



# **Amended **Final** Environmental Management Programme:**

in support of the  
Environmental Impact Assessment and  
~~Waste Management License Application~~  
for the proposed

**Solids Removal and Treatment Facilities Upgrade at the Southern Waste  
Water Treatment Works, Merewent, KwaZulu-Natal**

November 2015

June 2016 and September 2016

ETHEKWINI MUNICIPALITY

WATER AND SANITATION DEPARTMENT

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## Document description

Client:

**EThekweni Municipality – Water and Sanitation**

Project Name:

**Amended Final** Environmental Management Programme (fEMPr) in support of the Environmental Impact Assessment and Waste Management Licence Application for the proposed Solids Removal and Treatment Facilities Upgrade at the Southern Waste Water Treatment Works, Merewent, KwaZulu-Natal

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## NOTIFICATIONS

**This EMPr must be on site at all times and available for reference and application (together with all supporting documents).**

**This EMPr must be included in the construction tender document to ensure adequate pricing for environmental provisions.**

**This EMPr is a live document and hence can and must be updated, amended and changed where applicable as the project progresses through the project life-cycle.**

**This document is a legal document and is auditable – implementation of this document and adherence to all aspects thereof are legally binding.**

**This is the updated EMPr following the review period of the draft EIAR Report and draft EMPr, amendments are distinguished by highlight is teal (as per this comment).**

**Note that changes such as resizing figures to make them more readable are not counted as marked amendments, but may have lead to pagination changes thus making the document appear different visually to the earlier version, these are however not substantive changes.**

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## Glossary

**Accident** – A road vehicle accident.

**Activity (Development)** – an action either planned or existing that may result in environmental impacts through pollution or resource use. For the purpose of this report, the terms ‘activity’ and ‘development’ are freely interchanged.

**Alternative** – a possible course of action, in place of another, of achieving the same desired goal of the proposed project. Alternatives can refer to any of the following but are not limited to: site alternatives, site layout alternatives, design or technology alternatives, process alternatives or a no-go alternative. All reasonable alternatives must be rigorously explored and objectively evaluated.

**Anaerobic Digestion** – Anaerobic digestion is a biological process making it possible to degrade organic matter by producing biogas which is a renewable energy source and a sludge used as fertilizer. Under this process the organic sludge is treated in the absence of oxygen to reduce both the quantity and odour of sludge by breaking down the organic matter. The resultant sludge is rich in nutrients and organic matter which can improve the soil conditions if applied as soil supplement; hence it's possible use as fertilizers.

**Applicant** – the project proponent or developer responsible for submitting an environmental application to the relevant environmental authority for environmental authorisation.

**Biodiversity** – the diversity of animals, plants and other organisms found within and between ecosystems, habitats, and the ecological complexes.

**Building and demolition waste** – Building and demolition waste means waste, excluding hazardous waste, produced during the construction, alteration, repair or demolition of any structure, and includes rubble, earth, rock and wood displaced during that construction, alteration, repair or demolition.

**Construction** – means the building, erection or establishment of a facility, structure or infrastructure that is necessary for the undertaking of a listed or specified activity but excludes any modification, alteration or expansion of such a facility, structure or infrastructure and excluding the reconstruction of the same facility in the same location, with the same capacity and footprint.

**Contractor** – Companies appointed on behalf of the Client to undertake activities, as well as their sub-contractors and suppliers.

**Cumulative Impacts** – impacts that result from the incremental impact of the proposed activity on a common resource when added to the impacts of other past, present or reasonably foreseeable future activities to produce a greater impact or different impacts.

**Deconstruction** – Deconstruction is the selective dismantlement of building components. Deconstruction has also been defined as “construction in reverse”. Deconstruction is commonly separated into two categories; structural and non-structural. Non-structural deconstruction, also known as “soft-stripping”, consists of

reclaiming non-structural components e.g. doors, windows, and finish materials. Structural deconstruction involves dismantling the structural components of a building.

**Degradation** – The lowering of the quality of the environment through human activities e.g. river degradation, soil degradation.

**Demolition** – Demolition is the tearing-down of buildings and other structures, the opposite of construction. Demolition contrasts with deconstruction, which involves taking a building apart while carefully preserving valuable elements for re-use.

**Direct impacts** – impacts that are caused directly by the activity and generally occur at the same time and at the same place of the activity. These impacts are usually associated with the construction, operation or maintenance of an activity and are generally quantifiable.

**Domestic waste** – Domestic waste means waste, excluding hazardous waste that emanates from premises that are used wholly or mainly for residential, educational, health care, sport or recreation purposes.

**Ecological Reserve** – the water that is necessary to protect the water ecosystems of the water resource. It must be safeguarded and not used for other purposes. The Ecological Reserve specifies both the quantity and quality of water that must be left in the national water resource. The Ecological Reserve is determined for all major water resources in the different water management areas to ensure sustainable development.

**Ecosystem** – a dynamic system of plant, animal (including humans) and micro-organism communities and their non-living physical environment interacting as a functional unit. The basic structural unit of the biosphere, ecosystems are characterised by interdependent interaction between the component species and their physical surroundings. Each ecosystem occupies a space in which macro-scale conditions and interactions are relatively homogenous.

**Emergency** – An undesired event that results in a significant environmental impact and requires the notification of the relevant statutory body such as a local or provincial authority.

**Environment** – In terms of the National Environmental Management Act (NEMA) (Act No 107 of 1998) (as amended), “Environment” means the surroundings within which humans exist and that are made up of: (A) the land, water and atmosphere of the earth; (B) micro-organisms, plants and animal life; (C) any part or combination of (i) of (ii) and the interrelationships among and between them; and (D) the physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and wellbeing.

**Environmental Assessment (EA)** – the generic term for all forms of environmental assessment for projects, plans, programmes or policies and includes methodologies or tools such as environmental impact assessments, strategic environmental assessments and risk assessments.

**Environmental Assessment Practitioner** – the individual responsible for planning, management and coordination of environmental impact assessments, strategic environmental assessments, environmental management programmes or any other appropriate environmental instrument introduced through the EIA Regulations.

**Environmental Authorisation** – an authorisation issued by the competent authority in respect of a listed activity, or an activity which takes place within a sensitive environment.

**Environmental control officer** – An individual nominated through the Client to be present on site to act on behalf of the Client in matters concerning the implementation and day to day monitoring of the EMPr and conditions stipulated by the authorities.

**Environmental Impact** – a change to the environment (biophysical, social and/ or economic), whether adverse or beneficial, wholly or partially, resulting from an organisation's activities, products or services.

**Environmental Impact Assessment (EIA)** – the process of identifying, predicting, evaluating and mitigating the biophysical, social, and other relevant effects of development proposals prior to major decisions being taken and commitments made.

**Environmental Issue** – a concern raised by a stakeholder, interested or affected parties about an existing or perceived environmental impact of an activity.

**Environmental Management** – ensuring that environmental concerns are included in all stages of development, so that development is sustainable and does not exceed the carrying capacity of the environment.

**Environmental Management Programme** – A detailed plan of action prepared to ensure that recommendations for enhancing or ensuring positive impacts and limiting or preventing negative environmental impacts are implemented during the life cycle of a project. This EMPr focuses on the construction phase, operation (maintenance) phase and decommissioning phase of the proposed project.

**Expansion** – means the modification, extension, alteration or upgrading of a facility, structure or infrastructure at which an activity takes place in such a manner that the capacity of the facility or the footprint of the activity is increased.

**Fatal Flaw** – issue or conflict (real or perceived) that could result in developments being rejected or stopped.

**Flocculation** - The process by which individual particles of clay aggregate into clotlike masses or precipitate into small lumps. Flocculation occurs as a result of a chemical reaction between the clay particles and another substance, usually salt water.

**General waste landfill site** – A waste disposal site that is designed managed and permitted to allow for the disposal of general waste.

**General waste** – General waste means waste that does not pose an immediate hazard or threat to health or to the environment, and includes – (i) domestic waste; (ii) building and demolition waste; (iii) business waste; and (iv) inert waste.

**Groundwater** – All subsurface water that fills voids between highly permeable ground strata comprised of sand, gravel, broken rocks, porous rocks, etc. and move under the influence of gravitation.

**Hazardous waste landfill site** – A waste disposal site that is designed managed and permitted to allow for the disposal of hazardous waste.

**Hazardous waste** – Hazardous waste means any waste that contains organic or inorganic elements or compounds that may, owing to the inherent physical, chemical or toxicological characteristics of that waste have a detrimental impact on health and the environment.

**Hydrocyclone** - A hydrocyclone (often referred to by the shortened form cyclone) is a device to classify, separate or sort particles in a liquid suspension based on the ratio of their centripetal force to fluid resistance.

**Impact** – A description of the potential effect or consequence of an aspect of the development on a specified component of the biophysical, social or economic environment within a defined time and space.

**Incident** – An undesired event which may result in a significant environmental impact but can be managed through internal response.

**Indirect impacts** – indirect or induced changes that may occur as a result of the activity. These types of impacts include all of the potential impacts that do not manifest immediately when the activity is undertaken or which occur at a different place as a result of the activity.

**Integrated Environmental Management** – a philosophy that prescribes a code of practice for ensuring that environmental considerations are fully integrated into all stages of the development and decision-making process. The IEM philosophy (and principles) is interpreted as applying to the planning, assessment, implementation and management of any proposal (project, plan, programme or policy) or activity – at local, national and international level – that has a potentially significant effect on the environment. Implementation of this philosophy relies on the selection and application of appropriate tools for a particular proposal or activity. These may include environmental assessment tools (such as strategic environmental assessment and risk assessment), environmental management tools (such as monitoring, auditing and reporting) and decision-making tools (such as multi-criteria decision support systems or advisory councils).

**Interested and Affected Party** – for the purposes of Chapter 5 of the NEMA and in relation to the assessment of the environmental impact of a listed activity or related activity, means an interested and affected party contemplated in Section 24(4)(a)(v), and which includes – (a) any person, group of persons or organisation interested in or affected by such operation or activity; and (b) any organ of state that may have jurisdiction over any aspect of the operation or activity.

**Mechanical Thermal Drying** - Heat drying involves the application of heat to evaporate water and to reduce moisture content of biosolids below that achievable by conventional dewatering methods. Heat can be transferred by convection, conduction, radiation, or a combination of two or more methods. Thermal drying is one of the technologies available for processing of solids produced at wastewater treatment plants. Thermal drying technology is based on removal of water from dewatered solids which accomplishes both volume and weight reduction. The added benefit of thermal drying is that it typically results in a product with significant nutrient value. Typically, dewatered solids (at approximately 18% to 35% dry solids content) are delivered to a thermal drying system, where most of the water is removed *v/a* evaporation resulting in a product containing approximately 90% solids. In the thermal drying system, the temperature of the wet solids mass is raised so that the water is driven off as a vapor. By removing most of the water from the solids, thermal drying results in a significant reduction in both volume and mass.

**Mesophylic** - Describes an organism that lives and grows optimally at moderate temperatures, typically between 10 and 40°C. The vast majority of organisms are mesophiles, occupying all the major biomes of temperate and tropical climates.

**Method statement** – A method statement is a written submission by the Contractor to the Engineer in response to the specification or a request by the Engineer, setting out the plant, materials, labour and method the Contractor proposes using to carry out an activity, identified by the relevant specification or the Engineer

when requesting a Method Statement. It contains sufficient detail to enable the Engineer to assess whether the Contractor's proposal is in accordance with the Specifications and/or will produce results in accordance with the Specifications.

**Mitigate** – the implementation of practical measures designed to avoid, reduce or remedy adverse impacts or enhance beneficial impacts of an action.

**Mitigation** – Measures designed to avoid, reduce or remedy adverse impacts.

**No-Go Option** – in this instance the proposed activity would not take place, and the resulting environmental effects from taking no action are compared with the effects of permitting the proposed activity to go forward.

**Open Space** – environmentally sensitive areas which are not suitable for development and consist of watercourses, buffers, floodplains, steep slopes, sensitive biodiversity and/or areas of cultural or heritage significance.

**Polyelectrolytic / polyelectrolyte** - A macromolecule in which a substantial portion of the constitutional units have ionizable or ionic groups, or both. Polyelectrolytes are polymers whose repeating units bear an electrolyte group

**Pollution** – The National Environmental Management Act (NEMA), Act No. 107 of 1998, defined pollution to mean any change in the environment caused by – substances; radioactive or other waves; or noise, odours, dust or heat emitted from any activity, including the storage or treatment of waste or substances, construction and the provision of services, whether engaged in by any person or an organ of state, where that change has an adverse effect on human health or well-being or on the composition, resilience and productivity of natural or managed ecosystems, or on materials useful to people, or will have such an effect in the future.

**Preliminary treatment process** – in the treatment of waste water, this refers to the process of de-gritting. The purpose of preliminary treatment is to protect the operation of the wastewater treatment plant. This is achieved by removing from the wastewater any constituents which can clog or damage pumps, or interfere with subsequent treatment processes.

**Primary treatment process** – in the treatment of waste water, this refers to the process of sedimentation undertaken in the primary sedimentation tanks. Primary treatment removes material that will either float or readily settle out by gravity. It includes the physical processes of screening, grit removal, and sedimentation.

**Recovery** – The controlled extraction of a material or the retrieval of energy from waste to produce a product.

**Recycle** – A process where waste is reclaimed for further use, this involves the separation of waste from a waste stream for further use and the processing of that separated material as a product or raw material.

**Rehabilitation** – a measure aimed at reinstating an ecosystem to its original function and state (or as close as possible to its original function and state) following activities that have disrupted those functions.

**Re-use** – To utilise articles from the waste stream again for a similar or a different purpose without changing the form of properties of the articles.

**Safety, health and environmental officer** – The SHE officer is a Contractor representative, responsible for the safety, health and environmental aspects on the construction site. The SHE officer will be responsible for the day-to-day monitoring of the EMP and Health and Safety Plan.

**Scoping** – the process of determining the spatial and temporal boundaries (i.e. extent) and key issues to be addressed in an environmental assessment. The main purpose of scoping is to focus the environmental assessment on a manageable number of important questions. Scoping must also ensure that only significant issues and reasonable alternatives are examined.

**Secondary treatment process** – in the treatment of waste water, this refers to the process of aeration. Secondary (biological) treatment removes the dissolved organic matter that escapes primary treatment. This is achieved by microbes consuming the organic matter as food, and converting it to carbon dioxide, water, and energy for their own growth and reproduction.

**Sensitive environment** – any environment identified as being sensitive to the impacts of the development.

**Significance** – significance can be differentiated into impact magnitude and impact significance. Impact magnitude is the measurable change (i.e. magnitude, intensity, duration and likelihood). Impact significance is the value placed on the change by different affected parties (i.e. level of significance and acceptability). It is an anthropocentric concept, which makes use of value judgements and science-based criteria (i.e. biophysical, social and economic).

**Sludge** – Sludge is semi-solid slurry and can be produced as sewage sludge from wastewater treatment processes or as a settled suspension obtained from conventional drinking water treatment and numerous other industrial processes. Industrial wastewater solids are also referred to as sludge, whether generated from biological or physical-chemical processes.

**Stakeholder engagement** – the process of engagement between stakeholders (the proponent, authorities and I&APs) during the planning, assessment, implementation and/or management of proposals or activities.

**Sustainable Development** – development which meets the needs of current generations without hindering future generations from meeting their own needs.

**Tertiary treatment process** – in the treatment of waste water, this refers to the combination of processes including that of ozonation. Tertiary treatment is simply additional treatment beyond secondary. Tertiary treatment can remove more than ninety-nine percent (99%) of all the impurities from sewage, producing an effluent of almost drinking-water quality. The related technology can be very expensive, requiring a high level of technical know-how and well trained treatment plant operators, a steady energy supply, and chemicals and specific equipment which may not be readily available.

**Waste disposal facility** – Waste disposal facility means any site or premise used for the accumulation of waste with the purpose of disposing of that waste at that site or on that premises.

**Waste** – Waste means any substance, whether or not that substance can be reduced, re-used, recycled and recovered – (i) that is surplus, unwanted, rejected, discarded, abandoned or disposed of; (ii) which the generator has no further use of for the purposes of production; (iii) that must be treated or disposed of; or (iv) that is identified as a waste by the Minister by notice in the Gazette, and includes waste generated by the mining, medical or other sector, but – (i) a by-product is not considered waste; and (ii) any portion of waste, once re-used, recycled and recovered, ceases to be waste.



**Water pollution** – The National Water Act (NWA), Act No. 36 of 1998, defined water pollution to be the direct or indirect alteration of the physical, chemical or biological properties of a water resource so as to make it – less fit for any beneficial purpose for which it may reasonably be expected to be used; or harmful or potentially harmful (aa) to the welfare, health or safety of human beings; (bb) to any aquatic or non-aquatic organisms; (cc) to the resource quality; or (dd) to property”.

**Watercourse** – means: (a) a river or spring; (b) a natural channel or depression in which water flows regularly or intermittently; (c) a wetland, lake or dam into which, or from which, water flows; and (d) any collection of water which the Minister may, by notice in the Gazette, declare to be a watercourse as defined in the National Water Act, 1998 (Act No. 36 of 1998) and a reference to a watercourse includes, where relevant, its bed and banks.

**Wetland** – means land which is transitional between terrestrial and aquatic systems where the water table is usually at or near the surface, or the land is periodically covered with water, and which land in normal circumstances supports or would support vegetation typically adapted to life in saturated soil.

**Workforce** – The entire project team including people employed by the Developer or the Contractor, persons involved in activities related to the project, or person present at or visiting the construction area, including permanent contactors and casual labour.

## *Abbreviations and Acronyms*

AD	Anaerobic Digestion
CBD	Central Business District
CMS	Catchment Management System
C-PLAN	Conservation Plan
CSIR	Centre for Scientific and Industrial Research
DAEA	Department of Agriculture and Environmental Affairs (previous name of EDTEA)
DAFF	Department of Agriculture, Forestry and Fisheries
DMOSS	Durban Metropolitan Open Space System
DWA(F)	Department of Water Affairs (& Forestry) (previous names of DWS)
DWS	Department of Water and Sanitation (previously DWA (DWAF))
EA	Environmental Authorisation
ECO	Environmental Compliance Officer
EDTEA	Economic Development, Tourism and Environmental Affairs (previously DAEA – see above)
EIA	Environmental Impact Assessment



EIAR	Environmental Impact Assessment Report
EKZNW	EzemVelo KwaZulu-Natal Wildlife
EMPr	Environmental Management Programme
ESS	Environmental Scoping Study
ETM	eThekwini Municipality
EWS	eThekwini Water and Sanitation
GHG	Green House Gases
HAZID	Hazard Identification
HAZOP	Hazard Operability Study
HRA	Health Risk Assessment
I&AP	Interested and Affected Parties
IDP	Integrated Development Plan
ISO	International Organisation for Standardisation
IWRM	Integrated Water Resource Management
IWWMP	Integrated Waste Water Management Plan
MHI	Major Hazardous Installation
MSDS	Material Safety Data Sheet
NDOHS	National Department of Human Settlements
NDOT	National Department of Transport
NEMA	National Environmental Management Act
NEM:AQA	National Environmental Management Air Quality Act
NEM:WA	National Environmental Management Waste Act
NGO	Non-Governmental Organization
NWRS	National Water Resource Strategy
OHSACT	Occupational Health and Safety Act
PFD	Process Flow Diagram
PoS	Plan of Study
PPE	Personal Protective Equipment
PPP	Public Participation Process
PST	Primary Sedimentation Tank
RDP	Reconstruction and Development Plan
RQO	Resource Quality Objectives

SANBI	South African National Biodiversity Institute
SDB	South Durban Basin
SEA	Strategic Environmental Assessment
SIA	Social Impact Assessment
SNL	Supernatant Liquor
SR	Scoping Report
SR&TFU	Solids Removal and Treatment Facilities Upgrade
SWMP	Storm-water Management Plan
SWWTW	Southern Waste Water Treatment Works
TRS	Total Reduced Sulphur
US EPA	United States Environmental Protection Act
VOC	Volatile Organic Compounds
WML	Waste Management Licence

# 1 INTRODUCTION

## 1.1 Background

The Southern Waste Water Treatment Works (SWWTW) is located in South Durban, Merewent on the north-eastern bank of the Umlaas Canal. The SWWTW is surrounded by a mixed development node of both residential and industrial developments. The property address is 2 Byfield Road, Merewent / Bluff located in an industrial shared with residential area. The close proximity is shown **Figure 1-1** below and the wider context in the locality plan.



Figure 1-1: Site locality



Similar to numerous large coastal cities in many regions of the world, Durban sees a significant proportion of the wastewater that is generated daily by households and industry in the city of Durban, discharged to the marine environment through deep-water outfalls. The bulk of the wastewater is discharged through outfalls that serve the Central Works and the SWWTW, which are owned and operated by the eThekweni Municipality. The SWWTW discharges to sea outfall of 4.2 km in length with 34 diffusers discharging at a depth of 54 – 64 m.

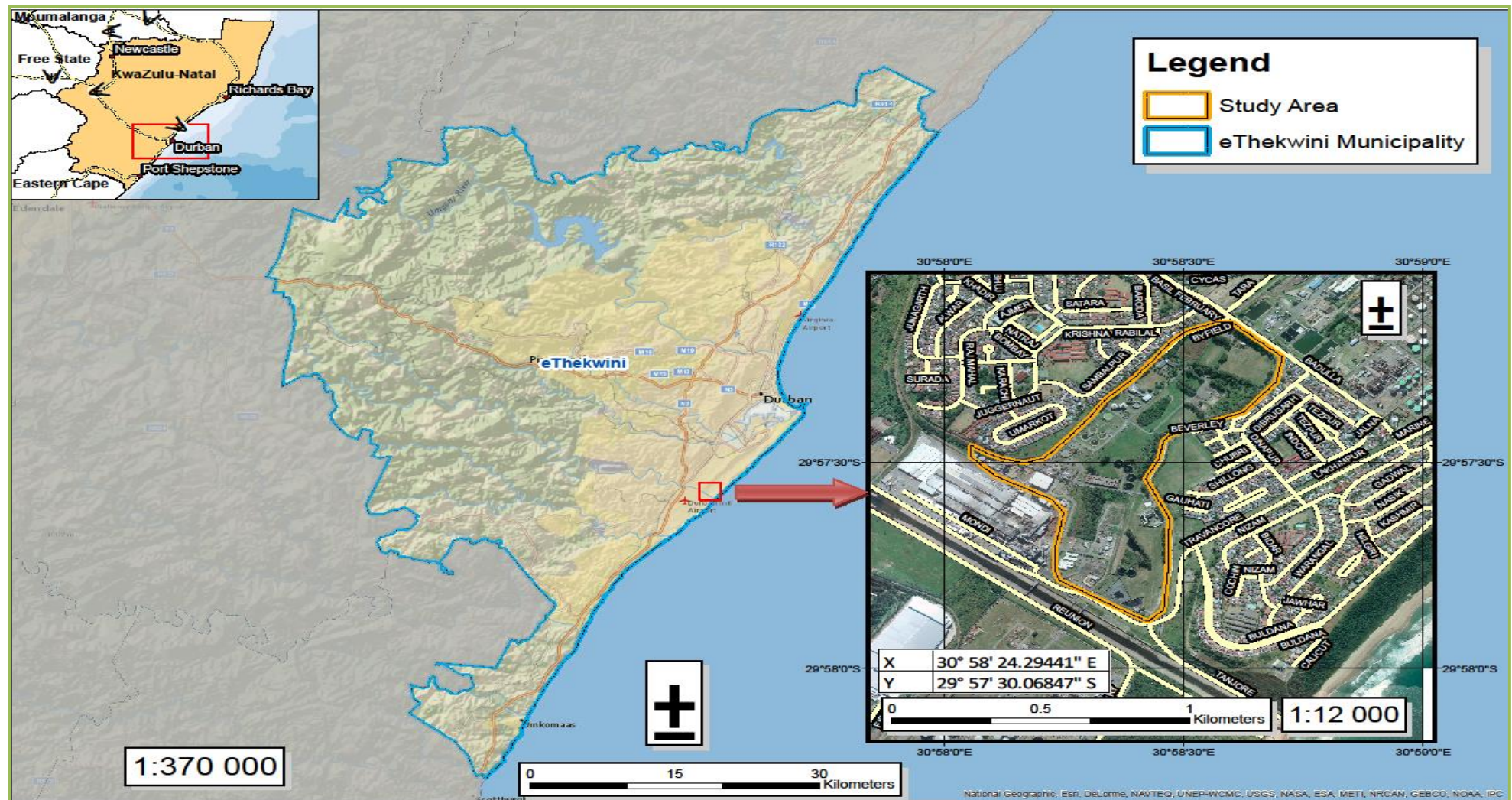


Figure 1-2: Locality plan (wider context)

The SWWTW receives the majority of its raw sewage effluent through three large (1,500 mm diameter) trunk sewers, i.e. the Main Southern Trunk Sewer (referred to as the Jacobs Trunk Sewer), the Wentworth Valley Trunk Sewer and the Umlaas Trunk Sewer. Other smaller diameter pipelines coming to this Works includes those from Mondi and SAPREF (each separately discharging at the inlet of this Works) and Illovo (discharging closer to the outlet of this Works). The total average daily flow to this works is in the region of 130 million litres per day and all the treated flows (110 million litres) leaving this works is discharged directly to sea (by gravity and by pumping) through a 1,000 mm diameter, 4.2 km long sea outfall.

The Umlaas Trunk Sewer which serves the areas of Chatsworth and Umlazi discharges effluent to this Works that is predominantly domestic in origin. The discharged flow (currently in the region of 35 million litres per day) is immediately directed to a separate treatment facility where it undergoes preliminary, primary, secondary and tertiary treatment. The secondary and tertiary treatment processes are managed by a private entity (Veolia Water) who stores and sells the tertiary treated (or reclaimed) effluent to industry. All sludge generated from the treatment of this effluent is discharged to sea.


The Jacobs Trunk Sewer which serves the residential areas of Yellow Wood Park, Montclair and Woodlands, and the industrial areas of Jacobs and Mobeni discharges sewage effluent that is a combination of domestic and industrial in origin. The Wentworth Valley Trunk Sewer which serves the areas of the Bluff, Wentworth, Clairwood, Bayhead and Island View, discharges sewage effluent that is also a combination of domestic and industrial in origin. The flows conveyed by these two trunk sewers (currently in the region of 95 million litres per day) combine at the main inlet works and undergo preliminary treatment only (i.e. removal of screenings and grit) before being discharged to sea.

In addition to the pipeline discharge of sewage effluent to this works, smaller volumes of effluent are also discharged by various road tankers. The effluent discharged by these road tankers also undergo preliminary treatment only before being discharged to sea.

### 1.1.1 Details of the Project Applicant

The project applicant is the eThekweni Water and Sanitation Department at the eThekweni Municipality. The details of the project applicants are as follows:

**Table 1-1: Applicant details**

Applicant	eThekweni Municipality	
Representative	Mr Ednick Msweli	
Physical Address	3 Prior Road, Durban, 4001	
Postal Address	P.O. Box 1038 Durban 4000 South Africa	
Telephone	031 311 8600	
Facsimile	031 311 8699	
E-mail	Ednick.Msweli@durban.gov.za	

### 1.1.2 Details of the Environmental Assessment Practitioner

Royal HaskoningDHV (RHDHV) was been appointed as the Environmental Consultant where Mr Malcolm Roods functions as the Environmental Assessment Practitioner (EAP) by eThekweni Water and Sanitation via AECOM who perform the function of lead design engineers. Royal HaskoningDHV undertook the appropriate environmental studies for this proposed project. The professional team of Royal HaskoningDHV has considerable experience in the environmental management and EIA fields.



**Table 1-2: EAP details**

DETAIL	ROYAL HASKONINGDHV		
Contact Persons	Malcolm Roods (EAP)	Bronwen Griffiths	Novashni Sharleen Moodley
Postal Address	PO Box 867, Gallo Manor, Gauteng, South Africa	PO Box 5195, Tyger Valley, 7 536, South Africa	PO Box 1243, Umhlanga Rocks, 4320, KwaZulu-Natal, South Africa
Telephone	011 798 6442	021 9367600	087 350 6763
Facsimile	031 719 5505	-	-
E-mail	<a href="mailto:Malcolm.roods@rhdhv.com">Malcolm.roods@rhdhv.com</a>	<a href="mailto:bronwen.griffiths@rhdhv.com">bronwen.griffiths@rhdhv.com</a>	<a href="mailto:Novashni.moodley@rhdhv.com">Novashni.moodley@rhdhv.com</a>
Qualification	HeD, BA (Hons) Environmental Management EAPSA	MSc Quantitative Conservation Biology Pr.Sci.Nat: 400169/11	MSc Environmental Science Pr.Sci.Nat: 400305/15
Experience	15 years	18 years	7 years

## 2 PROJECT DESCRIPTION

### 2.1 Scope of work proposed

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The aim of the proposed SWWTW upgrades is to reduce the quantity of suspended solids being disposed of to sea by affording primary treatment to the combined effluent discharges from the Jacobs and Wentworth Valley Trunk Sewers. This physical treatment process (through primary settling) will result in the organic load to sea being drastically reduced. The settled solids (referred to as primary [or raw] sludge) will then be removed and stabilised through a process of anaerobic digestion, before being dewatered.

The options proposed for the disposal of the dewatered sludge are as follows:

- Removal off site to the Shongweni landfill;

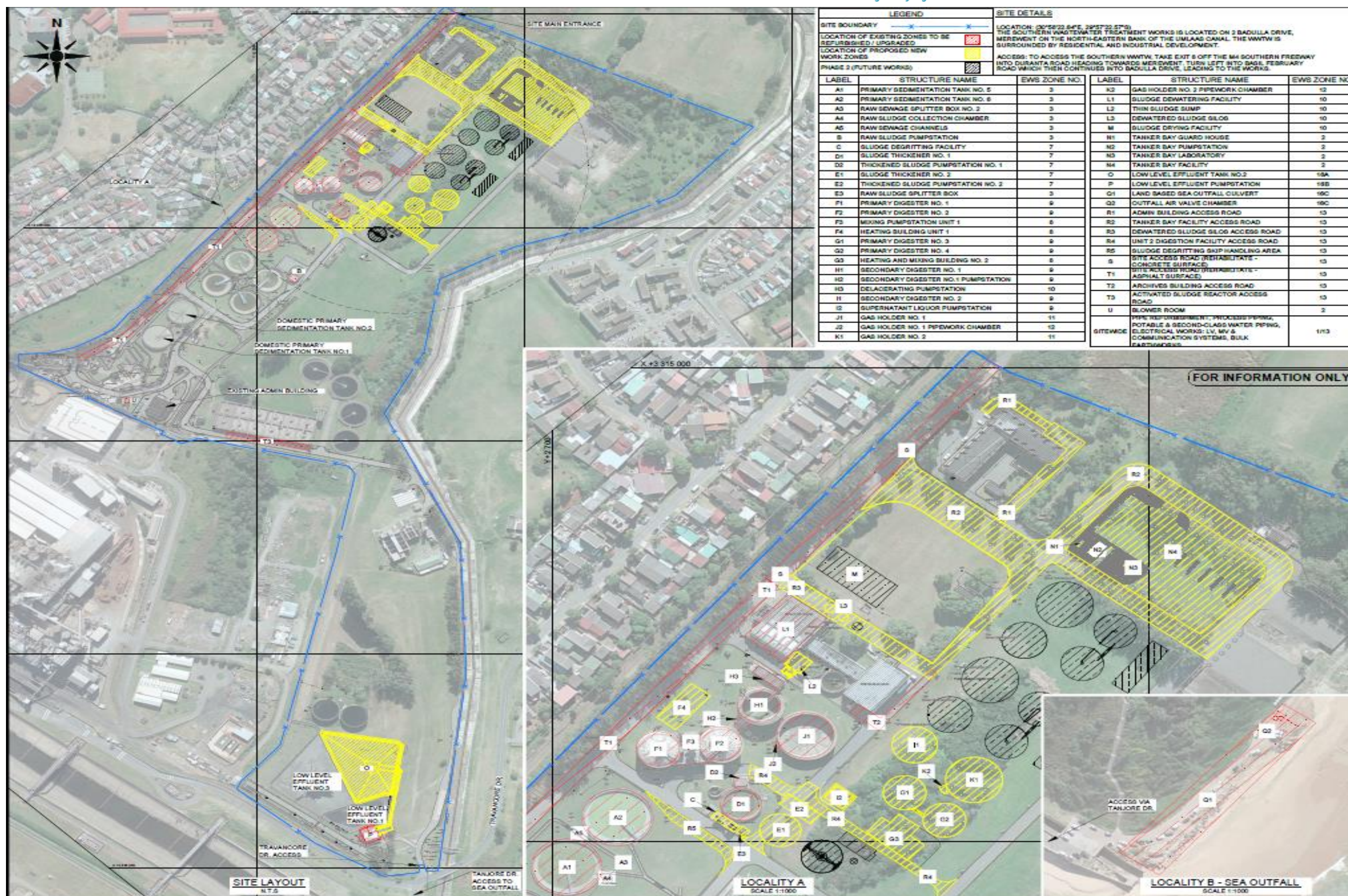
Possible later considerations will be given to:

- Thermal drying using sludge gas and then removal off site to agriculture;
- If not thermal drying, sludge gas will be used for the generation of electricity in the region of 1MW, to be used internally on the plant; and

**Figure 2-1** depicts the scope of work proposed.

Refer to **Appendix D** for approved layout and Process Flow Diagram.





### Figure 2-1: Proposed scope of works



The work will be undertaken in 2 phases, with Phase 1 being the immediate upgrade and Phase 2 being the future upgrade. The Phase 1 upgrade will result in the primary treatment of approximately 60 Mega (million) litres (or 63.5%) of the present combined flow (i.e. 95 Mega [million] litres) being discharged from the Jacobs and Wentworth Valley Trunk Sewers.

The solids (or sludge) to be removed will then be combined with that currently being removed from the treatment of the sewage effluent being discharged from the Umlaas Trunk Sewer, currently 35Mℓ/d, before being pumped to the anaerobic digesters. The biogas (which is made up of approximately 60% methane and 40% carbon dioxide) and emanating from the anaerobic digestion process will be stored in gas holders. The options proposed for the use of the biogas are as follows:

- Consumption of at least one third of the stored volume for heating of the sludge (as part of the digestion process) and flaring (or burning) of the remainder.
- Utilising most of the stored gas to dry the sludge through a mechanical thermal drying process and then using the waste heat from the drying process to heat the sludge. It is important to note that the drying of sludge would greatly reduce the road transportation requirements for removal of sludge off site.

The upgrades will be undertaken in two (2) phases as described below in FiguresFigure 2-2 and 2-3.

### 2.1.1 Phase 1

Phase 1 is taken to include the following:

- (a) Refurbish and bring back on line two out of six existing primary settling tanks.
- (b) Refurbish and bring back on line existing two anaerobic primary digesters and secondary digester and construct two new primary digesters and one secondary digester, all of same capacity as existing.
- (c) Refurbish and bring back on line existing raw sludge gravity thickener and construct a new gravity thickener of the same capacity.
- (d) Refurbish and bring back on line existing gas holder and construct a new gas holder of the same capacity.
- (e) Refurbish and bring back on line various existing (unused) electrical substation buildings and small pumping stations.
- (f) Establishing a new mechanical sludge dewatering facility on site and 2 x 150,000 litres fully enclosed steel sludge storage silos.
- (g) Provide additional effluent storage capacity of 23 Million litres at existing low level pumping station and replace all old pumps with new pumps.
- (h) Replace the last 70 m of the landline section of the sea outfall pipeline with new 2 x 1,000 m diameter pipe.
- (i) Construct new road tanker effluent discharge bays in close proximity to the entrance of the Works.
- (j) Install new medium voltage and low voltage electrical cables and equipment.
- (k) Minor road works and a new access road.

### 2.1.2 Phase 2

Phase 2 is taken to include the following:

- (a) Refurbish and bring back on line remaining four of the existing six primary settling tanks and construct two new primary settling tanks of the same capacity as existing.
- (b) Construct additional anaerobic primary digesters and secondary digesters, all of the same capacity as existing.
- (c) Construct a new raw sludge gravity thickener, of the same capacity as existing.
- (d) Construct a new gas holder (23 m diameter).
- (e) Install additional mechanical sludge dewatering equipment.
- (f) Establishment a new mechanical sludge thermal drying facility on site.

It is important to note that the timing of Phase 2 is still to be confirmed.

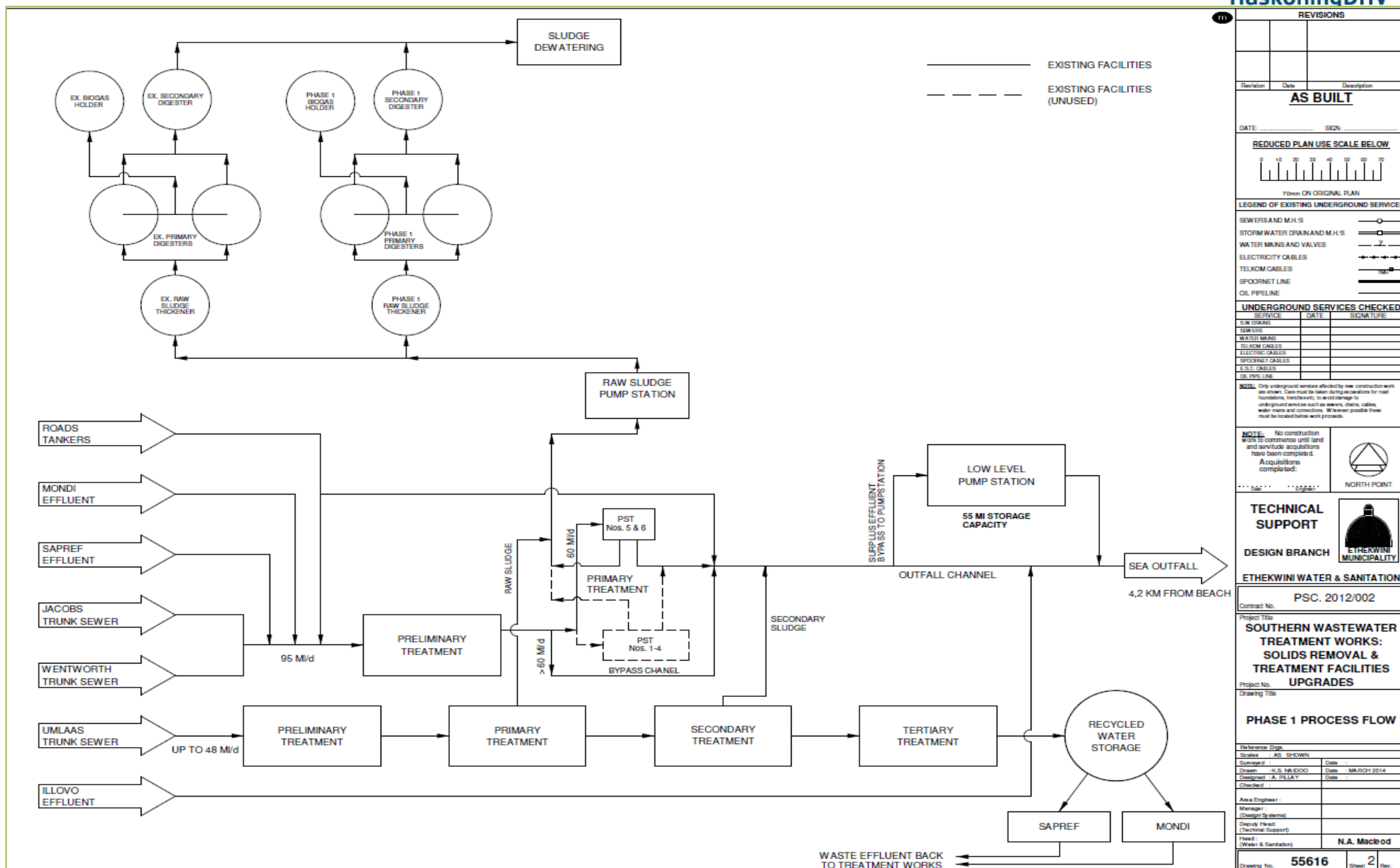


Figure 2-2: Phase 1 process flow diagram

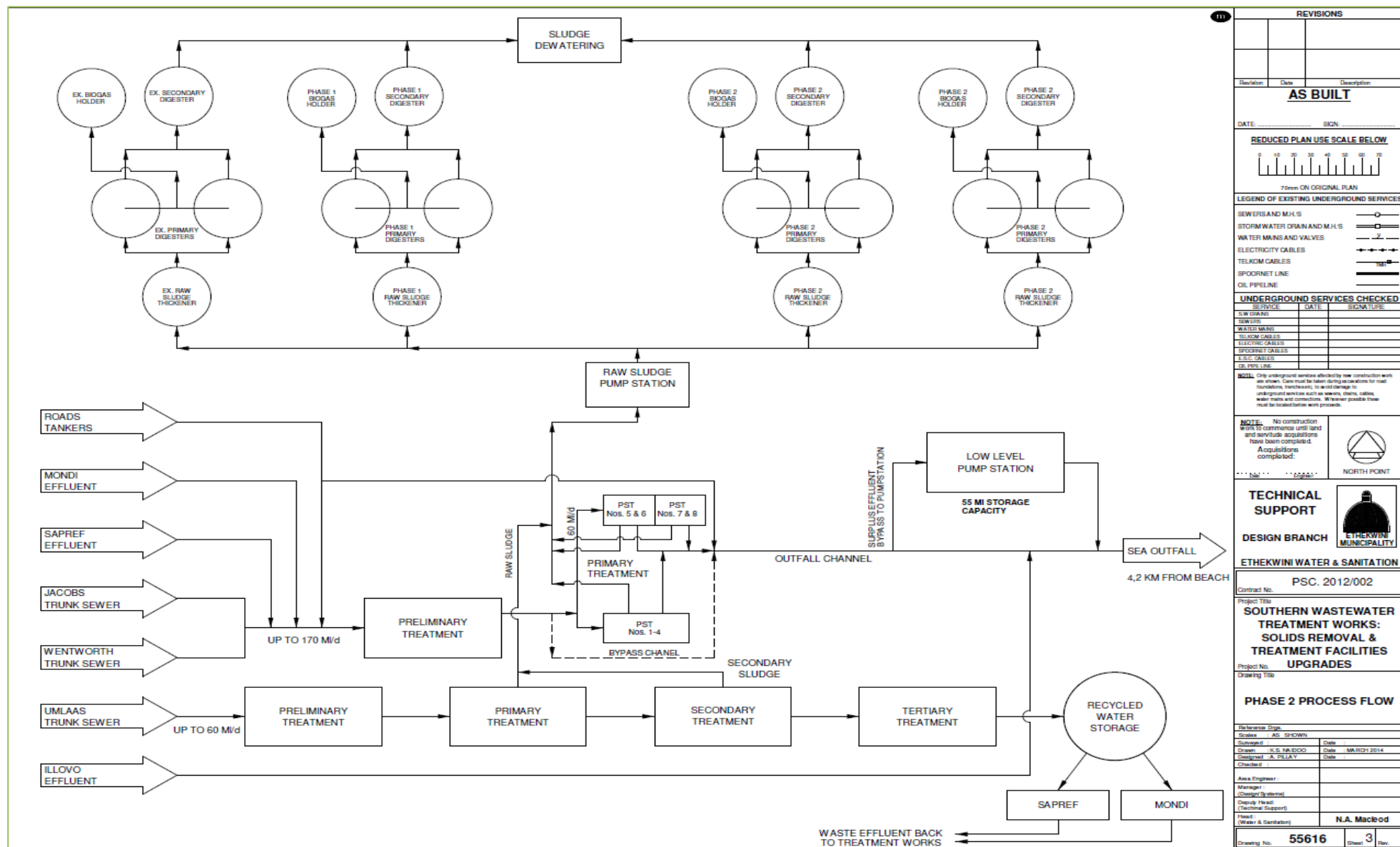


Figure 2-3: Phase 2 process flow diagram

### 3 LEGAL FRAMEWORK AND REQUIREMENTS

In order to protect the environment and ensure that the development is undertaken in an environmentally responsible manner, there is a number of environmental legislation that need to be taken into account during this study.

A summarised application is provided here in **Table 3-1**; however, please refer to **Appendix A** for a detailed explanation of the applicability of these Acts and for the table detailing the listed activities which have been authorised for this development.

**Table 3-1: Applicable Environmental Legislation**

LEGISLATION	SECTIONS	RELATES TO
The Constitution (No. 108 of 1996)	Chapter 2	Bill of Rights.
	Section 24	Environmental rights.
National Environmental Management Act (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.
EIA Regulations (2010) <sup>1</sup> Overarching legislation which must be abided by for the SWWTW EA.	GNR 543 – Sections 28, 31, 32, 33, 54	Content of scoping reports (Section 28), Environmental Impact Assessment reports (Section 31), specialist report and reports on specialised processes (Section 32), content of draft environmental management programmes (Section 33) and the public participation process (Section 54).
	GNR 544 – Listing Notice (LN) 1	Activities requiring a Basic Assessment study to be undertaken.
	GNR 545 – LN 2	Activities requiring a Scoping and Impact Assessment study to be undertaken.
	GNR 546 – LN 3	Activities in special geographical areas requiring a Basic Assessment study to be undertaken.
National Environmental Management: Waste Act (Act No. 59 of 2008)		Provides for specific waste management measures and the remediation of contaminated land. Overarching legislation which must be abided by for the SWWTW Waste Management License.

<sup>1</sup> The regulations under consideration are the 2010 regulations, not the 2014

LEGISLATION	SECTIONS	RELATES TO
	Government Notice 921	Waste Management Activities requiring licencing. These are categorised as per Category A (Basic Assessment), Category B (EIA) and Category C (Duty of Care).
Environment Conservation Act (Act No. 73 of 1989) and regulations	Sections 19 and 19A	Prevention of littering by employees and sub-contractors during construction and the maintenance phases of the proposed project.
National Heritage Resources Act (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.
National Environmental Management: Air Quality Act (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, Act No. 44 of 2008		<p>As a Specific Environmental Management Act (SEMA), under the overarching umbrella of the NEMA, the NEM: ICMA must be read in conjunction with the NEMA. Furthermore, the resolution of any conflicts arising from the implementation of the NEM: ICMA must be dealt with in terms of Chapter 4 of the NEMA.</p> <p>The NEM: ICMA has numerous objectives and these are:</p> <ul style="list-style-type: none"> <li>▪ Determination of the Coastal Zone in South Africa;</li> <li>▪ Provision for coordinated and integrated management of the coastal zone;</li> <li>▪ Preservation, protection, extension and enhancement of coastal public property;</li> </ul>

LEGISLATION	SECTIONS	RELATES TO
		<ul style="list-style-type: none"> <li>▪ Equitable access to coastal property; and</li> <li>▪ Giving effect to South Africa's obligations under international coastal and marine law.</li> </ul>
Occupational Health and Safety Act (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 (Act No. 36 of 1998) and regulations	Section 19	Prevention and remedying the effects of pollution.
	Section 20	Control of emergency incidents.
	Section 21 (a)	Abstraction of water.
Minerals and Petroleum Resources Development Act (Act No. 28 of 2002)	Section 22	Application for a mining right.
	Section 39	Environmental management programme and environmental management plan.
National Environmental Management Biodiversity Act (Act No. 10 of 2004)		Provide for the protection of species and ecosystems that warrant national protection and the sustainable use of indigenous biological resources.
National Forests Act (Act No. 84 of 1998) and Regulations	Section 7	No person may cut, disturb, damage or destroy any indigenous, living tree in a natural forest, except in terms of a licence issued under section 7(4) or section 23; or an exemption from the provisions of this subsection published by the Minister in the Gazette.
	Sections 12-16	These sections deal with protected trees, with the Minister having the power to declare a particular tree, a group of trees, a particular woodland, or trees belonging to a certain species, to be a protected tree, group of trees, woodland or species. In terms of section 15, no person may cut, disturb, damage, destroy or remove any protected tree; or collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree, except under a licence granted by the Minister.
Hazardous Substances Act (Act No. 15 of 1973) and regulations		Provides for the definition, classification, use, operation, modification, disposal or dumping of hazardous substances.
Asbestos Regulations (2001)	Section 19	Labelling, packaging, transportation and storage of asbestos.
	Section 20	Disposal of asbestos.
National Road Traffic Act (Act No. 93 of 1996)		Road safety.
Town Planning and Townships Ordinance (15 of 1986)		Town Planning.

LEGISLATION	SECTIONS	RELATES TO
SANS 10103 (Noise Regulations)		The measurement and rating of environmental noise with respect to annoyance and to speech communication.
The White Paper on Integrated Pollution and Waste management for South Africa		<p>The White Paper on Integrated Pollution and Waste management for South Africa represents a paradigm shift from dealing with waste only after it is generated towards:</p> <ul style="list-style-type: none"> <li>▪ Pollution prevention;</li> <li>▪ Waste minimisation;</li> <li>▪ Cross media integration;</li> <li>▪ Institution integrated both horizontal and vertical, of department and spheres of government; and</li> <li>▪ Involvement of all sectors of society in pollution and waste management.</li> </ul>

## 4 GENERAL DESCRIPTION OF THE STUDY AREA

It is imperative that site staff understand inherently the environment in which they are working and operating.

For a better understanding of the study area, please refer **Appendix B**, which describes the following:

- Biophysical factors;
- Climate;
- Rainfall;
- Seasons;
- Temperature;
- Humidity;
- Geology;
- Ecological Significance of the Study Area;
- Air Quality;
- Vegetation, Fauna and Water;
- Sea Outfall Monitoring;
- Socio-economic factors;
- Heritage and Cultural Value; and
- Socio-Economic Profile of the Receiving Environment.



## 5 PURPOSE OF THE ENVIRONMENTAL MANAGEMENT PROGRAMME

In terms of the Constitution of the Republic of South Africa (1996) (Section 24) everyone has the right 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 needs of the environment as well as affected parties must thus be integrated into overall project management.

The amended Final EMPr (the document at hand) thus sets out minimum requirements specified in the South African environmental legislation, as well as good environmental practice in terms of international norms and practice, and must be updated post authorisation with the specifications (conditions) thereof. The preparation of this EMPr for the SWWTW Solids Removal and Treatment Facilities Upgrades consolidates the findings of the EIA and the specialist studies.

The amended Final EMPr encourages best construction practice and ensures that environmental damage during construction is minimised. The purpose of the EMPr is to control the potential negative environmental impacts associated with the construction phase of the project, and/ or to enhance any positive environmental impacts. The effective implementation of the EMPr will ensure that the construction activities are conducted and managed in an environmentally sound and responsible manner.

An EMPr typically contains Environmental Specifications to which the appointed Contractor will be required to adhere to throughout the duration of his contract, to reduce or prevent negative environmental impacts to the surrounding environment. An EMPr also details the organisational authority and structure required to ensure the effective implementation of the EMPr and measures to monitor and improve the application of the EMPr.

The EMPr may be amended from time to time to ensure that any additional environmental requirements identified by key stakeholders are adequately covered. These amendments must be approved by the KZN EDTEA prior to implementation.

## 6 OBJECTIVES OF THE ENVIRONMENTAL MANAGEMENT PROGRAMME

The Amended Final EMPr has the following objectives:

- To ensure compliance with regulatory authority stipulations and guidelines, this may be local; provincial; national and/or international.
- To outline functions and responsibilities of responsible persons.
- To state standards and guidelines, which are required to be achieved in terms of environmental legislation.
- To outline mitigation measures and environmental specifications which are required to be implemented for all phases of the project in order to minimise the extent of environmental impacts, and to manage environmental impacts associated with the proposed project.
- To identify measures that could optimise beneficial impacts.
- To prevent long-term or permanent environmental degradation.
- To establish a method of monitoring and auditing environmental management practices during all phases of development.
- Detail specific actions deemed necessary to assist in mitigating the environmental impact of the project.
- Ensure that the safety recommendations are complied with.
- Propose mechanisms for monitoring compliance with the EMPr and reporting thereon.
- Specify time periods within which the measures contemplated in the EMPr must be implemented, where appropriate.
- To provide an environmental awareness plan.
- Provide rational and practical environmental conditions / requirements to:
  - a) Minimise disturbance of the natural environment;
  - b) Manage and minimise impact to the coastal environment and the sea;
  - c) Ensure water resource protection;
  - d) Prevent or minimise all forms of pollution;
  - e) Protect indigenous flora and fauna;
  - f) Prevent soil and sand erosion and facilitate the re-vegetation of affected areas;
  - g) Maintenance of newly re-vegetated areas;
  - h) Restrict noise disturbance;
  - i) Ensure compliance with all applicable laws, regulations, standards and guidelines for the protection of the environment (specifically the coastal and marine environment);
  - j) Adopt the best practical means available to prevent or minimise adverse environmental impacts;
  - k) Develop waste management practices based on prevention, minimisation, recycling, treatment or disposal of waste; and
  - l) Train the Developer, its employees and contractors with regard to their environmental obligations.

The EMPr is essentially a written plan of how the environment is to be managed in practical and achievable terms.

An independent Environmental Control Officer (ECO) must be appointed (by the Developer) to ensure compliance with the EMPr.

The EMPr will be considered an extension of the Conditions of Authorisation as set forth by the KZN EDTEA and any other regulatory authority. Non-compliance with the EMPr will constitute non-compliance with said Conditions. Cases of non-compliance are subject to the penalties / fines outlined in Table 14-1 below

## 7 SCOPE OF THE ENVIRONMENTAL MANAGEMENT PROGRAMME

In accordance with the requirements of the Environmental Impact Assessment (EIA) Regulations, 2010 (in terms of the National Environmental Management Act (NEMA)), and the requirements of the KZN EDTEA, this EMPr is to be implemented by the Developer as well as any employee, contractor, agent or sub-contractor appointed to act on behalf of the Developer in the execution of the project, in order to ensure environmental compliance on site.

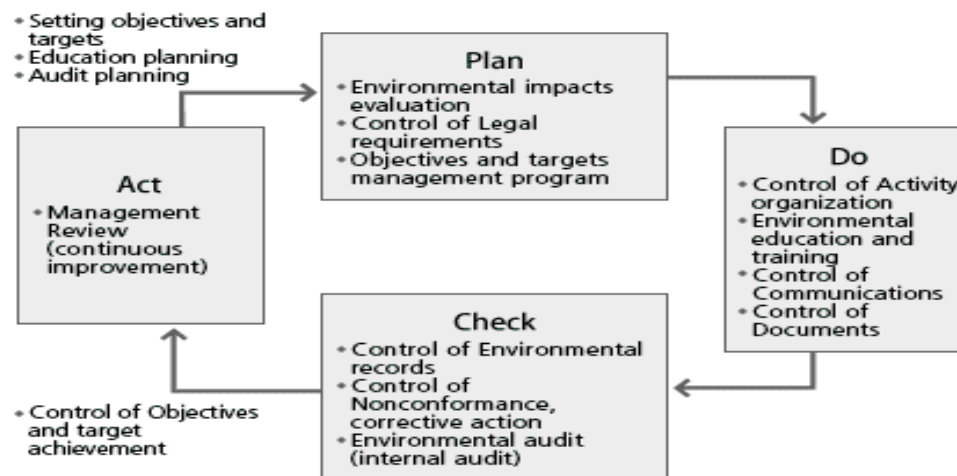
The specifications outlined in this EMPr are thus applicable to all activities undertaken by the Developer, as well as appointed Contractors and all persons involved in the execution of the works including sub-contractors, the workforce, suppliers and volunteers for the duration of construction, operation and future maintenance.

An Environmental Code of Conduct has also been developed that provides a simplified set of rules that must be adhered to by all persons involved with the project at all times. This is to be displayed at strategic points to ensure constant environmental awareness.

## 8 EMPr AS A “LIVE” DOCUMENT

The approach adopted for this EMPr is derived from the Deming Cycle and implemented in the Green Management System (**Figure 8-1**), a cycle of continuous improvement that entails the reiterative actions of plan, do, check, act, and critically to then return to the planning phase.

The effectiveness of the EMPr is limited by the level of adherence to the conditions set forth in the EMPr by the Developer, the Contractor and Sub-contractors. It is further assumed that compliance with the EMPr will be monitored and audited as set out in this EMPr and contractual clauses of the eThekweni Municipality – Water and Sanitation (EWS) and also in keeping with the policies of AECOM.



**Figure 8-1: The Continuous Development Cycle**

## 8.1 Plan

Project-specific planning for the proposed project involves consideration of the legal triggers, the specifics of the proposed development, and the nature of the receiving environment. This provides a starting point for targeted environmental management objectives. Environmental performance indicators are then determined with measurable targets prescribed to monitor the environmental performance of the project. Achieving the targets depends on compliance with this EMP and the legislative requirements that underpin it.

## 8.2 Do

Throughout the development's life-span, the developer will be required to develop and maintain a Quality Management System (QMS) – designed to ensure that best management practices are implemented in day-to-day management.

Such a QMS must at least include the following information:

- Location and extent of associated infrastructure;
- Associated activities, such as the transportation of people and equipment;
- Resources and experience required (staffing);
- Materials and equipment to be used;
- Management actions;

- Human resources used;
- Construction-monitoring activities;
- Emergency / disaster incident and reaction procedures; and
- Rehabilitation procedures for the impacted environment.

These topics will be cross-linked into the contracts related to the development of the project.

## 8.3 Check

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A system of assessing monitoring results has been developed to check the environmental management performance. Continuous assessment facilitates proactive management of the environmental issues. Mitigation measures can then be successfully implemented on an on-going basis to keep environmental indicators within their target thresholds. Furthermore, the assessment system also enables the assessment of the efficacy of the EMPr. Regular auditing of environmental performance is prescribed to prove and preserve accountability.

## 8.4 Act

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The assessments and monitoring of the results and findings of the regular audits must be documented within a reporting system. Precautionary mitigation measures and corrective actions will be prescribed and instructions will be given in order to implement these in the field. The findings of monitoring and auditing programmes can also be used to update the EMPr. Although the EMPr is a project-specific document, it is dynamic and must be updated regularly to address the changing circumstances of the scheme.

The implementation of this EMPr must be undertaken by treating the document as a checklist which forms the basis of the application of the process depicted in **Figure 8-2**.

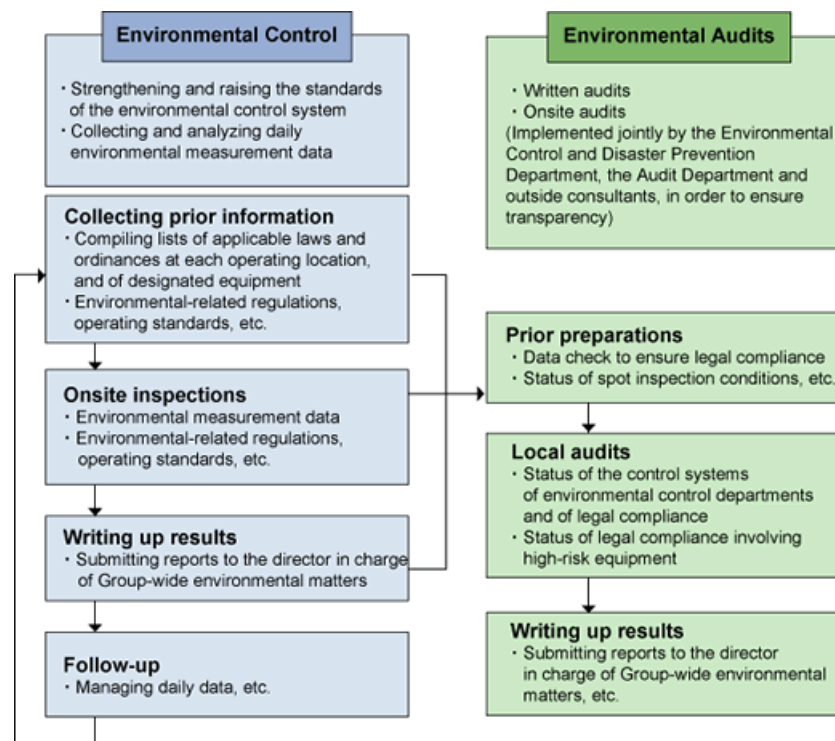
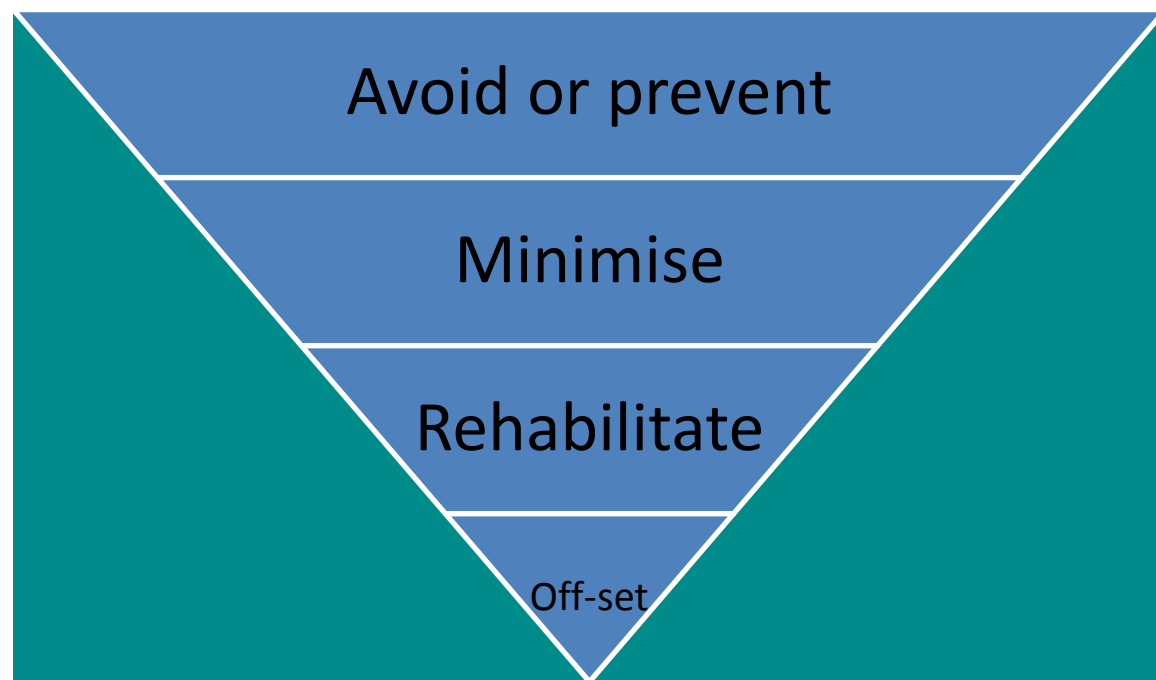


Figure 8-2: Environmental control and auditing process

## 8.5 Impact Mitigation Hierarchy

Mitigation requires proactive planning which is enabled by following the mitigation hierarchy in the figure below. Examples of mitigation can include changes to the scale, design, location, siting, process, sequencing, phasing, and management and/or monitoring of the proposed development activities, as well as the restoration or rehabilitation of disturbed sites. Where environmental impacts can be severe, the guiding principle should be “anticipate and prevent” in nature rather than “assess and repair”. A stepped approach should therefore be followed in trying to minimise development impacts which include:

1. Firstly, attempting to avoid/prevent impacts through project design and location;
2. Secondly, employing mitigation aimed at minimising the magnitude/significance of impacts where these are unavoidable; and
3. Lastly, compensating for any remaining/residual impacts through on-site rehabilitation or through the application of offsets where deemed relevant.



**Figure 8.3: The mitigation hierarchy (DEA, 2013)**

Avoid or prevent refers to considering options in project location, siting, scale, layout, technology and phasing to avoid impacts on biodiversity, associated ecosystem services, and people. This is the best option, but is not always possible. Where environmental and social factors give rise to unacceptable negative impacts mining should not take place. In such cases it is unlikely to be possible or appropriate to rely on the latter steps in the mitigation. In this scenario alternatives can be assessed to avoid and prevent impacts, either via location, design or layout alternatives and has been applied in this project by assessing layout alternatives.

Minimising refers to considering alternatives in the project location, siting, scale, layout, technology and phasing that would minimise impacts on biodiversity and ecosystem services. In cases where there are environmental and social constraints every effort should be made to minimise impacts.

Rehabilitation in the mitigation hierarchy refers to rehabilitation of areas where impacts are unavoidable and measures are provided to return impacted areas to near natural state or an agreed land use after mine closure. Although, rehabilitation may fall short of replicating the diversity and complexity of the original and natural system.

Off-setting refers to measures over and above rehabilitation to compensate for the residual negative effects on biodiversity, after every effort has been made to minimise and then rehabilitate impacts. Biodiversity offsets can provide a mechanism to compensate for significant residual impacts on biodiversity.

Mitigation measures specific to the impacts identified and discussed above are provided and are intended to augment standard/generic mitigation measures included in the construction Environmental Management Programme (EMPr).

## 9 STRUCTURE OF THE ENVIRONMENTAL MANAGEMENT PROGRAMME

The EMPr provides proposed mitigation and management measures for the following phases of the project (refer to **Table 9-1**).

**Table 9-1: Structure of the EMPr**

PHASE	DESCRIPTION
<b>Pre-Construction</b>	This section will provide guidelines on pre-construction activities including site establishment and clearance; environmental induction and training and awareness; site access and health and safety.
<b>Construction</b>	This section will provide guidelines on construction methods and considerations.
<b>Post Construction – Rehabilitation, Maintenance &amp; Operational</b>	This section of the EMPr provides management principles for the rehabilitation phase once construction activities are complete. This will include best practice, procedures and responsibilities as required for various associated activities.

## 10 ORGANISATIONAL STRUCTURE AND RESPONSIBILITIES

In order to ensure the sound development and effective implementation of the EMPr, it is necessary to identify and define the responsibilities and authority of the various persons and organisations that will be involved in the project.

The following sections describe the roles and responsibilities for the implementation of and adherence to the EMPr.

The role and responsibilities of the key individuals described below are not exhaustive and may be modified and expanded and additional roles added as necessary as it is tailored to ensure the best outcomes for the SWWTW SR&TFU. For this development, the Applicant (eThekweni Municipality and specifically the water and sanitation department – EWS) will function as the primary client / applicant / developer. AECOM functions as the project / design engineer.

It is imperative that the environmental and quality management systems of both of the organisations are adhered to. Where there are conflicts or contradictions that of the EWS take precedence.

**Figure 10-1** provides an indication of the organisational and team structure for the project.



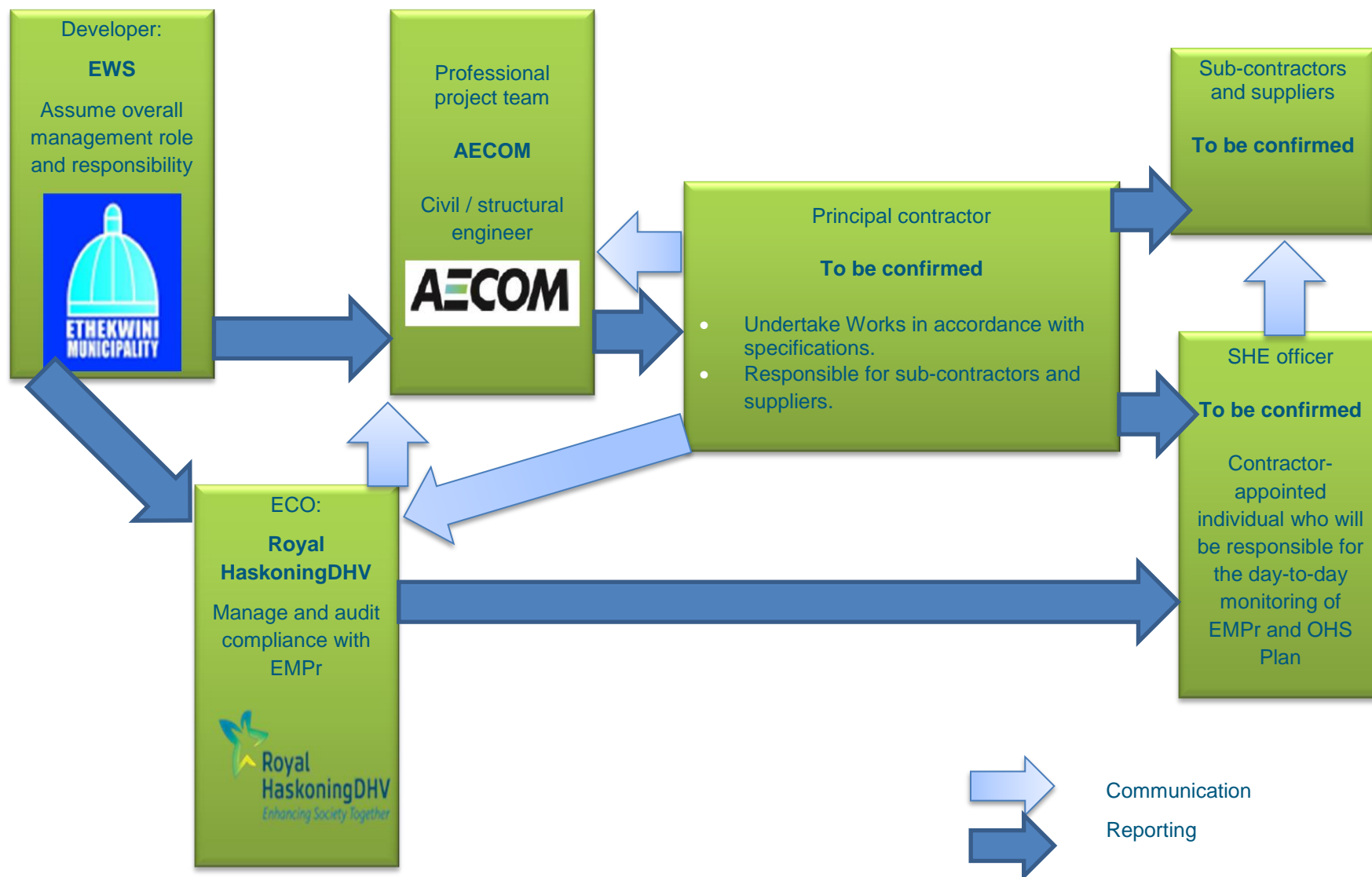


Figure 10-1: Compliance organisational Structure

The roles and responsibilities of the role-players are defined below.

#### DEVELOPER / APPLICANT

The Developer is ultimately responsible for ensuring compliance with the environmental specification and upholding both the EWS and AECOM's environmental commitment to 100% compliance with all National, Provincial and local legislation that relates to management of this environment.

*The Developer will:*

- Appoint a Project Manager (PM) to assume ultimate project responsibility;
- Be familiar with the contents of the EMPr;
- Ensure the EMPr is in the tender documentation issues to prospective contractors;
- Request for, review and approve the Method Statements prepared by the Contractor;
- Review and comment on environmental assessments and/ or reports produced by the Contractor and ECO;
- Undertake regular site visits and ensure environmental specifications are implemented;
- Discuss with the ECO the application of penalties for the infringement of the Environmental Specifications, another possible enforcement measures necessary;
- Issue penalties as and when necessary;
- Arrange information meetings for or consults with I&AP's about the impending construction activities;
- May on the recommendation of the Engineer and / or Environmental Officer order the Contractor to suspend any or all works on site if the Contractor or his Sub-Contractor / Supplier fails to comply with the said specifications;
- Compilation of a comprehensive operational health and safety risk assessment (HSRA) this must be done in accordance with the findings of the Major Hazardous Installation (Ishecon, 2015) findings, which declare the site an MHI;
- Maintain a register of complaints and queries by members of the public at the site office; and
- Ensure the EMPr is implemented as well as revised and updated as and when required.

#### ENGINEER

*The Engineer will:*

- Enforce the environmental specification on site;
- Be familiar with the contents of the EMPr;
- Ensure the EMPr is in the tender documentation issues to prospective contractors;
- Request for, review and approve the Method Statements prepared by the Contractor;
- Review and comment on environmental assessments and/or reports produced by the Contractor and ECO;
- Undertake regular site visits and ensure environmental specifications are implemented;
- Monitor 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; and
- 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.

## CONTRACTOR (INCLUDING SUB-CONTRACTORS)

The Contractor is required to:

- Be fully conversant with the EMPr and all conditions of the EA, and any permits, licenses, etc.;
- Implement, manage and maintain the EMPr for the duration of the contract;
- Appoint a suitably qualified Environmental Officer (EO) whose responsibility includes on-going monitoring and control of all construction activities concerning minimisation of environmental impact and adherence to the EMPr for the duration of the construction phase;
- 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 Developer, 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 EMPr and any subsequent revisions in terms of this specification and the project specification, as applicable, within the time period specified.
- Ensure any Sub-Contractors/Suppliers who are utilised within the context of the contract comply with the environmental requirements of the project, in terms of the specifications. The Contractor will be held responsible for non-compliance on their behalf;
- Provide appropriate resources – budgets, equipment, personnel and training - for the effective control and management of the environmental risks associated with the construction of the development;
- Bear the cost of any delays, with no extension of time granted, must 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;
- Review ECO reports and take cognisance of the information/ recommendations contained therein;
- Comply with all applicable legislation;
- Ensure that he informs the Engineer timeously of any foreseeable activities which will require input from the EO;
- Notify the ECO and PM, verbally and in writing at least 10 working days in advance of any activity he has reason to believe may have significant adverse environmental impacts, so that mitigatory measures may be implemented timeously;
- Ensure environmental awareness among his employees, sub-contractors and workforce so that they are fully aware of, and understand the Environmental Specifications and the need for them;
- Maintain a register of environmental training for site staff and sub-contractor's staff for the duration of the contract; and
- Communicate and liaise frequently and promptly with the ECO and the PM to ensure effective, proactive environmental management with the overall objective of preventing or reducing negative environmental impacts while enhancing positive environmental impacts.
- The Contractor will conduct all activities in a manner that minimises disturbance to the natural environment as well as directly affected residents and the public in general.
- The primary contractor assumes responsibility and accountability of all appointed sub-contractors and must ensure their compliance with this EMPr.
-

### ENVIRONMENTAL CONTROL OFFICER

The ECO will:

- Be fully conversant with the EMPr;
- Be familiar with the recommendations and mitigation measures of the associated EMPr for the project;
- Monitor the implementation of the EMPr during the construction and rehabilitation phases;
- Ensure site protection measures are implemented on site;
- Monitor that the Principal Contractor, sub-contractors, construction teams and the Developer are in compliance with the EMPr at all times during the construction and rehabilitation phases of the project;
- Monitor all site activities monthly for compliance;
- Conduct bi-monthly audits (twice a month during construction and thereafter once a month until completion of contract - or as specified in the issued EA) of the site according to the EMPr, and report findings to the Developer/Contractor;
- Attend monthly site meetings;
- 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 Developer and the KZN EDTEA; and
- 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 Developer and the SHE Officer.

### OCCUPATIONAL HEALTH AND SAFETY OFFICER

The OHS Officer will be responsible for undertaking of the following:

- Compilation of a comprehensive project health and safety risk assessment (HSRA) this must be done in accordance with the findings of the Major Hazardous Installation findings, which declare the site an MHI. Furthermore, this plan must be compatible with the health and safety risk plan that is developed and updated for the SWWTW itself;
- Compilation of health and safety specifications based on risks identified;
- Reviewing and approval of health and safety plan(s) submitted by appointed Principal Contractor(s);
- Conducting monthly health and safety inspections and compiling monthly OHS reports;
- Conducting monthly health and safety audits with audit reports;
- Assisting the Developer / Contractor in the investigation of major accident/incidents;
- Monitoring of site activities for compliance to the Occupational Health and Safety Act and Regulations;
- Establishment and monitoring of project health and safety file;
- Monitoring the Principal Contractor(s') health and safety performance; and
- Preparation of project close-out reports and submission of project health and safety files to the Client.

## SAFETY, HEALTH AND ENVIRONMENTAL (SHE) OFFICER

The Safety, Health and Environmental Officer will:

- Be fully conversant with the EMPr;
- Be fully conversant with all relevant environmental legislation applicable to the project, and ensure compliance with them;
- Compilation of Method Statements together with the Principal Contractor that will specify how potential environmental impacts in line with the requirements of the EMPr will be managed, and, where relevant environmental best practice and how they will practically ensure that the objectives of the EMPr are achieved;
- Convey the contents of this EMPr to the construction site staff and discuss the contents in detail with the Contractor;
- Undertake regular and comprehensive inspection of the site and surrounding areas in order to monitor compliance with the EMPr;
- Take appropriate action if the specifications contained in the EMPr are not followed;
- Monitor and verify that environmental impacts are kept to a minimum, as far as possible;
- Order the removal from the construction site of any person(s) and/or equipment in contravention of the specifications of the EMPr;
- Report any non-compliance or remedial measures that need to be applied to the appropriate environmental authorities, in line with the requirements of the EMPr;
- Submitting a report at each site meeting which will document all incidents that have occurred during the period before the site meeting;
- Ensuring that the list of transgressions issued by the ECO is available on request; and
- Maintain an environmental register which keeps a record of all incidents which occur on the site during construction. These incidents include:
  - Public involvement / complaints.
  - Health and safety incidents.
  - Incidents involving hazardous materials stored on site.
  - Non-compliance incidents.

# 11 TRAINING AND ENVIRONMENTAL AWARENESS PLAN

It is important to ensure that the Contractor has the appropriate level of environmental awareness and competence to ensure continued environmental due diligence and on-going minimisation of environmental harm.

Training needs must 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.

## 11.1 Objectives

The environmental training is aimed at:

- promoting environmental awareness;
- informing the Contractor of all environmental procedures, policies and programmes applicable;
- providing all risk aversion methods to avoid pollution and degradation to the environment;
- 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.

## 11.2 Methodology

Training will be done in a verbal format. The training will not be a once-off event but must also include regular toolbox talks (weekly) to be undertaken by the Contractor's safety officer and also includes induction training for new staff that joins the team during the project life cycle.

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 maximised.

## 11.3 Pre-Construction Phase

Upon receipt of the Environmental Authorisation, a Site File must be developed and prepared for the Contractor to keep on site at all times. This file must be treated as a reference document for training which specifies that all conditions within the authorisations and documents contained in the file is a non-negotiable condition to be complied with. The site file must contain all items as detailed in Section 13.1 below.

The ECO must develop posters and presentation from the findings of the EIA and the conditions of the EA and use this to conduct an induction of the site staff. This presentation must be repeated at each point when new site staff are appointed.

The EA and EMPr form part of the formal site induction for all contractors, sub-contractors and casual labourers, preferably in their native language. The induction training will, as a minimum, include the following:

- What is meant by the environment;
- The importance of conformance with all environmental policies;
- The environmental impacts, actual or potential, of their work activities;
- The environmental benefits of improved personal performance;
- Their roles and responsibilities in achieving conformance with the environmental policy and procedures and with the requirement of the Consultant's environmental management systems, including emergency preparedness and response requirements; and
- The mitigation measures required to be implemented when carrying out their work activities.

All contractors, sub-contractors and casual labourers must acknowledge their understanding of the EMPr and environmental responsibilities by signing an induction attendance record.

## 11.4 Construction Phase

Construction staff must be adequately educated by the ECO, and the Contractor's EO and/or SHE Officer, as to the provisions included in the EMPr and general environmentally friendly practice.

The Contractor is expected to have "tool box" talks. These talks must be in accordance with the risks and trends associated with the project.

All records of environmental induction and training (including toolbox talks) must be kept on site within the Site Environmental File.

Toolbox talks must range in environmental topic and relate specifically to this site and project.

Contractor staff must raise a safety or environmental finding for discussion at each and every toolbox talk in order to create awareness and relate day to day issues and findings.

## 12 MONITORING

A monitoring programme will be in place not only to ensure compliance with the EMPr through the contract / work instruction specifications, but also to monitor any environmental issues and impacts which have not been accounted for in the EMPr that are, or could result in significant environmental impacts for which corrective action is required.

A monitoring programme will be implemented for the duration of the construction phase of the project.

This programme will include:

- Bi-monthly (twice a month during construction and thereafter once a month until completion of contract) audits will be conducted by the Environmental Compliance Officer (ECO) for the duration of the construction phase. The ECO must undertake environmental monitoring on a monthly basis and the audits will consider compliance with the EMPr and licence conditions.
- External auditing may take place at unspecified times by the authorities and/or other relevant authorities.
- An independent, suitably qualified, auditor will need to be contracted to conduct bi-annual environmental audits during the construction phase of the project according to the provisions of the EMPr.
- The ECO must undertake regular site inspections (at least twice a month during construction and thereafter once a month until completion of contract) to ensure all legislative requirements are adhered to.
- The ECO must compile a monthly audit report (a total of 12) with a quantitative rating of the compliance with the EMPr.
- The ECO must keep a photographic record of any damage to areas outside the demarcated site area. The date, time of damage, type of damage and reason for the damage must be recorded in full to ensure the responsible party is held liable. The Contractor must be held liable for all unnecessary damage to the environment.

# 13 REPORTING PROCEDURES

## 13.1 Documentation

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

An Environmental File must be maintained by the Contractor which includes:

- Environmental Authorisation once issued by the KZN EDTEA;
- The Waste Management Licence, once issued by the KZN EDTEA;
- The SWWTW Water Use Licence, Reference number: 11/U60G/H/1623;
- The Coastal Waters Discharge Permit, once issued by the Department of Environmental Affairs (DEA);
- The Final Environmental Impact Assessment Report, Royal HaskoningDHV;
- Copy of the approved EMP;
- Copy of all other licences/permits;
- Copy of all rehabilitation plans;
- Copy of the Storm-water Management Plan;
- Copy of relevant legislation (**Appendix A** of this EMP);
- Environmental Policy of the Main Contractor;
- Environmental Policy of the EWS;
- Environmental Method statements compiled by the Contractor;
- Non-conformance Reports;
- Environmental Registers, which must include:
  - Communications Register – including records of Complaints, and, minutes and attendance registers of all environmental meetings.
  - Monitoring Results – including environmental monitoring reports, register of audits, non-conformance reports.
  - Incident Register – including copies of notification of Emergencies and Incidents, this must be accompanied by a photographic record.
  - Waste Documentation such as, but not necessarily limited to: Waste Manifest Documents, Safe Disposal Certificates (SDCs) and Sewerage Disposal Receipts;
  - Material Safety Data Sheets (MSDSs) for all hazardous substances;
  - Dust suppression register;
  - Water Quality Monitoring reports (including those of the annual Council of Scientific and Industrial Research [CSIR] Durban Outfalls Report);
  - Written Corrective Action Instructions; and
  - Notification of Emergencies and Incidents.



## 13.2 Incidents Register

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The Developer will put in place an Incidents Register.

The Contractor will ensure that the following information is recorded for all complaints / incidents:

- Nature of complaint / incident.
- Causes of complaint / incident.
- Party / parties responsible for causing complaint / incident.
- Immediate actions undertaken to stop / reduce / contain the causes of the 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.

The above records will form an integral part of the Contractors' Records.

These records will be kept with the EMPr on-site, and must be made available for scrutiny if so requested by the Developer and CA.

## 13.3 Non-Conformance Report

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A Non-Conformance Report (NCR) will be issued to the Contractor as a final step towards rectifying a failure in complying with a requirement of the EMPr. This will be issued by the ECO to the Contractor in writing. Preceding the issuing of an NCR, the Contractor must be given an opportunity to rectify the issue.

Must the ECO assess an incident or issue and find it to be significant (e.g. non-repairable damage to the environment), it will be reported to the relevant authorities and immediately escalated to the level of a NCR.

The following information must be recorded in the NCR:

- Details of non-conformance;
- Details of persons involved;
- Any plant or equipment involved;
- Any chemicals or hazardous substances involved;
- Work procedures not followed;
- Any other physical aspects.
- Nature of the risk.
- Actions agreed to by all parties following consultation to adequately address the non-conformance in terms of specific control measures and must take the hierarchy of controls into account.

- Agreed timeframe by which the actions documented in the NCR must be carried out.
- ✶ The ECO must verify that the agreed actions have taken place by the agreed completion date, when completed satisfactorily; the ECO and Contractor must sign the Close-Out portion of the Non-Conformance Form and file it with the contract documentation.

## 13.4 Environmental Emergency Response

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The Contractor's environmental emergency procedures must ensure appropriate responses to unexpected/ accidental actions / incidents that could cause environmental impacts.

Such incidents may include:

- Accidental discharges to water (i.e. into the watercourse) and land;
- Accidental spillage of hazardous substances (typically oil, petrol, and diesel);
- Accidental toxic emissions into the air; and
- Specific environmental and ecosystem effects from accidental releases or incidents.

The Environmental Emergency Response Plan is separate to the Health and Safety Plan as it is aimed at responding specifically to environmental incidents and must ensure and include the following:

- Construction employees must be adequately trained in terms of incidents and emergency situations;
- Details of the organisation (i.e. manpower) and responsibilities, accountability and liability of personnel;
- A list of key personnel and contact numbers;
- Details of emergency services (e.g. the fire department / on-site fire detail, spill clean-up services) must be listed;
- Internal and external communication plans, including prescribed reporting procedures;
- Actions to be taken in the event of different types of emergencies;
- Incident recording, progress reporting and remediation measures to be implemented; and
- Information on hazardous materials, including the potential impact associated with each, and measures to be taken in the event of accidental release.

The Contractor and their sub-contractor(s) must comply with the environmental emergency preparedness and incident and accident-reporting requirements as per the relevant legal requirements.

In addition the Emergency Response Plan in Appendix M must be complied with.

## 13.5 Method Statements

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It is a statutory requirement to ensure the well-being of employees and the environment.

To allow the mitigation measures in this document to be implemented, task-specific method statements must be developed for each set of tasks. A Method Statement details how and when a process will be carried out, detailing possible dangers / risks, and the methods of control required and must typically covers:

- Type of construction activity;
- Timing and location of the activity;
- Construction procedures;
- Materials and equipment to be used;
- Transportation of the equipment to/ from site;
- How equipment/ material will be moved while on site;
- Location and extent of construction site office and storage areas;
- Identification of impacts that might result from the construction activity;
- Methodology and/ or specifications for impact prevention/ containment;
- Methodology for environmental monitoring;
- Emergency/ disaster incident and reaction procedures (required to be demonstrated); and
- Rehabilitation procedures and continued maintenance of the impacted environment.

The Contractor will be accountable for all actions taken in non-compliance of the approved Method Statements. The Contractor must keep all the Method Statements and subsequent revisions on file, copies of which must be distributed to all relevant personnel for implementation.

As a minimum the following Method Statements will be required to be generated and reviewed by the ECO who will determine which method statements must be reviewed and approved by the EDTEA:

- Bunding;
- Piling and the noise reductions associated with this;
- Construction on Cuttings beach;
- Construction site and office / yard establishment;
- Cement mixing / concrete batching/ bentonite mixing;
- Contaminated water;
- Dust control;
- Environmental awareness course(s);
- Environmental monitoring;
- Erosion control;
- Fire, hazardous and/or poisonous substances;
- Fuels and fuel spills (may form part of the item above);
- Storage, handling and decanting of diesel (may form part of the item above);
- Personnel, public and animal safety;
- Rehabilitation of modified environment(s);
- Solid and liquid waste management (including Hazardous waste management);
- Sources of materials (including MSDSs);
- Top-soil management;
- Storm-water Management; and

- Wash areas.

## 13.6 Public Communication and Liaison with I&APs

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The Developer must ensure that the adjacent landowners are informed and updated throughout the construction phases. Sufficient signage must be erected around the site (including at the entrance), informing the public of the construction activities taking place.

The signboards must include the following information:

- The name of the Contractor.
- The name and contact details of the site representative to be contacted in the event of emergencies or complaint registration.

# 14 COMPLIANCE WITH THE ENVIRONMENTAL SPECIFICATION

Environmental management is concerned not only with the final results of the Contractor's operations to carry out the Works, but also with the control of how those operations are carried out. Tolerance with respect to environmental matters applies not only to the finished product but also to the standard of the day-to-day operation required to complete the works. It is thus required that the Contractor must comply with the environmental specifications on an on-going basis.

The EMPr forms part of the Contract Documentation and is thus a legally binding document. It is also necessary for the Contractor to make provisions as part of their budgets for the implementation of the EMPr. In terms of NEMA, an individual responsible for environmental damage must pay costs both to the environment and human health and the preventative measures to reduce or prevent additional pollution and/or environmental damage from occurring. This is referred to as the Polluter Pays Principle. Section 28 of the NEMA specifically embodies the polluter pays principle. Therefore, any failure on the Contractor's part to comply with the EMPr will entitle the Developer to certify the imposition of a penalty subject to the details set out.

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, site extensions and haul / access roads;
- Environmental damage ensues due to negligence;
- The Contractor ignores or fails to comply with corrective or other instructions issued by the Developer, ECO or Engineer within a specified time; and
- The Contractor fails to respond adequately to complaints from the public.

## 14.1 Penalties

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Application of a penalty clause will apply for incidents of non-compliance. The contractor will be allowed one offense and a written warning will be issued to the Contractor's Environmental Officer. Failure to rectify the offense within one (1) working week of the issue of the warning or a repeat offence will result in a penalty.

The penalty will be issued by the Developer. The penalty imposed will be per incident at the discretion of the Developer. The value of the penalty imposed must be as defined in the contract and enforcement must be at the discretion of the Developer. Such fines will be issued in addition to any remedial costs incurred as a result of non-compliance with the EMP. The Developer will inform the Contractor of the contravention and the amount of the penalty, and will deduct the amount from monies due under the Contract.

The penalty monies will become the property of the Developer to be used for rehabilitation and maintenance of the site.

If the issue of non-compliance is not addressed to the satisfaction of the ECO and the Developer within the specified timeframes, an independent firm will be appointed to undertake the rehabilitative works. The cost of this work, as well as a 20% management fee, will be withheld from the Contractor's final payment, by the Developer.

For each subsequent similar offence, the penalty may, at the discretion of the Developer be doubled in value to a maximum value to be determined by the Developer.

**Crucially, payment of any penalty in terms of the contract must not absolve the offender from being liable from prosecution in terms of any law.**

Unless stated otherwise in the project specification, the penalties imposed per incident or violation will be as given in **Table 14-1**:

**Table 14-1: Penalties for non-conformance**

OFFENCE	AMOUNT
Failure to submit Method Statements timeously	R 10 000
Failure to demarcate working areas and no-go areas and/or maintain demarcation fences / tape	R 10 000
Working outside of the demarcated areas and/or within the boundaries of the no-go area	R 30 000
Failure to strip topsoil with intact vegetation	R 50 000
Failure to stockpile topsoil correctly	R 30 000
Failure to stockpile materials in designated areas	R 10 000
Failure to take measures to control dust dispersion on site	R 10 000
Washing of vehicles on site	R 10 000
Pollution of water bodies and/ or groundwater	R 20 000
Failure to implement storm-water management provisions during construction	R 20 000
Failure to control storm-water runoff	R 30 000
Downstream erosion	R 30 000
Failure to provide adequate sanitation	R 10 000
Failure to erect temporary fences around trenches	R 10 000
Failure to provide adequate waste disposal facilities and services	R 50 000

OFFENCE	AMOUNT
Failure to reinstate disturbed areas within the specified time-frame	R 30 000
Any other contravention of the project specific specification	R 10 000
Insufficient education of staff regarding environmental matters and site housekeeping practices	R10 000
Untidiness and litter at camp	R 5 000
Failure to provide drip trays and/ or empty them frequently	R 10 000
Individual not making use of the site ablution facilities	R 5 000
Construction vehicles not adhering to site speed limits	R10 000
Failure to maintain a register of incidents on site	R 10 000
Failure to maintain the Environmental File on site	R 10 000
Any contravention with approved Method Statements	R 20 000

## 15 REMOVAL FROM SITE AND SUSPENSION OF WORKS

The Developer is responsible for the implementation of the EMPr and for compliance monitoring of the EMPr.

The EMPr will be made binding on all Contractors (including sub-contractors) operating on the site and will be included with the Contract.

Non-compliance with, or any deviation from, the conditions set out in this document constitutes a failure in compliance. Non-compliance with the conditions of the EMPr constitutes a breach of Contract.

The Developer, at the request of the ECO or of his own conviction, has the power to remove from site any person who is in contravention of the EMPr, and if necessary, the Developer can suspend part or the whole of the works, as required.

## 16 SITE SPECIFIC CONCERNS

### 16.1 Key Findings of the EIA

Overall, the results of the EIA emerge as having “negative low” significance after mitigation.

The following are key findings of the impact assessment, where those rated “very high” (either negative or positive) are highlighted.

Removal of plant species (alien invasives) in Area N <sup>2</sup> Removal of grass (alien invasives) in Locality A <sup>2</sup> Primary treatment process afforded to 63% of received wastewater Reduced suspended solids disposed into the marine environment Prevention of spillages onto cuttings beach	<b>Positive very high</b>
Classification as a MHI – for Alternative 2 (Alternative 1 is a negative high) High transportation costs associated with transporting sludge off-site Sludge and bio-solid handling is usually the most significant source of odour release and good sludge management is essential. All raw sludge and bio solids will release odour largely dependent upon age Greater footprint Perceived disadvantages to health and the quality of life of residents and workers alike from the surrounding areas Energy consumption – Associated with Alternative 2. Visual and/or aesthetic impacts imposed by the construction phase – Associated with the demolition of Alternative 2.	<b>Negative very high</b>

## 16.2 Key findings of the specialist studies are:

The biodiversity study rated the positive cumulative impacts after mitigation for the whole proposed development as a **positive very high (+13)** due mainly to the fact that the removal of the alien species present on site will constitute an overall positive impact for the study site.

However, there were two indigenous species identified, viz. Fuchsia (*Schotia brachypetala*) in Area N (within the red circle), and a mature Natal Fig (*Ficus natalensis*) just north of Area K (within the red circle of **Figure 16-1**). **These trees will be felled due to the upgrades and a 1:5 ratio must be applied, planting 5 trees of the same species for every one felled.** *Albizia adianthifolia* (Flat crown *albizia*) 1.2m high with treated timber stake and plastic protection collar has been selected to be planted in place of these trees. Refer to plate for a photo of this tree

<sup>2</sup> Refer to Section 16.2 hereafter for position of Area N.



**Plate 1: *Albizia adianthifolia* (Flat crown albizia)**

On the coastal end, the biodiversity study did not identify any potential negative impacts.





**Figure 16-1: Demarcation of indigenous trees on site**

The Major Hazard Installation (MHI) Risk Assessment classifies the site post-upgrades as meeting the definition of being an MHI. This is due mainly to the risk of the biogas holder rupture and delayed explosion. This assessment has found that it is possible, under abnormal accident situations, for the biogas to be stored on site to have a significant impact on public persons outside the site. However, it is further elucidated that the individual risk of being fatally exposed to the major hazards associated with the new biogas facility would be about  $75 \times 10^{-6}$  fatalities per person per year near the existing gas holder, reducing to  $0.002 \times 10^{-6}$  at the north-western (NW) site boundary.

The Air Quality Assessment found that there were no exceedances for pollutant tested, except for exceedance of the 50% threshold for Hydrogen Sulphide (H<sub>2</sub>S) in Phase 2 of the proposed upgrades. The study goes on to provide mitigation measures which can be employed – these have been integrated into the EMPr at hand.

## 17 DETAILED ENVIRONMENTAL MANAGEMENT PROGRAMME

The EMPr specifies the minimum requirements to be implemented by the Developer as per the scope of works and scope of the environmental authorisation, in order to minimise and manage the potential environmental impacts and ensure sound environmental management practices. It also provides the framework for environmental monitoring throughout the construction phases.

The provisions of this EMPr are binding on the Developer during the life of the project. The EMPr must be binding to EWS or any authority to which responsibility for the construction activities has been delegated to, until such time that the KZN edtea or applicable environmental authority has formally absolved the Developer from its responsibilities in terms of this EMPr.

It is essential that the EMPr requirements be carefully studied, understood, implemented, and adhered to at all time.

To simplify the EMPr requirements, each aspect related to the EMPr has been addressed in the table 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 MEASURES, ACTIONS AND CONTROLS**
  - This section indicates the actions required to either prevent and/or minimise the potential impacts on the environment that is associated with the project.
- **RESPONSIBILITY**
  - This section indicates the party responsible for implementing the environmental measures and action plans laid out in the EMPr.
- **MONITORING FREQUENCY**
  - This section indicates when the actions for that specific aspect must be implemented and/or monitored.

## 17.1 Pre-construction phase

Environmental Specification	Responsibility	Frequency
17.1.1 Authorisations, Permits and Licences		
All necessary authorisations (as specified but not limited to <b>section 13.1</b> ), permits and licences must be obtained by the Developer prior to the commencement of construction.	Developer	Once-off and On-going
All activities must comply with the Environmental Authorisation (once issued)		
The activity which is authorised may only be carried out at the premises listed in the authorisation		
Construction activities must comply with the Final Layout Drawings		
17.1.2 Appointment of Contractor		
The Developer must ensure that this Amended FEMPr forms part of any contractual agreements with a Contractor(s) and sub-contractors for the execution of the proposed project. The Contractor must make adequate provision in their budgets for the implementation of the EMPr.	Developer	Once-off
The Principal Contractor (including sub-contractors and suppliers) must comply with the relevant provisions of the EMPr, applicable environmental legislation, by-laws and associated regulations promulgated in terms of these laws.		
Tender documents must include statements to include the use of local communities or local community organisation in supplying services and labour to the construction activities.		
17.1.3 Appointment of ECO		
Royal HaskoningDHV as part of the appointment for the EIA have been appointed as the ECO. This ensures an inherent understanding of the requirements of the EMPr and hence increases the upholding of the EMPr. Furthermore, the ECO is still independent of the Developer, which is a legal requirement. The ECO reserves the right to update this live EMPr as necessary and as construction and operation progresses.	Developer / ECO	On-going
The commencement of the duties of the ECO must be given, in writing, to the KZN EDTEA at least fourteen days before the start of any work.		
The ECO must undertake bi-monthly (twice a month) site inspections and provide monthly audit reports for the duration of the construction and rehabilitation phases or as otherwise specified in the Environmental Authorisation. Each audit report must contain the results of the full audit. These audit results report on whether the response to the audit item is favourable, un-favourable or not applicable. Not applicable answers are for those aspects of the construction that have not yet started or are not applicable to the contract being considered. Graphs must be produced for each stage of the EMPr; general requirements, requirements during construction and post construction activities. Each of the aspects within each stage is allocated a percentage score. The percentage score is the percentage of favourable items against the total number of applicable items. The higher the score, the better the compliance. Complete compliance will result in a 100% score.	ECO	Bi-monthly and monthly

Environmental Specification	Responsibility	Frequency
17.1.4 Preparation of Method Statements		
Method Statements must be submitted by the Contractor to the Developer and ECO and must be adhered to by the Contractor and Project Engineer. These relate to water and storm-water management requirements, traffic requirements, solid waste management requirements, felling of the Fuchsia ( <i>Schotia brachypetala</i> ) in Area N and a mature Natal Fig ( <i>Ficus natalensis</i> ) just north of Area K, fuel storage and filling and dispensing of fuel (diesel and petrol), hydrocarbon spills, contaminated water treatment, the storage of hazardous materials, standard emergency procedures, biohazard control, construction on the Cuttings Beach, amongst others.	Contractor	Once-off
The ECO will monitor the implementation of the Statements. All copies of the statements and plans must be submitted to the appointed ECO. The ECO reserves the right to request a method statement which is not specified in this EMP.		
17.1.5 Notice of Construction		
A written notice must be given to the KZN EDTEA 14 days prior to the commencement of construction. The notice must include site preparation activities as well as a date on which it is anticipated that the activity will commence.	Developer ECO	Once-off
17.1.6 Environmental Training and Awareness		
Construction staff must be adequately educated by the ECO, and the Contractor's EO and/or SHE Officer, as to the provisions included in the EMP and general environmentally friendly practice.	ECO SHE Officer	Once-off
The EA and EMP forms part of the formal site induction for all contractors, sub-contractors and casual labourers, preferably in their native language. The induction training will, as a minimum, include the following: <ul style="list-style-type: none"><li>What is meant by the environment;</li><li>The importance of conformance with all environmental policies;</li><li>The environmental impacts, actual or potential, of their work activities;</li><li>The environmental benefits of improved personal performance;</li><li>Their roles and responsibilities in achieving conformance with the environmental policy and procedures and with the requirement of the Consultant's environmental management systems, including emergency preparedness and response requirements; and</li><li>The mitigation measures required to be implemented when carrying out their work activities.</li></ul>		
All contractors, sub-contractors and casual labourers must acknowledge their understanding of the EMP and environmental responsibilities by signing an induction attendance record.	SHE Officer	Weekly
The Contractor is expected to have "tool box" talks. These talks must be in accordance with the risks and trends associated with the project. All records of environmental induction and training (including toolbox talks) must be kept on site within the Site Environmental File. Attendance registers must be signed at these weekly tool box talks.		



Environmental Specification	Responsibility	Frequency
<b>17.1.7 Site Set-Up</b>		
The Contractor is to keep a thorough pre-construction photographic record prior to the commencement of any construction works. This photographic record must show the state or condition of the entire site. Additionally, the photographic record must show the preconstruction state or condition of the access road/s to be used to enter the site.	Contractor	Once-off
<p>Prior to the establishment of the site area, the Contractor will produce a site layout plan showing the positions of all equipment storage, waste stockpiling, fuel storage areas and other infrastructure for approval of the ECO and Developer.</p> <p>Choice of location for construction item storage must take into account location of local residents and environmentally sensitive areas (no-go areas) where applicable.</p> <p>The construction area must be clearly demarcated on the layout plan, and all other areas must be considered no-go areas for the construction personnel. All sensitive areas including the wetland which borders the site to the north and all indigenous vegetation must be protected by appropriate temporary fencing during construction, and vehicular access into these sensitive areas must be controlled.</p> <p>No construction camp is permitted for this development. Construction will take place within the site boundary which is a developed site and a construction camp / laydown area will not be established. Only storage areas will be permitted.</p> <p>Adequate signage must be placed in the area where construction will take place informing the public of the activities taking place.</p> <p>The site must be secured and manned on a 24 hour basis; this is a function currently in place at the boom gate of the SWWTW.</p> <p>The Contractor must take responsibility for the site to conform to all contractual aspects and environmental standards applicable.</p> <p>The Contractor must provide adequate refuse bins that must be cleaned / emptied and the waste removed from site on a regular basis.</p> <p>Details are required in relation to storage, treatment, transportation and disposal of sludge generated on site.</p> <p>All waste removed during the construction phase must be documented, transported and disposed of in a manner that does not contravene with the National Waste Management Act of 2009.</p> <p>The construction areas must be kept in an orderly state at all times.</p> <p>Vegetation removed for the site establishment is to be kept to a minimum. All alien weeds and invader plants must be removed.</p> <p>The construction storage area is to be located a minimum horizontal distance of 100 m from any watercourse, above the 1:100 year flood line and away from any wetland habitat, water bodies or drainage lines. The location of this area must be approved by the site engineer and ECO prior to establishment.</p> <p>The Contractor must ensure that drainage on site is such to prevent standing water and/or sheet erosion from taking place or that it is not altered even temporarily which adversely impacts on drainage.</p>	Contractor	Once-off

Environmental Specification	Responsibility	Frequency
<p>As there will not be the establishment of a fully function construction camp, construction staff must make use of the SWWTW facilities where necessary and as pre-approved by the facility security. The Contractor is to provide the following:</p> <ul style="list-style-type: none"><li>■ eating areas;</li><li>■ staff lockers and showers;</li><li>■ storage areas;</li><li>■ lined cement mixing areas;</li><li>■ temporary ablution facilities at a ratio of 1:15 workers;</li><li>■ maintenance areas (if required); and</li><li>■ waste management area (if required)</li></ul> <p><b>No refuelling is permitted on site.</b></p>		
17.1.8 Ablution / Sanitation		
Contractors must utilise temporary ablution facilities provided by the Contractor at a ratio of one per 15 workers.	Contractor	Daily
The Contractor must ensure that toilets remain clean and are not abused.		
Unauthorised dumping / spilling of waste from toilets into the environment and burying of human waste are strictly prohibited.		
17.1.9 Access		
Access to the site is permitted only via Byfield road which is the designated access road for the SWWTW.	Contractor Engineer Developer	On-going
The Contractor is only permitted to make use of the existing road entrances to the site as well as those agreed to with by the relevant authorities prior to construction commencing.		
The location of all underground services and servitudes must be identified and confirmed.		
The construction site must have strict access control to reduce the risks associated with vehicular transportation and pedestrian access on the site.		
Watercourses and steep gradients must be avoided as much as possible.		
No vehicles are permitted to drive onto the retained wetland or other sensitive sites and no-go areas.		
All no-go areas will be indicated as such with warning signs in all relevant languages.		
17.1.10 Vehicle Maintenance Yard		
Heavy machinery and construction vehicles are to be stored only for the minimum time for which they are used on site and are to be parked on existing tarred surfaces / roads at the SWWTW at a location where it will not pose a hazard or nuisance to the operation of the works and will not traverse undeveloped areas of the works.	Contractor	On-going
A dedicated maintenance area is not permitted on site.		
No vehicle may be extensively repaired in any place other than in the dedicated maintenance yard.		
Washing of vehicles is prohibited on site.		

Environmental Specification	Responsibility	Frequency
17.1.11 Waste Disposal Facilities		
<p>General waste produced on site includes:</p> <ul style="list-style-type: none"><li>Office waste (e.g. food, waste, paper, plastic);</li><li>Operational waste (clean steel, wood, glass); and</li><li>General domestic waste (food, cardboards, paper, bottles, tins).</li></ul> <p>At least 10 general waste receptacles, including bins must be arranged around the Construction area, on site to collect all domestic refuse, and to minimise littering.</p> <p>Different waste bins, for different waste streams must be provided to ensure correct waste separation and subsequent recycling, where applicable.</p> <p>Bins must be clearly marked and lined for efficient control and safe disposal of waste.</p> <p>A fenced area must be allocated for waste sorting and disposal on the site.</p>	Contractor	Daily
17.1.12 Security and Safety		
<p>The Contractor and all sub-contractors must abide by the security rules of the SWWTW in order to reduce the opportunity for criminal activity in the locality of the construction site.</p> <p>Potentially hazardous areas such as trenches are to be demarcated and clearly marked.</p> <p>Lighting on site is to be set out to provide maximum security and to enable easier policing of the site, without creating a visual nuisance to local residents or businesses.</p> <p>Material stockpiles or stacks, such as pipes, must be stable and well secured to avoid collapse and possible injury to site workers/ local residents</p> <p>Flammable materials must be stored as far as possible from adjacent residents/ businesses.</p> <p>Fire fighting equipment must be present on site at all times.</p>	Contractor	Once off
<p>A formal letter must be submitted notifying the local government, the Chief Inspector and the Provincial Director of the Major Hazard Installation that the risk assessment has been carried out. A copy of this risk assessment must accompany the letter particularly to the local authority emergency services. This must be done prior to construction of the new/upgraded facilities. Since the site is a Major Hazard Installation; all incidents on the installation that require the emergency procedures to be activated must be reported to the local emergency services as well as to the Provincial Director of Labour. Such incidents must be recorded and the register must be available for inspection.</p>		Daily
<p>Obstruction to driver's line of sight due to stockpiles and stacked materials must be avoided, especially at intersections and sharp corners.</p> <p>No materials are to be stored in unstable or high-risk areas, such as on steep slopes.</p>		
17.1.13 General and Hazardous Substances and Materials		
<p>Storage areas must not be within any watercourses or within 100 m of any drainage lines or watercourses.</p> <p>Storage areas must be designated, demarcated and fenced.</p> <p>Storage areas must be secure, under lock and key, so as to minimise the risk of crime.</p> <p>Fire prevention facilities must be present at all storage facilities.</p> <p>Proper storage facilities for the storage of oils, paints, grease, fuels, chemicals and any hazardous materials to be</p>	Contractor SHE Officer	Daily

Environmental Specification	Responsibility	Frequency
<p>used must be provided to prevent the migration of spillage into the ground and groundwater regime around the storage area(s).</p> <p>These pollution prevention measures for storage must include a bund wall high enough to contain at least 110% of any stored volume. Such a facility must be on an impervious surface. The storage area must be securely fenced and all hazardous substances such as fuel, oils, chemicals, etc., must be stored therein. Drip trays, a thin concrete slab or a facility with PVC lining, must be installed in such storage areas with a view to prevent soil and water pollution.</p> <p>All fuel storage tanks and associated facilities must be designed and installed in accordance with the relevant oil industry standards, SANS codes and other relevant requirements.</p> <p>Symbolic safety signs depicting “No Smoking”, “No Naked Flames” and “Danger” must be prominently displayed in and around the fuel storage area.</p> <p>The capacity of the fuel storage tank must be clearly displayed and the product contained within the tank clearly identified.</p> <p>Only empty and externally clean tanks may be stored on the bare ground. All empty and externally dirty tanks must be sealed and stored in an area where the ground has been protected.</p> <p>If fuel is dispensed from 200 litre drums, the specified dispensing equipment suitable to that drum must be used.</p> <p>The drum must not be tipped in order to dispense fuel. The dispensing mechanism of the fuel storage tank must be stored in a waterproof container when not in use.</p> <p>All waste fuel and chemical contaminated rags must be stored in leak-proof containers and disposed of at an approved hazardous waste site.</p> <p>Storage sites will be provided with bunds to contain any spilled liquids and materials. These storage facilities (including any tanks) must be on an impermeable surface that is protected from the ingress of storm-water from surrounding areas in order to ensure that accidental spillage does not pollute local soil or water resources.</p> <p>Material Safety Data Sheets (MSDSs) must be readily available on site for all chemicals and hazardous substances to be used on site. Where possible the available, MSDSs must additionally include information on ecological impacts and measures to minimise negative environmental impacts during accidental releases or spillages.</p> <p><b>Dewatered sludge must be disposed of at the Shongweni Landfill and disposal records maintained on site.</b></p> <p>Staff dealing with these materials / substances must be aware of their potential impacts and follow the appropriate safety measures.</p> <p>A suitable Waste Disposal Contractor must be employed to remove waste oil. These wastes must only be disposed of at licensed landfill sites designed to handle hazardous waste.</p> <p>Appropriate SDCs must be provided for all hazardous waste being disposed of and must be kept on site within the Site Environmental File.</p> <p>The Contractor must ensure that his staff are made aware of the health risks associated with any hazardous substances used and has been provided with the appropriate protective clothing / equipment in case of spillages or accidents and have received the necessary training.</p> <p>Cement / concrete must not be mixed directly on the ground. Dagga boards, mixing trays and impermeable sumps must be used at all mixing and supply points. Unused cement bags are to be stored so as not to be effected by rain or runoff events.</p> <p>The washing of concrete trucks on site is prohibited.</p> <p>Used cement bags must be stored in weatherproof containers to prevent windblown cement dust and water</p>		



Environmental Specification	Responsibility	Frequency
contamination. Used cement bags must be disposed of <b>weekly</b> via the solid waste management system, and must not be used for any other purpose.		
The washing of concrete trucks on site is prohibited.	Contractor SHE Officer	Daily
Used cement bags must be stored in weatherproof containers to prevent windblown cement dust and water contamination.		
All visible remains of excess concrete must be physically removed on completion of the plaster or concrete pour section and disposed of.		
Washing the remains into the ground is not acceptable as groundwater contamination could occur.		
No paint products are permitted to be disposed of on site.		
Care must be taken of the storage thresholds contained in the EIA Regulations (2010) Listing Notices as well as the Waste Management Activities contained in Categories A, B and C, these are not permitted to be exceeded.		
Storage areas must not be within any watercourses or within 100 m of any drainage lines and/or the high water mark of the sea.		
The Contractor must maintain a record of the sourcing of all materials (including topsoil, sands, natural gravels, crushed stone, asphalt, clay liners, etc.) used during construction.		
The Mineral and Petroleum Resources Act must be complied with.		

## 17.2 Construction Phase

Environmental Specification	Responsibility	Frequency
<b>17.2.1 Health and Safety</b>		
All Procedures and equipment must be in accordance with the Occupational Health and Safety Regulations (OHSA) of South Africa, Act No. 85 of 1993.	Contractor SHE Officer	Daily
The Contractor must familiarise himself and his employees with the contents of the aforementioned legislation.		
First Aid contents must be on hand at all times.		
The Contractor must implement adequate and mandatory safety precautions relating to all aspects of the deconstruction. Such safety measures and work procedures / instructions must be communicated to construction workers.		
The wearing of Personal Protective Equipment (PPE) on site is mandatory for all personnel and construction team members. Minimum requirements must include the wearing of an approved safety helmet, safety boots, safety eyewear, safety reflective jackets and dust masks, ear plugs, etc. where appropriate.		
PPE signs must be erected on site at the areas where it is required and the integrity and availability of the signs must be maintained.		
No one must be allowed on site unless they are wearing approved safety equipment.		
Casual visitors must be required to sign a register at the security checkpoint and undergo a site induction by the SHE Officer. The responsible person must then be contacted before the visitor is allowed access to site. No unauthorised visitors are to be allowed on site.		
Workers' right to refuse work in unsafe conditions must be respected.		

Environmental Specification	Responsibility	Frequency
<p>All personnel must be trained in basic site safety procedures.</p> <p>The Contractor must design, test / exercise emergency preparedness programmes (plans, schedules, procedures and methods) for addressing environmental accidents, incidents and events such as spills of fuel, oil or lubricants; fires, etc. This must take cognizance of the Emergency Response Plan in Appendix N.</p> <p>The Developer and/or Developer's agent will carry out audits on the principal contractor at least once per month. Similarly, principal Contractors must be responsible for carrying out audits on their contractors at least once per month.</p> <p>The results of both audit types must be tabled for action and discussed at the Health and Safety Committee meetings or the site meetings, as appropriate.</p> <p>The principal Contractor must provide evidence by means of a procedure or chart that he is fully aware of the "hierarchy" of incidents that can occur e.g. unsafe situations, near misses, first aid box injuries, medical cases, disabling injuries, etc. The Contractor must keep an incident register of all such incidents, investigate and apply corrective action where required.</p> <p>The Developer also reserves the right to stop any unsafe work and request incident statistics from the principal contractor such as DIs, DIFR and DISR and it is advised that these are maintained.</p>		
17.2.2 Fires		
<p>No open fires or uncontrolled fires will be permitted on site.</p> <p>Fire fighting measures such as fire extinguishers must be located on site.</p> <p>The workforce must be made aware of fire prevention and fire fighting measures.</p>	Contractor	Daily
17.2.3 Worker Conduct on Site		
<p>A general regard for the social and ecological wellbeing of the site and adjacent areas is expected of the site staff. Workers must be made aware of the following general rules:</p> <ul style="list-style-type: none"><li>No alcohol / drugs to be present on the site.</li><li>No firearms allowed on site or in vehicles transporting staff to and from site, unless used by security personnel.</li><li>Prevent excessive noise.</li><li>Prevent unsocial behaviour.</li><li>Bringing pets onto the site is forbidden.</li><li>No harvesting of firewood from the site or from the areas adjacent to it.</li><li>Construction staff is to make use of the facilities provided for them, as opposed to adhoc alternatives (e.g. fires for cooking, the use of surrounding bush for toilet facilities).</li><li>Trespassing on private properties adjoining the site is prohibited.</li><li>Driving under the influence of alcohol is prohibited.</li><li>The rules and regulations of the SWWTW must be adhered to at all times.</li></ul>	Contractor SHE Officer	Daily
17.2.4 Clearing and Protection of Fauna and Flora		
<p>The extent of the area disturbed must be kept to the minimum required to successfully implement the road</p>	Contractor	Daily

Environmental Specification	Responsibility	Frequency
<p>maintenance activities, thus minimising the destruction of any fauna and flora.</p> <p>The wetland to the north of the site boundary must not be traversed, impeded, impacted or interfered with at all.</p> <p>Removing of vegetation must be restricted to the immediate area for construction. All alien invasives on work areas must be removed.</p> <p>Refer to Appendix O for photos and instructions of specifics of which species should and should not be removed, as extracted from the Specialist Report.</p>		Once-Off
<p>The indigenous Fuchsia (<i>Schotia brachypetala</i>) and Monkey Puzzle trees (<i>Araucaria araucana</i>) in area N and a mature Natal Fig (<i>Ficus natalensis</i>) just north of area K which will be felled must be off-set by planting five for every one felled, of the same species. <i>Albizia adianthifolia</i> (Flat crown <i>albizia</i>) 1.2m high with treated timber stake and plastic protection collar has been selected to be planted in place of these trees.</p>	Developer to ensure	Once off
<p>No natural vegetation is permitted to be collected for use as firewood.</p> <p>No animals are permitted to be disturbed unnecessarily and no animals are allowed to be shot, trapped or caught for any reason.</p> <p>Any wildlife that is injured or killed on the site by accidental means i.e. hit by a vehicle, are to be reported to the Developer, who must take action to facilitate the recovery of the animal where possible i.e. take the animal to the SPCA.</p> <p>It must be ensured that for every tree removed; at least five (5) replacement trees must be planted in suitable localities.</p> <p>The introduction of alien plant species to the site and surrounding areas is prohibited.</p> <p>Where alien plants have been introduced on to the site during clearing and infilling, they must be removed.</p> <p>The Contractor must develop an Action Plan for the removal of alien invasive species and submit it to the ECO for approval.</p> <p>Invader species and weeds must be removed and disposed of in accordance with existing legislation on a regular basis.</p> <p>The removal of indigenous/endemic shrubs and small trees must be kept to a minimum and only be removed if absolutely necessary and where authorisation has been received where applicable.</p>	Contractor	Daily
<b>17.2.5 Heritage</b>		
<p>If an artefact on site is uncovered, work in the immediate vicinity must be stopped immediately. The Heritage Impact Assessment Phase 1 Report (eThembeni Cultural Heritage, 2014) must be consulted and <i>Section 9: Protocol for the identification, protection and recovery of heritage resources during construction and operation</i> must be followed.</p> <p>The contractor must take all precautions (cease work and demarcate the area with red-tape) to prevent any person from removing or damaging any such article and must immediately, upon discovery thereof, inform the Construction Engineer of such discovery which in turn must contact a registered archaeologist and AMAFA. Work can only resume once clearance is given in writing by the archaeologist and/or AMAFA.</p> <p>No structures older than sixty years or parts thereof are allowed to be demolished altered or extended without a permit from AMAFA and no activities are allowed within 50 m of a site, which contains rock art.</p>	Contractor	Daily

Environmental Specification	Responsibility	Frequency
17.2.6 Traffic and Safety		
Temporary loading and off-loading areas and holding of construction vehicles must be designed prior to construction activities to ensure that the most preferable access and haulage routes has been identified.	Contractor	Daily
Implement proper road signs to warn motorists of construction activities ahead.		
Ensure that there are flag men and signs in place at access points to the construction site.		
Road signs for all lane closures to be done in accordance to the South African Road Traffic Signs Manual (SARTSM, 1999).		
Construction routes must be clearly defined.		
Disruption to the peak traffic periods 06h00 – 9h00 and 15h00 – 18h00 to be minimised or if possible avoided.		
All contractors must ensure that their employees and in particular, construction vehicle drivers / operators comply with the safe access and egress plans that are to be put in place during the construction process.		
Appropriate warning and reduced speed signage must be erected where necessary.		
The use of Tara Road must be limited wherever possible.		
17.2.7 Pedestrian Protection		
Pedestrians must be protected from construction activities at all times.	Contractor	Daily
Pedestrian conflict with site access and construction vehicles must be managed by traffic officer.		
The construction site camp must remain fenced for the entire construction period with clear signage and will be within the SWWTW boundary.		
17.2.8 Construction Vehicles		
Access of all construction and material delivery vehicles must be strictly controlled.	Contractor	Daily
Holding of all construction vehicles is to be controlled to ensure that through traffic is not unnecessarily impeded.		
Vehicles and equipment must be serviced every third month to avoid the contamination of the area from oil and hydraulic fluid leaks, etc.		
Servicing of vehicles must be done off-site.		
All speed limits must be adhered to.		
Machinery or equipment used on site must not constitute a pollution hazard in respect of the above substances.		
The Constructor must order such equipment to be repaired or withdrawn from use if they consider the equipment or machinery to be polluting and irreparable.		
Suitably covered receptacles must be available at all times and conveniently placed for the disposal of waste.		
All used oils, grease or hydraulic fluids must be placed therein and these receptacles will be removed from the site on a regular basis for disposal at a registered or licensed disposal facility.		
17.2.9 Road Maintenance		
Contractors must ensure that any damage to the pedestrian walkway or holding areas are maintained in good condition by attending to any damages (e.g. road signs or storm-water damage, etc.) as soon as these develop.	Contractor	Daily

Environmental Specification	Responsibility	Frequency
If necessary, staff must be employed to clean surfaced roads adjacent to construction sites where materials have spilt.		
All temporary road signs to be removed and pavement reinstated at completion of works.		
All covered road signs to be reinstated.		
17.2.10      Soils, Geotechnical and Topsoil		
The Contractor must strip and stockpile all topsoil within the work area for subsequent use at a later stage.	Contractor	Daily
The removal of any topsoil from site is prohibited and this must be stockpiled and used solely in the rehabilitation of the works area.		
Stockpiles must be located outside of the 32 m wetland buffer.		
Stockpiles must be protected from wind and rain with the use of tarpaulins where necessary.		
Topsoil must be kept separate from overburden and must not be used for infilling.		
Noxious weeds must be eradicated from topsoil stockpiles.		
The Contractor must exercise precautions with the storage, handling and transport of all materials that could adversely affect the environment.		
If pollution of any surface or groundwater occurs, it must immediately be reported to the KZN EDTEA and appropriate mitigation measures must be employed.		
The topsoil and spoil material must be used to create storm-water attenuation berms and contour the topography accordingly, where required, rather than be spoiled.		
A WML has not been obtained for spoiling of material and hence such material must be re-used responsibly on site.		
Although allowable bearing pressures of between 100 kPa and >250kPa is achievable in the fill and alluvial soils for shallow foundations, these soils in its in-situ state are considered unsuitable as a founding medium for the proposed structures due to the variable consistency of the soils. Due to heavy anticipated loading of some of the structures, settlement problems are anticipated if founding within these soils. In order to reduce settlement and improve the allowable bearing capacity it must be ensured that the sludge drying facility and the tanker bay facility are founded on an engineered soil raft using conventional footings (strip or pad footings). This will involve the removal of the fill/alluvial soils below the footings to a depth and width of at least 1.5 times the foundation width. The in-situ soil at the base of the excavation must then be compacted to at least 95% Mod AASHTO.		
The removed material must be placed in compacted layers not exceeding 150mm to 95% Mod AASHTO density at the optimum moisture content up to the desired founding levels. A bearing capacity of at least 100kPa is achievable within the soil raft.		
The proposed mixing building and boiler house must be founded, using conventional footings, on an engineered soil raft constructed of inert G6 material. This will involve the removal of the fill/alluvial soils below the footings to a depth and width of at least 1.5 times the foundation width. The in-situ soil at the base of the excavation must be compacted to at least 95% Mod AASHTO. The removed material must be replaced with G6 material to be placed in compacted layers not exceeding 150mm to 95% Mod AASHTO density at the optimum moisture content up to the desired founding levels. A bearing capacity of 250kPa would be achievable within the soil raft if a G6 material is used and 150kPa if a G7 material is used.		

Environmental Specification	Responsibility	Frequency
<p>As a general rule, settlement of the fill is taken as 0.1% of the fill height for the well compacted fill.</p> <p>In cases where low settlement tolerances are anticipated, or where excessive load magnitudes result in stressing of the ground to depths which practically preclude the excavation and replacement of the in-situ soil, an alternative foundation approach must be considered in consultation with the engineer, such as piled foundations or founding on a rock mattress.</p> <p>Depending on the settlement sensitivity of the structures founded on shallow footings, a rock mattress compacted by a 5-10t vibratory compactor will eliminate differential settlement. The rock fill is to be compacted in 300-500mm thick layers.</p> <p>All piles must to be designed taking into account the presence of very loose and loose material in the upper subsoil layers (up to approximately 5m depth) and isolated weaker zones (poor consistencies) within the alluvial soils which may cause some downdrag.</p>		
17.2.11 Spoil		
<p>Litter and general waste is to be removed from the topsoil and spoil material before stockpiling.</p> <p>Spoil sites must be shaped to fit the natural topography.</p> <p>Spoil sites must receive a minimum of 75 mm topsoil and be grassed with a recommended seed mixture by a qualified horticulturist.</p> <p>Slopes must not exceed a vertical: horizontal ratio of 1:3.</p> <p>The topsoil and spoil material must be used to create storm-water attenuation berms and contour the topography accordingly, were required, rather than be spoiled.</p> <p>A WML has not been obtained for spoiling of material and hence such material must be re-used responsibly on site.</p>	Contractor	Daily
17.2.12 Soil Erosion and Sedimentation		
<p>Stockpiles of soil must be limited in height to between 2 m and 4 m, and must either be dampened on a regular basis or vegetated depending on the length of time the stockpile will exist.</p> <p>Soil erosion on site must be prevented at all times, i.e. pre, during and post construction activities. Suitable erosion control measures must be implemented in areas sensitive to erosion such as near water supply points and edges of slopes.</p> <p>These measures must include:</p> <ul style="list-style-type: none"><li>Phased construction activities must take place to ensure the removal of vegetation, only as it becomes necessary for work to proceed. This enables erosion and sedimentation to be minimised and centralised in relatively small areas easier to control and to stabilize. Topsoil storage must be as brief as possible and storage must occur in a bunded area away from watercourses as described above.</li><li>Vegetative Cover – vegetation reinforces soil and holds it in place thereby reducing erosion. Temporary or permanent vegetation must be planted on all bare soil immediately after any ground disturbance. The prompt rehabilitation (within one week) of exposed soil areas with indigenous vegetation will ensure that soil is</li></ul>	Contractor	Daily



Environmental Specification	Responsibility	Frequency
<p>protected from the elements. The unnecessary removal of vegetation especially on steep areas must be prevented. Taking necessary precautions in terms of design and construction and earthworks, cuts and fills must be taken. Soil stockpiles must be vegetated or covered to reduce soil loss as a result of wind or water to prevent erosion and sedimentation. Disturbed areas must be rehabilitated as soon as possible.</p> <ul style="list-style-type: none"> <li>Seeding, anchored mulch, wool binders or erosion control fabrics must be used to provide surface protection and stabilisation until vegetation is established.</li> <li>The suitable use of sand bags or Hessian sheets must be used to stabilise bare soil.</li> <li>The suitable use of geo-textiles, turf blankets or mats must be used as slope protection for exposed slopes.</li> <li>Proper drainage controls such as pipe culverts and cut-off trenches must be used to ensure proper management of surface water runoff to prevent erosion and sedimentation.</li> <li>Construction vehicles must remain on designated demarcated areas.</li> <li>Work areas must be clearly defined and demarcated to avoid unnecessary disturbance of areas outside the maintenance area.</li> </ul> <p>Constant cognisance of the inherent high erosion risk potential of all soils and sites on the property must be taken and appropriate control and preventative measure put in place.</p>		
<b>17.2.13 General Waste Management (not related to the wastewater of the SWWTW)</b>		
<p>General waste produced on site is to be collected in skips for disposal at a registered landfill site.</p> <p>Hazardous waste is not to be mixed or combined with general waste earmarked for disposal at the municipal landfill site.</p> <p>Under no circumstances is waste to be burnt or buried on site.</p> <p>The excavation and use of rubbish pits on site is forbidden.</p> <p>Waste bins must be cleaned out on a weekly basis to prevent any windblown waste and/or visual disturbance.</p> <p>All general waste must be removed from the construction areas on a daily basis and disposed of in suitable waste receptacles.</p> <p>No general waste is to be disposed of on site.</p> <p>Any form of waste material and rubble generated during construction must be removed from the site and disposed of at a facility registered in terms of section 20(b) of the NEM:WA (Act No. 59 of 2008), if it cannot be responsibly reused or recycled on site.</p> <p>No waste material is permitted to be buried (for the sole purpose of final disposal) or burnt.</p> <p>The contractor responsible for the removal of the rubble and waste must supply the applicant with a certificate indicating safe disposal.</p> <p>Within fourteen (14) days of its issue, a copy of the safe disposal certificates must be forwarded to KZN EDTEA.</p> <p>The storage facility (silos for the storage of waste) must be registered with the EDTEA and comply fully with the requirements of compliance with the Norms and Standards Government Notice No. 926 which is required for this project.</p>	Contractor SHE Officer	Daily
<b>17.2.14 Hazardous and Industrial Waste Management (not related to the wastewater of the SWWTW)</b>		
Hazardous waste produced on site includes:	Contractor	Daily

Environmental Specification	Responsibility	Frequency
<ul style="list-style-type: none"> <li>Oil and other lubricants, diesel, paints, solvent;</li> <li>Containers that contained chemicals, oils or greases; and</li> <li>Equipment, steel, other material (rags), soils, gravel and water contaminated by hazardous substances (oil, fuel, grease, chemicals or bitumen).</li> </ul> <p>Hazardous waste must be disposed of at a Licensed Hazardous Waste Landfill Site. The ECO must approve a licensed waste disposal site at the inception of the project.</p> <p>Hazardous waste bins must be clearly marked, stored in a contained area (or have a drip tray) and covered (either stored under a roof or the top of the container must be covered with a lid).</p> <p>Safe Disposal Certificates (SCDs) must be obtained from the waste removal company as evidence of correct disposal and kept on site within the Site Environmental File.</p> <p>Any transportation of hazardous materials must be done in accordance with legislative control; and Relevant SABS Codes of Practice must be adhered to.</p> <p>Conditions stipulated above in <b>Section 7.9</b> also apply to the Construction Phase.</p>		
<b>17.2.15 Wastewater (not related to the wastewater of the SWWTW)</b>		
<p>All wastewater generated at the proposed development must be disposed of into the sewer system or separated if polluted so as not to cause any surface or subsurface water pollution or health hazard. Wastewater, including cement-contaminated water, must not enter any water course or the sea and must be managed by the site manager to ensure that the existing water resources on and off site are not polluted by activities emanating from the above development.</p> <p>Contaminated wastewater including cement-contaminated water must not enter any watercourse and must be managed by the Contractor to ensure that the existing water resources on and off site are not polluted by activities emanating from the above development.</p> <p>Used oil and wastewater must be disposed of to a ROSE registered facility. A SDC is to be obtained by the Contractor and kept on site within the Site Environmental File.</p> <p>Water containing waste must not under any condition be discharged into the natural environment, except for via the sea outfall pipeline into the sea for which the works is authorised to do. Measures to contain water containing waste and safe disposal of such must be implemented.</p>	Contractor	Daily
<b>17.2.16 Water Pollution Management (including groundwater and soil contamination)</b>		
<p>The flow direction of any surface water runoff must be established prior to disturbing any area.</p> <p>The stockpiling of soil or any other material must not be allowed near a watercourse or water body in order to prevent pollution or impede surface runoff;</p> <p>Every effort must be made to ensure that any chemicals or hazardous substances do not contaminate the soil or ground water on site.</p> <p>Dirty water originating from maintenance activities is to be contained and disposed of correctly, to prevent the contamination of soil and/ or any watercourses.</p> <p>Bathing or washing of clothes, equipment or machinery within any watercourse is prohibited.</p>	Contractor	Daily

Environmental Specification	Responsibility	Frequency
Erosion and loss of soil must be prevented by minimising construction areas exposed to surface water runoff.		
Bare areas are to be rehabilitated as soon as the areas become available or after use.		
All water consumption on site must be recorded on a daily basis.		
The abstraction of water from any water resource for construction purposes and/or dust suppression must not be permitted without a water use license from the Department of Water and Sanitation.		
The water resource management section of the Department of Water and Sanitation (DWS) must be contacted at (031 336 2700) with regard to the requirements and registration of dams with dam safety risk	Developer	Once-off
<b>17.2.17 Wetland Management</b>		
A 32 m buffer at the very least from the edge of the permanent zone must be maintained for the wetland on the northern boundary of the site.	Contractor	Daily
Under no circumstances may this wetland be encroached on or disturbed.		
No clearing or infilling of the wetland is permitted.		
Under no circumstances may any of the construction workers or staff access the wetland. All staff must be informed of this requirement.		
No stockpiling of construction materials or spoil material or any construction activities whatsoever are allowed to take place within this fenced off area.		
The wetland must be included as part of storm-water management plan (SMP) however, it is not permitted under any circumstances that storm-water from the site be allowed to drain toward the wetland.		
It is vitally important that any storm-water discharging in the direction of the wetland is dissipated and diverted to avoid gully erosion or any negative impact on the hydrological functioning of the wetland.		
Visible markings showing the buffers demarcated must be provided during the construction phase.		
<b>17.2.18 Spills, Incidents and Pollution Control</b>		
Any spill incident, which may occur, must be investigated and immediate action must be taken. This must also be reported to the ECO and SHE Officer.	Contractor SHE Officer	Daily
In the case of a spill of hydrocarbons, chemicals or bituminous material in the construction camp or on the construction site / bunding area, the spill must be contained and cleaned up and the material together with any contaminated soil collected and disposed of as hazardous waste to minimize pollution risk and reduce bunding capacity. Refer to <b>Appendix L, Spill Contingency Plan</b> for further direction.		
The Emergency Response Plan (ERP) must be complied with by the Contractor.		
Should a pollution incident occur on site the Contractor must: <ul style="list-style-type: none"> <li>Implement reasonable measures immediately to contain and minimise the impacts of the incident;</li> <li>Contain the spill;</li> <li>Notify all persons whose health may be affected by the incident;</li> <li>Undertake clean up procedures immediately;</li> <li>Notify the Contractor of the incident immediately who will advise the employee as to the measures that must be implemented;</li> <li>Record the incident in the Environmental Incident Register; and</li> </ul>		

Environmental Specification	Responsibility	Frequency
<ul style="list-style-type: none"> <li>Implement measures to prevent similar incidents from occurring in the future.</li> </ul> <p>Concrete mixing must be confined to as few areas as possible and ad hoc mixing is to be avoided. Areas where concrete was mixed must be cleaned up after use. Concrete mixing is to be undertaken on an impervious surface. Subsoil and construction material stockpiles are to be bermed to prevent leachate and polluted runoff. In the event of a spill incident, the Emergency Response Plan and Method Statement developed by the Contractor must be followed.</p>		
<b>17.2.19 Noise</b>		
<p>Neighbouring landowners must be notified about construction activities.</p> <p>All construction vehicles and equipment are to be kept in good repair and must be fitted with Standard silencers prior to construction.</p> <p>Stationary noisy equipment (for example compressors, generators etc. must be encapsulated in acoustic covers, screens or sheds. Portable acoustic shields must be used in the case where noisy equipment is not stationary (for example drills, angle grinders, chipping hammers).</p> <p>Construction activities, and particularly the noisy ones, are to be contained to reasonable hours during the day and early evening.</p> <p>Machines in intermittent use must be shut down in the intervening periods between work or throttled down to a minimum.</p> <p>In general, operations must meet the noise standard requirements of the Occupational Health and Safety Act (Act No 85 of 1993).</p> <p>All mitigation measures to reduce the frequency of noise events to levels that would not constitute a noise nuisance must be documented prior to construction phase. Noise emissions must be minimized to comply with SANS 10103: 2008</p> <p>Construction staff working in areas where the 8-hour ambient noise levels exceed 75 dBA must wear ear protection equipment.</p> <p>Noise levels must be kept within acceptable limits.</p> <p>All noise and sounds generated must adhere to SANS 10103 specifications for maximum allowable noise levels for central business districts.</p> <p>No pure tone sirens or hooters may be utilised except where required in terms of SANS standards or in emergencies.</p> <p>Noisy operations must be combined so that they occur where possible at the same time.</p> <p>Noise from labourers must be controlled.</p> <p>Construction equipment must be kept in good working order and where appropriate fitted with silencers which are kept in good working order.</p> <p>If the vehicles or equipment are not in good working order, the Contractor must be instructed to remove the offending vehicle or machinery from site.</p> <p>The Contractor must take measures to discourage labourers from loitering in the area and causing noise disturbance. Where possible labour must be transported to and from the site by the Contractor or his sub-contractors by the contractors own transport.</p>	Contractor	Daily

Environmental Specification	Responsibility	Frequency
Construction activities are to be contained to reasonable hours during normal working hours of 07h30 to 17h00.		
Neighbours are to be given at least three (3) days warning prior to any blasting, piling or other 'noisy' activities.		
17.2.20      Air Quality Pollution Management and Odour Control		
Any oil containing equipment or containers must be managed in a manner to avoid oil exposure to atmosphere to limit evaporation of volatiles to atmosphere.	Contractor	Daily
No fires are to be allowed on site.		
Vehicles must be maintained to avoid excessive emissions and smoke. Similarly equipment must be serviced.		
17.2.21      Dust Control		
Dust track-on from disturbed areas to paved road surfaces must be avoided by making use of one of the following measures to: <ul style="list-style-type: none"><li>Road sweeping.</li><li>Chemical dust suppression of disturbed areas to reduce the amount of dust which can be lifted by the wheels of trucks.</li><li>Wet suppression to the roads using a light spray.</li><li>The washing down of the wheels of trucks before they exit only paved road surfaces.</li></ul>	Contractor SHE Officer ECO	Daily
Water may not be sourced from a watercourse unless a Water Use Licence is obtained for this specific use. If water is abstracted from a water resource for dust suppression, a Water Use Licence / General Authorisation must be obtained from the DWS.		
Dust liberated to atmosphere must not reduce the visibility for private vehicles making use of the road passing by the site.		
Wet suppression and wind speed reduction are common methods used to control open dust sources at construction sites.		
Re-vegetation of exposed areas for long-term dust and water erosion control is commonly used and is the most cost-effective option. Plant roots bind the soil, and vegetation cover breaks the impact of falling raindrops, thus preventing wind and water erosion. Plants used for re-vegetation must be indigenous to the area, hardy, fast-growing, nitrogen-fixing, provide high plant cover, be adapted to growing on exposed and disturbed soil (pioneer plants) and must easily be propagated by seed or cuttings.		
All construction vehicles and equipment are to be kept in good repair.		
Speed limits of a maximum of 40 km/hr are to be implemented on site and enforced by the Contractor.		
Dust liberated to atmosphere must not reduce the visibility for vehicles making use of the road passing by the site.		
Shade cloth fencing is to be used to reduce dust aggravation.		
Construction activities are to be contained to reasonable hours during the day avoiding periods of sunrise and sunset.		
In areas where there is a large potential for dust liberation (high wind days) wet suppression using a light spray must be applied to the areas in question.		
A dust suppression register as well as a complaints register needs to be kept.		
All complaints received need to be investigated with remedial action taken communicated to the affected party within		

Environmental Specification	Responsibility	Frequency
14 days.		
<b>17.2.22 Storm-water Management</b>		
<p>The Storm-water Management Plan must be implemented to ensure proper management of storm-water on the site during and after construction to ensure that pollutants and sediment are not released into any water resources.</p> <p>The storm-water management plan (SMP) must be approved by the eThekweni Municipality.</p> <p>The storm-water management plan must address the following issues (posed here as questions):</p> <ul style="list-style-type: none"> <li>▪ <i>“How will the changes in the absorptive capacity of the catchment be taken into account (more development, less absorption of rainfall with more hardened surfaces and increased peak runoff)?”</i></li> <li>▪ <i>“The WWTW is situated in a flood plain. How will it be able to deal with flood waters and will the designs take this into account by ensuring sufficient allowance for storm-water drainage systems on site to allow for the collection and slow release of peak flows, without impacting the Works, to protect neighbours?”</i></li> </ul> <p>Temporary storm-water attenuation ponds / silt fences and traps are to be formalised prior to bulk earthworks commencing. These attenuation ponds / silt traps can help considerably with storm-water attenuation as well as sediment trapping and erosion prevention during the construction phase.</p> <p>A temporary earth berm must be created with the subsoil that is to be scrubbed from the site prior to bulk earthworks commencing. These earth berms can be used to fill any embankments on completion of the earthworks or may be spoiled according to <b>Section 7.15</b> above.</p> <p>This earth berm must be located immediately down slope of the toe of all cut or fill embankments, must be grassed and must be used to trap sediment transported down slope during rainfall events during the construction phase and must drain to temporary storm-water attenuation ponds at a gradient of no steeper than 1:125 to prevent the creation of an erosion donga.</p> <p>Designs for the site development in general must avoid concentration of storm-water runoff both spatially and in time and may be required to provide for on-site attenuation of storm-water runoff to limit peak flows to pre-development levels.</p> <p>Detailed plans to control and prevent erosion by water must be agreed prior to the commencement of any works, including site clearance, on any portion of the site.</p> <p>Removal of vegetation cover must be carried out with care and attention to the effect, whether temporary or long-term, that this removal will have an erosion potential.</p> <p>Precautions must be taken at all times on building sites to contain soil erosion and prevent any eroded material from being removed from the site.</p> <p>Landscaping and re-vegetation of areas not occupied by buildings or paving must be programmed to proceed immediately after building works have been completed, or have reached a stage where newly established ground cover is not at risk from the construction works.</p> <p>On-site storm-water control systems, such as swales, berms, soil fences and attenuation ponds are to be constructed before any construction commences on the site.</p> <p>As construction progresses, the storm-water control measures are to be monitored and adjusted to ensure complete erosion and pollution control at all times.</p> <p>Earthworks on sites are to be kept to a minimum.</p> <p>Where embankments have to be formed, stabilisation and erosion control measures must be implemented</p>	Contractor Engineer	Daily



Environmental Specification	Responsibility	Frequency
<p>immediately.</p> <p>Storm-water must not be allowed to pond in close proximity to existing building foundations.</p> <p>No materials, fluids or substances are allowed to enter the storm-water system that could have a detrimental effect on the flora, fauna and aquatic life in the water courses and wetlands.</p> <p>Regular monitoring of the sites must be undertaken.</p> <p>Any site that is required to store any substances that could be regarded as hazardous in terms of water pollution must notify the eThekweni Municipality and must take measures to ensure spillages of the substance(s) can be adequately contained to prevent contamination of the water resources within the development area.</p>		
<b>17.2.23 Social Considerations</b>		
<p>Working hours are restricted to 07h30 – 17:00 during weekdays and 08:00-13:00 on Saturdays (only under exceptional circumstances as determined by low flow, tie-ins and shut downs. No construction is permitted on Sundays.</p> <p>Should work be required after these hours, the ECO must be notified and any person who resides in close proximity to the site and who may be impacted upon by the disturbance must also be notified.</p> <p>All neighbouring landowners and those that are disturbed due to construction activities are to be notified of construction activities and provided with regular feedback on the status of construction.</p> <p>The Contractor is to arrange for a suitable candidate to assist with the appointment of local labour and assist with labour disputes.</p> <p>Due to the concentration of a workforce in the area over the construction period, the contractor must implement an HIV/AIDS Awareness Programme on site.</p> <p>The contractor must appoint an HIV/AIDS Awareness Officer for the duration of the construction period.</p> <p>Activities for HIV/AIDS awareness and prevention will be broad based, targeting both individuals and groups. They may consist of:</p> <ul style="list-style-type: none"> <li>Information posters in public places both on and off site (eating places, bars, guest houses, etc);</li> <li>Peer educators (reference people) drawn from the local labour force and trained in HIV/AIDS issues for discussions with colleagues (estimate 1 per 30 employees);</li> <li>Small focus group discussions and information covering key issues must be held;</li> <li>Inclusion of HIV/AIDS activities at site meetings and other discussions; and</li> <li>Voluntary Counselling and Testing.</li> </ul> <p>Education must cover:</p> <ul style="list-style-type: none"> <li>Stigma and discrimination issues;</li> <li>Preventative behaviours including partner reduction, condom use, and awareness and importance of treatment of STDs;</li> <li>Skills including negotiating safer sex, correct condom use, purchase without embarrassment;</li> </ul> <p>Referral to local health centres and services available.</p>	Contractor	Daily
<b>17.2.24 Visual Considerations</b>		
Storage facilities, elevated tanks and other temporary structures must be located such that they have as little visual	Contractor	Daily

Environmental Specification	Responsibility	Frequency
<p>impact on local residents as possible. Special attention must be given to the screening of highly reflective materials on site.</p>		
<b>17.2.25 Coastal</b>		
<p>Care and responsibility must be exercised when undertaking the replacement of the 70 m of coastal pipeline. The areas must be kept void of litter.</p> <p>The EDTEA must be aware of the date of construction and scope of work to be done as part of this first phase;</p> <p>All regulations of the eThekweni Coastal Management department must be adhered to.</p> <p>Full notifications must be provided to the public to notify them of disturbance and beach restriction for the three (3) month period. All necessary authorisations must be in place prior to commencement of construction.</p> <p>Areas of construction on the Cuttings Beach must be clearly demarcated, and where deep trenches are dug, these must be carefully and adequately fenced off for safety purposes.</p> <p>The Contractor must obtain a letter of permission from the eThekweni Municipality (Parks and Recreation) to drive on the beach / cause a beach disturbance / restriction. Full method statements of planned construction activities must be communicated to the eThekweni Municipality to obtain this letter of permission.</p> <p>All members of the construction workforce working on the site must be provided with the appropriate high visibility clothing to ensure that can be distinguished from tourists on the beach and be seen by motorists.</p> <p>No contractor plant or vehicle must drive onto the beach without an authorisation permit from the relevant municipal official. The permit must indicate the model, colour and registration number of the vehicle, expiry date, name in print and signature of eThekweni Municipality Beach Manager and Contractor.</p> <p>Warning by way of site notices detailing the times and duration of disturbance must be erected along the Cuttings Beach and at other conspicuous locations. This must be done at least 7 days prior to workers being on site.</p> <p>The minimum trench size must be dug to ensure minimal disturbance. The trenches must be demarcated with danger tape and signage or danger erected.</p> <p>Only formal and existing access points onto the Cuttings Beach is permitted for use. These access points remain within the responsibility of the Contractor to maintain for the duration of use and be left in an orderly manner once construction is complete.</p> <p>Best practice methods must be exercised to limit impacts on the beach and beach dunes and dune vegetation. All waste from construction activities must be removed from the beach areas at the earliest opportunity to prevent these from spreading. Collected waste may be stored at areas identified by the ECO before final disposal to a Municipal land fill site.</p> <p>No rubble or waste is permitted to be left on the beach. No wastes or material must be temporarily kept /stored below the high water mark at any given time.</p> <p>No removal or disturbance of dune vegetation is permitted unless a method statement is submitted to the ECO with an explanation on how this cannot be averted. Vegetation removal may not exceed 300m<sup>2</sup> under any circumstances.</p> <p>Provision must be made for storm water management measures that will ensure effective run-off control and prevent erosion at run-off points and ponding on the beach.</p> <p>Sand must only be sourced from “sand-rich” beach areas for use in restoration work after approval or clearance from the ECO. This area must be identified in consultation with the biodiversity / ecological specialist and a coastal specialist.</p>	Contractor	Duration of coastal work

Environmental Specification	Responsibility	Frequency
17.2.26 Reporting & Record Keeping - Complaints Register		
Complaints received must be registered and recorded by the contractor and also brought to the attention of the contractor. Both parties will respond accordingly. The following information must be recorded in the case of any complaint / incident: <ul style="list-style-type: none"><li>Time, date and nature of complaint;</li><li>Response and investigation undertaken; and</li><li>Corrective and preventative actions taken and by whom.</li></ul>	Contractor	Daily
All complaints received will be investigated and a response is to be given to the complainant within 7 days.		
17.2.27 Reporting & Record Keeping - Environmental Incidents Register		
All environmental incidents occurring on the site will need to be recorded in an Environmental Incident Book and brought to the attention of the ECO. The following information must be provided: <ul style="list-style-type: none"><li>Time, date and nature of complaint;</li><li>Response and investigation undertaken; and</li><li>Corrective and preventative actions taken and by whom.</li></ul>	Contractor	Daily

## 18 POST-CONSTRUCTION PHASE – REHABILITATION / MAINTENANCE & OPERATIONAL

Environmental Specification	Responsibility	Frequency
18.1.1 Construction areas		
All structures comprising the construction affected areas are to be removed from the site and surrounding areas.	Contractor Developer	Post-Construction
The area that previously housed the construction materials is to be checked for spills of substances such as oil, paint, diesel, etc. and these must be cleaned up.		
All hardened surfaces within the construction affected area must be ripped, all imported materials removed, and the area must be top soiled and re-grassed accordingly with indigenous species.		
The Contractor must arrange the cancellation of any temporary services.		
18.1.2 Vegetation		
The Fig Tree is permitted to be removed without a tree removal permit from DAFF as this tree species is not a protected species. However five Fig trees are to be planted as an off-set at a location recommended by the	Developer	Post-Construction

Environmental Specification	Responsibility	Frequency
<p>ecologist. <i>Albizia adianthifolia</i> (Flat crown <i>albizia</i>) 1.2m high with treated timber stake and plastic protection collar has been selected to be planted in place of these trees. This must be approved by the ecologist prior to planting.</p> <p>All areas that have been disturbed by construction activities (including the construction affected areas) must be cleared of alien vegetation.</p> <p>All vegetation that has been cleared during construction is to be removed from site or used as mulch, (except for vegetation which may result in inadvertently seeding alien vegetation).</p> <p>Over time invader species (across the entire site) must be eradicated and be replaced with indigenous species native to the area to create more of a natural ecosystem with different types of natural habitat. The enhancement of the site with the creation of natural habitats as well as the planting of vegetation buffers as recommended in the specialist report (TEP, 2015) would be of value and is recommended to be implemented by the developer.</p>		
<b>18.1.3 Materials and Infrastructure</b>		
<p>All residual stockpiles must be removed to spoil or spread on site as directed by the Developer and/ or Engineer.</p> <p>All leftover building materials must be returned to the depot or removed from the site.</p> <p>The Contractor must repair any damage that the construction works has caused to neighbouring properties.</p> <p>Fences, barriers and demarcations associated with the construction phase are to be removed from the site unless stipulated otherwise by the Developer.</p>	Developer Engineer Contractor	Post-Construction
<b>18.1.4 Rehabilitation</b>		
<p>The Developer is responsible for compliance with the provisions for Duty of Care and Remediation of Damage in accordance with Section 28 of National Environmental Management Act (NEMA), Act No. 107 of 1998.</p> <p>All remaining maintenance materials, building rubble and waste are to be removed from the site to an approved disposal site. Burying rubble on the site is prohibited.</p> <p>All disturbed surfaces compacted by maintenance activities including the ablutions and loading areas must be ripped to a minimum depth of 30 cm to allow organic contaminants to breakdown and promote vegetation establishment.</p> <p>The Contractor is required to rehabilitate all impacted areas according to the approved Method Statement for the Rehabilitation of Modified Environments.</p> <p>Final rehabilitation must be completed within a period specified by the Engineer.</p> <p>The site and surrounding areas is to be cleared of all litter.</p> <p>Surfaces are to be checked for waste products from activities such as concreting or asphaltting.</p> <p>All embankments are to be trimmed, shaped and replanted to the satisfaction of the ECO.</p> <p>The Contractor is to check that all watercourses are free from building rubble, spoil materials and waste materials.</p>	Contractor Engineer Developer ECO	Post-Construction

Environmental Specification	Responsibility	Frequency
18.1.5 End of Contractor services		
A meeting is to be held on site between the Developer and the ECO to approve all remediation activities and ensure that the site has been restored to a condition acceptable to the ECO and the Developer.	ECO Developer	Post-Construction
A site close-out audit is to be undertaken by the ECO prior to handover of the site by the Contractor.		
18.1.6 Operations and maintenance of the SWWTW		
Methods for the reduction of Zinc levels must be investigated and implemented.	Developer	Operational phase
The coastal and sea outfall pipeline must be duly maintained.		
The facilities of the SWWTW must be duly maintained and repaired to ensure optimum operation.		
Maintain the existing procedures for quality assurance in place. Institute regular proper training, manual overrides, password protected etc. to prevent possible process upset caused by fatigue, lack of competence, lack of training or information, unsafe behaviour		
The Emergency Response Plan (ISHECON, 2016) must be complied with and updated post-construction and every five years thereafter.		
Sampling of every load that is tankered must be undertaken. Inventory control must be implemented. Manage within trade effluent discharge by-law requirements to prevent excessive chemical loading.		
Point source pollution control procedures must be in place e.g. from galvanizing industries. Monitoring and evaluation must be done on time. (UNEP, 2015) to prevent excessive heavy metals, high presence of pathogens and nutrients in sludge.		
Sludge classification must be carried out before disposal or utilization to prevent excessive heavy metals, high presence of pathogens and nutrients in sludge.		
On-going monitoring and effluent quality analysis must be ensured. Manage within trade effluent discharge by-law requirement.		
Ensure that water quality parameters of the final effluent are within defined parameters as stipulated in the standard to ensure that it improves final effluent quality before it is discharged to the receiving environment (sea, river or lake etc. include chlorination, nutrient removal etc. However, this process if not managed properly can cause environmental pollution).		
Skips and tanks must be controlled to minimize vector attraction.		
18.1.7 Roads and Traffic		
In order for the Department of Transport to ensure operational efficiency of the Provincial Road Network so as to ensure Road Safety is not compromised the Department maintains a level of control over Structures and Services, both within the declared or expropriated road reserve and in that portion of land immediately adjacent to the road reserve, known as the building restriction area, as defined in Section 13 (1) (a) & (b) of the Kwazulu-Natal Roads Act No. 4 of 2001.	Developer	Operational phase
No buildings or any structures whatsoever, other than a fence, hedge or a wall which does not rise higher than 2,1 m above or below the surface of the land on which it stands, must be erected on the land within a distance of 15 m measured from the road reserve boundary of a Blacktop surfaced Main or District Road, or within a distance		

Environmental Specification	Responsibility	Frequency
<p>of 30 m measured from the centre line of a Gravel surfaced Main Road; or within a distance of 25 m measured from the centre line of a Gravel surfaced District Road.</p> <p>The road reserve boundary must be determined in consultation with this Departments Road Information Services, (Tel: 033–355 8600).</p> <p>On Main Roads, no single pole power transmission line, telecommunication line, cable, or pipeline with a diameter of less than 100 mm diameter must be placed within a distance of 13 m of the Road centreline. Nor, in addition, must they be more than 2 m inside the road reserve boundary.</p> <p>Except at approved crossings of the road reserve, the closest point a pipeline exceeding 100 mm in diameter must be at least 17 m from the centreline of a Main Road, carriageway or ramp. In addition, the closest point a pipeline must be located is at least 2 m outside of the road reserve boundary.</p> <p>On District Roads and Local Roads, no single pole power transmission line, telecommunication line, cable, or pipeline with a diameter of less than 100 mm diameter must be placed within a distance of 8 m of the Road centreline. Nor, in addition, must be more than 2 m inside the road reserve boundary.</p> <p>Except at approved crossings of the road reserve, the closest point a pipeline exceeding 100 mm in diameter must be at least 12 m from the centreline of a District Road or Local Road. In addition, the closest point a pipeline must be located is at least 2 m outside of the road reserve boundary.</p> <p>All Structures and Services are to be approved and placed in consultation with and to the satisfaction of the relevant Cost Centre Manager.</p> <p>Vehicles involved during construction and thereafter must use the Mondi Route to the works to avoid congestion at Badulla Drive / Tara Rd intersection</p> <p>All costs incurred, as a result of these requirements must be borne entirely by the developer.</p>		
<b>18.1.8 Disaster Management and MHI</b>		
<p>It must be noted that there is a 33 kV underground cable in the roadside fronting the development and should they need to excavate the roads HV Operations Unit should be contacted prior to any excavation work on the existing road, Daren Papayya must be contacted on 031 322 1097 to seek an approval.</p> <p>To receive a full clearance from the electricity unit you still need to seek an approval from the MV/LV Operations Branch.</p> <p>The application must consult eThekweni Electricity's main records (held in the drawing office at eThekweni Electricity Headquarters, 1 Jelf Taylor Crescent, for the presence of underground electrical services. In addition, should any overhead line and/ or servitude be affected, the specific permission of the Head: Electricity must be sought, regarding the proposed development.</p> <p>The relocation of MV/LV electrical services, if required in order to accommodate the proposed development, will be carried out at the expense of the applicant.</p>	Developer	Construction and Operational phase
Building plans must be submitted to the Fire and Safety department of eThekweni Municipality for scrutiny		



Environmental Specification	Responsibility	Frequency
Full compliance with other applicable legislative requirements.		
Full compliance with the petroleum product or flammable gas pipeline in close proximity must be ensured.		
Full compliance with the Interim Code Relating to Fire Prevention and Flammable liquids and Substances must be ensured.		
Full compliance with Major Hazard Installation Regulations since the site is declared to be a MHI. Five colour copies of the MHI risk assessment must be forwarded to eThekweni Municipality MHI Technical Task Team for scrutiny and comments.		
Compliance with road closure during construction period regarding response time for the brigade and other emergency services must be ensured.		
<p>Compliance with Major Hazard Installation (MHI) Regulations in case the proposed development is in close proximity to existing MHIs or the facility itself will be an MHI.</p> <p>Full compliance with other applicable Legislative requirements.</p> <p>Should any upgrades be undertaken to the sewer pipelines which feed the plant, the plans for such must be submitted to the eThekweni department of electricity as there are existing underground cables which could be affected by trenching.</p> <p>Full compliance of the waste storage facility with Interim Code Relating to Fire Prevention and Flammable liquids and Substances.</p> <p>The developer must notify eThekweni Disaster Management Department of MHI status with the MHI report for notification (Ishecon, 2015).</p> <p>A copy of the MHI risk assessment must be available on the site at all times for inspection by the relevant authorities. This assessment can be made available to interested or affected persons who may wish to scrutinize the document.</p> <p>There is currently no emergency procedure suitable for a Major Hazard Installation.</p> <p>The Emergency Response Plan (ISHECON, 2016) must be applied.</p> <p>EThekweni Municipality must confirm that the relevant local emergency services have a suitable off-site emergency plan in place, and must provide information and assistance where required in compiling such a plan.</p> <p>EThekweni Municipality must familiarize themselves with the requirements of the MHI Regulation 7 in terms of incidents and near misses as well as activation of the MHI emergency plan that have to be recorded (records to be made available for inspection) and reported to the authorities.</p> <p>Maintenance and inspection of Anaerobic digesters, gas holder, sludge dewatering building and biogas transfer - And the vessels and piping thereof must be ensured.</p> <p>No smoking is permitted on the site except in designated areas.</p> <p>Emergency procedures and Fire fighting equipment must be in place at the SWWTW at all times.</p> <p>The following mitigation measures must be implemented:</p> <ul style="list-style-type: none"> <li>Ensuring the maintenance and testing of protective measures. Methane detectors must be installed</li> </ul>	Developer	Operational phase

Environmental Specification	Responsibility	Frequency
<p>around the plant (near the NW boundary) and must be tested and calibrated <b>monthly</b>.</p> <ul style="list-style-type: none"> <li>A windsock <b>must be erected</b> near the AD plant that would be clearly visible to the staff at this far side of the site.</li> <li>Since biogas is both flammable and toxic -and is being newly introduced onto the site – SWWTW must ensure that all plant staff are fully aware of the hazards associated with the plant.</li> <li>SWWTW must also take note that the empty vessels (digesters, piping, gas holders) must be thoroughly purged before entry / hot work and a hot work permit system must be put into place if there isn't yet one. Consider reviewing the plant SOPs in light of this change.</li> <li>SWWTW must ensure that they have adequate means for fire fighting. The need for adequate firewater, at the required pressure, back-up fire water pumps, a fire team and their training and the emergency response plan must all be reviewed.</li> </ul> <p>Organisational measures must be put in place with the aim of preventing risk events that could result in a MHI incident. Such organisational measures are known as a 'process safety management system' and cover elements such as: management leadership; safety documentation; integrity assurance; instrumented protection functionality; mechanical protective systems; electrical protective systems; process protective systems, etc.</p> <p>The MSDs provided in the MHI report must be used and kept on site at all times. Specifically that of Methane (Appendix K of this EMP) must be erected on site and abided by at all times.</p> <p>EThekweni Municipality must confirm that the relevant local emergency services have a suitable off-site emergency plan in place, and must provide information and assistance where required in compiling such a plan.</p> <p>EThekweni Municipality must familiarize themselves with the requirements of the MHI Regulation 7 in terms of incidents and near misses as well as activation of the MHI emergency plan that have to be recorded (records to be made available for inspection) and reported to the authorities.</p> <p>EThekweni Municipality must note that the MHI Regulations are under review at present and this may in future change the classification of the site and/or the requirements against the site.</p> <p>An additional windsock near the AD plant must be erected, so that it would be clearly visible to the staff at this far side of the site. Since biogas is both flammable and toxic -and is being newly introduced onto the site- SWWTW must ensure that all plant staff are fully aware of the hazards associated with the plant.</p> <p>SWWTW must also take note that the empty vessels (digesters, piping, gas holders) must be thoroughly purged before entry / hot work and a hot work permit system must be put into place if there is not yet one.</p> <p>In terms of the regulations, off-site emergency planning is the responsibility of the local authorities, with involvement from the operating personnel at the facility when developing the plan.</p> <p>Emergency services will be required to assist the site with the rescuing of any injured persons, applying first aid and medical treatment and providing an ambulance service to hospitals. They may also be required to warn and evacuate the public in the event of a large biogas release. Disaster Management may need to co-ordinate post incident support.</p> <p>EThekweni Municipality must therefore comply with the Emergency Response Plan (ISHECON, 2016, Appendix N).</p>		
<p>An emergency flare must be available for excess biogas that cannot be used. With regards to Biogas facilities, the following must apply:</p> <ul style="list-style-type: none"> <li>Digesters and gas storage holders must have overpressure protection in either a pressure safety valve or else</li> </ul>		

Environmental Specification	Responsibility	Frequency
<p>a bursting disk.</p> <ul style="list-style-type: none"> <li>• Digesters and gas storage holders must have vacuum protection in vacuum breakers.</li> <li>• Appropriate materials of construction will be used for the digesters and gas holders.</li> <li>• Biogas is not compressed and is stored at just slightly above ambient pressure in gas holders and thus presents less of a hazard.</li> <li>• Biogas is transferred via blowers and is not pumped which keeps the biogas at a low pressure and reduces the hazard.</li> <li>• Appropriate explosion proof equipment will be used e.g. lighting etc. Hazardous area classification is usually done for biogas plants.</li> <li>• Vessel entry manholes will be provided for maintenance purposes.</li> <li>• Pressure and temperature inside the digesters will be monitored.</li> <li>• No smoking on the site except in designated smoking areas.</li> </ul> <p>The maintenance and testing of protective measures must be undertaken on a monthly basis.</p> <p>Since biogas is both flammable and toxic -and is being newly introduced onto the site- SWWTW must ensure that all plant staff are fully aware of the hazards associated with the plant.</p> <p>SWWTW must also take note that the empty vessels (digesters, piping, gas holders) must be thoroughly purged before entry/hot work and a hot work permit system must be put into place if there isn't yet one. Plant SOP's in must be revised.</p> <p>The on-site emergency procedures must to be reviewed and updated every 3 years. In addition, the procedures must be tested and practised once a year and a record must be kept. This needs the involvement of local emergency services and any other industries in the area which may be affected.</p>		
<b>18.1.9 Waste Management</b>		
<p>Hazardous materials will be generated if there are spillages during construction and maintenance periods. This waste must be cleaned up using absorbent material provided in spill kits on site.</p> <p>Absorbent materials used to clean up spillages must be disposed of in a separate hazardous waste.</p> <p>While there is no construction camp envisaged for the site, there will be the need for a bunded hazardous waste storage area. This storage area for hazardous material must be concreted, bunded, covered, labelled and well ventilated.</p> <p>Provide employees with appropriate Personal Protective Equipment (PPE) for handling hazardous materials.</p> <p>All hazardous waste will be disposed of in a registered hazardous waste disposal facility. Records of all waste being taken off site must be recorded and kept as evidence.</p>	Developer	On-going
<p>Waste management at the SWWTW subscribes to the principles of sustainable waste management.</p> <p>This includes:</p> <ul style="list-style-type: none"> <li>▪ Waste prevention – the prevention and avoidance of the production of waste at source;</li> <li>▪ Waste reduction – the reduction of the volume or hazardous nature of the waste during production;</li> <li>▪ Resource recovery – recycling or re-use of the waste;</li> </ul>		

Environmental Specification	Responsibility	Frequency
<ul style="list-style-type: none"> <li>Waste treatment – the treatment of waste to reduce volume or risk to human and environmental safety and health to reduce the degree of hazard when waste is disposed of in a landfill or discharged into a water source; and</li> <li>Waste disposal – the environmentally acceptable and safe disposal or discharge of waste, (e.g. encapsulation, incineration, landfill or discharge to a water source).</li> </ul> <p>These principles must be practiced to the greatest extent possible.</p>		
<p align="center"><b>18.1.10 Air Quality and Odour abatement</b></p>		
<p>Good housekeeping practices for odour management must be ensured. Such general practices of odour management at a treatment works includes the following:</p> <ul style="list-style-type: none"> <li>Good housekeeping and raw material handlings practices;</li> <li>Control and minimization of odours from residual material and waste which includes imported sludge or septic tank waste;</li> <li>Maintaining the effluent aeration for aerobic processes;</li> <li>Avoiding anaerobic conditions and minimizing septicity;</li> <li>Selecting process steps that presents the least risk of odour generation;</li> <li>Minimization of sludge retention time in primary settlement;</li> <li>Application of extended aeration to avoid primary settlements;</li> <li>The build-up of scum and foam on tank surfaces can at times contribute and lead to odour. The draining of tanks for cleaning has been implicated as a prominent source of odour complaints. Practical measures such as use of appropriate chemicals can be used to minimize and mitigate odour impacts.</li> <li>Storage of sludge and products on site needs to be minimized;</li> <li>The cleaning of screens and grit must be done regularly, so as to reduce the odour potential;</li> <li>Washing of screens and grit;</li> <li>The dewatering facility must be enclosed;</li> <li>Sprays must be installed on the dam;</li> </ul> <p>With reference to plant performance and maintenance research has shown that some odour problems which occur at SWWTW had been due to plant maintenance and improper operations of odour abatement equipment. These problems were said to be due partly to difficulties in operations and lack of training. Plant performance, maintenance, inspection and operator training are therefore crucial in maintaining the effectiveness of odour control measures.</p> <p>The following must be implemented for an efficient operation of a treatment works;</p> <ul style="list-style-type: none"> <li>Sufficient supply of reagents and consumables must be kept on site;</li> <li>A record of maintenance must be available for inspection;</li> <li>The operator must maintain a record of training requirements for each operational post as well as a record of training received by each personnel whose actions have an impact on the environment;</li> <li>Minimisation of emissions on start-up and shut down.</li> </ul> <p>There exists opportunities for the minimization of odour emissions at certain stages of the process for instance during the primary settlement stage as the tanks are usually large; there is a significant surface area with which to emit pollutants.</p>	Developer	Operational phase

Environmental Specification	Responsibility	Frequency
<p>An effective method is to use a low rate biological treatment step such as extended aeration of sewage or a high rate process within a building to avoid primary treatment.</p> <p>Measures which can be put in place to reduce the septicity and minimize the retention time of sewage in transport under anaerobic conditions includes the following <b>which must be done</b>;</p> <ul style="list-style-type: none"> <li>▪ Improve ventilation;</li> <li>▪ If septic conditions develop, chemical dosing will assist in reducing the concentration of odorous emissions;</li> <li>▪ Minimize intermediate storage;</li> <li>▪ Regular cleaning to remove accumulations;</li> <li>▪ Also ensure that the slope of gravity prevents sedimentation and accumulation.</li> </ul> <p>Screening and pre-treatment of raw sewage is required to remove grit and other compounds prior to primary treatment.</p> <p>Procedures that must be considered to minimize emissions released during this stage of treatment involve the following:</p> <ul style="list-style-type: none"> <li>▪ Lowering discharge points to minimise emissions;</li> <li>▪ Balancing the flow of sludge liquors to even the load over the day;</li> <li>▪ Regular cleaning and flushing of screens and influent channels.</li> </ul> <p>During the primary treatment, sewage flows through large tanks known as the primary sedimentation tanks. The tanks are used to settle sludge, while oil and grease rises to the surface and is skimmed. The minimization of the sludge retention time in the primary tanks can reduce odour emissions.</p> <p>The appropriate steps taken to reduce odorous emissions during primary treatment are as follows;</p> <ul style="list-style-type: none"> <li>▪ The pre-treatment of septic sewage using nitrate salts;</li> <li>▪ A reduction in the hydraulic retention time;</li> <li>▪ Improving the efficiency of the de-sludge process and ensure regular cleaning of the tanks, sumps, scum and grease removal equipment.</li> </ul> <p>The conditions during secondary aerobic treatment must ensure that aerobic conditions are maintained at all times for activated sludge plants. Increasing the aeration can minimize the generation of aerosols.</p> <p>Sludge and bio-solid handling is usually the most significant source of odour release and good sludge management is essential. All raw sludge and bio solids will release odour largely dependent upon age.</p> <p>In general, sludge handling, storage and processing must be enclosed or and provided with ventilation to odour abatement equipment.</p> <ul style="list-style-type: none"> <li>▪ Sludge which has been lime treated can generate odour, particularly ammonia, and must be stored under cover to prevent odour generation;</li> <li>▪ Sludge must be processed as soon as possible after generation as retention will lead to anaerobic conditions. It is good practice to minimise the potential storage of sludge before treatment and storage for un-stabilised sludge must be limited to a maximum capacity of 24-hours production.</li> </ul> <p>The gas produced in an anaerobic digester will be odorous; therefore, the following must be ensured:</p> <ul style="list-style-type: none"> <li>▪ Routinely drain condensate traps to remove water and avoid back pressure;</li> <li>▪ Secondary digesters are often not covered and they can lose up to 10% of methane generated and odorous pollutants.</li> </ul>		

Environmental Specification	Responsibility	Frequency
<ul style="list-style-type: none"> <li>The primary digester must reduce the risk of odour generation at the secondary stage. In instances where the operation of the primary digester leads to emissions in the secondary stage, the secondary digester may require venting to an odour and methane treatment facility.</li> </ul> <p>There is a wide range of odour abatement equipment that can be used to treat emissions of contained air from the SWWTW. There are many factors which will affect the choice of equipment including odour removal efficiency, flow rate and inlet odour concentration, type of chemical species in the odour, variability in flow and load, space requirements and infrastructure.</p> <p>Any odour abatement equipment installed on contained emissions must have an odour removal efficiency of not less than 95%. This must be further investigated.</p>		
<b>18.1.11 Water Management</b>		
<p>On-going and routine monitoring and reporting must be ensured.</p> <p>Employees must be provided with absorbent spill kits and disposal containers to handle spillages.</p> <p>Train employees and contractors on the correct handling of spillages and precautionary measures that need to be implemented to minimise potential spillages.</p> <p>Employees must record and report any spillages to the responsible person.</p> <p>The Emergency Preparedness and Response must be implemented should an incident occur.</p> <p>Design of a lined pond with leakage detection system must be considered.</p> <p>On-going groundwater monitoring must be implemented.</p> <p>Routine inspections must be ensured, of the SWWTW in its entirety.</p> <p>EThekwini Municipality must consider the setup a new Super Natant Liquor pump station from which effluent is pumped into the effluent channel.</p> <p>Ensure proper tracking of all loads designated for landfill</p> <p>On-going and routine monitoring and reporting; Routine inspection, Tanker bay must be sloped and allowed to drain into the tanker discharge sump and thereafter pumped to the head of works for treatment.</p> <p>Increase in storage capacity to prevent possible contamination of surf zone caused by possible waste going into overflow.</p> <p>Put in place proper monitoring and strategic system management. Also consider high level monitoring of the low level sump.</p> <p>Install power generators to cope with power outages.</p> <p>Construction of bund wall must be ensured.</p> <p>Spillage to be collected in a sump pump to head of works.</p> <p>Separate storm-water and effluent spillage.</p> <p>The water management recommendations of the IWWMP must be exercised.</p> <p>These are specified as:</p> <p>In order to give effect to the water and waste management philosophy for upgrade of facilities at the SWWTW, the following strategies will be implemented:</p> <p><i>Surface water</i></p> <ul style="list-style-type: none"> <li>Construct and maintain adequate storm water control measures to keep clean and dirty water separate;</li> </ul>	Developer	Construction and operational phases – on-going



Environmental Specification	Responsibility	Frequency
<p>and</p> <ul style="list-style-type: none"> <li>Monitor water quality at the monitoring positions identified.</li> </ul> <p><i>Groundwater</i></p> <ul style="list-style-type: none"> <li>Minimise the impact on groundwater resource through the design and construction of engineered barriers for potential pollution sources;</li> <li>Implement on-going monitoring of groundwater quality and levels</li> <li>Implement long term water management by managing groundwater levels and through the implementation of an onsite water treatment facility.</li> </ul> <p><i>Storm water</i></p> <ul style="list-style-type: none"> <li>Separation of clean and dirty water</li> <li>Collection, containment and conveyance of both clean and dirty water in adequately sized water management infrastructure</li> <li>On-going monitoring and measurement of water quantity and quality to support the wide water balance and water management.</li> </ul> <p><i>Waste</i></p> <ul style="list-style-type: none"> <li>Implement waste separation at source;</li> <li>Maximise recycling and reuse of waste streams;</li> <li>Dispose of waste on authorised waste disposal facilities in accordance with legal requirements;</li> <li>Implement on-going waste monitoring to inform waste management; and</li> <li>Identification and rehabilitate contaminated land.</li> </ul> <p>Maintain adequate storm water control measures to keep clean and dirty water separate.</p> <p>Include adequate erosion controls in the design of changes to slope conformation, linear infrastructure and points of water discharge to prevent wash down of soils into sensitive surface water areas</p> <p>Monitor water quality before discharging effluent.</p> <p>Interpret results against baseline results and institute remedial action as required.</p> <p>Ensure that all its systems are fully enclosed to mitigate the risk of groundwater pollution. Put in place proper monitoring.</p> <p>Excess flow must be contained and reticulated to sea through overflow channels.</p> <p>Implement dedicated site monitoring and ensure safe disposal of hazardous waste</p> <p>Carry out immediate clean-up of spillage and dispose safely</p> <p>Implement point source pollution control procedures</p> <p>Increase storage capacity of overflows via construction of additional overflow channels; Ensure proper monitoring and strategic system management.</p> <p>Ensure adequate upstream screening and maintenance of overflows</p> <p>Carry out upstream monitoring of contaminants and control of tanker discharges</p> <p>Proper monitoring and sampling; consider alternatives for backup sludge removal</p> <p>Carry out sludge classification/analysis</p>		
<p style="text-align: center;"><b>18.1.12 Social concerns</b></p>		
Job creation expectations will have to be well managed via management systems and communication	Developer	Construction and

Environmental Specification	Responsibility	Frequency
<p>mechanisms that regularly inform the local community (on site and at local community centres) of the progress and job / skills needs at the development sites.</p> <p>A formal job application process must be communicated (must this be a requirement).</p> <p>The potential is that a small number of jobs will be created for the short duration of refurbishment and establishment of some other facilities.</p> <p>Wherever possible, local labour must be sought rather than external services brought in.</p> <p>Members of the public adjacent to the construction site must be notified of construction activities in order to limit unnecessary disturbance or interference.</p> <p>Construction activities will be undertaken during daylight hours and not on Sundays.</p> <p>Ensure the appointment of a Safety Officer to continuously monitor the safety conditions during construction. All construction staff must have the appropriate PPE.</p> <p>The construction staff handling chemicals or hazardous materials must be trained in the use of the substances and the environmental, health and safety consequences of incidents.</p> <p>Report and record any environmental, health and safety incidents to the responsible person.</p> <p>If possible all labour must be sourced locally. Contractors and their families may not stay on site.</p> <p>No informal settlements will be allowed.</p> <p>The labour force must be afforded the equalities stipulated in the Labour Act.</p> <p>Temporary ablution facilities are permitted.</p> <p>Working hours must abide by the rules of the Labour Act.</p> <p>Workers must be provided with PPE.</p> <p>A labour force representative must be elected</p> <p>The surrounding communities must be educated with respect to the actual impact caused by the SWWTW. Furthermore, it remains the responsibility of government and all operating industry in the study area to ensure that the health impacts associated with their operations, as well as with the cumulative impact, are mitigated or that initiatives are undertaken to assist the communities as part of a give-back initiative. For example, it must be considered by industry in the study area to collectively provide a health subsidy or form of medical aid scheme to the affected communities.</p> <p>It is expected that during refurbishment, there will be an increased number of construction vehicles on the road. It is recommended that alternative routes be found at scheduled times of the day – perhaps that would help keep the roads free when schools close, allowing children mobility without being hampered by large trucks utilising the same roads.</p> <p>A policy on Contractor Health and Safety for the duration of their work on site, must apply, and be monitored.</p> <p>In addition, a Contractor's Code of Conduct (especially in terms of respecting local by-laws and specific practical community concerns on which agreement may be reached), must be applied for the duration of construction and refurbishment.</p> <p>Regular information sharing discussions with the Contractors must be pursued, giving residents an opportunity to voice concerns and grievances throughout the duration of the project construction.</p>		operational phases – on-going
<b>18.1.13 Heritage and cultural value</b>		
If an artefact on site is uncovered, work in the immediate vicinity must be stopped immediately.	Developer	On-going

Environmental Specification	Responsibility	Frequency
The contractor must take reasonable precautions to prevent any person from removing or damaging any such article and must immediately, upon discovery thereof, inform the Construction Engineer of such discovery which in turn must contact a registered archaeologist and AMAFA.		
No structures older than sixty years or parts thereof are allowed to be demolished altered or extended without a permit from Amafa and no activities are allowed within 50 m of a site which contains rock art (deemed highly unlikely, but mentioned for completeness).		

## 19 ENVIRONMENTAL CODE OF CONDUCT

One of the objectives of the EMPr is to ensure that all the workforce, contractors, sub-contractors and construction staff have an understanding of environmental issues and potential impacts on site activities. This environmental code of conduct provides the basic rules that must be strictly adhered to.

It is the responsibility of the Contractor to ensure that each contractor, sub-contractor and workforce understand and adhere to the Code of Conduct.

### ENVIRONMENTAL CODE OF CONDUCT

#### **ALL PERSONS ARE OBLIGED TO KEEP TO THE RULES OF THIS CODE OF CONDUCT**

*Ignorance, negligence, recklessness or a general lack of commitment resulting in environmental degradation or pollution must not be tolerated!*

#### **ENVIRONMENTAL RULES:**

- Do not waste electricity, water or consumables;
- Only use authorised accesses;
- Do not litter;
- Dispose solid waste to the correct waste containers provided;
- Prevent pollution;
- Use the toilet facilities provided;
- Do not dispose contaminated waste water to the storm-water or the environment;

- **Immediately report any spillage from containers, plant or vehicles;**
  - **Do not burn or bury any waste in the sand;**
  - **Do not trespass onto private properties;**
  - **Strictly leave all animals alone. Never tease, catch or set devices to trap or kill any animal.**
  - **Never damage or remove any trees, shrubs or branches unless it forms part of working instructions and authorisation has been received where necessary;**
  - **Do not deface, draw or cut lettering or any other markings on trees, rocks or buildings in the area;**
  - **Know the fire fighting procedure and locations of fire fighting equipment; and**
  - **Know the environmental incident procedures.**
-