution facilities. • Only designated areas may be used for the storage of materials, machinery, equipment and site offices.		ESO
	Site offices should not be sited in close proximity to steep areas, as this will increase soil erosion. Preferred locations would be disturbed areas along routes.		Contractor
	Offices (and in particular the ablution facilities, aggregate stockpiles, spoil areas and hazardous material stockpiles) must be located as far away as		

	possible from any watercourse.		
	Regardless of the chosen site, the Contractor's intended mitigation measures shall be indicated on the plan		
	Throughout the period of construction, the contractor shall restrict all activities to within the designated areas on the construction layout plan. Any relaxation or modification of the construction layout plan is to be approved by the ECO.		

SITE AND CONTRACTORS CAMP LAYOUT

A construction campsite will need to be established to accommodate piping and associated attachments. In addition, excavated material would need to be stockpiled adjacent to areas of construction.

ENVIRONMENTAL ASPECT	MEASURES AND ACTION PLAN	TIMEFRAME	RESPONSIBILITY
Construction camp layouts that infringe on ecologically sensitive areas can have negative impacts on these areas	Prepare a Method Statement for site camp delineation and site establishment layout and submit the Method Statement to the Engineer and ECO for their approval.	During planning	ESO Contractor
	Locate the campsite outside the 1:50 year floodline.		
	Locate all on-site hazardous substances storage areas and portable loos outside the 1:100 year floodline.		
	Locate all fuel and flammable substance storage facilities/areas at least 3.5m from building, boundaries and any other combustible or flammable materials, or any other distance which the Ugu Chief Fire Officer has specified or approved.		
	Take availability of public access and service delivery into account.		
	Identify and consider existing above and underground infrastructure in the site camp planning.		
	Plan for a construction site camp layout that would provide for effective and neat camp site management of all relevant contractor and subcontractor activities.		
	Keep the footprint of the site camp to a minimum to minimize environmental impacts.		
	Identify working and no-go areas. Working areas are those areas required by the contractor and his sub-contractors to construct the pipelines and treatment works. No-go areas are generally those large areas outside the		

	designated working areas that include for example existing services and infrastructure, private property, sensitive environments (e.g. wetland area) which should not to be affected by the project. Provide for the contractors' camp to be fully fenced and for site access to be controlled. Provide appropriate aesthetically pleasing visual screening of the campsite during construction. Include a site camp layout plan in the abovementioned Method Statement that illustrates the following: • Working and no-go areas • Survey of existing above and underground infrastructure • Perimeter fence • Visual screens • Access route and gates • Physical security measures • Dedicated material (including waste) lay-down and stockpile areas and stores • Dedicated ablution and other staff facilities • Effluent and storm water drainage and management system. The following restrictions or constraints should be placed on the site camp, and construction staff in general: • The use of rivers and streams for washing of clothes. • The use of welding equipment. • Indiscriminate disposal of rubbish or construction wastes or rubble. • Littering of the site. • Spillage of potential pollutants, such as petroleum products. • Collection of firewood. • Poaching of any description. • Use of surrounding veld as toilets. • Burning of wastes and cleared vegetation. • No concrete structures allowed, if the site camp is within protected areas.		
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SITE MONITORING, AUDITING AND NON-COMPLIANCE PENALTIES

The purpose of the EMPr is to prevent environmental impacts and minimise those which may occur during the various phases of development. Auditing is an essential component of the development process whereby activities on-site are monitored and audited to ensure compliance with the EMP.

ENVIRONMENTAL ASPECT	MEASURES AND ACTION PLAN	TIMEFRAME	RESPONSIBILITY
Non-compliance can lead to infringements that will not only negatively the natural environment, but will also incur penalties on the contractor	Report any EMPr non-compliance, environmental near-miss and/or incident to the PM immediately.	During construction	PM
	Monitor EMPr compliance and instruct the Contractor employees and Sub-contractors on any required corrective action to address non-compliances and mitigate environmental impact		ECO
	Non-compliance rectification must be commenced within one week of the PM receiving any incident reports.		ESO
	Non-compliance with an audit report can result in a fine by the DAEA or instruction to cease construction until the non-conformance is resolved.		Contractor
	Record the following information in the environmental incidents log: - Time, date and nature of the near-miss, incident and/or complaint - Type of communication (telephone, letter etc.). - Name, contact address and telephone number of the complainant or person who reported the issue. - Details of the environmental incident that occurred. - Response and investigation undertaken. - Actions taken and by whom.		
	Keep the following records and documentation on site at all times: - Environmental Authorisation (EA) issued for the project. - EMPr (latest approved version). - Method Statements (latest approved version). - Site daily diary. - Environmental near-miss and incidents log. - Complaints register. - Records of all remediation / rehabilitation activities. - Waste disposal consignment notes. - ECO inspection and audit reports.		
	Ensure that the documentation are signed by all relevant parties		

WATER INTERRUPTIONS

Scheduled/planned water interruptions may be expected during construction. However, water interruptions can also occur through accidental damage to water pipelines.

ENVIRONMENTAL ASPECT	MEASURES AND ACTION PLAN	TIMEFRAME	RESPONSIBILITY
Surrounding communities not timely notified of water interruptions (as a result of construction) may be adversely affected	Ensure that residents are informed on any scheduled water interruptions well in advance of such water interruptions.	During construction	PM
	Any accidental damage to operating water pipes during construction must be repaired immediately to ensure that the duration of water interruptions is kept minimal.		Engineer
	Should any accidental damage occur to existing reticulation water mains along the route or household connections during excavation, ensure that any water spills are immediately contained and that damaged pipes are repaired		Contractor
	Any proposed water interruptions must be advertised at least two weeks prior to interruptions occurring.		
	Interruptions must be planned to take place during nighttime when demand for water is low.		

PERMITS AND LICENSING

Permits or authorisations may be necessary from the Department of Water Affairs when working within a wetland or stream channel.

ENVIRONMENTAL ASPECT	MEASURES AND ACTION PLAN	TIMEFRAME	RESPONSIBILITY
Commencing construction activities without necessary authorisation can lead to legal action or stopping of a project	If necessary, obtain approvals/permits from the relevant authorities, e.g. the Department of Water Affairs and Department of Agriculture and Environmental Affairs, for the abstraction or diversion of water from the stream.	During planning	PM
	Provide a Method Statement for any required abstraction or diverting of water flows from the stream.		ECO
	Submit the Method Statement to the Engineer and ECO for their approval.		

WATER FOR HUMAN CONSUMPTION

Water must be provided for human consumption and use, this is done in order to avoid usage of water from natural water sources.

ENVIRONMENTAL ASPECT	MEASURES AND ACTION PLAN	TIMEFRAME	RESPONSIBILITY
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Abstraction of water from natural sources can lead to pollution or degradation of these water sources	Water for human consumption should be available at the site offices and at other convenient locations on site	During construction	ECO Contractor
	Under no circumstances must water from natural sources be used for human consumption or use.		

SEWAGE TREATMENT

Safe sanitation facilities must be provided for, and the consequent removal and treatment of sewage water must be planned.

ENVIRONMENTAL ASPECT	MEASURES AND ACTION PLAN	TIMEFRAME	RESPONSIBILITY
Sewage or wastewater disposed of in non-designated areas may enter and contaminate water sources	Sanitary arrangements should be to the satisfaction of the PM and ECO.	During construction	ECO ESO Contractor
	If no other ablution facilities are available, chemical toilets must be supplied (1 per 10 persons) and must be regularly cleaned and maintained by the contractor.		
	The positioning of the chemical toilets is to be done in consultation with the ECO.		
	The Contractor should arrange for regular emptying of toilets and will be entirely responsible for enforcing their use and for maintaining such latrines in a clean, orderly and sanitary condition to the satisfaction of the ECO.		
	If necessary, the ablution facilities must be screened from the public view.		
	In remote areas where chemical toilets may not be a viable option, agreement must be reached on alternatives before construction starts.		

COOKING FUEL

Cooking fuel must be provided to construction staff to ensure that natural materials are not harvested for fuel

ENVIRONMENTAL ASPECT	MEASURES AND ACTION PLAN	TIMEFRAME	RESPONSIBILITY
Collection of firewood or other natural materials for cooking fuel can damage ecologically sensitive areas	The Contractor shall provide adequate facilities for his staff so that they are not encouraged to supplement their comforts on site by accessing what can be taken from the natural surroundings.	During construction	ECO Contractor
	Collection of firewood is not permitted.		

WASTE MANAGEMENT

Waste management plans must be developed to ensure the regular collection and proper disposal of all waste generated at construction sites or from construction activities.

ENVIRONMENAL ASPECT	MEASURES AND ACTION PLAN	TIMEFRAME	RESPONSIBILITY
Waste generated at construction sites or from construction activities, and that is not disposed of in the prescribed manner can enter natural systems cause pollution or contamination of these systems	Solid waste shall be stored in an appointed area within the site camp in covered drums for collection and disposal.	During planning	ECO Contractor
	Disposal of solid waste shall be at an approved landfill site – this must be agreed to with the ECO.		
	Discharge of waste into the environment or burying of waste is strictly prohibited.		
	Remove all left-over construction materials (e.g. sand, cement, gravel) from the site at the end of each day.		
	Remove all construction debris, litter and domestic waste from the site and working areas and transfer to a permitted disposal site.		
	During the construction period, the facilities shall be maintained in a neat and tidy condition, and the site is to be kept free of litter.		
	At all places of work, the Contractor shall provide litter collection facilities for later safe disposal at approved waste disposal sites.		

SAFETY

Safety measures must be adhered to at all construction sites and at all times.

ENVIRONMENAL ASPECT	MEASURES AND ACTION PLAN	TIMEFRAME	RESPONSIBILITY
Safety measures and guidelines that are not adhered to may lead to injury or loss of life	All safety measures and regulations must be adhered to at all times	Daily	ECO Contractor
	All the necessary handling and safety equipment required for the safe use of petrochemicals and oils shall be provided by the Contractor to, and used or worn by the staff whose duty it is to manage and maintain the Contractor's and his subcontractor's and supplier's plant, machinery and equipment.		
	Contractor must comply with the Occupational Health and Safety Act (Act 85 of 1993) and Construction Regulations, 2003 as this governs what the contractor has to do/provide for his staff.		

HAZARDOUS MATERIAL STORAGE

All hazardous materials must be identified and stored in appropriate and safe containment facilities.

ENVIRONMENAL ASPECT	MEASURES AND ACTION PLAN	TIMEFRAME	RESPONSIBILITY
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Hazardous materials that are not appropriately confined may enter natural systems and cause pollution or contamination of natural sources	Petrochemicals, oils and identified hazardous substances shall only be stored under controlled conditions.	During planning	ECO Contractor
	All hazardous materials will be stored in a secured, appointed area that is fenced and has restricted entry.		
	Storage of hazardous products shall only take place using suitable containers approved by the ECO.		
	Hazard signs indicating the nature of the stored materials shall be displayed on the storage facility or containment structure.		

FUELS AND GAS STORAGE

Fuels and gases must be stored in appropriate storage containers and under their respective temperature conditions.

ENVIRONMENTAL ASPECT	MEASURES AND ACTION PLAN	TIMEFRAME	RESPONSIBILITY
Spillage or leakage can result in pollution or contamination of the natural environment	Fuel should be stored in a secure area in a steel tank supplied and maintained by the contractor according to safety procedures.	Daily	ECO Contractor
	Gas welding cylinders and LPG cylinders should be stored in a secure, well-ventilated area.		
	The contractor must supply sufficient firefighting equipment in event of an accident and strictly no smoking will be allowed where fuel is stored and used.		

WATER SUPPLY

Adequate water for construction activities must be provided for before construction commences.

ENVIRONMENTAL ASPECT	MEASURES AND ACTION PLAN	TIMEFRAME	RESPONSIBILITY
Water abstracted from natural sources and used for construction activities can lead to degradation of the water sources	Water supply pipelines will be according to contract specifications, following the most direct, yet most ecologically responsible route agreed to with the engineer and as per contract documentation.	During construction	ECO Contractor
	Point out to contractors where they can obtain water (e.g. water for mixing of cement as well as for drinking).		
	Contractors shall not make use of/collect water from any other source than those pointed out to them as suitable for use by them.		

LIQUID WASTE

Proper planning for liquid waste disposal and removal will prevent the natural environment from being contaminated.

ENVIRONMENTAL ASPECT	MEASURES AND ACTION PLAN	TIMEFRAME	RESPONSIBILITY
Poor planning of liquid waste disposal and removal can lead to leakages and overflows resulting in contamination or pollution of the natural environment	Under the General Authorisations in terms of Section 39 of the National Water Act (Act No. 36 of 1998), DWAF does not permit the construction of wastewater disposal sites (such as septic tank systems) within the 100 year flood line of any watercourse, or alternatively, within 100 metres of the edge of a water resource.	During planning	Authority
	The treatment and disposal of effluent will comply with all applicable legislation and the relevant permit regarding the disposal of purified effluent into the natural environment will have to be obtained from DWAF if so required during construction and operations.		PM
	The design, installation and operation of septic tanks and soak-aways will conform to Water Act, including all the regulations made under section 26 of the National Water Act.		ECO

CONSTRUCTION PHASE**VEHICULAR ACCESS AND MOVEMENT OF CONSTRUCTION VEHICLES**

All vehicles operation within the construction footprint must adhere to all safety and environmental measures.

ENVIRONMENTAL ASPECT	MEASURES AND ACTION PLAN	TIMEFRAME	RESPONSIBILITY
Construction vehicles can cause damage to vegetation and natural habitats	During construction, use should be made of existing access routes to construction areas where possible.	Daily	ECO
	Construct approved vehicle turning areas, avoiding selected ecological sensitive areas or species, and have turning area routes approved by the ECO.		Contractor
	Temporary access roads must be rehabilitated after usage as per prior agreement between the Land Owner and Contractor.		

ACCESS ROADS

Access roads must be designed to cause as minimal environmental degradation as possible.

ENVIRONMENTAL ASPECT	MEASURES AND ACTION PLAN	TIMEFRAME	RESPONSIBILITY
Vehicles that do not use authorised paths and roads risk damaging vegetation and destroying natural habitats	Construction staff may only use authorised paths and roads.	Daily	ECO Contractor
	The proclaimed speed limit must be strictly adhered to.		
	ECO will monitor the conduct of drivers and report any negative impact to the contractor immediately.		
	Construction roads must follow existing roads and tracks and should not be wider than necessary with a maximum width of 3 m. Should a wider road be required, this will require the approval of the ECO.		
	If two-way traffic movement is to take place, passing bays are to be used where specified by the ECO to prevent access / detours into the surrounding areas. The drivers delivering construction materials to site are to be made aware of this. They may not drive off the road in order to allow another vehicle to pass.		
	Continual use of dirt access roads by heavy machinery and increased transport loads means they will have to be carefully monitored and regularly graded as soon as potholes or rutting occurs.		
	Upon completion of the construction period, the Contractor will ensure that the access roads are returned to a state no worse than prior to construction commencing.		

MOVEMENT OF CONSTRUCTION PERSONNEL, LABOURERS AND EQUIPMENT

Movement of personnel, labourers and equipment must only occur within demarcated areas

ENVIRONMENTAL ASPECT	MEASURES AND ACTION PLAN	TIMEFRAME	RESPONSIBILITY
Movement outside of construction sites can lead to damage of vegetation	The Contractor must ensure that all construction personnel, labourers and equipment remain within the demarcated construction sites at all times.	Daily	ECO Contractor
	Where construction personnel and/or equipment wish to move outside the boundaries of the site, the contractor/ labourers must obtain permission from the ECO.		

PLANT SEARCH AND RESCUE

All sensitive species within the construction site must be identified and relocated by a specialist.

ENVIRONMENTAL ASPECT	MEASURES AND ACTION PLAN	TIMEFRAME	RESPONSIBILITY
Damage and destruction of sensitive species	Plant search and rescue (i.e. the location and removal of specified plant species, without unnecessary damage, and their transfer to a specified location) and the collection of seed, shall be conducted by the ECO prior to the onset of any site clearing operations, should the ecologist/ Scientific Services indicate this to be necessary.	Prior to construction	ECO
	Sensitive areas and/or species that have been selected for conservation by the ecologist / Scientific Services, Park Manager or ECO, shall be demarcated with danger tape. No activity shall take place at these areas.		ESO
	De-stumping shall only occur at the request of the ECO. Where roots can act as erosion protection, trees should be cut as close as possible to the ground level.		Contractor
	During the clearing of woody vegetation no basal cover or grass and topsoil shall be removed and damage to this layer shall be minimised as far as possible.		

VEGETATION REMOVAL AND TRIMMING IN WATERCOURSES

Vegetation removal and trimming must be done according to prescribed methods

ENVIRONMENTAL ASPECT	MEASURES AND ACTION PLAN	TIMEFRAME	RESPONSIBILITY
Improper methods of removal of vegetation can cause significant degradation of the removal site	No heavy machinery shall be permitted within watercourses for any purpose, except emergency procedures, without the prior approval of the ECO.	Prior to construction	ECO
	Clearing of vegetation shall be conducted by hand.		ESO
	All cleared and trimmed vegetation shall be removed from any watercourse to prevent flooding/snagging hazards being created.		Contractor

REHABILITATION

A detailed rehabilitation plan must be followed to ensure that the degraded areas are restored to their natural states.

ENVIRONMENTAL ASPECT	MEASURES AND ACTION PLAN	TIMEFRAME	RESPONSIBILITY
Areas that are not rehabilitated will not be able to support fauna and flora that were inhabitants of the area prior to	The PM, ECO, and Contractor must agree on rehabilitation of areas.	Post-construction	PM
	The Contractor shall be held responsible for rehabilitation for all areas disturbed during construction.		

construction	This includes, for example, service roads, stockpile areas, stop/go facilities, windrows and wherever material generated for, or from, road construction has to be stored temporarily or otherwise within the road reserve, or at designated or instructed areas outside the road reserve.		ECO Contractor
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PROTECTION OF FAUNA

All fauna must be protected from harm or mistreatment.

ENVIRONMENTAL ASPECT	MEASURES AND ACTION PLAN	TIMEFRAME	RESPONSIBILITY
Harming or killing fauna can result in dislocation of faunal communities or imbalances in the food chain	Under no circumstances shall any animals be handled, removed, killed or be interfered with by the Contractor, his employees, his subcontractors or his subcontractors' employees.	During construction	ESO
	The Contractor and his employees shall not bring any domesticated animals onto the site.		ECO
	The Contractor shall ensure that the work site be kept clean, tidy and free of rubbish that would attract animals.		Contractor
	No poaching of fauna and flora shall be tolerated by the Contractor or his personnel on site or elsewhere.		

SOIL MANAGEMENT

No unauthorised removal of topsoil must take place.

ENVIRONMENTAL ASPECT	MEASURES AND ACTION PLAN	TIMEFRAME	RESPONSIBILITY
The improper removal or degradation of topsoil will lead to infertile rehabilitation process	The Contractor is required to strip topsoil together with grass / groundcover from all areas where permanent or temporary structures are located, construction related activities occur, and access roads are to be constructed, etc. This must be read together with the contract specifications & conditions. Topsoil must be stockpiled for later use.	Prior to construction	ECO
	Topsoil is to be handled twice only - once to strip and stockpile, and secondly to replace, level, shape and scarify.		Contractor
	Topsoil stockpiles are not to exceed 1.5 m in height and should be protected to prevent erosion where needed.		
	Topsoil stockpiles are to be maintained in a weed free condition. The ECO can assist with guidance as to which plants are weeds and require removal.		

	Topsoil is to be replaced by direct return where feasible (i.e. replaced immediately on the area where construction is complete), rather than stockpiling it for extended periods.		
	With regard to spoil material, the location of spoil stockpile sites shall be agreed upon by the ECO prior to the onset of any operations that will generate spoil materials. No spoil material shall be dumped outside the defined site. The Contractor shall ensure that the material does not blow or wash away. If the spoil material is in danger of being washed or blown away, the contractor shall cover it with a suitable material, such as hessian or plastic.		

EROSION CONTROL

Measures must be implemented to control erosion as a result of construction activities

ENVIRONMENTAL ASPECT	MEASURES AND ACTION PLAN	TIMEFRAME	RESPONSIBILITY
Inadequate erosion control will lead to slope instability and silting if water courses	The Contractor shall protect all areas susceptible to erosion and shall take measures, to the approval of the ECO. The Contractor shall not allow erosion to develop on a large scale before effecting repairs and all erosion damage shall be repaired as soon as possible.	During construction	ECO ESO Contractor
	The specifics of erosion protection work will vary from situation to situation. These specifics should be cleared with the ECO and comply with the contract specifications.		
	Where required, cut-off trenches can be installed to divert substantial run-off and prevent erosion.		
	Areas susceptible to erosion must be protected by installing temporary or permanent drainage works and energy dispersion mechanisms and could include: • Vegetation, • Mitre drains (afleivore), • Benches (grondwalle), • Benches consisting of sandbags, • Packing branches and rocks in small gullies and disturbed areas.		
	Storm water drainage measures are required on site to control runoff and prevent erosion.		

SLOPE PROTECTION

Weak or vulnerable slopes must be protected and slope rehabilitation measures developed for degraded slopes.

ENVIRONMENTAL ASPECT	MEASURES AND ACTION PLAN	TIMEFRAME	RESPONSIBILITY
Slopes that are not protected can result in land mass slips or landslides	Cut and fill slopes shall be shaped and trimmed to approximate the natural condition and contours as closely as possible and, where possible, be undulating. Levels incongruous to the surrounding landscape shall be reshaped as per contract specifications.	Prior to construction	ECO Contractor
	Slopes that need protection shall be identified by the ECO and the specifications needed must be established using the latest approved methods and technology.		

RUN-OFF FROM CONSTRUCTION CAMPS

Run-off must be controlled, and diverted where necessary, to prevent contaminants reaching water sources.

ENVIRONMENTAL ASPECT	MEASURES AND ACTION PLAN	TIMEFRAME	RESPONSIBILITY
Uncontrolled runoff can transport contaminants to water sources	The Contractor must ensure that rainwater containing pollutants does not run-off into natural areas and thus result in a pollution threat.	During construction	ECO Contractor
	A drainage diversion system is to be installed to divert runoff from areas of potential pollution, e.g. batching area, vehicle maintenance area, workshops, chemical and fuel stores, etc.		

WORKING WITHIN A WETLAND OR STREAM CHANNEL

Installation of pipelines may proceed across channel; however this can only be done through the implementation of prescribed mitigation measures.

ENVIRONMENTAL ASPECT	MEASURES AND ACTION PLAN	TIMEFRAME	RESPONSIBILITY
Degradation of the wetland or stream channel is likely to occur if appropriate and environmentally sound construction activities are not implemented	Bury the pipeline at sufficient depth of at least 2m or more below the channel bed.	During construction	PM ECO Contractor
	The existing gabion barrier may be exploited to trap any sediment washing off the works area and to prevent scouring of the streamline in case of heavy flows and also to provide protection for the downstream section of the wetland, for almost the entire length of the Pipeline across the stream channel and stream banks.		
	Appoint a suitably qualified wetland specialist to oversee construction within the wetland and stream channel.		

DISTURBANCE OF WETLAND VEGETATION AND HABITAT

Construction activities must cause minimal disturbance to wetland habitats and vegetation.

ENVIRONMENTAL ASPECT	MEASURES AND ACTION PLAN	TIMEFRAME	RESPONSIBILITY
Construction activities can significantly impact on wetland habitats and vegetation	The construction zone must be clearly demarcated prior to the commencement of construction activities to ensure that activities do not unduly disturb the wetland/riparian zone	During construction	PM / Contractor / ECO / Appointed Wetland Specialist
	Minimise the width of the construction servitude across the wetland zone.		
	Areas to be cleared of vegetation must be demarcated.		
	Appoint a suitably qualified wetland specialist to identify indigenous wetland vegetation to be safely removed.		
	Once identified, indigenous wetland plant species requiring removal shall be removed appropriately with their root ball intact.		
	Wetland vegetation removed shall be stockpiled neatly on the periphery of the area being stripped, for use in wetland rehabilitation.		
	Stockpiled vegetation is to be properly demarcated such that it is not unnecessarily disturbed by construction activities.		
	Wetland vegetation should be placed in a shaded area or covered using an appropriate material and kept moist.		
	Any indigenous grasses may be retained for use in rehabilitation of the channel.		
	Where possible, cut vegetation to ground-level rather than removing completely, leaving root systems to ensure rapid re-colonisation.		

DISTURBANCE OF WETLAND SOILS AND ALTERATION OF WETLAND GEOMORPHOLOGY

Construction activities must cause minimal disturbance of wetland soils or alteration of wetland geomorphology

ENVIRONMENTAL ASPECT	MEASURES AND ACTION PLAN	TIMEFRAME	RESPONSIBILITY
Construction activities can significantly impact on wetland soils or alter wetland geomorphology	Minimise servitude width as far as possible within the wetland zone.	During construction	PM / Contractor / ECO
	Stockpile wetland topsoil (top 300mm) removed during construction separately from terrestrial soils.		
	Stockpiled wetland soil should be demarcated, kept free of weeds and is not to be compacted.		
	Wetland soils are to be handled twice only, firstly to strip and stockpile, and secondly to replace, level, shape and reinstate wetland vegetation.		

	Depending on timescales of construction, the stockpiled soil may need to be kept moist using some form of spray irrigation on a regular basis as appropriate and according to weather conditions.		
	Do not use wetland soils for construction purposes.		
	If standing water or saturated soils are present, or if construction equipment causes ruts or mixing of the topsoil and subsoil in wetlands, use low-groundweight construction equipment, or operate normal equipment on riprap or prefabricated equipment mats.		

ALTERATION OF HYDROLOGICAL FUNCTIONING OF THE WETLAND CHANNEL

Construction activities must cause minimal alteration to the hydrological functioning of the wetland channel.

ENVIRONMENTAL ASPECT	MEASURES AND ACTION PLAN	TIMEFRAME	RESPONSIBILITY
Construction activities can significantly impact on or alter the hydrological functioning of the wetland channel	Construction must not permanently alter the surface or subsurface flow of water through the wetland.	During construction	PM / Contractor / ECO
	Do not stockpile construction materials, including spoil material in wetland/riparian areas.		
	Fill and stabilise any artificial channels/erosion gullies initiated as a result of construction once pipeline installation is complete.		
	Construction should proceed mainly during the dry, winter months, when flows are low.		
	Bury the pipeline at a sufficient depth below the active stream channel to prevent exposure along the channel bed.		
	During trenching, divert flows around the section of trench being excavated, to reduce silt loads and ensure flows continue within the channel and to allow for continued ecological functioning of the stream during construction.		
	Under no circumstance should consideration be given to the excavation of an alternative channel or the damming of the stream in such a manner as to totally restrict the flow. Water diversion must be temporary and only one diversion made at a time.		
	An effective roughness element may need to be re-introduced by the fixing of large boulders on to the surface of the pipeline, in order to dissipate flow.		

POTENTIAL POLLUTION OF IMMEDIATE DOWNSTREAM ENVIRONMENT

Measures must be developed to prevent pollution of the immediate downstream environment

ENVIRONMENTAL ASPECT	MEASURES AND ACTION PLAN	TIMEFRAME	RESPONSIBILITY
Poorly monitored construction activities can cause pollution to the downstream environment	Remove and properly disposed of any contaminated soil from the construction site.	During construction	PM / Contractor / ECO / ESO
	Clean up spillages immediately and properly drain contaminants.		
	Implement a preventative maintenance system to ensure that work vehicles are maintained in an acceptable condition. This would involve routinely checking vehicles for leaks before construction begins and not allowing vehicles with significant leaks to operate or be repaired within the construction site.		
	Drip trays must be provided for all vehicle repairs.		
	The proper storage and handling of hazardous substances (fuels, chemicals and paints) must be administered.		
	Ensure that appropriate solid waste disposal facilities are provided onsite during construction and adequate signage is provided.		
	Clear and completely remove from site all general waste, constructional plant, equipment, surplus rock and other materials once construction has been completed. Collected waste must be disposed of at a registered landfill site.		

EROSION AND SEDIMENTATION FROM CONSTRUCTION ACTIVITIES

Erosion control measures must be developed to prevent on-site erosion and sedimentation of water sources

ENVIRONMENTAL ASPECT	MEASURES AND ACTION PLAN	TIMEFRAME	RESPONSIBILITY
Poorly managed construction activities can cause erosion or lead to sedimentation of water sources	Any erosion gullies/channels created during construction must be filled to ensure silt does not drain into the wetland.	During construction	PM / Contractor / ECO
	Do not place any spoil from the construction zone within the wetland.		
	Place excavated material in an up-slope direction so that storm flows are likely to wash the sediment into the trench, rather than directly into the wetland.		
	Place sandbags across the trench in any area where significant flow rates are expected.		
	Install sediment barriers/silt curtains along the edge of the pipeline trench as necessary to contain spoil and prevent sediment flow into the wetland. An appropriate silt trap could be in the form of a silt curtain or hay-bales placed end-to-end.		

	Dewater the trench in a manner that does not cause erosion and does not result in heavily silt-laden water flowing into any wetland area.		
	Ensure that the trench is adequately covered and soil pushed down to natural ground level to limit the potential of soil loss from the trench line once construction is complete.		
	Water discharged into the environment (e.g. from trench dewatering) must be done in a manner that is not conducive to erosion and does not result in heavily silt-laden water flowing into any wetland/river. One method could be to divert trench water through dense vegetation (to act as a filter) before re-entering the river.		
	Bare ground exposed after vegetation removal must be rehabilitated as soon as possible.		
	Construction should proceed mainly during the dry, winter months in order to minimize soil erosion linked to high runoff rates.		

INVASION BY EXOTIC PLANTS

Effective removal of invasive plants will ensure that indigenous vegetation will thrive after construction is complete.

ENVIRONMENTAL ASPECT	MEASURES AND ACTION PLAN	TIMEFRAME	RESPONSIBILITY
Ineffective control of invasive plants can lead to a disruption of sensitive habitats	Remove and effectively treat any alien plants in the construction zone during the pipeline construction and operational phase. The use of herbicides will require an investigation into the necessity, type to be used, effectiveness and impacts of the agent on aquatic biota.	Prior to construction	PM / Contractor / Appointed Wetland Specialist
	Where possible, cut rather than totally remove indigenous vegetation in the construction zone to facilitate more rapid re-colonization of disturbed areas.		

IMPACT ON STREAM MORPHOLOGY

Measures must be followed in order to minimise the impact of construction activities on stream morphology.

ENVIRONMENTAL ASPECT	MEASURES AND ACTION PLAN	TIMEFRAME	RESPONSIBILITY
Stream morphology may be altered as a result of construction activities	Re-directed flow must not be channelled towards stream banks to cause erosion.	During construction	PM /
	Construct any necessary erosion protection works where the pipeline intersects the macro-channel banks of the stream in order to prevent scouring or bank erosion.		

	Protection works to be considered include gabions, reno mattresses or other stabilising structures. Existing gabions within the stream channel can be exploited but may require upgrading to function properly.		Contractor
	River sediments/debris are not to be used for construction (eg. rocks for use in gabion baskets/reno mattresses) or to be permanently removed from the system. Removed sediment should be stockpiled for rehabilitation low the elevation of the channel bed.		
	Construction should occur during the winter months when flows are low.		

DISTURBANCE OF IN-STREAM HABITAT

In-stream habitats are sensitive and any intensive construction activities can damage these habitats

ENVIRONMENTAL ASPECT	MEASURES AND ACTION PLAN	TIMEFRAME	RESPONSIBILITY
Construction activities within in-stream habitats can damage or permanently degrade these habitats	No physical damage to any aspects of a watercourse (including the riverbed and banks) is permitted, other than those necessary to complete the works as specified.	During construction	PM / Contractor
	Ensure that construction activities are carefully monitored to limit the zone of impact on in-stream habitat.		
	Ensure the use of coffer dams/piped culverts and sand bags to re-direct flow and thus allow for a dry construction.		
	Riparian areas immediately downstream of the pipeline crossing must be appropriately protected. A layer of coarse immovable material could be used.		
	Store excavated soil and sediments away from the riparian zone.		
	Undertake the pipeline crossing work during low flow season to reduce the risk of high flow/flood impacts.		

ACCIDENTAL SPILLAGES

Accidental or unplanned spillages, both non-hazardous and hazardous, can have a significant impact on the environment and site operations if not properly contained and managed. Preparations for such events require clear and detailed procedures to minimise the potential for spillages and ensure maximum contamination prevention and effective clean-up.

ENVIRONMENTAL ASPECT	MEASURES AND ACTION PLAN	TIMEFRAME	RESPONSIBILITY
Accidental spillages can have a significant impact on the environment	All personnel must be well trained to work in the designated positions.	During construction	ESO
	Strict access rules should be applied to personnel entering the construction site.		
	All personnel should wear appropriate clothing.		

	Procedures must be put in place for clean-up and incidents to be reported.		Contractor
	Appropriate signage (e.g. no smoking) must be clearly displayed in the construction site.		
	The construction equipment must be regularly maintained as required to ensure that all the fittings and equipment are in good working condition.		

HAZARDOUS SUBSTANCES

The use of hazardous substances must only be managed and handled by trained or certified professionals.

ENVIRONMENTAL ASPECT	MEASURES AND ACTION PLAN	TIMEFRAME	RESPONSIBILITY
Improper handling or use of hazardous substances can lead to contamination of the natural environment	The Contractor must comply with all national, regional and local legislation with regard to the storage, transport, use and disposal of petroleum, chemical, harmful and hazardous substances and materials.	During construction	ECO
	The Contractor will furthermore be responsible for the training and education of all personnel on site who will be handling the material about its proper use, handling and disposal.		ESO
	The Contractor will be responsible for establishing an emergency procedure for dealing with spills or releases of petroleum.		Contractor
	Storage of all hazardous material is to be safe, tamper proof and under strict control.		
	Petroleum, chemical, harmful and hazardous waste throughout the site must be stored in appropriate, well maintained containers.		
	Exercise extreme care with the handling of diesel and other toxic solvents so that spillage is minimised.		
	Any accidental chemical / fuel spills to be corrected immediately.		
	Timber products should be treated off-site prior to use in construction.		
	Periodic on-site application of timber treatment products (for maintenance purposes) should take place with due care for the nature of the product (toxicity) and for potential spillages that may occur. Areas where timber is to be treated should have secondary containment measures instituted, such as the placement of a plastic layer (some form of covering) over soils, beneath the timber structures to prevent contamination of the soil surface.		
	The accidental or negligent spillage of any fuels or hazardous substances must be cleaned up immediately using the most appropriate methodologies, equipment and materials.		

	The Contractor must ensure that the necessary materials and equipment and chemicals are available on the site to deal with spills of any of the hazardous materials present (e.g. Drizit).		
	A "Clean-up Kit" containing suitable spillage clean-up equipment must be on-site at all times and used in the event of a spill.		
	The clean-up of spills and damage caused by a spill will be for the Contractors' account.		
	Any contaminated soil or water must be removed and stored appropriately until it can be disposed of at a permitted disposal site.		
	All spillages shall be reported to the PM and ECO in charge immediately so that appropriate clean-up measures can be implemented.		
	No spills may be hosed down into drains leading to wetlands/riparian areas.		

SPILLAGE OF OIL AND FUEL ON POROUS SURFACES

Measures must be developed to prevent spillages on porous surfaces.

ENVIRONMENTAL ASPECT	MEASURES AND ACTION PLAN	TIMEFRAME	RESPONSIBILITY
Spillage of oil and fuel on porous surfaces will allow these substances to seep into the ground and subsequently enter and contaminate water sources	The affected area must be scraped off to the depth of contamination.	During construction	ECO
	The contaminated soil must be handled as hazardous waste and stored and disposed of accordingly at a waste handling site where safe disposal certificates will be issued. Safe disposal certificates must be submitted to EWS.		ESO
	Removed contaminated soil must be replaced with clean top soil.		Contractor

SPILLAGE OF OIL AND FUEL ON HARD SURFACES

Measures must be followed to ensure that spillages on hard surfaces don't spread

ENVIRONMENTAL ASPECT	MEASURES AND ACTION PLAN	TIMEFRAME	RESPONSIBILITY
Spillage of oil and fuel on hard surfaces that are not efficiently mitigated will allow these substances to seep into the ground over time, and subsequently enter and contaminate water sources	Use must be made of a spill kit, Spill Sorb flakes or Spill Sorb sausage/bag to absorb and clean up any fuel or oil spills.	During construction	ECO
	Where spill kits or Spill Sorb are not available, an absorbent material such as sawdust or sand to absorb any fuel or oil spills must be used.		ESO
	All the absorbent material or sawdust must be swept together and disposed of into a heavy-duty plastic bag, skip or any suitable container. The heavy-duty plastic bags must be handled as hazardous waste and disposed of accordingly.		Contractor

	Areas where spillages have occurred can be cleaned using environmentally friendly products as a detergent (Dimol should NOT be used).		
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CONCRETE BATCHING

Concrete to be used in the construction has the potential to contaminate soil and groundwater.

ENVIRONMENTAL ASPECT	MEASURES AND ACTION PLAN	TIMEFRAME	RESPONSIBILITY
The storage, mixing and application of concrete all have the potential to contaminate the natural environment	Concrete foundations must be laid with minimal impact to the environment.	During construction	ESO Contractor
	Concrete mixing must only take place in a designated area approved by the ECO.		
	No concrete mixing will be allowed outside of the designated area or in the sugarcane fields.		
	Concrete trucks shall not be washed on site after depositing concrete into foundations.		
	Any spilled concrete shall be cleaned up immediately.		
	No mixed concrete shall be deposited directly onto the ground. A batter board or other suitable platform/mixing tray shall be provided onto which any mixed concrete can be deposited whilst it awaits placing.		
	Concrete spilled outside of the demarcated area must be promptly removed and taken to a permitted waste disposal site.		
	Wash water from cement must not be released into the environment. This water must be collected, stored and disposed of at an approved site.		
	Cement bags are to be considered "waste" and therefore stored and disposed of at a licensed waste disposal facility.		
	Small scale concrete mixing is to take place at a location approved by the EWS. Concrete mixing areas need to be concentrated so that the area of contamination is minimised.		
	Ad hoc concrete mixing at the active working area should be avoided wherever possible.		

CONSULTATION WITH I&APs

Interaction and consultation with IAPs during the construction is particularly significant to ensure immediate and efficient conflict resolution should activities on-site be reported to be impacting on IAPs

ENVIRONMENTAL ASPECT	MEASURES AND ACTION PLAN	TIMEFRAME	RESPONSIBILITY
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No consultation with IAPs will lead to conflicts	Open liaison channels should be established between Contractor, the developer and IAPs, including all residents along the alignment of the route of the pipeline.	During construction	ALL
	A complaints register must be maintained as per Section 6.5.		

EATING/BREAK AREAS

Labourers are permitted to take tea and lunch breaks.

ENVIRONMENTAL ASPECT	MEASURES AND ACTION PLAN	TIMEFRAME	RESPONSIBILITY
Labourers can potentially pollute their surroundings during breaks	Designate an area for staff and labourers to eat during breaks.	During construction	Contractor
	No fires will be allowed on site.		
	No littering of any areas with foil, lunch paper, plastic or glass bottles, etc.		
	Labourers must be made environmentally aware of their potential to pollute their surroundings during breaks		

FIRE PREVENTION AND CONTROL

Minimising the potential for fire-related accidents and explosions on-site, is important in protecting the safety of the workers.

ENVIRONMENTAL ASPECT	MEASURES AND ACTION PLAN	TIMEFRAME	RESPONSIBILITY
Construction sites are potential fire risks and fires originating here can spread to the adjacent natural environment	The Contractor must take all the necessary precautions to ensure that fires are not started as a result of activities on site.	During construction	ECO ESO Contractor
	No fuels or chemicals may be stored under trees.		
	Gas and liquid fuel may not be stored in the same storage area.		
	The Contractor must ensure that there is adequate fire-fighting equipment at the fuel stores.		
	No open fires for heating or cooking will be permitted on site, unless otherwise agreed and then only in designated areas.		
	The Contractor will supply all living quarters, site offices, kitchen areas, workshop areas, material stores and any other areas identified with suitable, tested and approved firefighting equipment.		
	The construction site must be protected against fire, and a sufficient fire break must be constructed, on advice by the Section Ranger, around each construction site and the construction camp where necessary.		
	Smoking is prohibited in the vicinity of flammable substances.		

	Ensure the availability of sufficient fire extinguishers.		
	Ensure any welding or other source of heating of materials is done in a controlled environment and under appropriate supervision, in such a manner as to minimise the risk of fires and/or injury to staff.		
	Provide training to the staff members in the use of the appropriate firefighting equipment.		

WASTEWATER MANAGEMENT

All wastewater must be appropriately contained, filtered and discharged to ensure the environment and surrounding neighbours are not impacted upon.

ENVIRONMENTAL ASPECT	MEASURES AND ACTION PLAN	TIMEFRAME	RESPONSIBILITY
Poor wastewater management can lead to overflows and spills which can potentially contaminate and pollute surrounding natural systems	Any waste oils, greases, fuels, chemicals etc. should be collected and disposed of in an appropriate manner off site. Waste oil, grease and/or fuel disposal/storage containers should under no circumstances be voided to the surrounding environment.	During construction	PM
	Any water discharged must comply with the relevant Water Quality limits/guidelines specified by the Department of Water Affairs.		ECO
	The Contractor must take reasonable precautions to prevent the pollution of the ground and / or water resources on and adjacent to the site as a result of his activities.		ESO
	The Contractor may discharge 'clean' silt laden water overland and allow this water to filter into the ground. However, he must ensure that he does not cause erosion as a result of any overland discharge.		Contractor
	No natural watercourse is to be used for the cleaning of tools or any other apparatus. This includes for purposes of bathing, or the washing of clothes etc.		
	All washing operations will take place off-site at a location where wastewater can be disposed of in an acceptable manner.		
	Trucks delivering concrete may not be washed on site or anywhere inside the park.		
	No spills may be hosed down into a storm water drain or sewer, or into the surrounding natural environment.		
	Adequate ablution facilities are to be provided at each construction site, conveniently located near to work areas to avoid localised water pollution from camp sewerage.		
	All soil contaminated, for example by leaking machines, refuelling spills etc. is to be excavated to the depth of contaminant penetration, placed in 200 litre drums and		

	removed to an appropriate landfill site.		
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SOLID WASTE MANAGEMENT

Construction activities generate waste which must be disposed of appropriately. A solid waste control and removal system must be implemented to ensure there is no contamination of the site and surrounding environment by the waste generated and / or collected on-site. All general waste must be disposed of at a licensed landfill site.

ENVIRONMENTAL ASPECT	MEASURES AND ACTION PLAN	TIMEFRAME	RESPONSIBILITY
Solid waste can potentially pollute or contaminate the surrounding environment	The waste storage area must be kept clean and tidy at all times and not littered with waste around the waste bins.	During construction	ECO Contractor
	An adequate number of 'scavenger proof' refuse bins must be provided at the construction sites and at the construction camps.		
	These bins must be provided with lids and an external closing mechanism to prevent their contents blowing out and must be scavenger-proof to prevent baboons and other animals that may be attracted to the waste.		
	The Contractor will ensure that all personnel immediately deposit waste in the waste bins provided.		
	All refuse and solid waste generated at all work sites will be stored in appropriate scavenger proof containment vessels at the relevant site and removed to the main construction camp, where the waste will be sorted and stored within a fenced waste storage area.		
	All waste must be transported in an appropriate manner (e.g. plastic rubbish bags).		
	The Contractor may not dispose of any waste and / or construction debris by burning, or by burying.		
	Discard all construction waste at a registered waste management facility / landfill site, particularly those wastes or products that could impact on surface or groundwater quality by leaching into or coming into contact with water.		
	The contractor will maintain 'good housekeeping' practises as ensure that all work sites and construction camp are kept tidy and litter free.		
	Waste must not be burned on site.		
	Littering will not be tolerated.		

LABOUR AND SOCIAL ISSUES

The management of social issues such as health and safety, instructions, control etc., particularly related to contractors and workers on-site, must be given priority during the construction of the development.

ENVIRONMENTAL ASPECT	MEASURES AND ACTION PLAN	TIMEFRAME	RESPONSIBILITY
Poor management can lead to labourers not adhering to the environmental mitigation measures set out in this EMP	Ensure proper supervision of employees at all times, undertake regular inspections of the workplace, enforce the wearing of safety equipment/clothing and ensure compliance with all relevant rules and procedures.	During construction	Contractor
	Ensure the provision and proper utilisation, maintenance and management of wash and waste facilities for staff during construction.		
	Machine / vehicle operators should receive clear instructions to remain within demarcated access routes.		
	Adhere to normal working hours and ensure that all machinery is in a good state of maintenance to mitigate noise.		

EXCAVATION AND BACKFILLING

Excavation activities must be controlled and managed so that the excavated site does not become a safety or environmental risk.

ENVIRONMENTAL ASPECT	MEASURES AND ACTION PLAN	TIMEFRAME	RESPONSIBILITY
Excavation sites are a potential safety risk to both labourers and fauna	Where at all possible, excavations must not stand open longer than 2 days, and should preferably be opened and closed on the same day. They should not be permitted to stand open longer than a week under any circumstances. Excavations must be marked with tape to clearly demarcate the area and warn against access.	During construction	ECO Contractor
	Excavations must not be undertaken until such time that all required materials / services etc. are available on-site, to facilitate immediate laying of such services or the construction of subsurface infrastructure.		
	Any such excavations should ideally be undertaken within the confines of an established construction site - i.e. a site that is either protected with a peripheral fence, or a site that has a regular / continual human presence. Failing this, regular daily inspections are essential.		
	If need be, spread the rocks in as natural a looking manner as possible in the veld.		
	Excess rocks and sand as a result of excavation activities is not to be dumped along next to construction site – rocks to be spread in a natural looking manner in the surrounding area.		
	Removed soil is to be used to backfill areas where required (i.e. such as existing and un-rehabilitated gravel pits).		
	Excavated material is to be stockpiled along the trench within the working servitude,		

	unless otherwise authorised.		
	Deficiency of backfill material will not be made up by excavation within the protected area. Where backfill material is deficient, it must be made up by importation from an approved borrow pit area.		

TRENCHES

The excavation of trenches along the route may include the excavations of roads, verges and driveways within the Ugu Municipality owned road reserve.

ENVIRONMENTAL ASPECT	MEASURES AND ACTION PLAN	TIMEFRAME	RESPONSIBILITY
Trenches pose a potential safety hazard	Trenches shall be appropriately and securely demarcated and regularly monitored during operations to ensure that pedestrian (and vehicular) access of these areas is strictly prohibited.	During construction	ESO
	Sign boards, alerting pedestrians and road users to the potential dangers presented by the construction activities, shall be erected.		Contractor

LEVELLING

Levelling must be supervised at all times

ENVIRONMENTAL ASPECT	MEASURES AND ACTION PLAN	TIMEFRAME	RESPONSIBILITY
Poor levelling will result in areas that don't conform to the natural layout of the environment	Excess sand and soil resulting from levelling activities of the work area should be stored in low heaps either on the access road or already disturbed area.	During construction	ECO
	Excess topsoil is to be spread evenly over the area in a manner that blends in with the natural topography.		ESO
	Once heavy machinery has cleared the bulk of these material stockpiles, the disturbed areas should be levelled and cleared of any foreign material manually e.g. with spades. It is unacceptable to leave foreign material behind with the knowledge that it will become hidden amongst the rejuvenating vegetation with time.		Contractor

SAND EXTRACTION

Extraction of sand must be controlled and managed so as to not significantly impact the environment.

ENVIRONMENTAL ASPECT	MEASURES AND ACTION PLAN	TIMEFRAME	RESPONSIBILITY
Uncontrolled extraction can significantly impact the environment	This is a specialised and potentially environmentally impacting activity, which must be undertaken with the approval and overall management of the PM.	During	ECO

	Regular inspections must be undertaken by the local ESO and ECO to monitor and audit the effects and impacts of such removals.	construction	Contractor
	On completion of the sand-winning activity, the river bed will be rehabilitated to the satisfaction of the ECO.		

STOCKPILING, HANDLING AND STORAGE OF BUILDING MATERIALS

Stockpiles of construction materials are susceptible to collapse and extensive damage if not located or stacked correctly

ENVIRONMENTAL ASPECT	MEASURES AND ACTION PLAN	TIMEFRAME	RESPONSIBILITY
The stockpiling, handling and storage of building materials can pose a significant safety risk	Stockpiles and storage yards will be demarcated in areas already disturbed or where they will cause minimal disturbance.	During construction	ESO Contractor PM
	Clearly indicate which activities are to take place in which areas within the site e.g. the mixing of cement, stockpiling of materials etc. Limit these activities to single sites only. This may not always be possible for example for heaps of topsoil, but should definitely be the case for other building materials.		
	Ensure that soil stockpiles are neatly kept to avoid soil dispersing		
	Stockpiles of expensive materials such as cement bags should be such that they can easily be removed from the site over weekends or during rainy weather.		
	Stockpiles are not to exceed 2m in height unless otherwise permitted by the PM.		
	The PM must direct stockpiling of materials and designate a formal stockpile area.		
	Soil stockpiles must be positioned in areas sheltered from the wind and rain to prevent erosion and dispersion of loose materials.		
	Specific sites should be allocated for construction waste e.g. empty cement bags, discarded planks, etc. A low temporary fence may be erected around such a site in order to contain the waste and assist the effective removal thereof from the site.		
	Old cement mixing bags will be placed in wind and spill proof containers as soon as they are empty. The Contractor will not allow closed, open or empty bags to lie around the site.		
	The Contractor will ensure that all operations that involve the use of cement and concrete are carefully controlled.		
	Concrete mixing may only take place in the construction camp or in agreed specific areas on site.		
	Concrete may not be mixed directly on the ground. No mixed concrete may be deposited directly onto the ground prior to placing. A board or other suitable platform		

	/ surface is to be provided onto which the mixed concrete can be deposited whilst it waits placing.		
	All visible remains of excess concrete will be deposited in a designated area awaiting removal to an approved landfill site.		

SERVICING AND RE-FUELLING OF CONSTRUCTION EQUIPMENT

All maintenance, repair and re-fuelling of construction equipment must be monitored to ensure compliance.

ENVIRONMENTAL ASPECT	MEASURES AND ACTION PLAN	TIMEFRAME	RESPONSIBILITY
Maintenance and re-fuelling activities can pose a potential spillage and contamination risk	All maintenance and repair work will be carried out at the main construction camp within an area designated for this purpose, equipped with necessary pollution containment measures. The ground under the servicing and refuelling areas must be protected against pollution caused by spills and / or tank overfills (bundled / lined). The Contractor may only change oil or lubricant at agreed and designated locations, except if there is a breakdown or emergency repair, and then any accidental spillages must be cleaned up / removed immediately. In such instances the Contractor will ensure that he has drip trays available to collect any oil or fluid. Construction vehicles are to be maintained in an acceptable state of repair. No vehicles or equipment with leaks or causing spills will be permitted to operate at any of the construction sites. These will be sent immediately back to the maintenance yard for repair. All equipment that leaks must be repaired immediately or must be removed from site. Fuels required during construction must be stored in a central depot at the construction camp. This storage area should be located on a slab and be contained within a bund capable of containing at least the volume of one of the containers. Temporary fuel storage tanks and transfer areas also need to be located on an impervious surface adequately bunded to contain accidental spills. Appropriate run-off containment measures must be in place.	During construction	ECO Contractor

DUST

Dust can pose a potential environmental and health risk

ENVIRONMENTAL ASPECT	MEASURES AND ACTION PLAN	TIMEFRAME	RESPONSIBILITY
Uncontrolled generation of dust will pose a potential environmental or health risk	The Contractor shall take precautions to the satisfaction of the ECO to limit the production of dust and damage caused by dust.	During construction	ECO Contractor

NOISE

Noise will be generated by construction activities such as trench excavation, pipe welding and construction vehicles. Since the construction activities will mainly be undertaken in a residential area, it is important that noise levels be kept low.

ENVIRONMENTAL ASPECT	MEASURES AND ACTION PLAN	TIMEFRAME	RESPONSIBILITY
Noise can cause conflict between neighbouring residents and construction labourers	Restrict noisy construction activities, e.g. jack hammering, to daytime activities to between 07h00 and 18h00, unless otherwise agreed to and approved by Ugu Municipality and adjacent landowners.	During construction	ESO Contractor
	Ensure that all vehicles and where possible, noisy equipment, are fitted with silencers that are properly maintained.		
	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.		
	Noise levels must be kept within acceptable limits for a protected area, and must not be of such nature as to detract from the natural experience of other visitors to the protected area.		
	The contractor shall take into consideration that the project areas are located within a natural environment and that noise could be a major disturbance/ nuisance for the fauna and visitors to the park. Project management should endeavour to keep noise generating activities associated with construction activities to a minimum and within working hours.		
	Construction employees must be trained and made aware of not creating unnecessary noise such as hooting and shouting.		

VISUAL AND AESTHETICS

The construction area must be clearly visible at all times, and must present the least visual impact.

ENVIRONMENAL ASPECT	MEASURES AND ACTION PLAN	TIMEFRAME	RESPONSIBILITY
Lighting and aesthetics can be unpleasant to surrounding residents	Security lighting must be placed such that it is not a nuisance to residents and visitors to the area. Shields may be required to prevent lights from being visible from other parts of the area.	During construction	ECO
	Care will be taken when positioning the lights to ensure the least visual impact, while still providing a safe work environment for construction staff.		ESO
	Should any construction activities take place where residents can see the construction activities, then clear signboards must be erected to inform the residents of the activity taking place. Contractor to erect boards as required.		Contractor
	The Contractor shall not establish any activities which, in the opinion of the ECO, are likely to adversely affect the scenic quality of the area. The ECO may direct the Contractor to refrain from such activities or to take ameliorative actions to reduce the adverse effects of such activities.		
	No painting or marking of natural features shall take place. Marking for surveying and other purposes shall only be done with pegs and beacons.		
	All packed rock and exposed rock cuttings shall be treated in order to blend their colour with the colours of the natural weathered rocks of the adjacent environment.		
	Ensure that soils stockpiles from trench excavation are kept neat and situated at equal distances from each other along the construction route.		Contractor
	The construction camp site must be located in an area that is not visually sensitive.		
	Appropriate aesthetically pleasing visual screening of the campsite must be implemented during construction.		
SITE CLEAN-UP AND REHABILITATION			
Site clean-up and rehabilitation must be managed and monitored to ensure the least possible degradation to the site and surroundings.			
ENVIRONMENAL ASPECT	MEASURES AND ACTION PLAN	TIMEFRAME	RESPONSIBILITY
Poorly managed site clean-up and rehabilitation must can cause degradation to the site and surroundings	The Contractor must ensure that all temporary structures, materials, waste and facilities used for construction activities are removed upon completion of the project.	Post-Construction	ECO
	Fully rehabilitate (e.g. clear and clean area, rake, pack branches etc.) all disturbed areas and protect them from erosion.		ESO
	Only indigenous plants which are able to establish easily and will need less maintenance because they have already adapted to the local conditions should be		Contractor

	considered.		
	Before final decisions about the choice of plant species are taken the ECO should be approached for their advice.		

SAFETY

Safety measures must be developed and adhered to in order to minimise the potential for injury or death.

ENVIRONMENTAL ASPECT	MEASURES AND ACTION PLAN	TIMEFRAME	RESPONSIBILITY
Construction sites are potentially hazardous environments as the activities that take place can affect the health and safety of the labourers	An Emergency Plan must be compiled and approved by Ugu Municipality.	During construction	Contractor
	Telephone numbers of emergency services must be posted conspicuously around the construction site.		
	Potentially hazardous areas are to be demarcated with danger tape.		
	All trenches must be secured.		
	Material stockpiles such as equipment must be stable and well secured to avoid collapse and possible injury.		
	Flammable materials must be stored as far as possible high risk areas e.g. concentration of workers, and must be clearly marked and stored appropriately.		

GENERAL RULES

General rules by which activities on-site are undertaken must be adhered to.

ENVIRONMENTAL ASPECT	MEASURES AND ACTION PLAN	TIMEFRAME	RESPONSIBILITY
Non-compliance with these rules will increase the potential risk of damage to the environment	Provide a comprehensive first aid kit and make sure that there are adequate staff members who are trained in first aid.	During construction	ECO ESO Contractor
	Provide sufficient fire-fighting equipment at the work areas, and make sure that there are staff members who know how to use the equipment.		
	Make sure that the necessary safety equipment and protective clothing, required for specific construction work are used, and inform staff about safety procedures and possible dangerous working conditions.		
	Ablution must not be permitted anywhere other than in available toilets on site.		
	No alcohol / drugs are permitted on site.		
	No unsocial behaviour or unruly behaviour will be permitted.		
	No smoking is permitted on site.		

DECOMMISSIONING

SITE CLOSURE

At the closure of site every day the Contractor's Safety Officers (as defined by the Occupational Health and Safety Act, No. 85 of 1993) must check the site, ensure that the following conditions pertain and report on compliance with this clause.

ENVIRONMENTAL ASPECT	MEASURES AND ACTION PLAN	TIMEFRAME	RESPONSIBILITY
Non-compliance can increase the potential for damage to the environment	Store any fuels / flammables / hazardous materials securely in bunded areas and locked in the designated storage area.	Daily	ECO
	Secure all foundation areas.		Contractor
	Display all emergency and management contact details prominently.		

DANGEROUS/HAZARDOUS MATERIAL SPILLS

ENVIRONMENTAL ASPECT	MEASURES AND ACTION PLAN	TIMEFRAME	RESPONSIBILITY
Potential spills of dangerous goods or hazardous wastes will impact on the health and safety of the personnel in the vicinity of the spill. The spilled material may also contaminate the environment immediately associated with the spill site, or, depending on the nature of the material, eventuate in the greater surrounding environment (watercourses, atmosphere).	Use / deplete the chemicals and materials at the existing site in the processes prior to decommissioning to reduce the volume of dangerous goods to be transferred.	Daily	ECO
	Check that chemical containers are intact prior to moving.		Contractor
	Provide appropriate training for personnel moving the materials and equipment.		
	Establish appropriate method statements for high risk transfer activities.		
	Ensure that adequate personal protective equipment is worn by personnel affecting the transfer.		
	Ensure that appropriate spill containment and remediation equipment for the specific materials being transferred is available.		
	Ensure that suitably licenced waste management operators are appointed to remove unwanted materials and hazardous waste from the site.		

POTENTIAL SITE CONTAMINATION

ENVIRONMENTAL ASPECT	MEASURES AND ACTION PLAN	TIMEFRAME	RESPONSIBILITY
The handling and storage of materials	All empty chemical containers and waste should be carefully removed from the site		

and waste at the site may have resulted in the contamination of the site, during accidental spills and the washing of equipment. These contaminants could pose a health risk to future occupants of personnel at the site, or limit potential future light industrial activities at the site.	and recycled, or, if not recyclable, disposed of at an appropriately licenced waste disposal facility.	Daily	ECO Contractor
	After materials and waste have been removed from the site, soil samples should be taken from potentially contaminated areas at the site (silt trap, unpaved areas, and unpaved edge of loading area) and tested for contaminants (E.g. acids, bases, hydrocarbons).		
	The internal floors and surfaces, as well as bund areas, should be tested for potential contaminants (acid residue) and suitably cleaned if required.		
	Should contamination be detected corrective action should be taken. e.g. • Neutralising chemicals applied. • Contaminated soils removed and disposed of at a suitable waste disposal facility.		

RESIDUAL WASTE

ENVIRONMENTAL ASPECT	MEASURES AND ACTION PLAN	TIMEFRAME	RESPONSIBILITY
During the decommissioning process unwanted materials and waste may remain at the site after the re-useable materials and equipment have been removed. e.g. damaged IBCs, empty containers, broken pallets.	All the residual waste at the site should be separated, classified and appropriately managed (re-used, recycled, or disposed to landfill).	Daily	ECO Contractor
	Materials which can be re-used or recycled should be collected by an appropriate licensed waste recycling service provider		
	General waste should be separately loaded and disposed of at a licensed general waste disposal facility.		
	Hazardous waste should be collected by a licensed hazardous waste management contractor, and appropriately disposed of at an appropriately licensed hazardous waste disposal facility.		
	Personnel handling waste must wear appropriate personal protective equipment for the waste / materials handled.		
	Establish appropriate method statements for high risk loading and handling activities.		
	Spill response equipment must be available during the handling and loading of hazardous waste.		

WASTE GENERATION AND SLUDGE HANDLING

ENVIRONMENTAL ASPECT	MEASURES AND ACTION PLAN	TIMEFRAME	RESPONSIBILITY
Various forms of waste will be generated from old infrastructure and the remaining sludge from holding facilities will need to be removed from the site and disposed of adequately.	Personnel must be well versed in the relevant existing waste management procedures and activities on site.	Daily	ECO Contractor
	This will include sorting of waste types and correct disposal to either recycling facilities, local registered waste disposal sites, and in extreme cases to registered hazardous waste disposal sites.		
	Recovered sludge from sewage treatment plant will be useful as fertilizer with the extent of land rehabilitation required		

SURFACE AND GROUNDWATER POLLUTION

ENVIRONMENTAL ASPECT	MEASURES AND ACTION PLAN	TIMEFRAME	RESPONSIBILITY
Certain spillages may occur when existing infrastructure is removed from the site and the existing piping systems are dismantled.	Care must be exercised when infrastructure is removed and/or piping systems are dismantled, ensuring that systems are correctly drained as far as possible beforehand.	Daily	ECO Contractor
	Monitoring of the different decommissioning sites and pipeline routes by the monitoring of boreholes situated around the decommissioning site and the boreholes closest to the pipeline routes.		
	Pipeline routes should also be inspected on a regular basis to ensure that they are leak free.		

TRAFFIC ACCIDENTS DURING TRANSFER

ENVIRONMENTAL ASPECT	MEASURES AND ACTION PLAN	TIMEFRAME	RESPONSIBILITY
During the decommissioning process, materials and equipment may need to be transferred from the existing site to a new facility. During this time there will be increased risk of vehicle collisions.	Concentrate moving activities over weekends when traffic volumes are lower.	Daily	ECO Contractor
	Consolidate loads rather than taking a large number of small loads to the new site.		
	Provide flagmen to slow down traffic during transfers across the road.		

DUST CREATION

ENVIRONMENTAL ASPECT	MEASURES AND ACTION PLAN	TIMEFRAME	RESPONSIBILITY
Decommissioning of the effluent treatment infrastructure may lead to an increased amount of airborne particles in the local atmosphere as the infrastructure is dismantled and transported to the disposal site.	Use water tankers and irrigation equipment to control dust where necessary.	Daily	ECO Contractor

LOSS OF FLORA

ENVIRONMENTAL ASPECT	MEASURES AND ACTION PLAN	TIMEFRAME	RESPONSIBILITY
The disturbances created during the decommissioning phase will likely lead to a loss of floral species within the working servitude. Loss of species diversity.	Disturbed areas must be rehabilitated with indigenous species as far as possible.	Post-decommissioning	ECO Contractor
	Implement weed eradication program to curb the spread of weedy species following decommissioning.		
	The footprint should be limited to the existing disturbed sites where possible or the minimum working servitude required to perform the decommissioning.		
	Intrusion into surrounding natural vegetation areas should be limited.		
	Retain large indigenous trees where possible.		

REMOVAL/SPREAD OF ALIEN AND INVASIVE SPECIES

ENVIRONMENTAL ASPECT	MEASURES AND ACTION PLAN	TIMEFRAME	RESPONSIBILITY
Without a weed eradication program, these species will colonise disturbed areas following the decommissioning, and can possibly spread into the surrounding areas.	A weed eradication program should be implemented during and after decommissioning.	Post-decommissioning	ECO Contractor

FAUNA DISRUPTION

ENVIRONMENTAL ASPECT	MEASURES AND ACTION PLAN	TIMEFRAME	RESPONSIBILITY
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Certain fauna will be disturbed in their natural habitat, especially in areas of relatively undisturbed vegetation.	All disturbed land should be re-vegetated and infrastructure material removed.	Post-decommissioning	ECO Contractor
SOIL EROSION			
ENVIRONMENAL ASPECT	MEASURES AND ACTION PLAN	TIMEFRAME	RESPONSIBILITY
The clearing of vegetation, as well as exposing of soil during decommissioning of treatment facilities and pipelines, may lead to erosion of these surfaces due to rain and wind.	Re-vegetation of disturbed surfaces should be as soon as reasonably possible.	Post-decommissioning	ECO Contractor
	Areas that have not been allocated alternative uses following the decommissioning should be rehabilitated and re-vegetated.		

9. RECOMMENDATIONS

- After implementation, the EMPr must be reviewed bi-annually for the first two years, in order to streamline its implementation and manage obstacles at the various sites.
- Thereafter, the EMPr must be reviewed every two (2) years.
- The review of the EMPr must include *inter alia* an update of legislation and relevant regulations, updating the roles and responsibilities, and the detail within the listed environmental specifications.

10. CONCLUSION

This EMPr has been compiled using various inputs including the EAPs, relevant Authorities, I&APs and referenced sources. These inputs facilitated the identification of relevant and implementable mitigation measures, which may now be used by Ugu District Municipality, Ugu Water Services Department and appointed construction teams to respond to the tender documentation respectively. Penalties to be imposed for the transgression of environmental specifications are also noted along with the roles and responsibilities of all stakeholders. A broad spectrum of WTW and WWTW operational processes have been considered, environmental aspects identified and associated mitigation measures provided. In order to ensure compliance, all parties undertaking the design, construction, operation or decommissioning of WTW, WWTW and related facilities and infrastructure must be fully acquainted with the contents of this EMPr. This will ensure that potential negative impacts are identified, avoided and mitigated.

11. REFERENCES

Arcus GIBB (2010). *Environmental Management Programme for the Proposed Installation of a Trunk Water Main in Assagay, Durban*, eThekweni Municipality: Water and Sanitation Unit.

Department of Environmental Affairs (DEA). (2014). *National Guideline for the Discharge of Effluent from Land-based Sources into the Coastal Environment*. Pretoria, South Africa. RP101/2014.

Department of Water Affairs and Forestry (DWAf), 2007. *Best Practice Guideline H4: Water Treatment*.

Department of Water Affairs and the Water Research Commission (DWA and WRC) (2010). *Wastewater Risk Abatement Plan, A guideline to plan and manage towards safe and compliant wastewater collection and treatment in South Africa*, Draft 01.

Environmental Impact Management Services (Pty) Ltd. (EIMS) (2011). *Final Environmental Impact Assessment Report for the Proposed Water and Effluent Collection and Treatment Infrastructure Upgrade for the South African Nuclear Energy Corporation (NECSA)*, DEAT Ref No: 12/12/20/1294.

Polygon Environmental Planning (PEP) (2011). *Draft Environmental Management Plan for the Proposed Upgrading of the Existing Sewage Treatment System on Part of the Farm Roerfontein 161-LT, Senwamokgope, Limpopo Province*.

Public Process Consultants (PPC) (2011). *NiRoVe Paint Stripping, erf 975 and 981 Redhouse, Perseverance, Nelson Mandela Bay Municipality*, Final EIA Report.

Royal HaskoningDHV (RHDHV) (2012). *Environmental Management Programme for the Albersville and Port Shepstone CBD Pipeline Replacement Project*, Ugu Municipality.

South African National Parks (no date). *Environmental Management Plan: General construction activities in parks, Construction of a New Sewage Treatment Plant at Cape Point*, Table Mountain National Park.

The MSA Group (MSA). (2013). *Meyerton Waste water Treatment Works Waste Management License Draft EMP*, Midvaal Local Municipality, J2142.

Ugu District Municipality (2012). *Site Specific Wastewater Risk Abatement Plan – Margate WWTW*, Version 1.0, Water Services Department.

Ugu District Municipality (2011). *Wastewater Risk Abatement Plan, Incident Management Protocol*, Water Services Department.

Umgeni Water (2012). *South Coast Conveyance Systems, Environmental Management Plan (Operational Phase)*, Draft – November 2012, Engineering and Scientific Services Division.

Umgeni Water (2015). *Environmental Management Plan, South Coast: Mthlwume Water Works*, Water and Environmental Services, Amended 2/12/2015.

Water Research Commission (WRC) (2006). *Handbook for the Operation of Water Treatment Works*, TT265/06, ISBN 1-77005-428-6.

**RELEVANT REGULATIONS IN TERMS OF NEMA & NEMWA AS
AT JULY 2014**

**LISTING NOTICES THAT MAY BE TRIGGERED DURING THE
LIFECYCLE STAGES OF FACILITIES**

Listing Notice 1

9	The construction of facilities or infrastructure exceeding 1000 metres in length for the bulk transportation of water, sewage or storm water – (i) with an internal diameter of 0,36 metres or more; or (ii) with a peak throughput of 120 litres per second or more, excluding where: a. such facilities or infrastructure are for bulk transportation of water, sewage or storm water or storm water drainage inside a road reserve; or b. where such construction will occur within urban areas but further than 32 metres from a watercourse, measured from the edge of the watercourse.
11	The construction of: (i) canals; (ii) channels; (iii) bridges; (iv) dams; (v) weirs; (vi) bulk storm water outlet structures; (vii) marinas; (viii) jetties exceeding 50 square metres in size; (ix) slipways exceeding 50 square metres in size; (x) buildings exceeding 50 square metres in size; or (xi) infrastructure or structures covering 50 metres or more where such construction occurs within a watercourse or within 32 metres of a watercourse, measured from the edge of a watercourse, excluding where such construction will occur behind the development setback line.
23	The transformation of undeveloped, vacant or derelict land to – (i) residential, retail, commercial, recreational, industrial, or institutional use, inside an urban area, and where the total area to be transformed is 5 hectares or more, but less than 20 hectares, (ii) residential, retail, commercial, recreational, industrial, or institutional use, outside an urban area, and where the total area to be transformed is bigger than 1 hectare but less than 20 hectares;- except where transformation takes place- (i) for linear activities; or (ii) for the purposes of agriculture or afforestation, in which case Activity 16 of Notice No. R. 545 applies.
24	The transformation of land bigger than 1000 square metres in size, to residential, retail, commercial, industrial or institutional use, where, at the time of the coming into effect of this Schedule or thereafter such land was zoned open space, conservation or had an equivalent zoning.
26	Any process or activity identified in terms of section 53(1) of the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004).
27	The decommissioning of existing facilities or infrastructure, for – (iv) activities where the facility or the land on which it is located is contaminated; (v) storage, or storage and handling, of dangerous goods of more than 80 cubic litres; But excluding any facilities or infrastructure that commenced under an environmental authorisation issued in terms of the Environmental Impact Assessment Regulations, 2006, made under section 24(5) of the Act and published in Government Notice No. R. 385 of 2006, or Notice No. 543 of 2010.
28	The expansion of or changes to existing facilities for any process or activity where such expansion or changes to will result in the need for a new permit or license in terms of the

	national or provincial legislation governing the release of emissions or pollution, excluding where the facility, process or activity is included in the list of waste management activities published in terms of section 19 of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) in which case the Act will apply.
37	The expansion of facilities or infrastructure for the bulk transportation of water, sewage or storm water where: (a) the facility or infrastructure is expanded by more than 1000 metres in length; or (b) where the throughput capacity of the facility or infrastructure will be increased by 10% or more- excluding where such expansion: (i) relates to transportation of water, sewage or storm water within a road reserve; or (ii) where such expansion will occur within urban areas but further than 32 metres from a watercourse, measured from the edge of the watercourse.
39	The expansion of (i) canals; (ii) channels; (iii) bridges; (iv) weirs; (v) bulk storm water outlet structures; (vi) marinas; within a watercourse or within 32 metres of a watercourse, measured from the edge of a watercourse, where such expansion will result in an increased development footprint but excluding where such expansion will occur behind the development setback line.
40	The expansion of (i) jetties by more than 50 square metres; (ii) slipways by more than 50 square metres; or (iii) buildings by more than 50 square metres; (iv) infrastructure by more than 50 square meters within a watercourse or within 32 metres of a watercourse, measured from the edge of a watercourse, but excluding where such expansion will occur behind the development setback line.
52	The expansion of facilities or infrastructure for the transfer of water from and to or between any combination of the following: (i) water catchments; (ii) water treatment works; or (iii) impoundments; where the capacity will be increased by 50 000 cubic metres or more per day, but excluding water treatment works where water is treated for drinking purposes.
55A	The construction of facilities for the treatment of effluent, wastewater or sewage with a daily throughput capacity of more than 2 000 cubic metres but less than 15 000 cubic metres.
55B	The expansion of facilities for the treatment of effluent, wastewater or sewage on undeveloped land where the capacity will be increased by 15 000 cubic metres or more per day.

Listing Notice 2

5	The construction of facilities or infrastructure for any process or activity which requires a permit or license in terms of national or provincial legislation governing the generation or release of emissions, pollution or effluent and which is not identified in Notice No. 544 of 2010 or included in the list of waste management activities published in terms of section 19 of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) in which case that Act will apply.
10	The construction of facilities or infrastructure for the transfer of 50 000 cubic metres or more water per day, from and to or between any combination of the following: (i) water catchments; (ii) water treatment works; or (iii) impoundments; excluding treatment works where water is to be treated for drinking purposes.
17	The extraction or removal of peat or peat soils, including the disturbance of vegetation or soils in anticipation of the extraction or removal of peat or peat soils.

Listing Notice 3

12	The clearance of an area 300 square metres or more of vegetation where 75% or more of the vegetative cover constitutes indigenous vegetation. (a) Within any critically endangered or endangered ecosystem listed in terms of section 52 of NEMBA or prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial Biodiversity Assessment 2004; (b) Within critical biodiversity areas identified in bioregional plans; (c) Within the littoral active zone or 100 metres inland from the high water mark of the sea or an estuary, whichever distance is the greater, excluding where such removal will occur behind the development setback line on erven in urban areas
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PROJECT START UP INSPECTION SHEET

PROJECT START UP INSPECTION SHEET

PROJECT: _____
CONTRACT NO.: _____
CONTRACTOR: _____

DATE: _____
COMPLETED BY: _____

ES	ENVIRONMENTAL ASPECT	YES NO N/A	COMMENTS	ACTION
PLANNING				
ESTABLISHMENT				
CLEARANCE				

ROUTINE SITE INSPECTION SHEET

ROUTINE SITE INSPECTION SHEET

PROJECT: _____
CONTRACT NO.: _____
CONTRACTOR: _____

DATE: _____
COMPLETED BY: _____

ES	ENVIRONMENTAL ASPECT	YES NO N/A	COMMENTS	ACTION
HOUSEKEEPING				
CONSTRUCTION ACTIVITIES				
REINSTATEMENT AND REHABILITATION				

SITE DECOMMISSIONING INSPECTION SHEET

SITE DECOMMISSIONING INSPECTION SHEET

PROJECT: _____
CONTRACT NO.: _____
CONTRACTOR: _____

DATE: _____
COMPLETED BY: _____

ES	ENVIRONMENTAL ASPECT	YES NO N/A	COMMENTS	ACTION
DECOMMISSIONING OF THE SITE				

SITE INSPECTION REPORT STRUCTURE

APPENDIX E

Purpose of the Site Inspection Report

The purpose of the Site Inspection Report is to describe the results of the site inspections undertaken by the Environmental Control Officer (ECO) or delegated responsible person so that the level of compliance with the Environmental Management Programme (EMPr) can be monitored throughout the contract.

In particular, it will be expected to summarise the following:

- The key results
- Trends observed
- Key issues observed
- Problems encountered
- Actions required and response taken or to be taken
- Recommendations.

The Site Inspection Report should conclude with a commentary on the overall performance of the Contractor in terms of meeting the requirements of individual/groups of Environmental Specifications and/or EMPr as a whole.

Preparation of the Site Inspection Reports

Site Inspection Reports are expected to be prepared regularly throughout a given construction contract, including (but not limited to) the following:

- Prior to the handover of the site to the Contractor
- At regular stages throughout the construction works, and particularly with the commencement of particularly significant activities
- At the decommissioning of the site and prior to the handover of the site to the Employer/Operator.

Recommended Structure for the Site Inspection Reports

The following report structure is suggested for the Site Inspection Report:

Introduction

By way of setting the context for the Site Inspection Report, this section should outline the following:

- The need for the Site Inspections, and reporting.
- Purpose of the Site Inspection Report.
- The scope of coverage of the Site Inspection

Environmental Management Requirements

This section should summarise the environmental requirements for the contract and for the construction works, and against which environmental performance is assessed.

Methodology

This should describe the activities undertaken during the particular site inspection, such as:

- A site walkabout with the Project Manager (PM).
- A review of documents and records, such as complaints records and/or incidents reports maintained by the Contractor and/or ECO.
- Consultations with pertinent parties on site.

APPENDIX E

Findings of the Site Inspection

This should contain reference to the following:

- A commentary on the level of compliance with key aspects of the Environmental Specifications, as listed in the checklist(s).
- Details of issues, infringements, problems and non-compliances encountered.
- Recommendations on actions to be undertaken to address any issues, infringements and/or non-compliances.

Conclusions

This should include an overall statement on the level of compliance observed during the site inspection.

Annexures

Annexures should be used to store supporting information to the main document, such as:

- Photographs.
- A quick reference, summary table of issues of concern and the necessary corrective measures required to address these issues

APPENDIX F

INCIDENTS INCURRING PENALTIES	VALUE
Failure to secure construction site from public access.	R5,000.00
Failure to stockpile topsoil correctly.	R1000.00
Failure to stockpile materials in designated areas.	R500.00
Pollution of water bodies – including increased suspended solid loads.	R2,000.00
Discharging effluent and/or storm water onto the ground or into surface water	R1,000.00
Failure to provide adequate sanitation, waste disposal facilities or services.	R1,000.00
Failure to demarcate construction area boundaries before commencing construction clearance and other activities	R1,000.00
Insufficient education of employees regarding environmental matters and site housekeeping practices	R500.00
Use of soil in an unspecified manner	R500.00
Inappropriate mixing of cement/concrete and poor management of slurry	R1,000.00
Unauthorised removal of indigenous trees, medicinal or other plants.	R1,000.00
Damaging/killing animals/birds.	R1,500.00
Failure to reinstate disturbed areas within the specified timeframe.	R1,000.00
Fire – costs of runaway fires will be borne by the Contractor, should he/she be proven responsible for such fires.	R5,000.00
Failure to provide equipment for emergency situations	R1,000.00
Defacing, painting or damaging natural or heritage features and private property	R1,000.00
Damaging cultural, historical and/or archaeological sites of importance	R5,000.00
Failure to maintain basic safety measures on site	R1,000.00
Failure to obey site protection measures specified by the Project Manager	R1,000.00
Failure to carry out required community liaison, damage to property etc., without prior negotiation and/or compensation and other social infringements	R500.00
Persistent and un-repaired oil leaks from machinery. The use of inappropriate methods of refuelling.	R500.00
Failure to provide drip trays and/or empty them frequently.	R500.00
Inappropriate use of bins and poor waste management on site.	R200.00
Inappropriate off-site disposal of waste from site.	R1,000.00
Deliberate lighting of illegal fires on site.	R500.00
Eating of meals on site outside the defined eating area. Individual not making use of the site ablution facilities.	R100.00
Dust or excess noise on or emanating from the site.	R500.00
Inappropriate use of watercourses and water bodies – such as for unapproved water abstraction, washing of vehicles, wastewater disposal and use by employees for washing.	R2,000.00
Failure to comply with specifications for working within a wetland and stream.	R 10,000.00
Any person, vehicle, item of plant, or anything related to the Contractor's operations causing a public nuisance.	R1,000.00
Improper use of plant or equipment.	R500.00
Construction vehicles not adhering to speed limits.	R250.00
Failure to maintain a register of incidents on site.	R1,000.00
Failure to remove all temporary features and leftovers from the construction site and works areas upon completion of the works.	R20,000.00
Repeated contravention of the specifications or failure to comply with instructions	R5,000.00

APPENDIX G

WETLAND REHABILITATION MEASURES

Phase 1	❖ Stockpiled wetland soil shall be replaced in the reverse order as to which it was removed (subsoil first followed by topsoil). ❖ Reinstated wetland soil is not to be compacted too heavily, as this will prevent water saturation and proper plant growth during rehabilitation. ❖ Should significant compaction occur, the area is to be ripped to reduce the bulk density of the soil. ❖ The pipeline should ideally be covered with coarse material such as boulders to create habitat diversity.
Phase 2	❖ The pre-construction profile of the stream channel and banks shall be returned to one similar as before construction, with no major net increase in slope transversely or longitudinally. ❖ The channel bed should be restored as far as possible to the original condition and stream banks reinstated as close as possible to the original contours in order to reduce potential scouring. ❖ All fill material, cofferdams, causeways or any other structures used to provide a footing in the river must be completely removed. ❖ The channel embankments must be rehabilitated to ensure both longitudinal and cross sectional stability against summer floods. Depending on the circumstances, this may necessitate stabilizing structures such as gabions or renomattresses.
Phase 3	❖ All waste products (spoil, construction materials, hazardous substances and general litter) need to be removed from the stream and disposed of in proper local waste facilities.
Phase 4	❖ The removal of exotic vegetation species from the disturbed wetland and adjacent areas will need to occur. Implement an integrated alien weed control programme to ensure that alien plants are eradicated from the disturbed site, and so they do not impact on the pipeline itself.
Phase 5	❖ Once the soil and topography of the riparian zone has been returned to its preconstruction state, and waste products removed, stockpiled riparian vegetation is to be reinstated. Re-instate the area affected with suitable indigenous grasses (Antelope grass) and bulrushes, such as those found at the site. ❖ Stream banks should be re-vegetated as soon as practically possible with indigenous species similar to those occurring in the original habitat.

Declaration of Understanding and Acceptance of Terms of the EMPr

I _____ have read and understand the above document.

By signing below, I declare that I will abide by the rules and procedures specified in the above document, and that I will follow recommended safety and environmental procedures to minimize personal risk/injury and harm to the environment while working for Ugu District Municipality.

I also accept responsibility for my actions should Ugu District Municipality find me guilty for contravention of the rules and procedures outlined in this document.

Signature

Date