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

ETHEKWINI MUNICIPALITY

WATER AND SANITATION DEPARTMENT

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Approval:
Malcolm Roods EAPSA

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.

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.

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 if 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.

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.

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 EMPr and Health and Safety Plan.

Scoping – the process of determining the spatial and temporal boundaries (i.e. extent) and key issues to be addresses 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 eThekwini Municipality. The SWWTW discharges to sea outfall of 4.2 km in length with 34 diffusers discharging at a depth of 54 – 64 m.

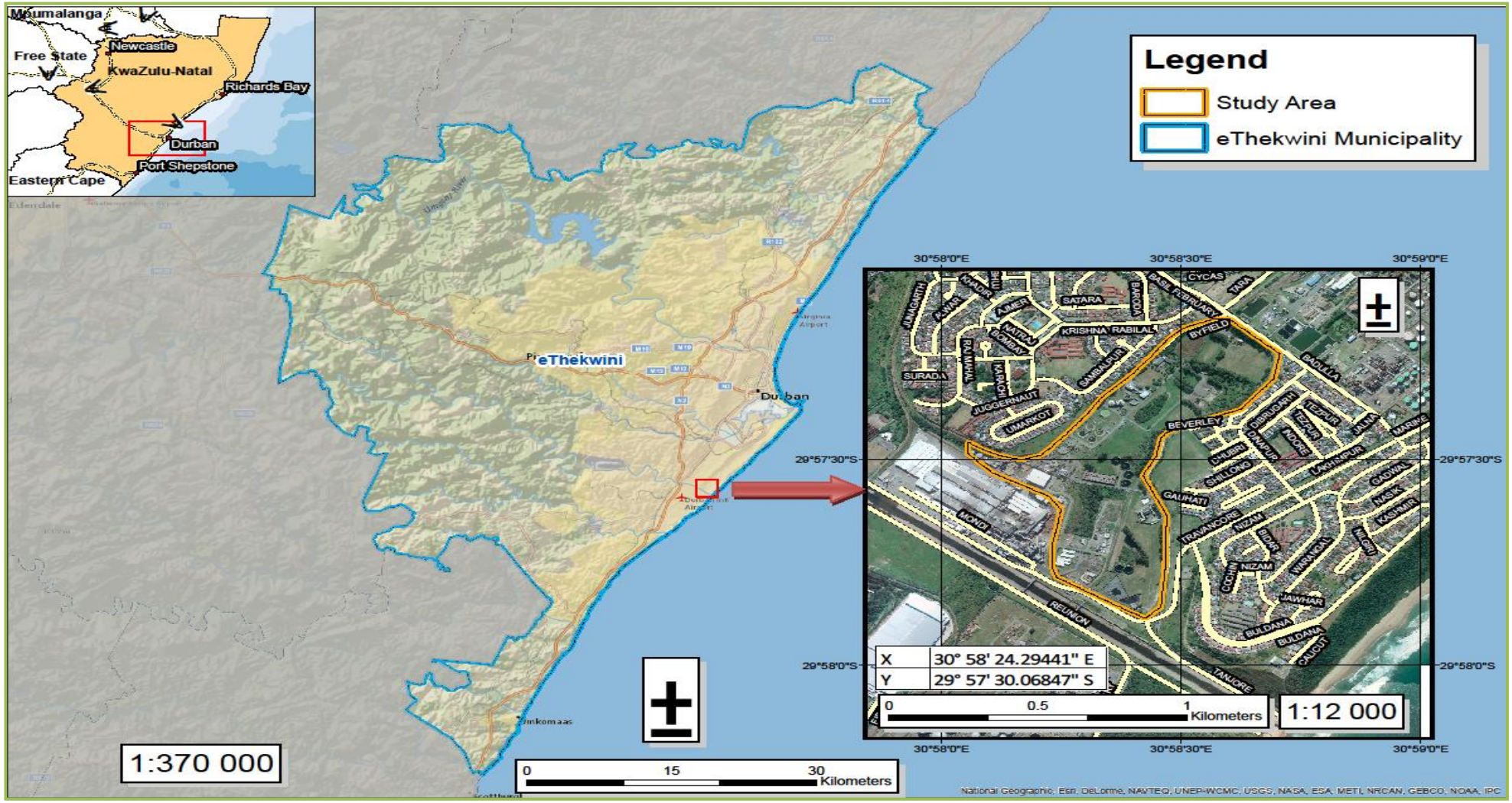


Figure 1-2: Locality plan (wider context)

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

Table 1-1: Applicant details

Applicant	eThekwini 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 eThekwini 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 55, Pinetown, 3610	PO Box 55, Pinetown, 3610
Telephone	011 798 6442	031 719 5500	031 719 5500
Facsimile	031 719 5505	031 719 5505	031 719 5505
E-mail	Malcolm.roods@rhdhv.com	bronwen.griffiths@rhdhv.com	Novashni.moodley@rhdhv.com
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	13 years	17 years	6 years

2 PROJECT DESCRIPTION

2.1 Scope of work proposed

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
- Manufacture of fertilizer through a separate sludge pelletizing process using sludge gas to be established on site by a private entity (unconfirmed at this stage) and then removal off site. **This option may be investigated under a separate study to be undertaken by others and does not form part of this study nor the scope of work described hereunder.**

Figure 2-1 depicts the scope of work proposed.

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

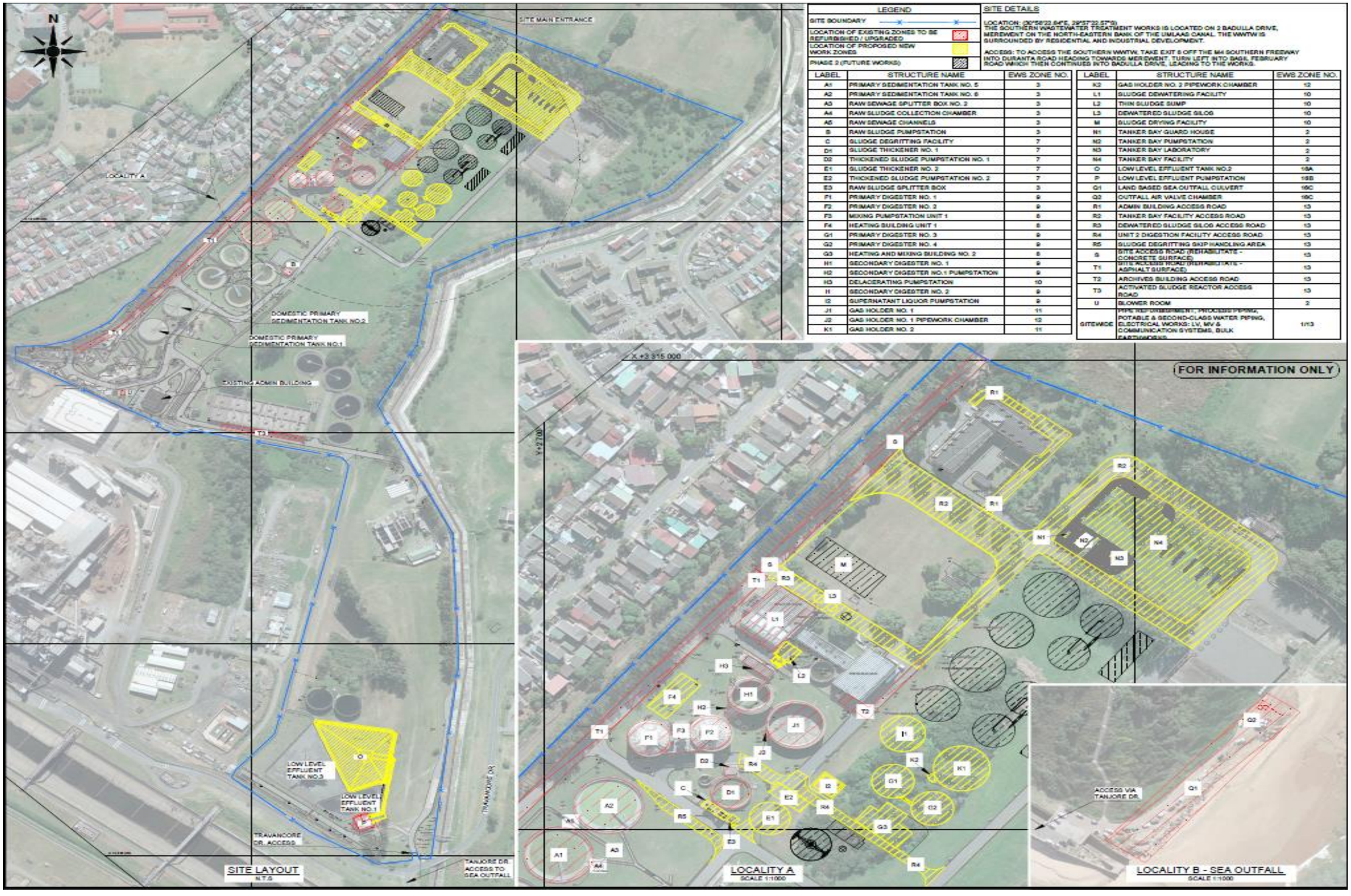


Figure 2-1: Proposed scope of works

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.

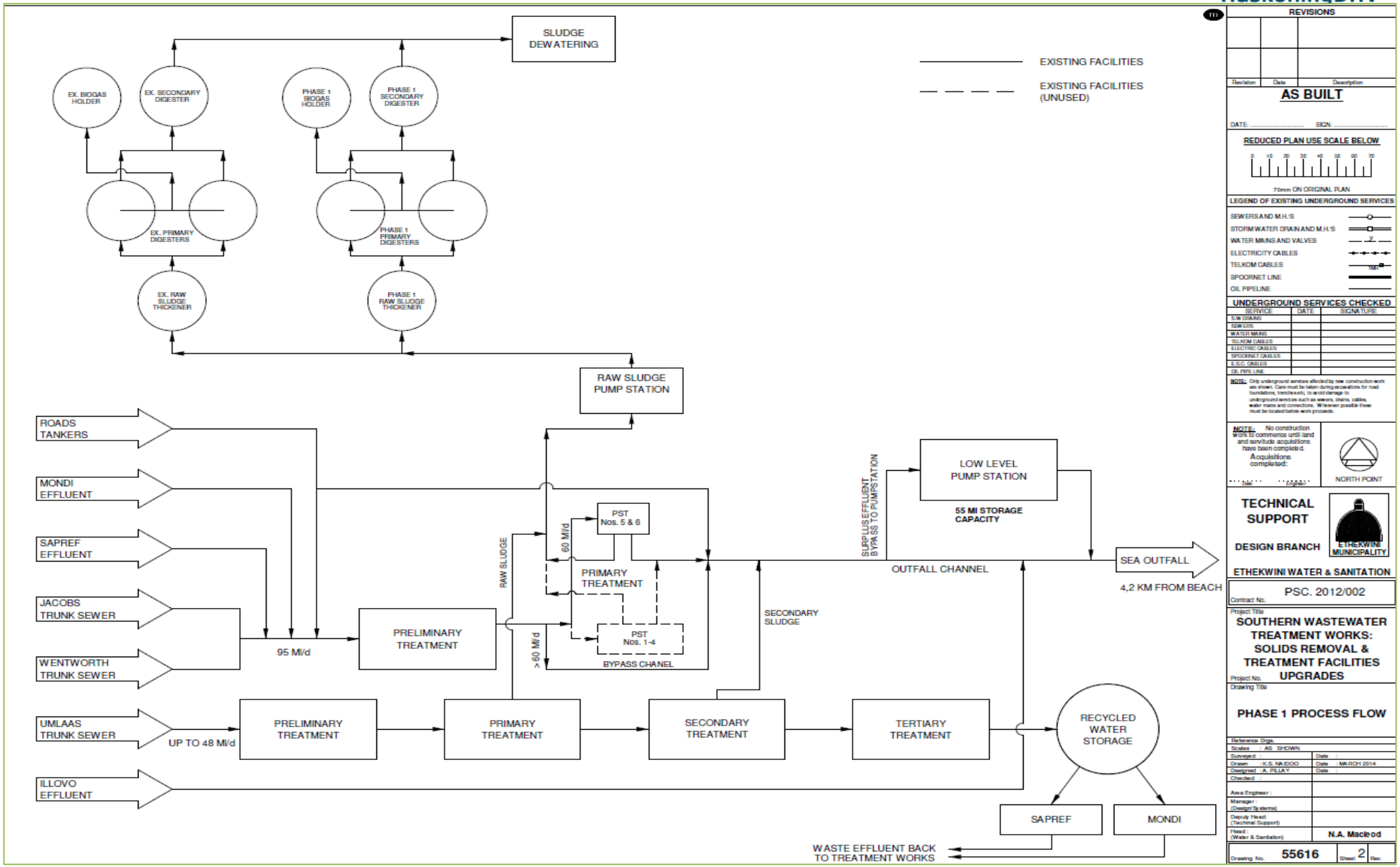


Figure 2-2: Phase 1 process flow diagram

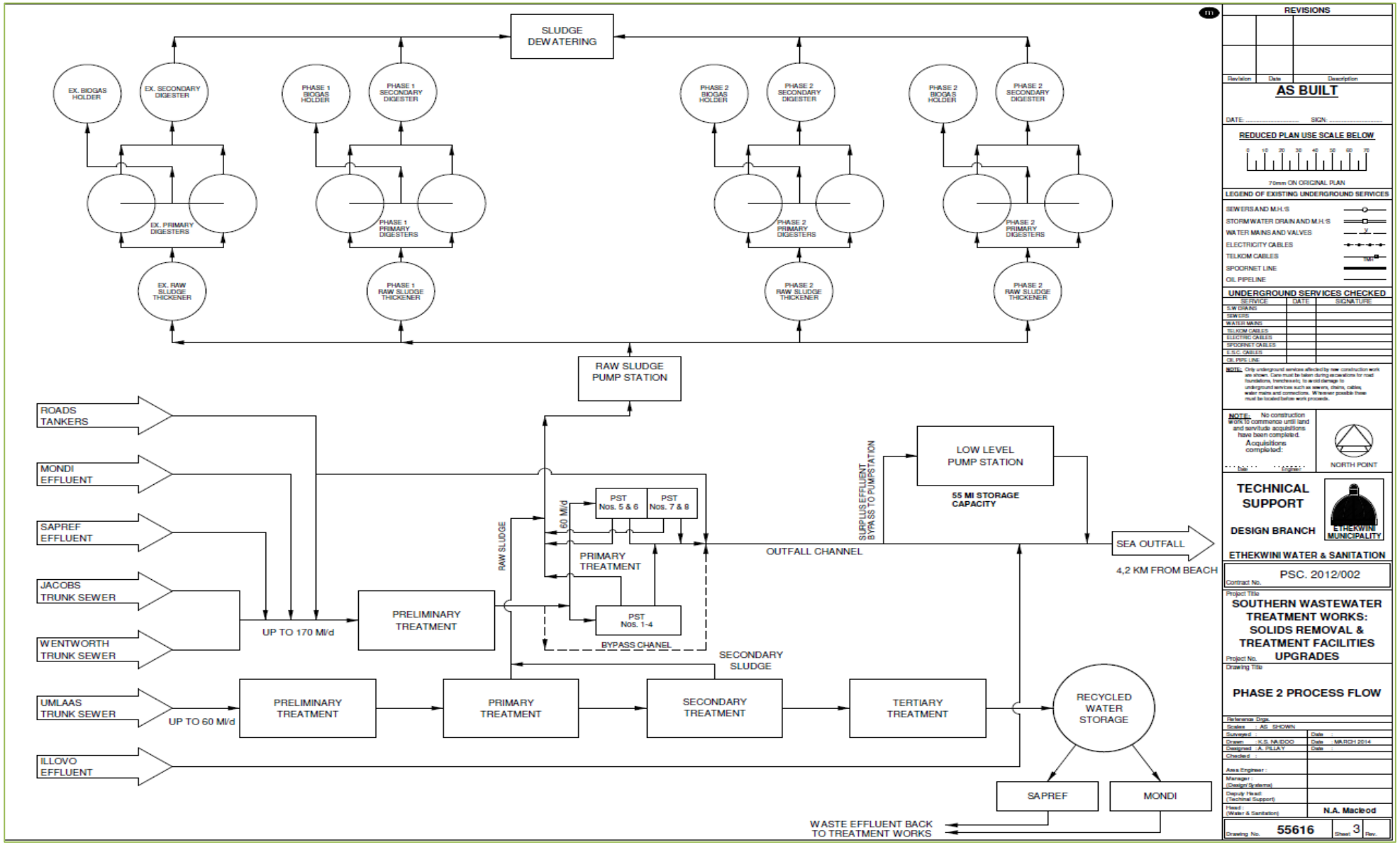


Figure 2-3: Phase 2 process flow diagram

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)[1] 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.

[1] 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		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. The NEM: ICMA has numerous objectives and these are: ▪ Determination of the Coastal Zone in South Africa; ▪ Provision for coordinated and integrated management of the coastal zone; ▪ Preservation, protection, extension and enhancement of coastal public property;

LEGISLATION	SECTIONS	RELATES TO
		▪ Equitable access to coastal property; and ▪ Giving effect to South Africa's obligations under international coastal and marine law.
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 of 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		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: ▪ Pollution prevention; ▪ Waste minimisation; ▪ Cross media integration; ▪ Institution integrated both horizontal and vertical, of department and spheres of government; and ▪ Involvement of all sectors of society in pollution and waste management.

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 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 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 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 eThekwini Municipality – Water and Sanitation (EWS) and also in keeping with the policies of AECOM.

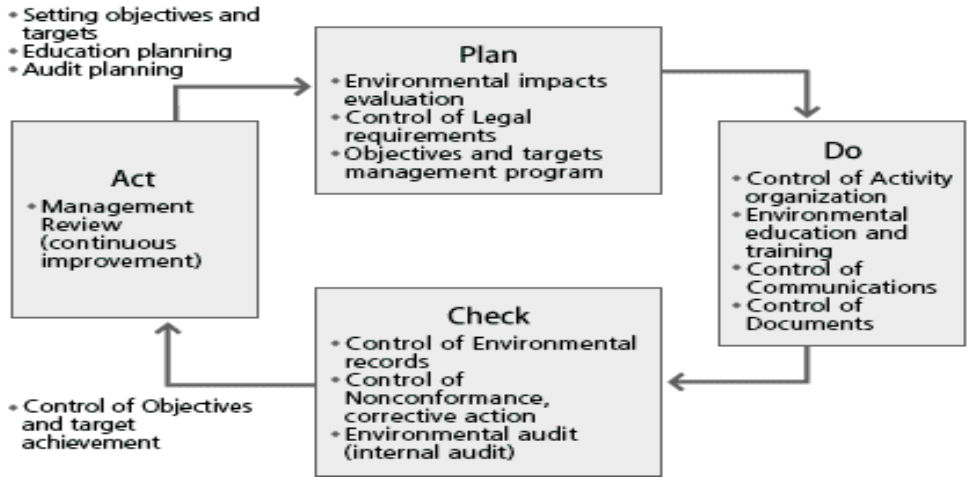


Figure 8-1: The Continuous Development Cycle

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 EMPr 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

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

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**.

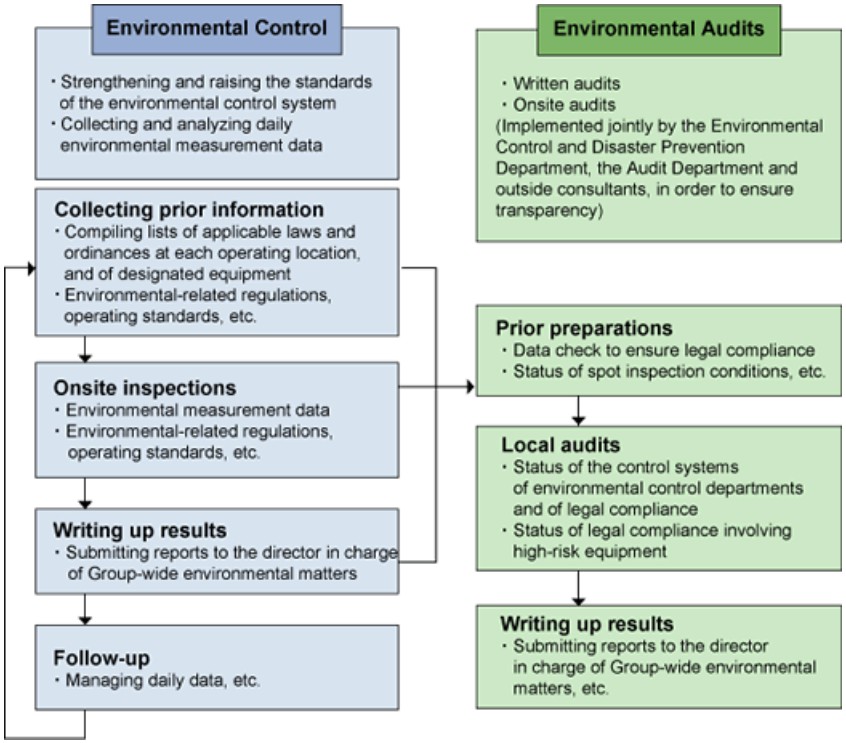


Figure 8-2: Environmental control and auditing process

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.

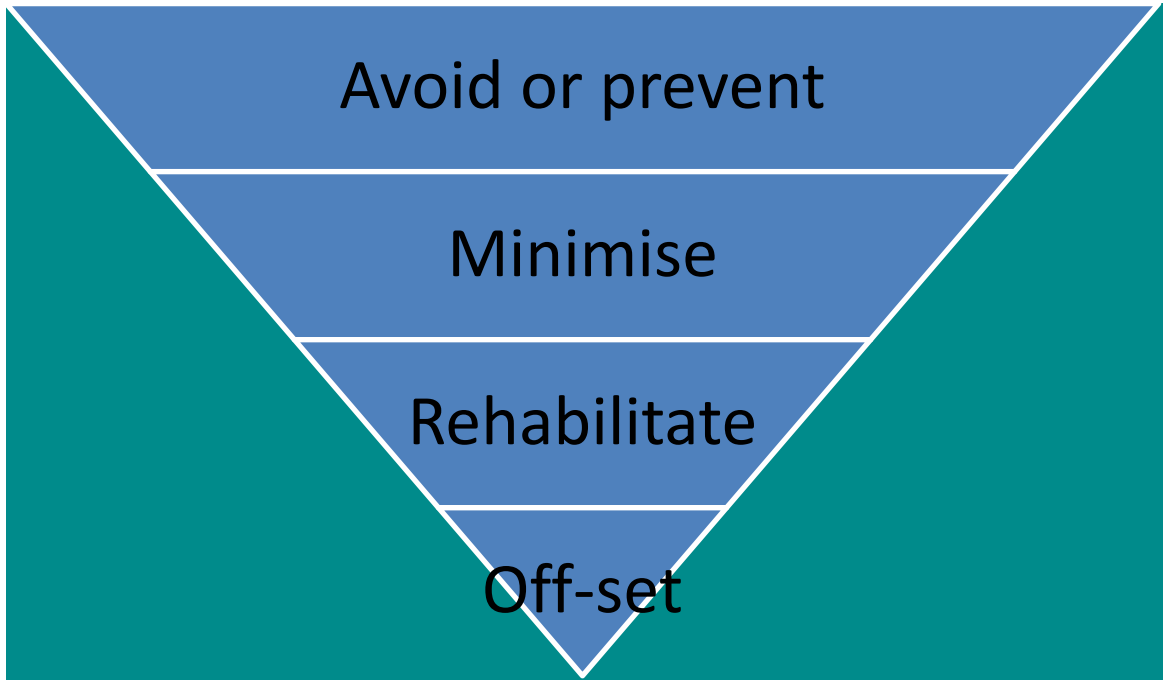


Figure 8.3: **The mitigation hierarchy (DEA, 2013)**

Avoid or prevent refers to considering options in project location, sitting, 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
Pre-Construction	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.
Construction	This section will provide guidelines on construction methods and considerations.
Rehabilitation	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 (eThekwini 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.

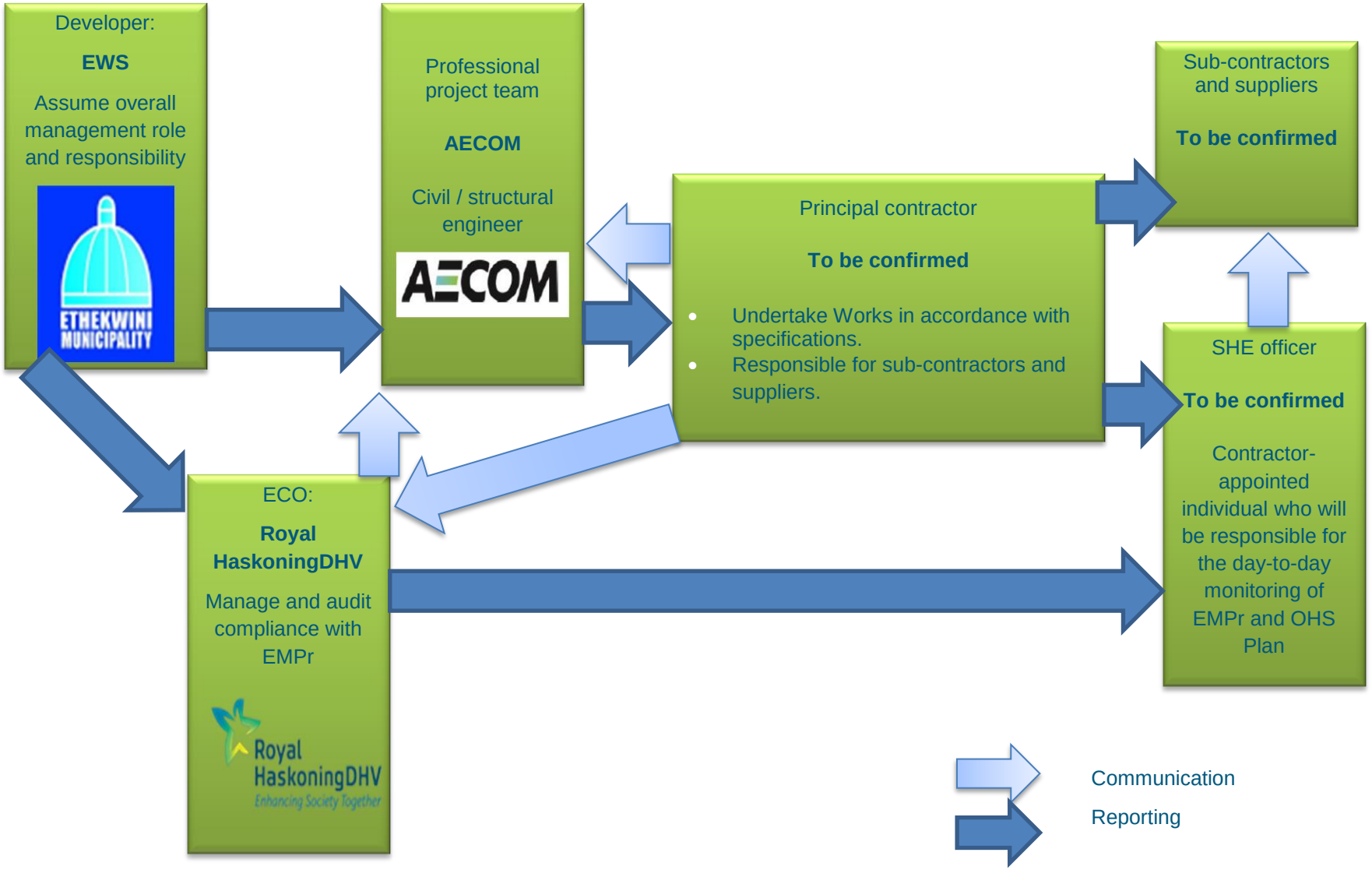


Figure 10-1: Compliance organisational Structure

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 is 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 is accordance with the findings of the Major Hazardous Installation findings, which declare the site an MHI. Furthermore, tis 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

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.

The environmental training is aimed at:

- promoting environmental awareness;
- informing the Contractor of all environmental procedures, policies and programmes applicable;
- providing generic training on the implementation of environmental management specifications; and

- providing job-specific environmental training in order to understand the key environmental features of the construction site and the surrounding environment.

Training will be done in a verbal format. The training will not be a once-off event but must also include regular toolbox talks (weekly) to be undertaken by the Contractors 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.

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

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

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 EMPr;
- 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 EMPr);
- 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

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

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

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.

13.5 Method Statements

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:

- Bunding;
- Construction site and office / yard establishment;
- Cement mixing / concrete batching/ bentonite mixing;
- Contaminated water;
- Dust;
- 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

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

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 EMPr. 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
Failure to reinstate disturbed areas within the specified time-frame	R 30 000
Any other contravention of the project specific specification	R 10 000

OFFENCE	AMOUNT
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[2] Removal of grass (alien invasives) in Locality A[2] Primary treatment process afforded to 63% of received wastewater Reduced suspended solids disposed into the marine environment Prevention of spillages onto cuttings beach	**Positive very high**
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.	**Negative very high**

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.

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

[2] *Refer to Section 16.2 hereafter for position of Area N.*

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* 10-6 fatalities per person per year near the existing gas holder, reducing to $0.002*10^{-6}$ 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_2S) 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 **section 13.1**), 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 Amended 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 EMPr 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 (*Schotia brachypetala*) in Area N and a mature Natal Fig (*Ficus natalensis*) 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, 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 EMPr.		
17.1.5 Notice of Construction		
A written notice must be given to the KZN EDTEA 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 EMPr and general environmentally friendly practice.	ECO SHE Officer	Once-off
The EA and EMPr 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: ▪ 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.		
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.	SHE Officer	Weekly

Environmental Specification	Responsibility	Frequency
17.1.7 Site Set-Up		
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
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. Choice of location for construction item storage must take into account location of local residents and environmentally sensitive areas (no-go areas) where applicable.	Contractor	Once-off
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 rivers, 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.		
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.		
Adequate signage must be placed in the area where construction will take place informing the public of the activities taking place.		
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.		
The Contractor must take responsibility for the site to conform to all contractual aspects and environmental standards applicable.		
The Contractor must provide adequate refuse bins that must be cleaned / emptied and the waste removed from site on a regular basis. Details are required in relation to storage, treatment, transportation and disposal of sludge generated on site. 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.		
The construction areas must be kept in an orderly state at all times.		
Vegetation removed for the site establishment is to be kept to a minimum. All alien weeds and invader plants must be removed.		
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.		
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.		

Environmental Specification	Responsibility	Frequency
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: ▪ eating areas; ▪ staff lockers and showers; ▪ storage areas; ▪ cement mixing areas; ▪ temporary ablution facilities at a ratio of 1:15 workers; ▪ maintenance areas (if required); and ▪ waste management area (if required) **No refuelling is permitted on site.**		
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 may 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		
General waste produced on site includes: ▪ Office waste (e.g. food, waste, paper, plastic); ▪ Operational waste (clean steel, wood, glass); and ▪ General domestic waste (food, cardboards, paper, bottles, tins). An adequate number of general waste receptacles, including bins must be arranged around the Construction area, on site to collect all domestic refuse, and to minimise littering.	Contractor	Daily
Different waste bins, for different waste streams must be provided to ensure correct waste separation and subsequent recycling, where applicable. Bins must be clearly marked and lined for efficient control and safe disposal of waste.		
A fenced area must be allocated for waste sorting and disposal on the site.		
17.1.12 Security and Safety		
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.	Contractor	Once off
Potentially hazardous areas such as trenches are to be demarcated and clearly marked.		
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.		
Material stockpiles or stacks, such as pipes, must be stable and well secured to avoid collapse and possible injury to site workers/ local residents		Daily
Flammable materials must be stored as far as possible from adjacent residents/ businesses.		
Fire fighting equipment must be present on site at all times.		
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. Ideally public notification of the expansion must be undertaken and the 60-day comment period incorporated into the project schedule. 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.	Developer	Once off
Obstruction to driver's line of sight due to stockpiles and stacked materials must be avoided, especially at intersections and sharp corners.	Developer	On-going
No materials are to be stored in unstable or high-risk areas, such as on steep slopes.		
17.1.13 General and Hazardous Substances and Materials		
Storage areas must not be within any watercourses or within 100 m of any drainage lines or watercourses.	Contractor SHE Officer	Daily
Storage areas must be designated, demarcated and fenced. Storage areas must be secure, under lock and key, so as to minimise the risk of crime.		

Environmental Specification	Responsibility	Frequency
Fire prevention facilities must be present at all storage facilities.		
Proper storage facilities for the storage of oils, paints, grease, fuels, chemicals and any hazardous materials to be used must be provided to prevent the migration of spillage into the ground and groundwater regime around the storage area(s). 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.		
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.		
Symbolic safety signs depicting “No Smoking”, “No Naked Flames” and “Danger” are to be prominently displayed in and around the fuel storage area.		
The capacity of the tank must be clearly displayed and the product contained within the tank clearly identified.		
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.		
If fuel is dispensed from 200 litre drums, the proper dispensing equipment must be used.		
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.		
All waste fuel and chemical contaminated rags must be stored in leak-proof containers and disposed of at an approved hazardous waste site.		
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.		
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.		
Dewatered sludge must be disposed of at the Shongweni Landfill and disposal records maintained on site.		
Staff dealing with these materials / substances must be aware of their potential impacts and follow the appropriate safety measures.		
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. Appropriate SDCs must be provided for all hazardous waste being disposed of and must be kept on site within the Site Environmental File.		
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.		
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.		
The washing of concrete trucks on site is prohibited.		

Environmental Specification	Responsibility	Frequency
Used cement bags must be stored in weatherproof containers to prevent windblown cement dust and water contamination. Used cement bags must be disposed of on a regular basis *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. Used cement bags must be disposed of on a regular basis via the solid waste management system, and must not be used for any other purpose.		
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 may 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.		
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
17.2.1 Health and Safety		
All Procedures and equipment must be in accordance with the Occupational Health and Safety Regulations (OHSA) of South Africa, Act No. 85 of 1993. The Contractor must familiarise himself and his employees with the contents of the aforementioned legislation.	Contractor SHE Officer	Daily
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		

Environmental Specification	Responsibility	Frequency
visitors are to be allowed on site.		
Workers' right to refuse work in unsafe conditions must be respected.		
All personnel must be trained in basic site safety procedures.		
The Contractor must design, test / exercise appropriate 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.		
The Developer and/or Developer's agent will carry out regular audits on the principal contractor at least once per month. Similarly, principal Contractors must be responsible for carrying out regular audits on their contractors at least once per month. 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.		
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. 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.		
17.2.2 Fires		
No open fires or uncontrolled fires will be permitted on site.	Contractor	Daily
Fire fighting measures such as fire extinguishers must be located on site.		
The workforce must be made aware of fire prevention and fire fighting measures.		
17.2.3 Worker Conduct on Site		
A general regard for the social and ecological wellbeing of the site and adjacent areas is expected of the site staff. Workers need to be made aware of the following general rules: ▪ No alcohol / drugs to be present on the site. ▪ No firearms allowed on site or in vehicles transporting staff to and from site, unless used by security personnel. ▪ Prevent excessive noise. ▪ Prevent unsocial behaviour. ▪ Bringing pets onto the site is forbidden. ▪ No harvesting of firewood from the site or from the areas adjacent to it. ▪ 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). ▪ Trespassing on private properties adjoining the site. ▪ Driving under the influence of alcohol is prohibited. ▪ The rules and regulations of the SWWTW must be adhered to at all times.	Contractor SHE Officer	Daily

Environmental Specification	Responsibility	Frequency
17.2.4 Clearing and Protection of Fauna and Flora		
The extent of the area disturbed must be kept to the minimum required to successfully implement the road maintenance activities, thus minimising the destruction of any fauna and flora.	Contractor	Daily
The wetland to the north of the site boundary must not be traversed, impeded, impacted or interfered with at all.		
Removing of vegetation must be restricted to the immediate area for construction. All alien invasives on work areas must be removed.		
The indigenous Fuchsia (*Schotia brachypetala*) and Monkey Puzzle trees (*Araucaria araucana*) in area N and a mature Natal Fig (*Ficus natalensis*) just north of area K which will be felled must be off-set by planting five for every one felled, of the same species.	Developer to ensure	Once off
No natural vegetation is to be collected for use as firewood.	Contractor	Daily
No animals are to be disturbed unnecessarily and no animals are allowed to be shot, trapped or caught for any reason. 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 appropriate action to facilitate the recovery of the animal where possible i.e. take the animal to the SPCA.		
A permit must be obtained from the Department of Agriculture, Forestry and Fisheries (DAFF), for any trees / plants (if any) that fall within the development footprint that is protected as per the National Forestry Act (Act No. 84 of 1998) and need to be removed or relocated. It must be ensured that for every tree removed; at least five (5) replacement trees must be planted in suitable localities. However, the EIA has not identified any protected indigenous trees for removal.		
Care must be taken to avoid the introduction of alien plant species to the site and surrounding areas.		
Where alien plants have been introduced on to the site during clearing and infilling, they must be removed. The Contractor must develop an Action Plan for the removal of alien invasive species and submit it to the ECO for approval.		
Invader species and weeds must be removed and disposed of in accordance with existing legislation on a regular basis.		
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.		
17.2.5 Heritage		
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 *Section 9: Protocol for the identification, protection and recovery of heritage resources during construction and operation* must be followed.	Contractor	Daily
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.		

Environmental Specification	Responsibility	Frequency
Work may only resume once clearance is given in writing by the archaeologist and/or AMAFA.		
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 to be protected from construction activities at all times.	Contractor	Daily
Pedestrian conflict with site access and construction vehicles to be managed by traffic officer.		
The construction site camp must remain fenced for the entire construction period with clear signage.		
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 regularly 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 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. The Engineer is to use his discretion as to the mechanism to be used to ensure this protection.		
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 suitable 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, were 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.		
17.2.11 Spoil		
Litter and general waste is to be removed from the topsoil and spoil material before stockpiling.	Contractor	Daily
Spoil sites will be shaped to fit the natural topography.		
Spoil sites must receive a minimum of 75 mm topsoil and be grassed with a recommended seed mixture by a qualified horticulturist.		
Slopes must not exceed a vertical: horizontal ratio of 1:3.		
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. A WML has not been obtained for spoiling of material and hence such material must be re-used responsibly on site.		
17.2.12 Soil Erosion and Sedimentation		
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.	Contractor	Daily
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. These measures must include:		

Environmental Specification	Responsibility	Frequency
▪ 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. ▪ 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 of exposed soil areas with indigenous vegetation will ensure that soil is 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. ▪ Seeding, anchored mulch, wool binders or erosion control fabrics must be used to provide surface protection and stabilisation until vegetation is established. ▪ The suitable use of sand bags or Hessian sheets must be used to stabilise bare soil. ▪ The suitable use of geo-textiles, turf blankets or mats must be used as slope protection for exposed slopes. ▪ Proper drainage controls such as culverts and cut-off trenches must be used to ensure proper management of surface water runoff to prevent erosion and sedimentation. ▪ Construction vehicles must remain on designated demarcated areas. ▪ Work areas must be clearly defined and demarcated to avoid unnecessary disturbance of areas outside the maintenance area. 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.		
17.2.13 General Waste Management (not related to the wastewater of the SWWTW)		
General waste produced on site is to be collected in skips for disposal at a registered landfill site. Hazardous waste in not to be mixed or combined with general waste earmarked for disposal at the municipal landfill site.	Contractor SHE Officer	Daily
Under no circumstances is waste to be burnt or buried on site. The excavation and use of rubbish pits on site is forbidden.		
Waste bins must be cleaned out on a regular basis to prevent any windblown waste and/or visual disturbance.		
All general waste must be removed from the construction areas on a daily basis and disposed of in suitable waste receptacles. No general waste is to be disposed of on site.		
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. No waste material may be buried (for the sole purpose of final disposal) or burnt. The contractor responsible for the removal of the rubble and waste must supply the applicant with a certificate indicating safe disposal. Within fourteen (14) days of its issue, a copy of the safe disposal certificates must be forwarded to KZN EDTEA.		

Environmental Specification	Responsibility	Frequency
17.2.14 Hazardous and Industrial Waste Management (not related to the wastewater of the SWWTW)		
Hazardous waste produced on site includes: ▪ Oil and other lubricants, diesel, paints, solvent; ▪ Containers that contained chemicals, oils or greases; and ▪ Equipment, steel, other material (rags), soils, gravel and water contaminated by hazardous substances (oil, fuel, grease, chemicals or bitumen). Hazardous waste is to 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.	Contractor	Daily
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).		
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.		
It may be feasible for the waste to be transported to a central point where it can be collected in bulk by the waste disposal company. It must however be noted that: ▪ Transport of hazardous materials must be done in accordance with legislative control; and ▪ Relevant SABS Codes of Practice must be adhered to.		
Conditions stipulated above in **Section 7.9** also apply to the Construction Phase.		
17.2.15 Wastewater (not related to the wastewater of the SWWTW)		
All wastewater generated at the proposed development must be disposed of in a suitable manner 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.	Contractor	Daily
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.		
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.		
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.		
17.2.16 Water Pollution Management (including groundwater and soil contamination)		
The flow direction of any surface water runoff must be established prior to disturbing any area.	Contractor	Daily
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;		

Environmental Specification	Responsibility	Frequency
Every effort must be made to ensure that any chemicals or hazardous substances do not contaminate the soil or ground water on site.		
Dirty water originating from maintenance activities is to be contained and disposed of correctly, to prevent the contamination of soil and/ or any watercourses.		
Bathing or washing of clothes, equipment or machinery within any watercourse is prohibited.		
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
17.2.17 Wetland Management		
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. Under no circumstances may this wetland be encroached on or disturbed.	Contractor	Daily
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.		
Adequate measures must be put in place to protect the water resources, including the wetland which flow in close proximity to the site. Visible markings showing the buffers demarcated must the provided during the construction phase.		
17.2.18 Spills, Incidents and Pollution Control		
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 **Appendix L**, Spill Contingency Plan for further direction.		
An Emergency Response Plan (ERP) must be developed by the Contractor for approval by the Developer and review by the ECO.		

Environmental Specification	Responsibility	Frequency
Should a pollution incident occur on site the Contractor must: ▪ Implement reasonable measures immediately to contain and minimise the impacts of the incident; ▪ Contain the spill; ▪ Notify all persons whose health may be affected by the incident; ▪ Undertake clean up procedures immediately; ▪ Notify the Contractor of the incident immediately who will advise the employee as to the measures that must be implemented; ▪ Record the incident in the Environmental Incident Register; and ▪ Implement measures to prevent similar incidents from occurring in the future.		
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 developed by the contractor must be followed.		
17.2.19 Noise		
Neighbouring landowners must be notified about construction activities.	Contractor	Daily
All construction vehicles and equipment are to be kept in good repair and must be fitted with Standard silencers prior to construction.		
Where possible, 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).		
Construction activities, and particularly the noisy ones, are to be contained to reasonable hours during the day and early evening.		
Machines in intermittent use must be shut down in the intervening periods between work or throttled down to a minimum.		
In general, operations must meet the noise standard requirements of the Occupational Health and Safety Act (Act No 85 of 1993).		
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		
Construction staff working in areas where the 8-hour ambient noise levels exceed 75 dBA must wear ear protection equipment.		
Noise levels must be kept within acceptable limits. All noise and sounds generated must adhere to SANS 10103 specifications for maximum allowable noise levels for central business districts. No pure tone sirens or hooters may be utilised except where required in terms of SANS standards or in emergencies.		
Noisy operations must be combined so that they occur where possible at the same time.		
Noise from labourers must be controlled.		
Noise suppression measures must be applied to all construction equipment.		

Environmental Specification	Responsibility	Frequency
Construction equipment must be kept in good working order and where appropriate fitted with silencers which are kept in good working order. Must the vehicles or equipment not be in good working order, the Contractor may be instructed to remove the offending vehicle or machinery from site.		
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.		
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: ▪ Road sweeping. ▪ Chemical dust suppression of disturbed areas to reduce the amount of dust which can be lifted by the wheels of trucks. ▪ Wet suppression to the roads using a light spray. ▪ The washing down of the wheels of trucks before they exit only paved road surfaces.	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.		

Environmental Specification	Responsibility	Frequency
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 14 days.		
17.2.22 Storm-water Management		
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.	Contractor Engineer	Daily
The storm-water management plan (SMP) must be approved by the eThekwini Municipality.		
The storm-water management plan must address the following issues (posed here as questions): ▪ "*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)?*" ▪ "*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?*"		
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.		
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 **Section 7.15** above.		
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.		
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.		
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.		
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.		
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.		
Landscaping and re-vegetation of areas not occupied by buildings or paving must be programmed to proceed		

Environmental Specification	Responsibility	Frequency
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.		
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. As construction progresses, the storm-water control measures are to be monitored and adjusted to ensure complete erosion and pollution control at all times.		
Earthworks on sites are to be kept to a minimum. Where embankments have to be formed, stabilisation and erosion control measures must be implemented immediately.		
Storm-water must not be allowed to pond in close proximity to existing building foundations.		
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. Regular monitoring of the sites must be undertaken.		
Any site that is required to store any substances that could be regarded as hazardous in terms of water pollution must notify the eThekwini 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.		
17.2.23 Social Considerations		
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. Must 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.	Contractor	Daily
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.		
The Contractor is to arrange for a suitable candidate to assist with the appointment of local labour and assist with labour disputes.		
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. The contractor must appoint an HIV/AIDS Awareness Officer for the duration of the construction period. Activities for HIV/AIDS awareness and prevention will be broad based, targeting both individuals and groups. They may consist of: ▪ Information posters in public places both on and off site (eating places, bars, guest houses, etc); ▪ 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); ▪ Small focus group discussions and information covering key issues must be held; ▪ Inclusion of HIV/AIDS activities at site meetings and other discussions; and ▪ Voluntary Counselling and Testing. Education must cover: ▪ Stigma and discrimination issues;		

Environmental Specification	Responsibility	Frequency
▪ Preventative behaviours including partner reduction, condom use, and awareness and importance of treatment of STDs; ▪ Skills including negotiating safer sex, correct condom use, purchase without embarrassment; Referral to local health centres and services available.		
17.2.24 Visual Considerations		
Storage facilities, elevated tanks and other temporary structures must be located such that they have as little visual impact on local residents as possible. Special attention must be given to the screening of highly reflective materials on site.	Contractor	Daily
17.2.25 Coastal		
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.	Contractor	Duration of coastal work
All regulations of the eThekwini Coastal Management department must be adhered to.		
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.		
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.		
The Contractor must obtain a letter of permission from the eThekwini 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 eThekwini Municipality to obtain this letter of permission.		
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.		
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 eThekwini Municipality Beach Manager and Contractor.		
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.		
The minimum trench size must be dug to ensure minimal disturbance. The trenches must be demarcated with danger tape and signage or danger erected.		
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.		
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. 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.		

Environmental Specification	Responsibility	Frequency
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^2 under any circumstances.		
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.		
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.		
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: ▪ Time, date and nature of complaint; ▪ Response and investigation undertaken; and ▪ Corrective and preventative actions taken and by whom.	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: ▪ Time, date and nature of complaint; ▪ Response and investigation undertaken; and ▪ Corrective and preventative actions taken and by whom.	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.		

Environmental Specification	Responsibility	Frequency
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 ecologist.	Developer	Post-Construction
All areas that have been disturbed by construction activities (including the construction affected areas) must be cleared of alien vegetation.		
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).		
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.		
18.1.3 Materials and Infrastructure		
All residual stockpiles must be removed to spoil or spread on site as directed by the Developer and/ or Engineer.	Developer Engineer Contractor	Post-Construction
All leftover building materials must be returned to the depot or removed from the site.		
The Contractor must repair any damage that the construction works has caused to neighbouring properties.		
Fences, barriers and demarcations associated with the construction phase are to be removed from the site unless stipulated otherwise by the Developer.		
18.1.4 Rehabilitation		
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.	Contractor Engineer Developer ECO	Post-Construction
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.		
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.		
The Contractor is required to rehabilitate all impacted areas according to the approved Method Statement for the Rehabilitation of Modified Environments.		
Final rehabilitation must be completed within a period specified by the Engineer.		
The site and surrounding areas is to be cleared of all litter.		
Surfaces are to be checked for waste products from activities such as concreting or asphalting.		
All embankments are to be trimmed, shaped and replanted to the satisfaction of the ECO.		
The Contractor is to check that all watercourses are free from building rubble, spoil materials and waste materials.		

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		
Sampling of every load that is tankered. 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. 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 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.		
The road reserve boundary must be determined in consultation with this Departments Road Information Services,		

Environmental Specification	Responsibility	Frequency
(Tel: 033–355 8600).		
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.		
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.		
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.		
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.		
All Structures and Services are to be approved and placed in consultation with and to the satisfaction of the relevant Cost Centre Manager.		
Vehicles involved during construction and thereafter must use the Mondi Route to the works to avoid congestion at Badulla Drive / Tara Rd intersection		
All costs incurred, as a result of these requirements must be borne entirely by the developer.		
18.1.8 Disaster Management and MHI		
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.	Developer	Operational phase
Full compliance with other applicable Legislative requirements. Must any upgrades be undertaken to the sewer pipelines which feed the plant, the plans for such must be submitted to the eThekwini department of electricity as there are existing underground cables which could be affected by trenching.		
Full compliance of the waste storage facility with Interim Code Relating to Fire Prevention and Flammable liquids and Substances.		
The developer must notify eThekwini Disaster Management Department of MHI status with the MHI report for notification (Ishecon, 2015).		
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.		
There is currently no emergency procedure suitable for a Major Hazard Installation. The checklist shown in **appendix 7** of the MHI report must be used a guide for compiling procedures. This plan must be developed and maintained for the SWWTW.		
EThekwini 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.		
EThekwini Municipality must familiarize themselves with the requirements of the MHI Regulation 7 in terms of		

Environmental Specification	Responsibility	Frequency
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.		
Maintenance and inspection of Anaerobic digesters, gas holder, sludge dewatering building and biogas transfer - And the vessels and piping thereof must be ensured.		
No smoking is permitted on the site except in designated areas.		
Emergency procedures and Fire fighting equipment must be in place at the SWWTW at all times.		
The following mitigation measures must be implemented: ▪ Ensuring the maintenance and testing of protective measures. Any methane detectors that are installed around the plant must be regularly tested and calibrated. ▪ Consider erecting an additional windsock near the AD plant that 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. ▪ 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. ▪ Consider installing methane detectors at key locations on the site, especially at the NW boundary near the residential area. ▪ 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.		
It is good practice for MHI operating companies to put in place organisational measures 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.		
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 EMPr) must be erected on site and abided by at all times.		
EThekwini 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.		
EThekwini 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.		
EThekwini 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.		
EThekwini Municipality must ensure the maintenance and testing of protective measures. Consider installing methane detectors at key locations on the site, especially at the NW boundary near the residential area. 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.		

Environmental Specification	Responsibility	Frequency
The MHI report, Appendix 8 must be used for a more comprehensive list of measures.		
Any methane detectors that are installed around the plant must be regularly tested and calibrated.		
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. 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.		
The checklist provided in the detailed MHI report can be used a guide for compiling procedures. 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. 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. EThekwini 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.		
18.1.9 Waste Management		
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. Absorbent materials used to clean up spillages must be disposed of in a separate hazardous waste. 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. Provide employees with appropriate Personal Protective Equipment (PPE) for handling hazardous materials. 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.	Developer	On-going
Waste management at the SWWTW subscribes to the principles of sustainable waste management. This includes: ▪ Waste prevention – the prevention and avoidance of the production of waste at source; ▪ Waste reduction – the reduction of the volume or hazardous nature of the waste during production; ▪ Resource recovery – recycling or re-use of the waste; ▪ 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 ▪ Waste disposal – the environmentally acceptable and safe disposal or discharge of waste, (e.g. encapsulation, incineration, landfill or discharge to a water source). These principles must be practiced to the greatest extent possible.		

Environmental Specification	Responsibility	Frequency
18.1.10 Air Quality and Odour abatement		
Good housekeeping practices for odour management must be ensured. Such general practices of odour management at a treatment works includes the following: ▪ Good housekeeping and raw material handlings practices; ▪ Control and minimization of odours from residual material and waste which includes imported sludge or septic tank waste; ▪ Maintaining the effluent aeration for aerobic processes; ▪ Avoiding anaerobic conditions and minimizing septicity; ▪ Selecting process steps that presents the least risk of odour generation; ▪ Minimization of sludge retention time in primary settlement; ▪ Application of extended aeration to avoid primary settlements; ▪ 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. ▪ Storage of sludge and products on site needs to be minimized; ▪ The cleaning of screens and grit must be done regularly, so as to reduce the odour potential; ▪ Washing of screens and grit; ▪ The dewatering facility must be enclosed; ▪ Sprays must be installed on the dam;	Developer	Operational phase
With reference to plant performance and maintenance research has shown that some odour problems which occur at WWTW 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. The following must be implemented for an efficient operation of a treatment works; ▪ Sufficient supply of reagents and consumables must be kept on site; ▪ A record of maintenance must be available for inspection; ▪ 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; ▪ Minimisation of emissions on start-up and shut down.		
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. 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.		
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; ▪ Improve ventilation; ▪ If septic conditions develop, chemical dosing will assist in reducing the concentration of odorous		

Environmental Specification	Responsibility	Frequency
emissions; ▪ Minimize intermediate storage; ▪ Regular cleaning to remove accumulations; ▪ Also ensure that the slope of gravity prevents sedimentation and accumulation.		
Screening and pre-treatment of raw sewage is required to remove grit and other compounds prior to primary treatment. Procedures that must be considered to minimize emissions released during this stage of treatment involve the following: ▪ Lowering discharge points to minimise emissions; ▪ Balancing the flow of sludge liquors to even the load over the day; ▪ Regular cleaning and flushing of screens and influent channels.		
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. The appropriate steps taken to reduce odorous emissions during primary treatment are as follows; ▪ The pre-treatment of septic sewage using nitrate salts; ▪ A reduction in the hydraulic retention time; ▪ Improving the efficiency of the de-sludge process and ensure regular cleaning of the tanks, sumps, scum and grease removal equipment. 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.		
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. In general, sludge handling, storage and processing must be enclosed or and provided with ventilation to odour abatement equipment. ▪ Sludge which has been lime treated can generate odour, particularly ammonia, and must be stored under cover to prevent odour generation; ▪ 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.		
The gas produced in an anaerobic digester will be odorous; therefore, the following must be ensured: ▪ Routinely drain condensate traps to remove water ad avoid back pressure; ▪ Secondary digesters are often not covered and they can lose up to 10% of methane generated and odorous pollutants. ▪ 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.		
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		

Environmental Specification	Responsibility	Frequency
requirements and infrastructure. Any odour abatement equipment installed on contained emissions must have an odour removal efficiency of not less than 95%. This must be further investigated.		
18.1.11 Water Management		
On-going and routine monitoring and reporting must be ensured.	Developer	Construction and operational phases – on-going
Employees must be provided with absorbent spill kits and disposal containers to handle spillages.		
Train employees and contractors on the correct handling of spillages and precautionary measures that need to be implemented to minimise potential spillages.		
Employees must record and report any spillages to the responsible person.		
An Emergency Preparedness and Response Plan will be developed and implemented must and incident occur.		
Design of a lined pond with leakage detection system must be considered.		
On-going groundwater monitoring must be implemented.		
Routine inspections must be ensured, of the SWWTW in its entirety.		
EThekwini Municipality must consider the setup a new Super Natant Liquor pump station from which effluent is pumped into the effluent channel.		
Ensure proper tracking of all loads designated for landfill		
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.		
Increase in storage capacity to prevent possible contamination of surf zone caused by possible waste going into overflow. Put in place proper monitoring and strategic system management. Also consider high level monitoring of the low level sump.		
Install power generators to cope with power outages.		
Construction of bund wall.		
Spillage to be collected in a sump pump to head of works.		
Separate storm-water and effluent spillage.		
The water management recommendations of the IWWMP must be exercised. These are specified as: 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: *Surface water* ▪ Construct and maintain adequate storm water control measures to keep clean and dirty water separate; and ▪ Monitor water quality at the monitoring positions identified. *Groundwater* ▪ Minimise the impact on groundwater resource through the design and construction of engineered barriers for potential pollution sources; ▪ Implement on-going monitoring of groundwater quality and levels		

Environmental Specification	Responsibility	Frequency
▪ Implement long term water management by managing groundwater levels and through the implementation of an onsite water treatment facility. *Storm water* ▪ Separation of clean and dirty water ▪ Collection, containment and conveyance of both clean and dirty water in adequately sized water management infrastructure ▪ On-going monitoring and measurement of water quantity and quality to support the wide water balance and water management. *Waste* ▪ Implement waste separation at source; ▪ Maximise recycling and reuse of waste streams; ▪ Dispose of waste on authorised waste disposal facilities in accordance with legal requirements; ▪ Implement on-going waste monitoring to inform waste management; and ▪ Identification and rehabilitate contaminated land.		
Maintain adequate storm water control measures to keep clean and dirty water separate.		
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		
Monitor water quality before discharging effluent.		
Interpret results against baseline results and institute remedial action as required.		
Ensure that all its systems are fully enclosed to mitigate the risk of groundwater pollution. Put in place proper monitoring.		
Excess flow must be contained and reticulated to sea through overflow channels.		
Implement dedicated site monitoring and ensure safe disposal of hazardous waste		
Carry out immediate clean-up of spillage and dispose safely		
Implement point source pollution control procedures		
Increase storage capacity of overflows via construction of additional overflow channels; Ensure proper monitoring and strategic system management.		
Ensure adequate upstream screening and maintenance of overflows		
Carry out upstream monitoring of contaminants and control of tanker discharges		
Proper monitoring and sampling; consider alternatives for backup sludge removal Carry out sludge classification/analysis		
18.1.12 Social concerns		
Job creation expectations will have to be well managed *via* management systems and communication 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. A formal job application process must be communicated (must this be a requirement). The potential is that a small number of jobs will be created for the short duration of refurbishment and establishment of some other facilities. Wherever possible, local labour must be sought rather than external services brought it.	Developer	Construction and operational phases – on-going

Environmental Specification	Responsibility	Frequency
Members of the public adjacent to the construction site must be notified of construction activities in order to limit unnecessary disturbance or interference. Construction activities will be undertaken during daylight hours and not on Sundays. Ensure the appointment of a Safety Officer to continuously monitor the safety conditions during construction. All construction staff must have the appropriate PPE. 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. Report and record any environmental, health and safety incidents to the responsible person.		
If possible all labour must be sourced locally. Contractors and their families may not stay on site. No informal settlements will be allowed.		
The labour force must be afforded the equalities stipulated in the Labour Act. Temporary ablution facilities are permitted. Working hours must abide by the rules of the Labour Act. Workers must be provided with PPE. A labour force representative must be elected		
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.		
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. A policy on Contractor Health and Safety for the duration of their work on site, must apply, and be monitored. 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. 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.		
18.1.13 Heritage and cultural value		
If an artefact on site is uncovered, work in the immediate vicinity must be stopped immediately.	Developer	On-going
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.**

APPENDIX A: LEGAL FRAMEWORK

1 LEGAL FRAMEWORK AND REQUIREMENTS

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

1.1 The Constitution of South Africa

Section 24 of the Constitution of South Africa (No. 108 of 1996) states that

"*…everyone has the right - … (a) to an environment that is not harmful to their health or well-being; and … (b) to have the environment protected, for the benefit of present and future generations through reasonable legislative and other measures that …(c) secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development*."

This protection encompasses preventing pollution and promoting conservation and environmentally sustainable development. These principles are embraced in the National Environmental Management Act (Act No. 107 of 1998) (as amended) (NEMA) and given further expression.

1.2 National Legislation and Regulations

This section outlines the applicable national legislation which needs to be taken cognisance of.

1.2.1 National Environmental Management Act (Act No. 107 of 1998)

The National Environmental Management Act (Act No. 107 of 1998)(as amended), or otherwise known as NEMA, is South Africa's overreaching environmental legislation and has, as its primary objective to provide for co-operative, environmental governance by establishing principles for decision–making on matters affecting the environment, institutions that will promote co-operative governance and procedures for co-ordinating environmental functions exercised by organs of state, and to provide for matters connected therewith.

The principles of the Act are following:

- Environmental Management must place people and their needs at the forefront of its concern;
- Development must be socially, environmentally and economically sustainable;
- Environmental Management must be integrated, acknowledging that all elements of the environment are linked and interrelated;

- Environmental justice must be pursued so that adverse environmental impacts shall not be distributed in such a manner as to unfairly discriminate against any person;
- Equitable access to environmental resources, benefits and services to meet basic human needs and ensure human well-being must be pursued;
- Responsibility for the environmental health and safety consequences of a policy, programme, project or activity exists throughout its life cycle.
- The participation of all interested and affected parties in environmental governance must be promoted;
- Decisions must take into account the interests needs and values of all interested and affected parties, and this includes recognizing all forms of knowledge including traditional and ordinary knowledge;
- Community well-being and empowerment must be promoted through environmental education, the raising of environmental awareness;
- The social, economic and environmental impacts of activities including disadvantages and benefits, must be considered, assessed and evaluated and decisions must be appropriate in the light of such consideration and assessment;
- The right of workers to refuse work that is harmful to human health or the environment;
- Decisions must be taken in an open and transparent manner, and access to information must be provided in accordance with the low;
- There must be intergovernmental co-ordination and harmonisation of policies, legislation and actions relating to the environment;
- The environment is held in public trust for the people , the beneficial use of the environment resources must serve the public interest and the environment must be protected as the people's common heritage;
- The cost of remedying pollution, environmental degradation and consequent adverse health effects and of preventing, controlling or minimising further pollution, environmental damage or adverse health effects must be paid for by those responsible for harming the environment; and
- The vital role of women and youth in environmental management and development must be recognised and their full participation therein must be promoted.

1.2.2 EIA Regulations (2010)

The nature of the proposed project includes activities listed in the following Listing Notices – GNR 544 (Listing Notice 1), GNR 545 (Listing Notice 2) and GNR 546 (Listing Notice 3) of the EIA Regulations (2010 as amended November 2013) – refer to Table 1-1.

Section **Error! Reference source not found.** provides a comparison between 2010 and new 2014 EIA Regulations, which were passed in December 2014. It should be noted that these came into operation after the application was lodged and thus in terms of the transitional arrangements included in the 2014 Regulations, the project is to proceed in terms of the controls and process as stipulated in the then-current 2010 Regulations.

Table 1-1: Listed Activities according To Listing Notices 1 and 2 of the EIA Regulations (2010) (comments in *italics* to indicate relevance)

Relevant notice:	Activity No(s)	Description (Verbatim and as per applicability to proposed development)

Relevant notice:	Activity No(s)	Description (Verbatim and as per applicability to proposed development)
GNR 544 Basic Assessment (BA) process	11	The construction of facilities or infrastructure exceeding 1,000 m in length for the bulk transportation of water, sewage or storm water – (i) with an internal diameter of 0.36 m or more; or (ii) with a peak throughput of 120 ℓ/s or more, excluding where: a. such facilities or infrastructure are for bulk transportation of water, sewage or storm water or storm water drainage inside a road reserve; or b. where such construction will occur within urban areas but further than 32 m from a watercourse, measured from the edge of the watercourse. *The precautionary principle is exercised in the inclusion of this activity, pertaining to possible stormwater outlet structures within 32 m from the Umlaas Canal.*
	12	The construction of facilities or infrastructure for the off-stream storage of water, including dams and reservoirs, with a combined capacity of 50,000 m^3 or more, unless such storage falls within the ambit of activity 19 of Notice 545 of 2010; *This activity is applicable to the storage tank to be constructed which may have a wall of 5 m height.*
	13	The construction of facilities or infrastructure for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 but not exceeding 500 m^3; *There will potentially be the construction of facilities for the storage of dangerous goods, not exceeding 500 m^3. These include the storage of biogas and sewage.******
	14	The construction of structures in the coastal public property where the development footprint is bigger than 50 m^2, excluding (i) the construction of structures within existing ports or harbours that will not increase the development footprint or throughput capacity of the port or harbour; (ii) the construction of a port or harbour, in which case activity 24 of Notice 545 of 2010 applies; (iii) the construction of temporary structures within the beach zone where such structures will be demolished or disassembled after a period not exceeding 6 weeks. *This activity applies for any structures constructed for the upgrading and replacement of 70 m of the sea outfall pipeline and which will be kept on site for more than 6 weeks and hence not be considered temporary.*
	16	Construction or earth moving activities in the sea, an estuary, or within the littoral active zone or a distance of 100m inland of the high-water mark of the sea or an estuary, whichever is the greater, in respect of – (i) fixed or floating jetties and slipways; (ii) tidal pools; (iii) embankments; (iv) rock revetments or stabilising structures including stabilising walls; (v) buildings of 50 m^2 or more; or (vi) infrastructure covering 50 m^2 or more –

Relevant notice:	Activity No(s)	Description (Verbatim and as per applicability to proposed development)
		but excluding (a) if such construction or earth moving activities will occur behind a development setback line; or (b) where such construction or earth moving activities will occur within existing ports or harbours and the construction or earth moving activities will not increase the development footprint or throughput capacity of the port or harbour; (c) where such construction or earth moving activities is undertaken for purposes of maintenance of the facilities mentioned in (i) – (vi) above; or (d) where such construction or earth moving activities is related to the construction of a port or harbour, in which case activity 24 of Notice 545 of 2010 applies. *This activity is applicable due to the replacement of the sea outfall pipelines and the subsequent possible requirements for revetments or stabilising structures. The sea outfall pipe above high water level will be replaced with approximately 70 m of 1,000 mm ND HDPE pipe onshore.*
	17	The planting of vegetation or placing of any material on dunes and exposed sand surfaces, within the littoral active zone for the purpose of preventing the free movement of sand, erosion or accretion, excluding where the planting of vegetation or placement of material relates to restoration and maintenance of indigenous coastal vegetation or where such planting of vegetation or placing of material will occur behind a development setback line. *This activity pertains to the planting of vegetation along the dunes for stabilisation post pipe lying.*
	18	The infilling or depositing of any material of more than 5 m^3 into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock or more than 5 m^3 from: (i) a watercourse; (ii) the sea; (iii) the seashore; (iv) the littoral active zone, an estuary or a distance of 100m inland of the high-water mark of the sea or an estuary, whichever distance is the greater – but excluding where such infilling, depositing, dredging, excavation, removal or moving; (a) is for maintenance purposes undertaken in accordance with a management plan agreed to by the relevant environmental authority; or (b) occurs behind the development setback line. *This is of relevance for impacts of infilling and associated with the refurbishing and upgrading of interconnecting pipe-work on site and the replacement of sea-outfall pipe above the high water mark.*
	40	The expansion of (i) jetties by more than 50 m^2; (ii) slipways by more than 50 m^2; (iii) buildings by more than 50 m^2; or (iv) infrastructure by more than 50 m^2 within a watercourse or within 32 m of a watercourse, measured from the edge of a watercourse, but excluding where such expansion will occur behind

Relevant notice:	Activity No(s)	Description (Verbatim and as per applicability to proposed development)
		the development setback line. *This refers to the expansion of buildings by more than 50 m^2; or Infrastructure by more than 50 m^2 which forms part of general upgrades to the SWWTW within 32 m of the Umlaas Canal and the beach.*
	42	The expansion of facilities for the storage, or storage and handling, of a dangerous good, where the capacity of such storage facility will be expanded by 80 m^3 or more. *This applies to the expansion of facilities for the storage of dangerous goods; the intention is that it is not to be expanded by more than 80 m^3. This includes the storage of biogas.*
	43	The expansion of structures in the coastal public property where the development footprint will be increased by more than 50 m^2, excluding such expansions within existing ports or harbours where there would be no increase in the development footprint or throughput capacity of the port or harbour. *This activity pertains to activities of the general upgrades which will include refurbishments and replacements to the sea outfall pipeline and possible maintenance buildings.*
	45	The expansion of facilities in the sea, an estuary, or within the littoral active zone or a distance of 100m inland of the high-water mark of the sea or an estuary, whichever is the greater, for – (i) fixed or floating jetties and slipways; (ii) tidal pools; (iii) embankments; (iv) rock revetments or stabilising structures including stabilising walls; (v) buildings by more than 50m^2; (vi) infrastructure by more than 50m^2; (vii) facilities associated with the arrival and departure of vessels and the handling of cargo; (viii) piers; (ix) inter- and sub-tidal structures for entrapment of sand; (x) breakwater structures; (xi) coastal marinas; (xii) coastal harbours or ports; (xiii) structures for draining parts of the sea or estuary; (xiv) tunnels; or (xv) underwater channels – where such expansion will result in an increase in the development footprint of such facilities, but excluding where such expansion occurs:

Relevant notice:	Activity No(s)	Description (Verbatim and as per applicability to proposed development)
		(a) behind a development setback line; or (b) within existing ports or harbours where there will be no increase in the development footprint or throughput capacity of the port or harbour. *This pertains to activities of the general upgrades which will include refurbishments and replacements to the sea outfall pipeline and possible maintenance buildings, possible 100 m inland of the high water mark of the sea.*
	55A	The construction of facilities for the treatment of effluent, wastewater or sewage with a **daily** throughput capacity of more than 2,000 m^3 but less than 15,000 m^3. *(Amendment i.t.o. GNR 922, 29 November 2013)* *While this proposed project triggers listed activity 27 of GNR 545 and hence an EIA, this activity is included in the interest of inclusivity and due to the fact that the SWWTW has not been historically licenced having been commissioned prior to the Environment Conservation Act (Act No. 73 of 1989).*
	55B	The expansion of facilities for the treatment of effluent, wastewater or sewage on undeveloped land where the capacity will be increased by more than 15,000 m^3. *(Amendment i.t.o. 922, GNR 29 November 2013)* *This activity is included due to the expansions to be undertaken at the SWWTW where expansions will take place on portions of the facility which are not currently developed. These include the biogas storage facility, the dewatering plant, sludge digesters and sludge thickening facilities.*
	56	Phased activities for all activities listed in this Schedule, which commenced on or after the effective date of this Schedule, where any one phase of the activity may be below a threshold but where a combination of the phases, including expansions or extensions, will exceed a specified threshold; – excluding the following activities listed in this Schedule: 2; 11(i)–(vii); 16(i)–(iv); 17; 19; 20; 22(i) & (iii); 25; 26; 27(iii) & (iv); 28; 39; 45(i)–(iv) & (vii)–(xv); 50; 51; 53; and 54. *The upgrades will be undertaken in a two phased approach Furthermore the eThekwini Water and Sanitation Department commit to further development of the SWWTW to refine the treatment process and discharge less solids out to sea in future years.*
GNR 545 Full Scoping and EIA (S&EIR) process	3	The construction of facilities or infrastructure for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of more than 500 m^3. *As part of general upgrades, the construction of facilities or infrastructure for the storage, or for the storage and handling, of a dangerous good, with a combined capacity of more than 500 m^3 cubic metres will be undertaken. This refers to the storage of biogas.*
	24	Construction or earth moving activities in the sea, an estuary, or within the littoral active zone or a distance of 100 m inland of the high-water mark of the sea or an estuary, whichever distance is the greater, in respect of: (i) facilities associated with the arrival and departure of vessels and the handling of cargo; (ii) piers; (iii) inter- and sub-tidal structures for entrapment of sand; (iv) breakwater structures; (v) coastal marinas; (vi) coastal harbours or ports; (vii) structures for reclaiming parts of the sea;

Relevant notice:	Activity No(s)	Description (Verbatim and as per applicability to proposed development)
		(viii) tunnels; or (ix) underwater channels; but excluding – (a) activities listed in activity 16 in Notice 544 of 2010, (b) construction or earth moving activities if such construction or earth moving activities will occur behind a development setback line; (c) where such construction or earth moving activities will occur in existing ports or harbours where there will be no increase of the development footprint or throughput capacity of the port or harbour; or (d) where such construction or earth moving activities takes place for maintenance purposes. *The upgrades will involve construction or earth moving activities within 100 m of the high water mark of the sea for structures such as the replacement of 70 m of the sea outfall pipeline, predominantly on shore.*
	27	The construction of facilities for the treatment of effluent, wastewater or sewage with a daily throughput capacity of 15,000 m^3 or more. (Amendment through GNR 923, 29 November 2013) *The construction of facilities for the treatment of industrial effluent, industrial wastewater (from surrounding industry) or sewage (from surrounding communities) will take place. The treatment process at SWWTW does have a daily throughput capacity of 15,000 m^3 or more (130,000 m^3 currently).*
GNR 546 Geographically determined BA	12	The clearance of an area of 300 m^2 or more of vegetation where 75% or more of the vegetative cover constitutes indigenous vegetation: (a) Within any critically endangered or endangered ecosystem listed in terms of Section 52 of NEMBA or prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial Biodiversity Assessment 2004. (b) Within critical biodiversity areas identified in bioregional plans *The precautionary principle is exercised in the inclusion of this activity pertaining to the clearance of 300 m^2 or more of vegetation where 75% or more constitutes indigenous vegetation, relevant in this regard due to possible removal of dune vegetation and furthermore due to designation of the study area as a critically endangered ecosystem, as defined in the clarification letter from the then DAEA, dated 13.02.2014.*
GN 921 Waste-related Activities	1	The storage of general waste in lagoons. *The storage of general waste (sludge) will be undertaken in 350 m^3 silos on the site, for a period of a few days prior to being trucked to a landfill site. The wastewater treatment works facility constitutes a "lagoon" hence the triggering of this activity.*
	3	The recycling of general waste at a facility that has an operational area in excess of 500 m^2 excluding recycling that takes place as an integral part of an internal manufacturing process within the same premises. *The scope of work includes the option of the provision of dewatered sludge to a pelletizing plant which constitutes the recycling of general waste. The pelletizing plant will be outside of the premises of the SWWTW.*

Relevant notice:	Activity No(s)	Description (Verbatim and as per applicability to proposed development)
	9	The disposal of inert waste to land in excess of 25 tons but not exceeding 25,000 tons, excluding the disposal of such waste for the purposes of levelling and building which has been authorised by or under other legislation. *The options for the disposal of the dewatered sludge (inert waste) include disposal to agricultural land or landfill. This will not exceed 25,000 tons per day.*
	10	The disposal of general waste to land covering an area of more than 50 m^2 but less than 200 m^2 and with a total capacity not exceeding 25,000 tons. *The options for the disposal of the dewatered sludge (general waste) include disposal to agricultural land or landfill. The land area will not exceed 200 m^2 and the waste will not exceed 25,000 tons per day.*
	12	The construction of a facility for a waste management activity listed in Category A of this schedule (GN 921) (not in isolation to associated waste management activity). *This activity is applicable for the construction of the350m3 silos for the storage of the sludge.*

*** *It is for this reason that Activity 13 of GNR 544 (i.e. storage and handling of dangerous goods) has been included to ensure total coverage should legislative changes occur in the near future.*

The changes discussed above regarding wastewater specific activities, where previously provided for in the waste management activities, now fall under the ambit of the EIA Regulations, and this has particular implications for wastewater treatment and to a certain degree lessen the distinguishing between “grey-water” and “black-water”.

With reference to storage, treatment, disposal and discharge of wastewater, these are listed in the waste activities of GN 921, but then go on to specifically exclude effluent, wastewater and sewage. These specific activities were delisted from the waste activities (GN 721) and included into the 2010 EIA activities for assessment under the EIA Regulations – that is, a waste management license was not triggered. The reasoning or understanding behind this is that the impacts of sewage / wastewater / effluent (latter dependent on constituents) are relatively well understood and can be adequately mitigated. Furthermore, sewage especially cannot be treated as hazardous waste due to the fact that such flows (if contained) are found throughout every city in the wider sewer network. Therefore, these changes imply that if contained and adequately managed; wastewater, effluent and sewage are considered in terms of their general impacts only, rather than being considered as a waste *per se*.

Nonetheless, given the relative infancy of this viewpoint, Royal HaskoningDHV has undertaken this study to include the risks and impacts associated with hazardous waste, and furthermore with dangerous goods, and thereby ensure a robust environmental impact assessment. The listed activities, as required however, follow the letter of the law. In this regard, the letter of the law states that (with reference to this specific project) if the sludge is classified as hazardous waste as defined according the Department of Water and Sanitation (DWS) guidelines, then the application for authorisation must be submitted to the National Department of Environmental Affairs (DEA). However, the sludge has been classified as general waste, and therefore this application was submitted to the edtea.

1.2.3 National Water Act (Act No. 36 of 1998) (as amended)

The National Water Act (NWA) provides for fundamental reformation of legislation relating to water resources and use. The purpose of the Act is stated, in Section as, *inter alia*:

- Promoting the efficient, sustainable and beneficial use of water in the public interest;
- Facilitating social and economic development;
- Protecting aquatic and associated ecosystems and their biological diversity;
- Reducing and preventing pollution and degradation of water resources; and
- Meeting international obligations.

The Act presents strategies to facilitate sound management of water resources provides for the protection of water resources, and regulate use of water catchments management agencies water user associations advisory committees and international water management.

Section 19 of the Act makes provision for the prevention of pollution. A landowner or occupier is responsible for the prevention, control and clean-up of water pollution occurring because of activities on his land. If the responsible person fails undertake remediation (prevention, containment, clean-up), the catchments management agency may take the measures it considers necessary, and recover the costs from the responsible person.

The SWWTW currently holds a Water Use License. The license is held for Section 21 (h) of the Act:

"*for disposing in any manner of water containing waste from, or which has been heated in any industrial or power generation process.*"

As part of this EIA, discussions are being undertaken with the Department of Water and Sanitation (DWS) as the current license requests that any change to the licensed site is communicated to the Department (of Water and Sanitation). As the SWWTW is undergoing an upgrade, the DWS has been engaged with and the requirements of the DWS are currently under discussion.

1.2.4 National Environmental Management: Biodiversity Act (No 10 of 2004)

The project needs to comply with the National Environmental Management: Biodiversity Act (Act No. 10 of 2004) (NEM: BA) in providing the cooperative governance in biodiversity management and conservation.

NEM: BA provides for the Minister to publish a notice in the Government Gazette that issues norms and standards, and indicators for monitoring progress for the achievement of any of the objectives of the Act.

The NEM: BA also provides for:

- The National Biodiversity Framework;
- Bioregional Plans;

- Biodiversity Management Plans;
- Biodiversity Management Agreements;
- The identification, listing and promotion of threatened or protected ecosystems; and
- Alien invasive species control and enforcement.

1.2.4.1 National Spatial Biodiversity Assessments (2004, 2011)

This informs the policies, plans and day to day activities of a wide range of sectors both public and private. A spatial biodiversity assessment can take place at different spatial scales, from global to local.

It involves mapping information about biodiversity features such as species, habitats and ecological processes, protected areas and current and future patterns of land and resource use. It provides a national context for assessments at the sub national scale and points to broad priority areas where further investigation, planning and action are warranted.

It identifies three keys strategies for conserving South Africa's biodiversity existence from the assessment, namely:

- Pursuing opportunities to link biodiversity and socio-economic development in priority geographic areas;
- Focusing on emergency action on threaten ecosystem, to prevent further loss of ecosystem functioning; and
- Expanding of the protected area network.

1.2.4.2 National Biodiversity Strategy and Action Plans (2005)

The National Biodiversity Strategy and Action Plans (NBSAP) aims to conserve and manage terrestrial and aquatic biodiversity to ensure sustainable and equitable benefits to the people of South Africa, now and in the future.

In South Africa, terrestrial, inland water, coastal and marine ecosystems and their associated species are widely used for commercial, semi-commercial and subsistence purposes through both formal and informal markets. While some of this use is well managed and/or is at levels within the capacity of the resource for renewal, much is thought to be unsustainable. "Use" in this case refers to direct use, such as collecting, harvesting, hunting, fishing, etc. for human consumption and production, as well as more indirect use such as ecotourism.

1.2.4.3 Protected Areas

Protected areas a fundamental tool for achieving biodiversity objectives and protecting essential natural heritage areas and ecosystems services, since these often provide greater security for conservation- worthy land than the agreements or land use limitations provided for in the National Environmental Management: Biodiversity Act.

The National Environmental Management: Protected Areas Act (Act No 57 of 2003) (NEM:PAA) creates a legal framework and management system for all protected areas in South Africa as well as establishing the South African National Parks (SANParks) as a statutory board. Each conservation area will have its own set of land use restrictions or regulations that stem either from generic restrictions under NEM:PAA, or customized regulations for individual protected areas.

1.2.5 National Environmental Management: Waste Act (Act No. 59 of 2008)(as amended)

The nature of the proposed project includes activities listed in GN 921, list of waste management activities (2010 as amended November 2013) – refer to Table 1-1.

As a Specific Environmental Management Act (SEMA), under the overarching umbrella of the NEMA, this Act must be read in conjunction with the NEMA.

The National Environmental Management Waste Act (Act No 59 of 2008) – the 'Waste Act' reforms the law regulating waste management in order to protect health and the environment by providing reasonable measures for the prevention of pollution and ecological degradation and for securing ecologically sustainable development; to provide for institutional arrangements and planning matters; to provide for national norms and standards for regulating the management of waste by all spheres of government; to provide for specific waste management measures; to provide for the licensing and control of waste management activities; to provide for the remediation of contaminated land; to provide for the national waste information system; to provide for compliance and enforcement; and to provide for matters connected therewith.

The objectives of this Act are:

a) "to protect health, well-being and the environment by providing reasonable measures for –

- *i. minimising the consumption of natural resources;*
- *ii. avoiding and minimising the generation of waste;*
- *iii. reducing, re-using, recycling and recovering waste;*
- *iv. treating and safely disposing of waste as a last resort;*
- *v. preventing pollution and ecological degradation;*
- *vi. securing ecologically sustainable development while promoting justifiable economic and social development;*
- *vii. promoting and ensuring the effective delivery of waste services;*
- *viii. remediating land where contamination presents, or may present, a significant risk of harm to health or the environment; and*
- *ix. achieving integrated waste management reporting and planning;*

b) to ensure that people are aware of the impact of waste on their health, well-being and the environment;

c) to provide for compliance with the measures set out in paragraph (a); and

d) generally to give effect to section 24 of the Constitution in order to secure an environment that is not harmful to health and well-being."

1.2.6 National Environmental Management: Integrated Coastal Management Act, Act No. 44 of 2008

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 should be dealt with in terms of Chapter 4 of the NEMA.

The NEM: ICMA has numerous objectives and these are:

- Determination of the Coastal Zone in South Africa;
- Provision for coordinated and integrated management of the coastal zone;
- Preservation, protection, extension and enhancement of coastal public property;
- Equitable access to coastal property; and
- Giving effect to South Africa's obligations under international coastal and marine law.

In terms of the National Environmental Management: Integrated Coastal Management Act (Act No. 44 of 2008) (NEM: ICMA), anyone who wishes to discharge effluent into coastal waters must apply to the DEA for a coastal waters discharge permit (CWDP) within 24 months of commencement of the NEM: ICMA. This is specifically if the discharge is in terms of an existing License or authorisation issued under the National Water Act (Act No. 36 of 1998) (NWA) – as is the case of the Southern Works sea outfall.

As indicated in section 1.2.3 above, the SWWTW, in addition to the CWDP, holds a WUL for section 21(h). It is imperative to understand that the need for both these licenses / permits is warranted. The SWWTW is required to remain compliant with the conditions of both the CWDP and the WUL as each fall within the jurisdiction of separate authorities, where the former is under the mandate of the DEA and the latter under the mandate of the DWS. A CWDP for the SWWTW sea outfall is currently being applied for. It must however be noted that the SWWTW is not discharging out to sea without a license, the WUL which is held by the SWWTW permits the Works to discharge to sea, however, in light of the NEM:ICMA, both a WUL and CWDP is required, hence the latter is formerly being applied for from the DEA.

1.2.7 White Paper on Integrated Pollution and Waste Management for South Africa

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:

- Pollution prevention;
- Waste minimisation;

- Cross media integration;
- Institution integrated both horizontal and vertical, of department and spheres of government; and
- Involvement of all sectors of society in pollution and waste management.

The government believes that pollution prevention is one of the most effective means of protecting South Africa people and environment. Pollution prevention eliminates costly and unnecessary waste and promotes sustainable development. It aims to reduce risks to human health and environment by trying to eliminate the causes rather than treating the symptoms of pollution.

This Integrated Pollution and Waste Management for South Africa apply to all government institutions, society at large and to all activities that impact on pollution and waste management. One of the fundamental approaches of this policy is to prevent pollution, minimise waste and to control and remediate impacts. The management of waste will be implemented in a holistic and integrated manner, and will extend over the entire waste cycle, from “cradle to grave” including the generation, storage, collection, transportation, treatment and final disposal of waste.

The government aims to:

- Encourage the prevention and minimisation of waste generation and thus pollution at source;
- Encourage the management and minimization of the impact of unavoidable waste from its generation to its final disposal;
- Ensure the integrity and sustained “fitness for use” of all environmental media , i.e. air, water and land;
- Ensure that any pollution of the environment is remediated by holding the responsible parties accountable;
- Ensure environmental justice by integrating environmental considerations with the social, political and development needs and rights of all sectors, communities and individuals; and
- Prosecute non-compliance with authorizations and legislation.

1.2.8 National Environmental Management Biodiversity Act (Act No. 10 of 2004)

The Biodiversity Act (NEM: BA) regulates South Africa’s laws relating to biodiversity. The overall purpose of the act is:

- The management and conservation of South Africa’s biodiversity and it’s components;
- The protection of species and ecosystems that warrant national protection ;
- The sustainable use of indigenous biological resources;
- The fair and equitable sharing of benefits arising from bioprospecting including indigenous biological resources; and
- The establishment of a South African National Biodiversity Institute.

1.2.9 National Environmental Management: Protected Areas Act (Act No. 57 of 2003)

This Act (NEM: PAA) aims to provide for a national system of protected areas in South Africa as a part of a strategy to manage and conserve its biodiversity. The Protected Areas Act tries to ensure protection of the entire range of biodiversity, referring to natural landscapes and seascapes.

The Act makes express reference to the need to move towards Community Based Natural Resource Management (CBNRM) as its objectives include promoting the participation of local communities in the management of protected areas.

The purpose of the Act is:

- To protect ecologically viable areas representative of South Africa's biological diversity and its natural landscapes and seascapes and their ecological integrity;
- To conserve biodiversity in those areas;
- To protect South Africa's rare species
- To protect vulnerable or ecologically sensitive areas;
- To assist in ensuring the sustained supply of environmental goods and services;
- To provide for the sustainable use of natural and biological resources;
- To create or augment destinations for nature-based tourism;
- To manage the interrelationship between natural environmental biodiversity, human settlement and economic development;
- To contribute to human, social, cultural, spiritual and economic development; and
- To rehabilitate and restore degraded ecosystems and promote the recovery of endangered and vulnerable species.

This Act further stipulates various criteria which must be met before an area can be declared as a special nature reserve, national park, nature reserve and protected environment. It also prescribes a range of procedures, including consultation and public participation procedures, which must be followed before any of the kinds of protected areas are declared.

1.2.10 National Heritage Resources Act (Act No. 25 of 1999)

In terms of section 38 of the NHRA (subject to the provisions of subsections (7), (8) and (9) of the Act), any person who intends to undertake a development categorised as:

- The construction of a road, wall, power line, pipeline, canal or other similar form of linear development or barrier exceeding 300 m in length;
- The construction of a bridge or similar structure exceeding 50 m in length;
- Any development or other activity which will change the character of a site:

- Exceeding 5,000 m² in extent;
  - Involving three or more existing erven or subdivisions thereof; or
  - Involving three or more erven or divisions thereof which have been consolidated within the past five years; or
  - The costs of which will exceed a sum set in terms of regulations by SAHRA or a provincial heritage resources authority;
- The re-zoning of a site exceeding 10,000 m^2 in extent; or
- Any other category of development provided for in regulations by SAHRA or a provincial heritage resources authority, must at the very earliest stages of initiating such a development, notify the responsible heritage resources authority and furnish it with details regarding the location, nature and extent of the proposed development.

1.2.11 National Environmental Management: Air Quality Act (Act No. 39 of 2004)

The NEMA Air Quality Management Act (NEM:AQA) states the following as it primary objective:

"To reform the law regulating air quality in order to protect the environment by providing reasonable measures for the prevention of pollution and ecological degradation and for securing ecologically sustainable development while promoting justifiable economic and social development; to provide for national norms and standards regulating air quality monitoring, management and control by all spheres of government, for specific air quality measures, and for matters incidental thereto.

Whereas the quality of ambient air in many areas of the Republic is not conducive to a healthy environment for the people living in those areas let alone promoting their social and economic advancement and whereas the burden of health impacts associated with polluted ambient air falls most heavily on the poor, And whereas air pollution carries a high social, economic and environmental cost that is seldom borne by the polluter, And whereas atmospheric emissions of ozone-depleting substances, greenhouse gases and other substances have deleterious effects on the environment both locally and globally, and whereas everyone has the constitutional right to an environment that is not harmful to their health or well-being, and whereas everyone has the constitutional right to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that:

- *Prevent pollution and ecological degradation;*
- *Promote conservation; and*
- *Secure ecologically sustainable development and use of natural resources.*

And whereas minimisation of pollution through vigorous control, cleaner technologies and cleaner production practices is key to ensuring that air quality is improved, and whereas additional legislation is necessary to strengthen the Government's strategies for the protection of the environment and, more specifically, the enhancement of the quality of ambient air, in order to secure an environment that is not harmful to the health or well-being of people."

1.2.12 National Veld and Forest Act (Act No. 101 of 1998)

The National Veld and Forest Fire Act's purpose is to prevent and combat veld, forest mountain fires throughout the Republic. The act also places emphasis on the fire protection associations and preventing fires and veld fries through firebreaks.

1.2.13 Hazardous Substance Act (Act No. 15 of 1973) and Regulations

The object of the Act is *inter alia* to 'provide for the control of substances which may cause injury or ill health to or death of human beings by reason of their toxic, corrosive, irritant, strongly sensitising or flammable nature or the generation of pressure thereby in certain circumstances; for the control of electronic products; for the division of such substances or products into groups in relation to the degree of danger; for the prohibition and control of such substances'.

In terms of the Act, substances are divided into schedules, based on their relative degree of toxicity, and the Act provides for the control of importation, manufacture, sale, use, operation, application, modification, disposal and dumping of substances in each schedule.

Pollution control in South Africa is affected through numerous national statutes, provincial ordinances and local authority by-laws. Only the more significant legislation pertaining to the regulation of water, air, noise and waste pollution is dealt with in this section.

1.2.14 National Building Regulations and Building Standards Act (Act No. 103 of 1997)

The Act has the following objective:

"*To promote for the promotion of uniformity in the law relating to the erection of buildings in the areas of jurisdiction of local authorities for the prescribing of building standards and for the matters connected therewith.*"

All building controls, as considered in terms of the final roll-out of the parallel town planning process, will need to comply with this Act.

1.2.15 Occupational Health and Safety Act (No 85 of 1993)

The Occupational Health and Safety Act (OHSA) provides for the health and safety of persons at work and for the health and safety of persons in connection with the use of plant and machinery; the protection of persons other than persons at work, against hazards to health and safety arising out of or in connection with the activities of persons at work.

The project, due to its nature is constrained by the requirements included in and linked to this Act to the Major Hazardous Installation (MHI) classification of the site, post upgrades. In this regard, the MHI status of the Works post upgrades will need to comply with the requirements of the OHSA in terms of the development and implementation of the necessary safety plans.

1.2.16 Sustainable Development

The principle of Sustainable Development has been established in Section 24 of the Constitution of the Republic of South Africa (No. 108 of 1996) and given effect by NEMA. Section 1(29) of NEMA states that sustainable development means the integration of social, economic and environmental factors into the planning, implementation and decision-making process so as to ensure that development serves present and future generations.

Therefore, Sustainable Development requires that:

- The disturbance of ecosystems and loss of biological diversity are avoided, or, where they cannot be altogether avoided, are minimised and remedied;
- That pollution and degradation of the environment are avoided, or, where they cannot be altogether avoided, are minimised and remedied;
- The disturbance of landscapes and sites that constitute the nation's cultural heritage is avoided, or where it cannot be altogether avoided, is minimised and remedied;
- Waste is avoided, or where it cannot be altogether avoided, minimised and re-used or recycled where possible and otherwise disposed of in a responsible manner;
- A risk-averse and cautious approach is applied, which takes into account the limits of current knowledge about the consequences of decisions and actions; and
- Negative impacts on the environment and on people's environmental rights be anticipated; and, prevented and where they cannot altogether be prevented, are minimised and remedied.

APPENDIX B: DETAILED DESCRIPTION OF STUDY AREA

1 GENERAL DESCRIPTION OF THE STUDY AREA

1.1 Biophysical factors

1.1.1 Climate

The SWWTW is located on the southern side of Durban. Durban has a subtropical climate with hot, humid summers and warm, dry, frost-free winters. This climate has a profound influence on the biodiversity. Refer to Figure 1-1.

- Rainfall:
  - The city has an annual rainfall of 1,009 mm. Rain falls predominantly in summer (October – March). Mean rainfall ranges from 28 mm in June to 134 mm in January.
  - Average rainy days range from 4.5 days in June to 16 in November.
- Seasons:
  - Summers are sunny, hot and humid during the day, but are often relieved by afternoon or evening thunderstorms.
  - Winters are generally warm and sunny (May – August).
  - Spring is in September, while autumn is in April.
- Tropical storms and cyclones occasionally affect Durban during the cyclone season from the 15th of November to the 30th of April.
- Temperature:
  - The average temperature in summer lies around 28°C and in winter around 20°C.
  - Record high temperatures range from 33.8°C in May to 40 °C in October.
  - Mean highs range from 22.6°C in July to 28°C in February.
  - Daily means range from 16.5°C in July to 24.3°C in February. Mean lows range from 10.5°C in July to 21.1°C in January and February.
  - Record lows range from 2.6°C in July and August to 14°C in January.
- Humidity:
  - Ranges from 72% in June and July to 80% in January, February and March.
- Mean monthly sunshine hours range from 166.1 in November to 230.4 in July.
- Sunrise during the summer solstice occurs at 04h45 and sunset at 19h00.
- During the winter solstice, sunrise is at 06h30 and sunset at 17h20.

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Record high °C (°F)	36.2 (97.2)	33.9 (93)	34.8 (94.6)	36.0 (96.8)	33.8 (92.8)	35.7 (96.3)	33.8 (92.8)	35.9 (96.6)	36.9 (98.4)	40.0 (104)	33.5 (92.3)	35.9 (96.6)	40.0 (104)
Average high °C (°F)	27.8 (82)	28.0 (82.4)	27.7 (81.9)	26.1 (79)	24.5 (76.1)	23.0 (73.4)	22.6 (72.7)	22.8 (73)	23.3 (73.9)	24.0 (75.2)	25.2 (77.4)	26.9 (80.4)	25.2 (77.4)
Daily mean °C (°F)	24.1 (75.4)	24.3 (75.7)	23.7 (74.7)	21.6 (70.9)	19.1 (66.4)	16.6 (61.9)	16.5 (61.7)	17.7 (63.9)	19.2 (66.6)	20.1 (68.2)	21.4 (70.5)	23.1 (73.6)	20.6 (69.1)
Average low °C (°F)	21.1 (70)	21.1 (70)	20.3 (68.5)	17.4 (63.3)	13.8 (56.8)	10.6 (51.1)	10.5 (50.9)	12.5 (54.5)	15.3 (59.5)	16.8 (62.2)	18.3 (64.9)	20.0 (68)	16.5 (61.7)
Record low °C (°F)	14.0 (57.2)	13.3 (55.9)	11.6 (52.9)	8.6 (47.5)	4.9 (40.8)	3.5 (38.3)	2.6 (36.7)	2.6 (36.7)	4.5 (40.1)	8.3 (46.9)	10.3 (50.5)	11.8 (53.2)	2.6 (36.7)
Rainfall mm (inches)	134 (5.28)	113 (4.45)	120 (4.72)	73 (2.87)	59 (2.32)	28 (1.1)	39 (1.54)	62 (2.44)	73 (2.87)	98 (3.86)	108 (4.25)	102 (4.02)	1,009 (39.72)
Avg. rainy days (≥ 0.1 mm)	15.2	12.9	12.6	9.2	6.8	4.5	4.9	7.1	11.0	15.1	16.0	15.0	130.3
% humidity	80	80	80	78	76	72	72	75	77	78	79	79	77
Mean monthly sunshine hours	184.0	178.8	201.6	206.4	223.6	224.9	230.4	217.0	173.3	169.4	166.1	189.9	2,365.4

Figure 1-1: Climate data for Durban (1961 – 1990; data from the World Meteorological Organization and the National Oceanic and Atmospheric Administration

1.1.2 Geology

The biodiversity scan undertaken by *The Ecological Partnership* identified that clays and silts of the Harbour Beds underlie the SWWTW area, while dune sands of the Berea Formation underlie the area through which the outfall pipe passes before it reaches the paved section of road near the beach (TEP, 2014).

Figure 1-2 depicts the site geology.

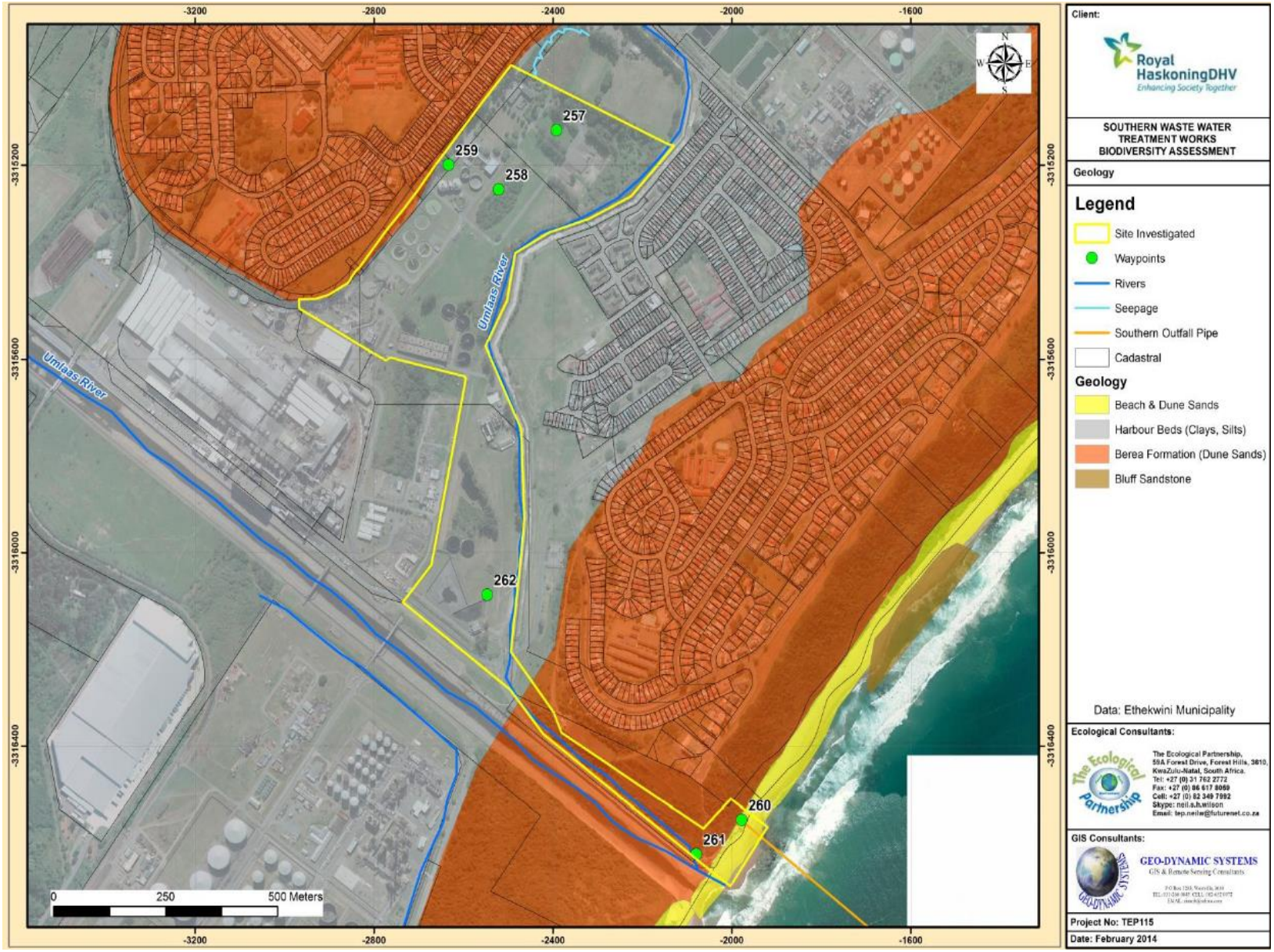


Figure 1-2: Study area geology

1.1.3 Ecological Significance of the Study Area

The SWWTW forms part of the Durban Metropolitan Open Space System (DMOSS) and lies within the 1: 100 year flood-line. The footprint of the proposed upgrade falls within a Critically Threatened Ecosystem and forms part of a Biodiversity Priority Area, see **Figure 1-4**.

It can be seen that the replacement of the portion of sea outfall pipeline will be within the Critically Threatened Ecosystem. In this regard, Listing Notice 3 has been consulted and it was determined that only activity 12 is triggered pertaining to the removal of indigenous vegetation. It is noted that the infrastructure is in place and will only be replaced, with the footprint not increasing. It is therefore the construction phase which requires focus in terms of impact mitigation.

The footprint of the upgrade development is largely covered by mown lawn with alien trees; alien invader plants and a few indigenous trees are also present (Plates 1-4 in Figure 1-3). The subtropical climate and the clays, silts and dune sands of the study area have less of an influence on the biodiversity than the organized, managed and artificial nature of the footprint.

Figure 1-3 (Plates 1-4): Mowed grass, alien vegetation and indigenous trees of the study area

Although the footprint's biodiversity is very limited, the study area still forms part of a Critically Threatened Ecosystem and a Biodiversity Priority Area (Figure 1-4) both of which highlight its potential in terms of biodiversity conservation. All the invader plant species mentioned are also present in areas which will not be upgraded. It has been requested that over time all such 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.

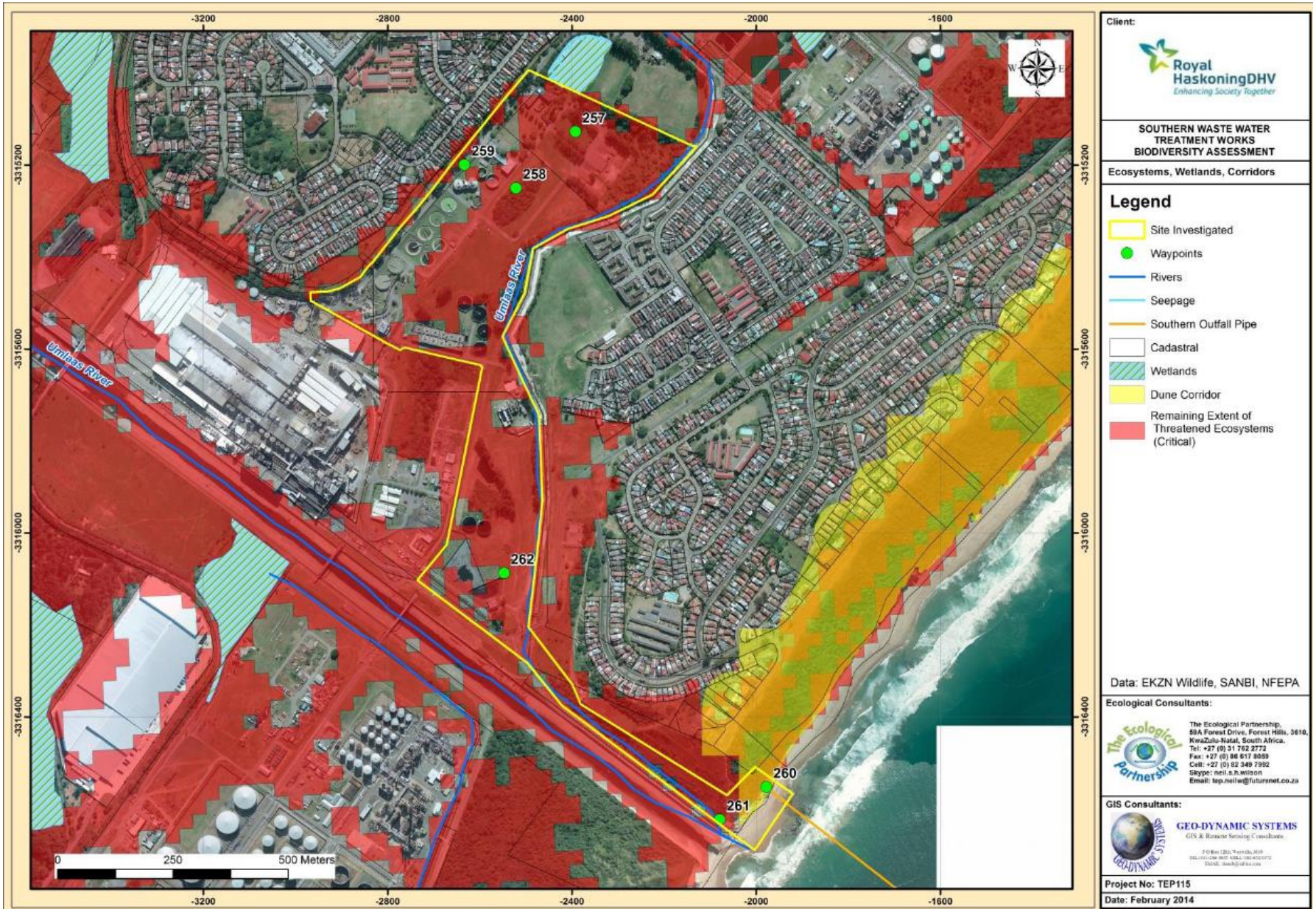


Figure 1-4: Critically threatened ecosystems of the study area

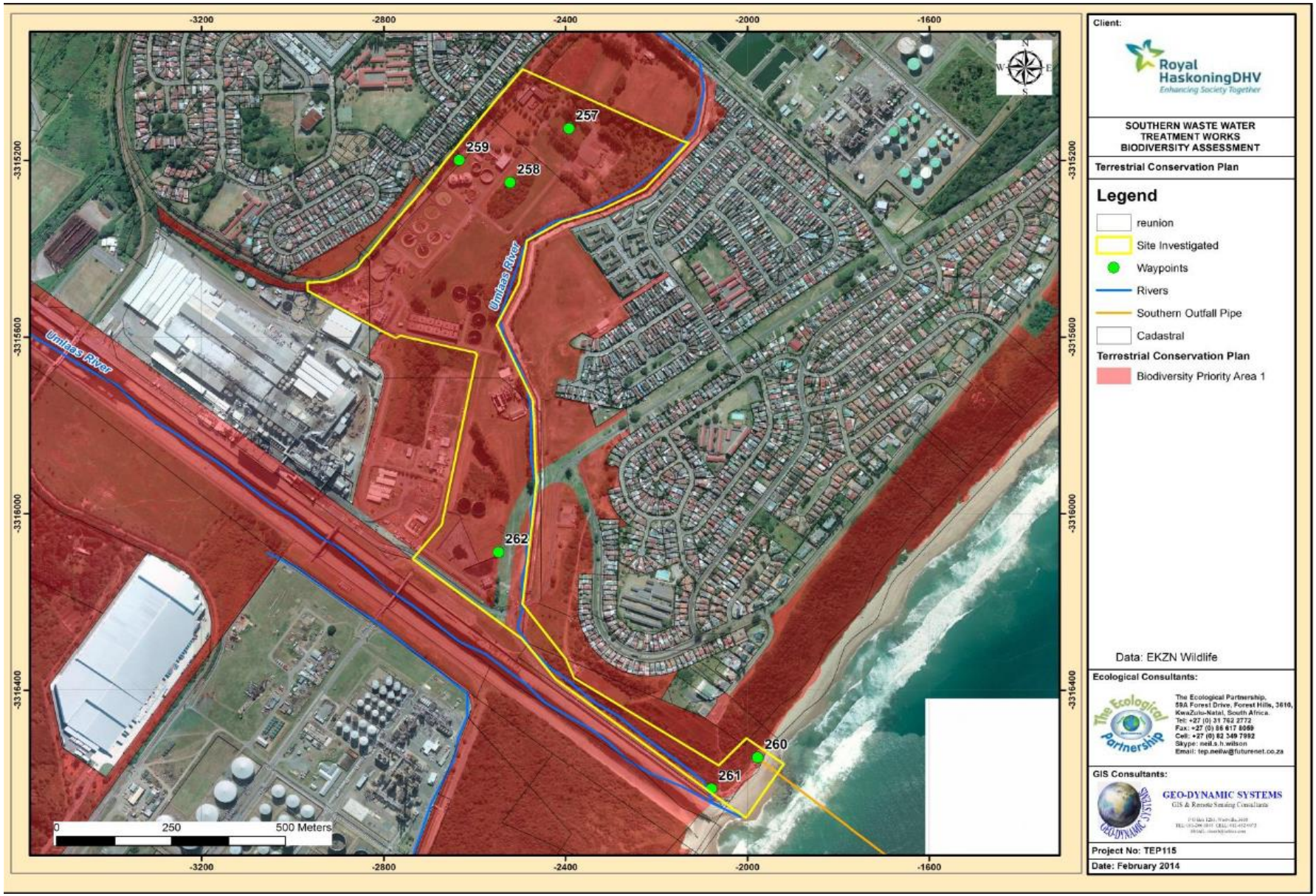


Figure 1-5: Biodiversity Priority Areas of EzemVelo KZN Wildlife's Terrestrial Conservation Plan

1.1.4 Air Quality

The following information has been extracted from the Baseline Air Quality Report undertaken by Royal HaskoningDHV.

1.1.4.1 Meso-Scale Meteorology

The nature of the local climate will determine what will happen to particulates when released into the atmosphere (Tyson & Preston-Whyte, 2000). Concentration levels fluctuate daily and hourly, in response to changes in atmospheric stability and variations in mixing depth. Similarly, atmospheric circulation patterns will have an effect on the rate of transport and dispersion.

The release of atmospheric pollutants into a large volume of air results in the dilution of those pollutants. This is best achieved during conditions of free convection and when the mixing layer is deep (unstable atmospheric conditions). These conditions occur most frequently in summer during the daytime. This dilution effect can however be inhibited under stable atmospheric conditions in the boundary layer (shallow mixing layer). Most surface pollution is thus trapped under a surface inversion (Tyson & Preston-Whyte, 2000).

Inversion occurs under conditions of stability when a layer of warm air lies directly above a layer of cool air. This layer prevents a pollutant from diffusing freely upward, resulting in an increased pollutant concentration at or close to the earth's surface. Surface inversions develop under conditions of clear, calm and dry conditions and often occur at night and during winter (Tyson & Preston-Whyte, 2000). Radiative loss during the night results in the development of a cold layer of air close to the earth's surface. These surface inversions are however, usually destroyed as soon as the sun rises and warm the earth's surface. With the absence of surface inversions, the pollutants are able to diffuse freely upward; this upward motion may however be prevented by the presence of an elevated inversion (Tyson & Preston-Whyte, 2000).

Elevated inversions occur commonly in high pressure areas. Sinking air warms adiabatically to temperatures in excess of those in the mixed boundary layer. The interface between the upper, gently subsiding air is marked by an absolutely stable layer or an elevated subsidence inversion. This type of elevated inversion is the most common type found in Southern Africa (Tyson & Preston-Whyte, 2000).

The climate and atmospheric dispersion potential of the interior of South Africa is determined by atmospheric conditions associated with the continental high pressure cell located over the interior. The continental high pressure present over the region in the winter months results in fine conditions with little rainfall and light winds with a northerly flow. Elevated inversions are common in such high pressure areas due to the subsidence of air. This reduces the mixing depth and suppresses the vertical dispersion of pollutants, causing increased pollutant concentrations (Tyson and Preston-Whyte, 2000).

Seasonal variations in the positions of the high pressure cells have an effect on atmospheric conditions over the region. For most of the year the tropical easterlies cause an air flow with a north-easterly to north-westerly component. In the winter months the high pressure cells move northward, displacing the tropical easterlies northward resulting in disruptions to the westerly circulation. The disruptions result in a succession of cold fronts over the area in winter with pronounced variations in wind direction, wind speeds, temperature, humidity, and surface pressure. Airflow ahead of a cold front passing over the area has a strong north-north-westerly to

north-easterly component, with stable and generally cloud-free conditions. Once the front has passed, the airflow is reflected as having a dominant southerly component (Tyson and Preston-Whyte, 2000).

Easterly and westerly wave disturbances cause a southerly wind flow and tend to hinder the persistence of inversions by destroying them or increasing their altitude, thereby facilitating the dilution and dispersion of pollutants. Pre-frontal conditions tend to reduce the mixing depth. The potential for the accumulation of pollutants during pre-frontal conditions is therefore enhanced over the plateau (Tyson and Preston-Whyte, 2000).

1.1.4.1.1 Wind

Wind roses comprise of 16 spokes which represents the direction from which the winds blew during the period under review. The colours reflect the different categories of wind speeds. The dotted circles provide information regarding the frequency of occurrence of wind speed and direction categories.

Based on an evaluation of the site specific meteorological data obtained from the South African Weather Services in the Durban South Area, KwaZulu Natal, the following deductions regarding the prevailing wind direction and wind frequency can be presented. Based in Figure 1-6 below, the predominant wind direction for the area under review occurs mainly from the north eastern and south western regions. Secondary winds were noted from the north western and south eastern quadrants.

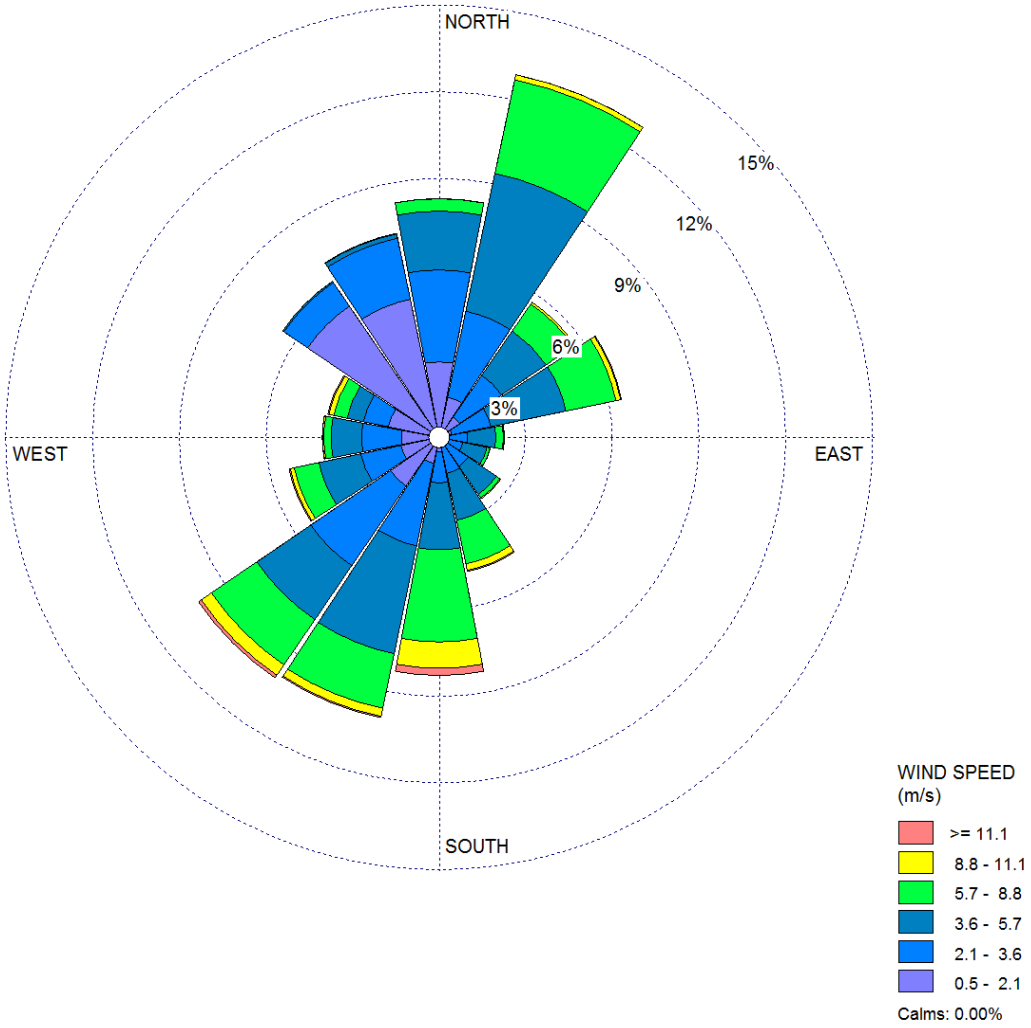


Figure 1-6: Periodic Wind Rose for the Jan 2009 – Dec 2013 Monitoring Period

Figure 1-7 illustrates the wind class frequency distribution for the 2009 -2013 monitoring period. No calm winds were experienced during the monitoring period. 27.8% of the total wind speeds experienced fell within the 3.6 – 5.7m/s wind class, while 26.7% of the total wind speeds fell within the 2.1 – 3.6m/s wind class.

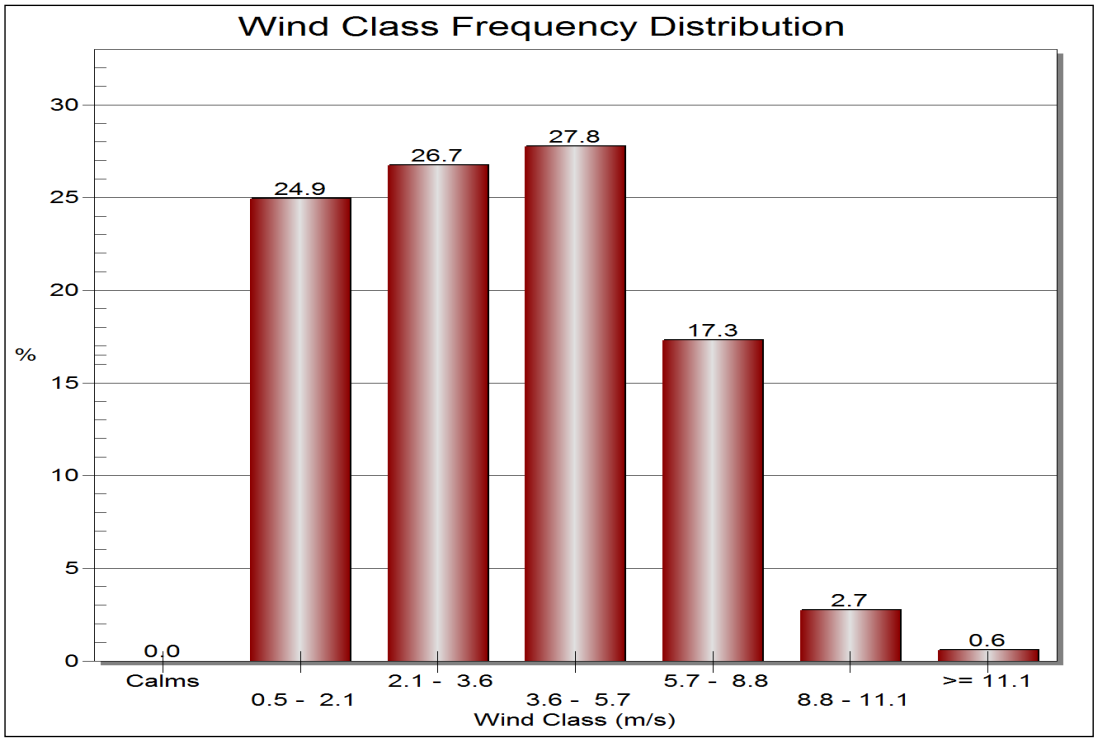


Figure 1-7: Wind class frequency distribution

1.1.4.1.2 Atmospheric Stability

Atmospheric stability is commonly categorised into one of seven stability classes. These are briefly described in Table 1-1 below. The atmospheric boundary layer is usually unstable during the day due to turbulence caused by the sun's heating effect on the earth's surface. The depth of this mixing layer depends mainly on the amount of solar radiation, increasing in size gradually from sunrise to reach a maximum at about 5 – 6 hours after sunrise. The degree of thermal turbulence is increased on clear warm days with light winds. During the night a stable layer, with limited vertical mixing, exists. During windy and/or cloudy conditions, the atmosphere is normally neutral. A neutral atmospheric potential neither enhances nor inhibits mechanical turbulences. An unstable atmospheric condition enhances turbulence, whereas a Stable atmospheric condition inhibits mechanical turbulence.

Table 1-1: Atmospheric Stability Class

A	Very unstable	calm wind, clear skies, hot daytime conditions

B	Moderately unstable	clear skies, daytime conditions
C	Slightly Unstable	moderate wind, slightly overcast daytime conditions
D	Neutral	high winds or cloudy days and nights
E	Slightly Stable	moderate wind, slightly overcast night-time conditions
F	Moderately stable	low winds, clear skies, cold night-time conditions
G	Very stable	Calm winds, clear skies, cold clear night-time conditions

1.1.4.1.3 Temperature and Humidity

Temperature affects the formation, action, and interactions of pollutants in various ways (Kupchella & Hyland, 1993). Chemical reaction rates tend to increase with temperature and the warmer the air, the more water it can hold and hence the higher the humidity. Temperature also provides an indication of the rate of development and dissipation of the mixing layer as well as determining the effect of plume buoyancy; the larger the temperature difference between the plume and ambient air, the higher the plume is able to rise.

Higher plume buoyancy will result in an increased lag time between the pollutant leaving the source, and reaching the ground. This additional time will allow for greater dilution and ultimately a decrease in the pollutant concentrations when reaching ground level.

Humidity is the mass of water vapour per unit volume of natural air. When temperatures are at their highest the humidity is also high, the moisture is trapped inside the droplets of the water vapour. This makes the moisture content of the air high. When relative humidity exceeds 70%, light scattering by suspended particles begins to increase, as a function of increased water uptake by the particles (CEPA/FPAC Working Group, 1999). This results in decreased visibility due to the resultant haze. Many pollutants may also dissolve in water to form acids, as well as secondary pollutants within the atmosphere.

The average monthly temperature and relative humidity for the January 2008 – December 2013 monitoring period is presented in **Figure 1-8** below. Daily average summer temperatures ranged between 22.5 – 25.1ºC, while the average winter temperatures ranged between 16.8 – 20.0ºC. Relative Humidity for the January 2009 – December 2013 monitoring period was highest during the summer months of December, January and February and lowest during the winter months.

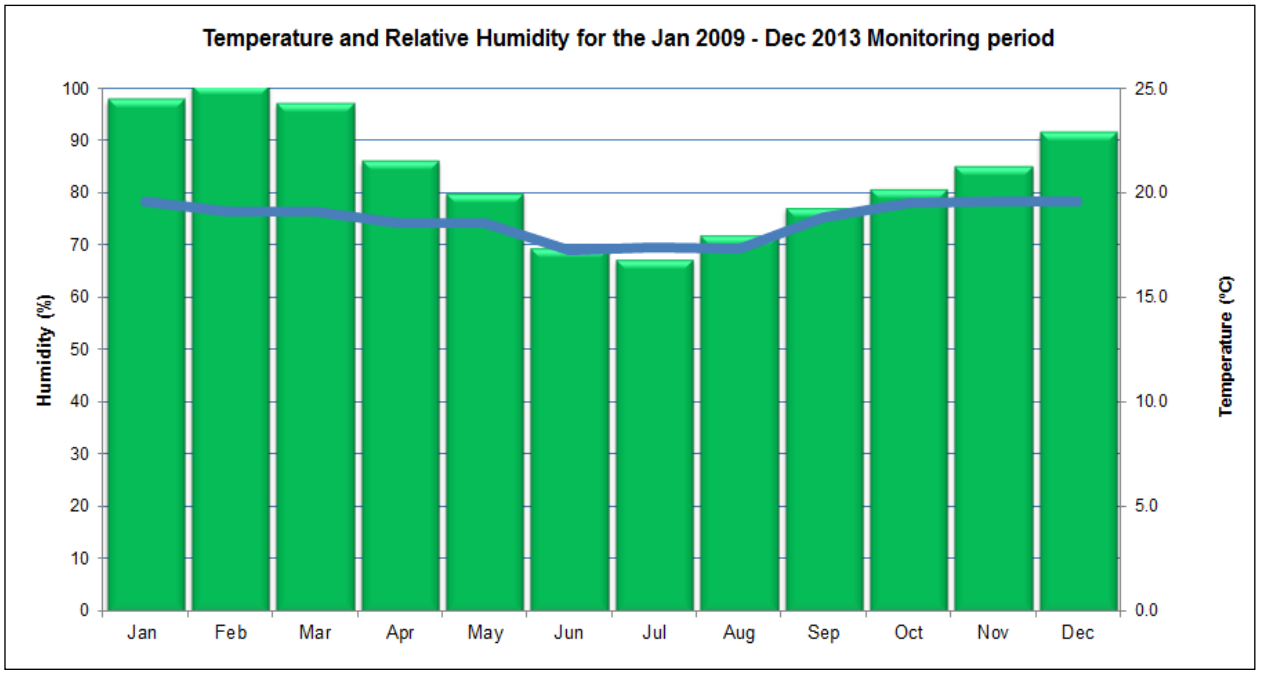


Figure 1-8: Average Temperature and Relative Humidity for the Jan 2009 – Dec 2013 Monitoring Period

1.1.4.1.4 Precipitation

Precipitation cleanses the air by washing out particles suspended in the atmosphere (Kupchella & Hyland, 1993). It is calculated that precipitation accounts for about 80-90% of the mass of particles removed from the atmosphere (CEPA/FPAC Working Group, 1999).

A summary of the total rainfall profile for the January 2009 - December 2013 monitoring period is illustrated in Figure 1-9 below. The spring and summer months recorded the highest rainfall with 242.26mm and 250.76mm respectively. The winter months recorded the lowest average of precipitation with 92.24mm.

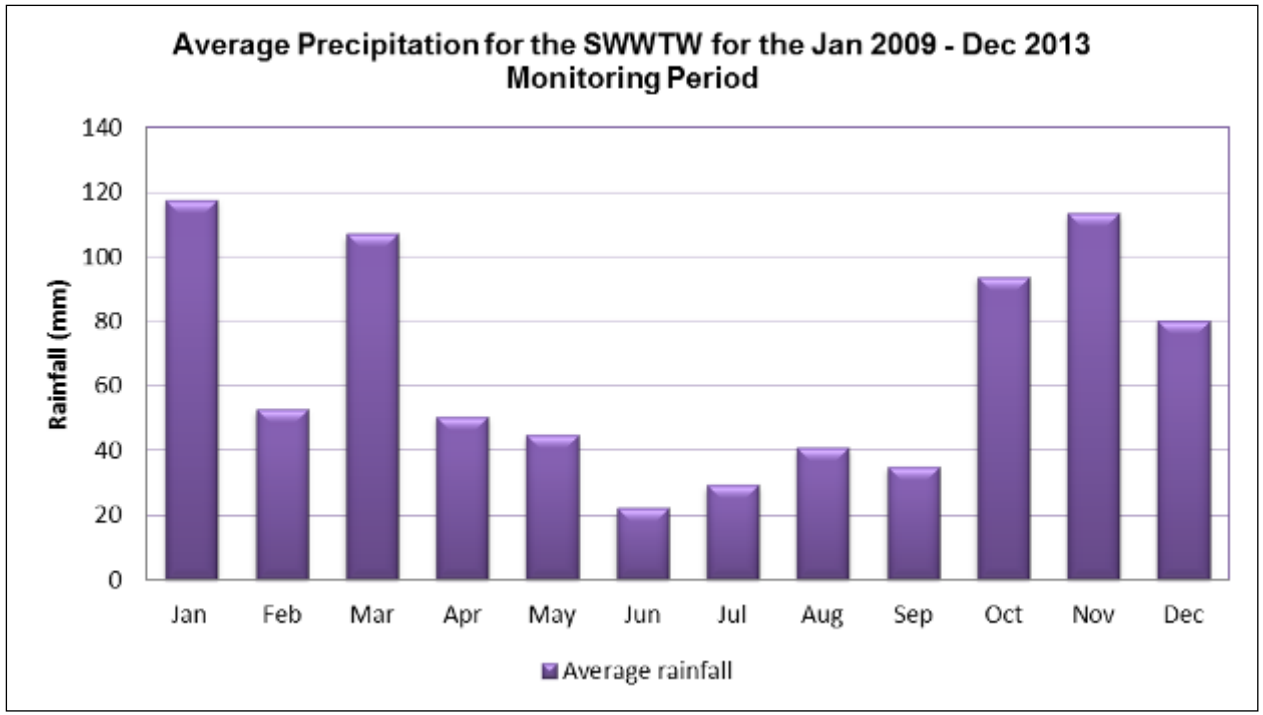


Figure 1-9: Average Precipitation for the Jan 2009 – Dec 2013 Monitoring Period for the SWWTW.

1.1.4.2 Baseline Air Quality

The eThekwini Municipality conducted continuous monitoring in the Durban South Basin in 2009 as part of the Air Quality Monitoring Programme and management plan.

The monitoring network consisted of twelve (12) monitoring stations of which three (3) are background concentrations and five (5) are meteorological. Priority pollutants which were assessed include; Sulphur dioxide (SO_2), Nitrogen dioxide (NO_2), Particulate matter (PM_{10}) and Total Reduced Sulphur (TRS).

Table 1-2: Location of Monitoring stations and parameters measured.

Monitoring station	SO_2	NO_2	PM_{10}	TRS

Monitoring station	SO_2	NO_2	PM_{10}	TRS
Prospecton	x			
Southern Works	x	x	x	x
Settlers School	x			x
Ganges School	x	x	x	
Grosvenor School	x			
Wentworth	x	x	x	
Jacobs	x	x		
Ferndale	x	x	x	
Warwick		x		
City Hall		x	x	

1.1.4.2.1 Sulphur Dioxide

Sulphur Dioxide (SO_2) is an irritant that is absorbed in the nose and aqueous surfaces of the upper respiratory tract, and is associated with reduced lung function and increased risk of mortality and morbidity. Adverse health effects of SO_2 include coughing, phlegm, chest discomfort and bronchitis.

Figure 1-10 below illustrates the annual trends in SO_2 from 2004 - 2009. There is gradual decrease in the annual concentrations of SO_2 since 2004. All monitoring stations, with the exception of the 2004 exceedance at the Southern Works, all fell below the annual SO2 limit of 50 µg/m3.

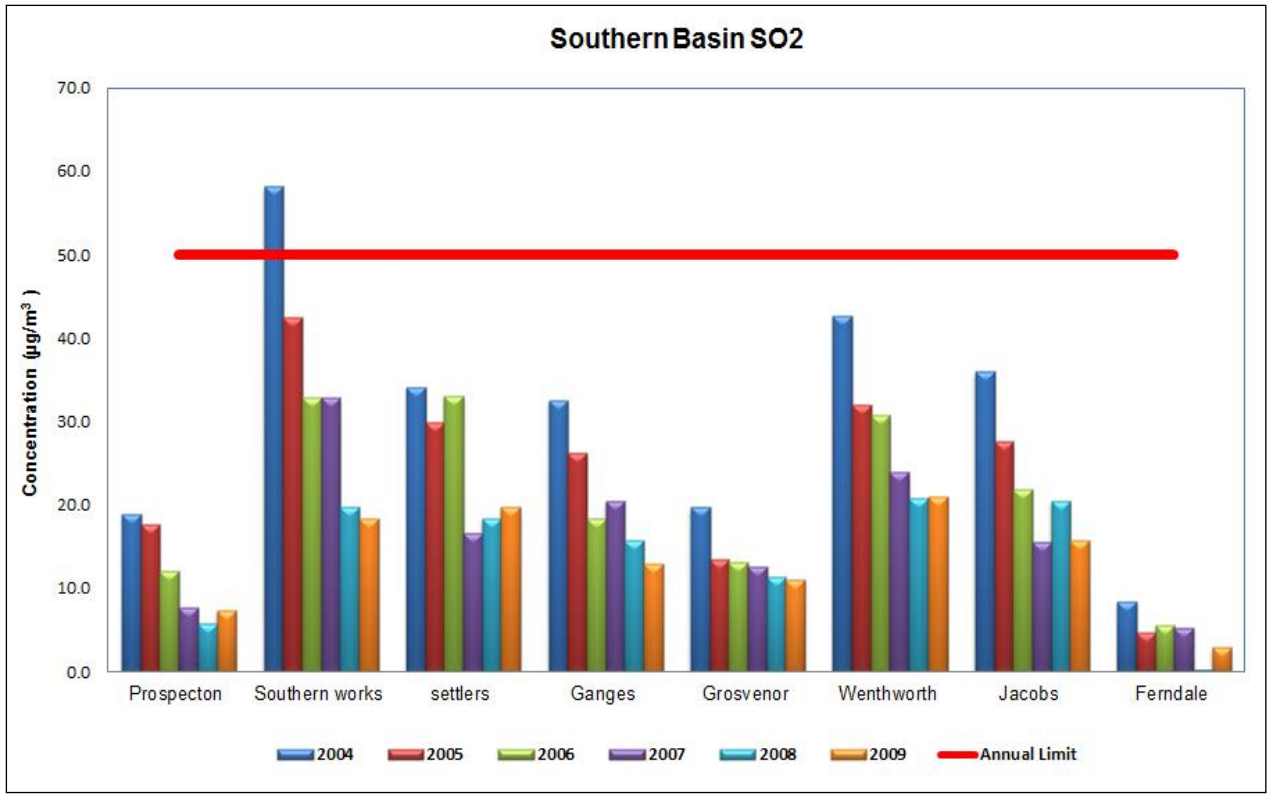


Figure 1-10: Sulphur dioxide concentration (µg/m^3) annual trends (2004 – 2009).

1.1.4.2.2 Nitrogen Dioxide

Air quality guidelines and standards issued by most other countries and organisations tend to be given exclusively for Nitrogen Dioxide (NO_2) concentrations as NO_2 is the most important species from a human health point of view. NO_2 is an irritant gas that is absorbed into the mucous membrane of the respiratory tract.

The most adverse health effect occurs at the junction of the conducting airway and the gas exchange region of the lungs. The upper airways are less affected because NO_2 is not very soluble in aqueous surfaces. Exposure to NO_2 is linked with increased susceptibility to respiratory infection, increased airway resistance in asthmatics and decreased pulmonary function.

Figure 1-11 below illustrates the annual trends in NO_2 from 2004 – 2009. The monitoring station located at the Ganges School exceeded the annual limit of 40 µg/m3 for NO_2 on four (4) occasions in 2004, 2005, 2006 and 2009, respectively. The Warwick monitoring station exceeded the annual limit of NO_2 during the 2004 and 2008 monitoring periods, while the City Hall and Jacobs Monitoring station exceeded the annual standard in 2006 and 2007 respectively.

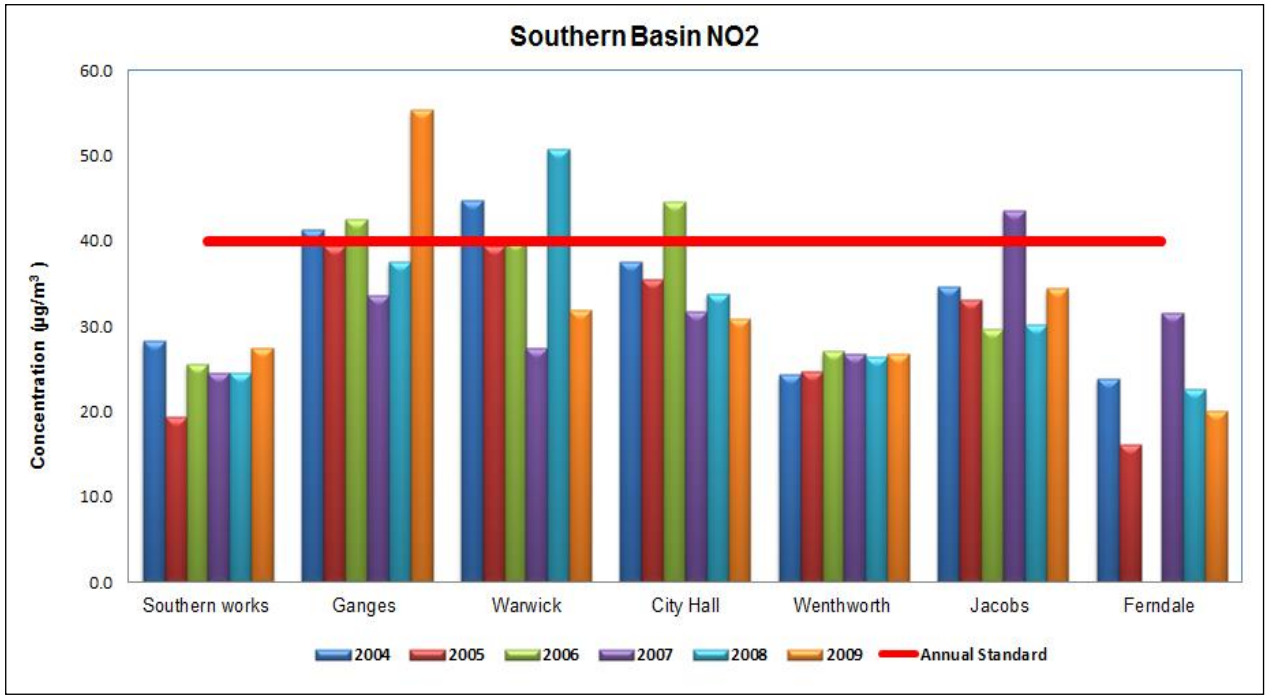


Figure 1-11: Nitrogen dioxide concentration (µg/m^3) annual trends from 2004 – 2009.

1.1.4.2.3 Particulate Matter

Particulate matter (PM) is the collective name for fine solid or liquid particles added to the atmosphere by processes at the earth's surface. PM includes pollutants such as dust, smoke, soot, pollen and soil particles (Kemp, 1998).

PM has been linked to a range of serious respiratory and cardiovascular health problems. The key effects associated with exposure to ambient particulate matter include: premature mortality, aggravation of respiratory and cardiovascular disease, aggravated asthma, acute respiratory symptoms, chronic bronchitis, decreased lung function, and an increased risk of myocardial infarction (US EPA, 1996).

PM represents a broad class of chemically and physically diverse substances. Particles can be described by size, formation mechanism, origin, chemical composition, atmospheric behaviour and method of measurement. The concentration of particles in the air varies across space and time, and is related to the source of the particles and the transformations that occur in the atmosphere (USEPA, 1996).

PM represents a broad class of chemically and physically diverse substances. Particles can be described by size, formation mechanism, origin, chemical composition, atmospheric behaviour and method of measurement. The concentration of particles in the air varies across space and time, and is related to the source of the particles and the transformations that occur in the atmosphere (USEPA, 1996).

EPA groups particle pollution into two categories:

- "Inhalable coarse particles," such as those found near roadways and dusty industries, are larger than 2.5 micrometers and smaller than 10 micrometers in diameter; and
- "Fine particles", such as those found in smoke and haze, are 2.5 micrometers in diameter and smaller. These particles can be directly emitted from sources such as forest fires, or they can form when gases emitted from power plants, industries and automobiles react in the air.

Figure 1-12 below illustrates the annual trends for particulate matter at the various monitoring stations. As seen from the trends illustrated in the graph below, all monitored data fell below the annual standard of 50 µg/m^3. The highest concentrations (µg/m^3) in PM_{10} were experienced at the Ganges monitoring station.

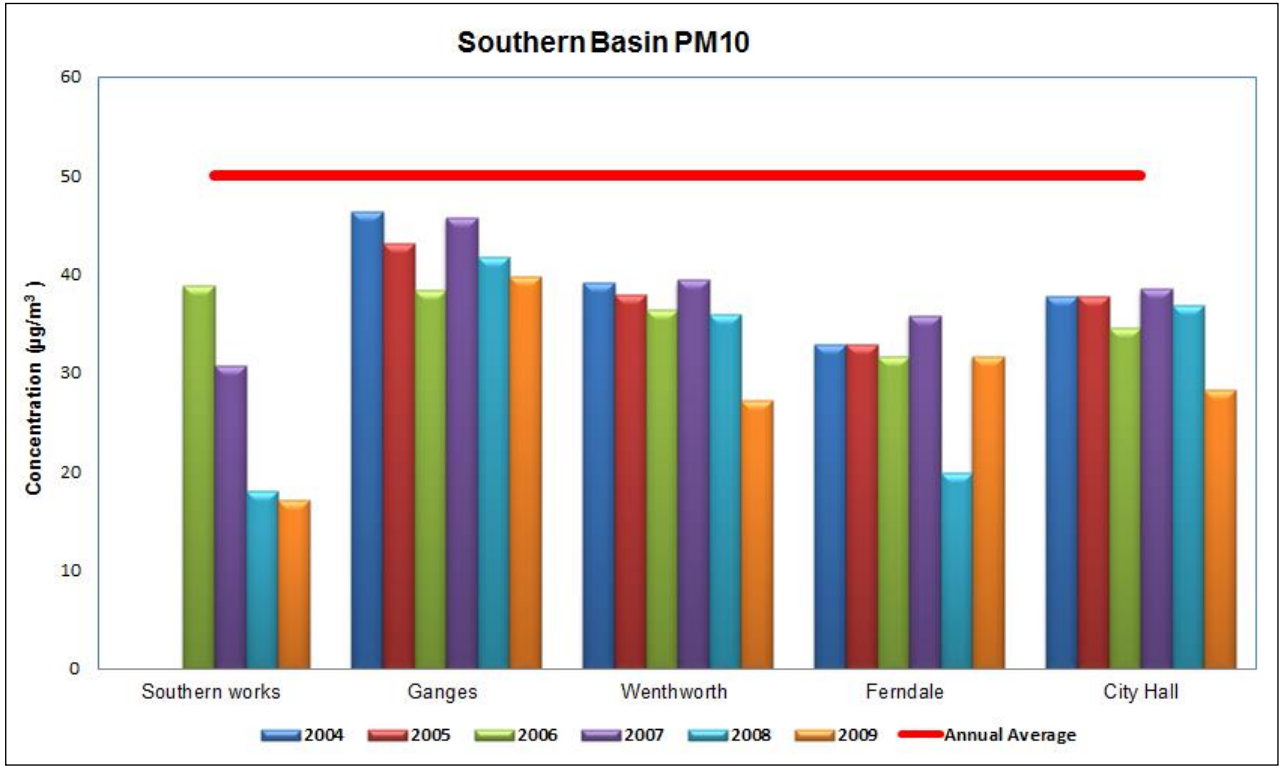


Figure 1-12: Particulate Matter concentration (µg/m^3) annual trends from 2004 – 2009

1.1.4.2.4 TRS – Total Reduced Sulphur

Total Reduced Sulphur is not classified as a priority pollutant as thus has no prescribed South African Standards. Use is made of the European Union standards for Hydrogen Sulphide which comprises of 60% of TRS.

Figure **1-13** below illustrates the TRS concentration (ppb) monitored during the 2008 – 2009 monitoring period. All monitoring station recorded an annual average below the annual standard of 7.8 ppb.

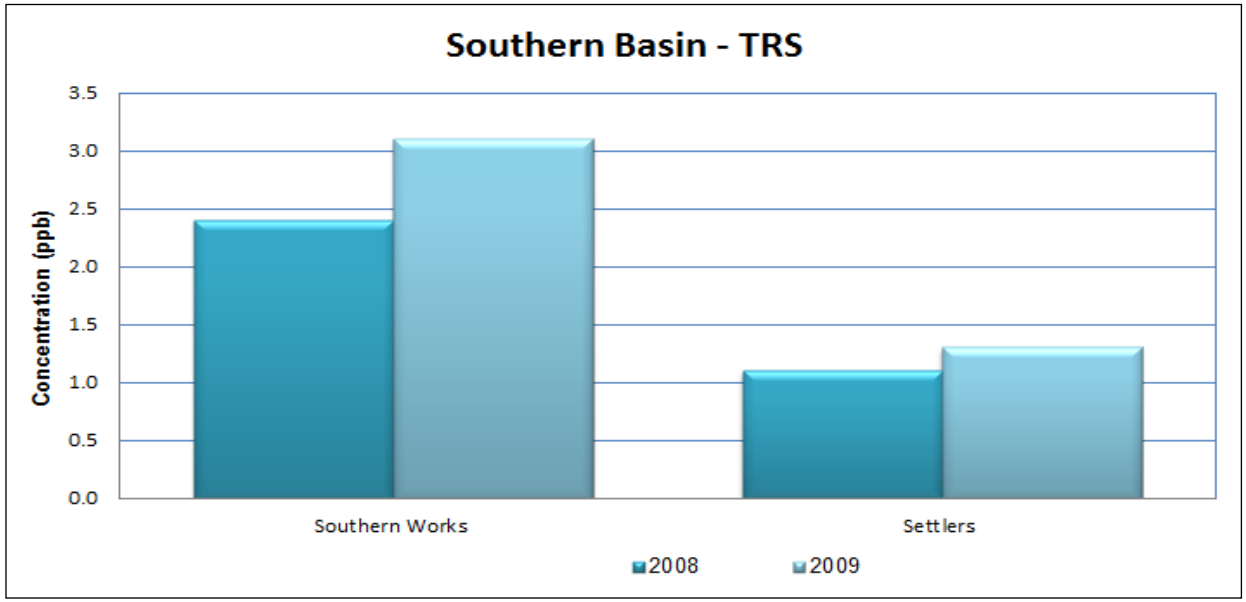


Figure 1-13: TRS concentration (ppb) during the 2008-2009 monitoring period

1.1.5 Vegetation and Fauna

At the northern portion of the study area there is a wetland that borders the boundary fence. At the edge of the wetland within the SWWTW is a large, mature *Erythrina caffra* (Coast Coral-tree). A 10 m buffer is recommended from the edge of the wetland that is necessary to protect the wetland and save the Coast Coral-tree. This does not preclude the mandatory 32 m buffer from watercourses, which has been applied for as a listed activity for this project, but rather is seen as a total exclusion zone in addition to the 32 m buffer area.

Area N, as per the Scope of Works Map in Figure 4-1, is composed of a mowed grass section and many tall, mature trees. Several tall *Casuarina equisetifolia* trees are present. These are Category 2 plant invaders and must thus be removed according to the NEM:BA.

Tall Monkey Puzzle trees (*Araucaria araucana*) belonging to the ancient genus, *Araucaria*, are also present. The species is native to the Chilean and Argentinean Andes, is classified as Endangered on the IUCN Red List and is listed in Appendix 1 of CITES. Thus, although an alien, such trees should not be removed unless necessary.

The Crimson Bottlebrush *(Callistemon citrinus*), which is native to Australia grows in this area as well, as do exotic fir trees of the genus Abies, a Magnolia tree (*Magnolia sp*.), two palms, an aloe-like tree, and another tree with large simple, shiny leaves and big pods (which needs to be identified but is not considered to be indigenous), and importantly, the indigenous Tree Fuchsia (*Schotia brachypetala*).

Areas K, I, G and E (of in Figure 4-1) are largely taken up with mown grass together with an oval area overlapping with Areas K and I, and projecting south into Area G.

The oval area specified is infested with alien plant invaders, including the following: Bug Weed (*Solanum mauritianum*, Category 1 invader), Indian Shot (*Canna indica*, category 1 invader), Castor-oil Plant (*Ricinus communis*, Category 2 invader), Peanut Butter Cassia (*Senna didymobotrya*, Category 3 invader), Mulberry (*Morus alba*, category 3 invader), and Seringa (*Melia azedarach*, Category 3 invader). Category 1 plants must be removed when encountered irrespective of whether development occurs – and this will be included in the site's ongoing maintenance schedule. Category 2 plants should be removed if possible. Category 3 plants may remain, but new young plants should be eradicated as soon as they are encountered.

The indigenous Common Reed (*Phragmites australis*) is also present.

An indigenous, tall, mature Natal Fig (*Ficus natalensis*) is growing just north of Area K.

Area M is composed of cut grass together with a Magnolia tree (*Magnolia sp*.) – an exotic, but not of a listed category.

1.1.6 Sea Outfall Monitoring

The eThekwini Municipality is authorised to discharge sludge to sea from SWWTW through a Water Use License (WUL). The potential impact on receiving water is measured *via* an annual monitoring programme conducted by the Council for Scientific and Industrial Research (CSIR) which includes effluent toxicity, water and sediment quality, and the status of benthic macro faunal communities. Monitoring shows that all indicators are within compliance/threshold limits or below method detection limit and possible impact of no immediate ecological effect, but comparisons of certain indicators with earlier surveys show a gradual increase in possible impact.

The proceeding sections outline the methodology of reporting and the sampling points, first highlighting the findings of the 2013 surveys, and thereafter those of previous years 2011 and 2012.

The outfalls of both the Central Works and the SWWTW are shown in Figure 1-14 below. The Central Works is included here as this is how the CSIR conduct their monitoring. The outfalls are situated about 12 km apart off the Bluff/Merewent area of Durban, and discharge effluent at a depth of about 43–53 m in the case of the Central Works outfall (about 3.2 km off the shoreline) and about 54–64 m in the case of the Southern Works outfall (about 4.2 km off the shoreline).

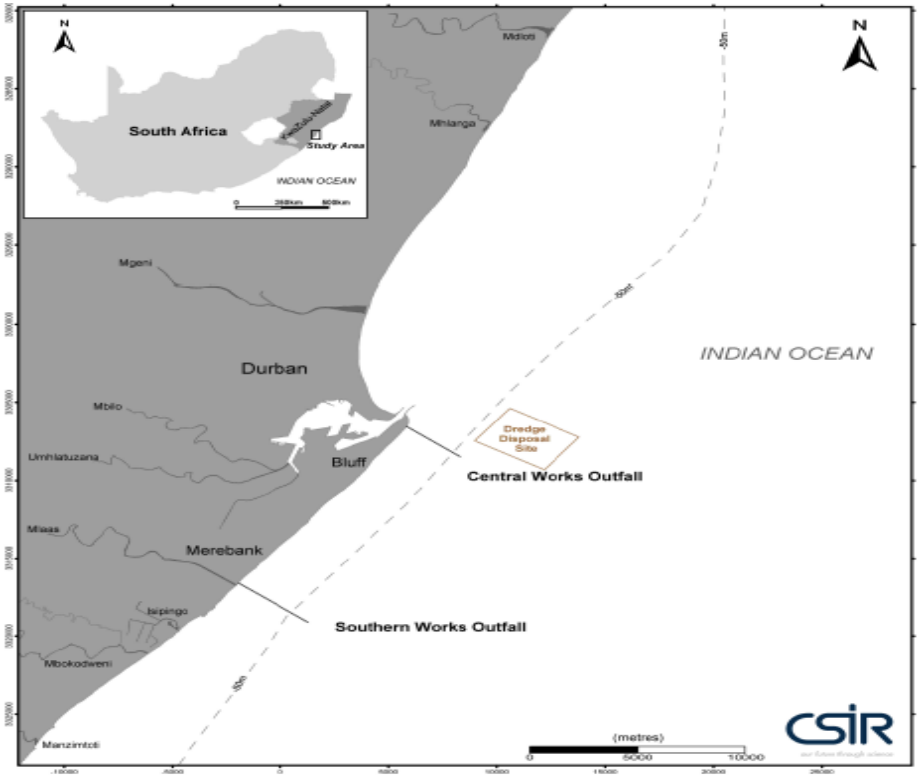
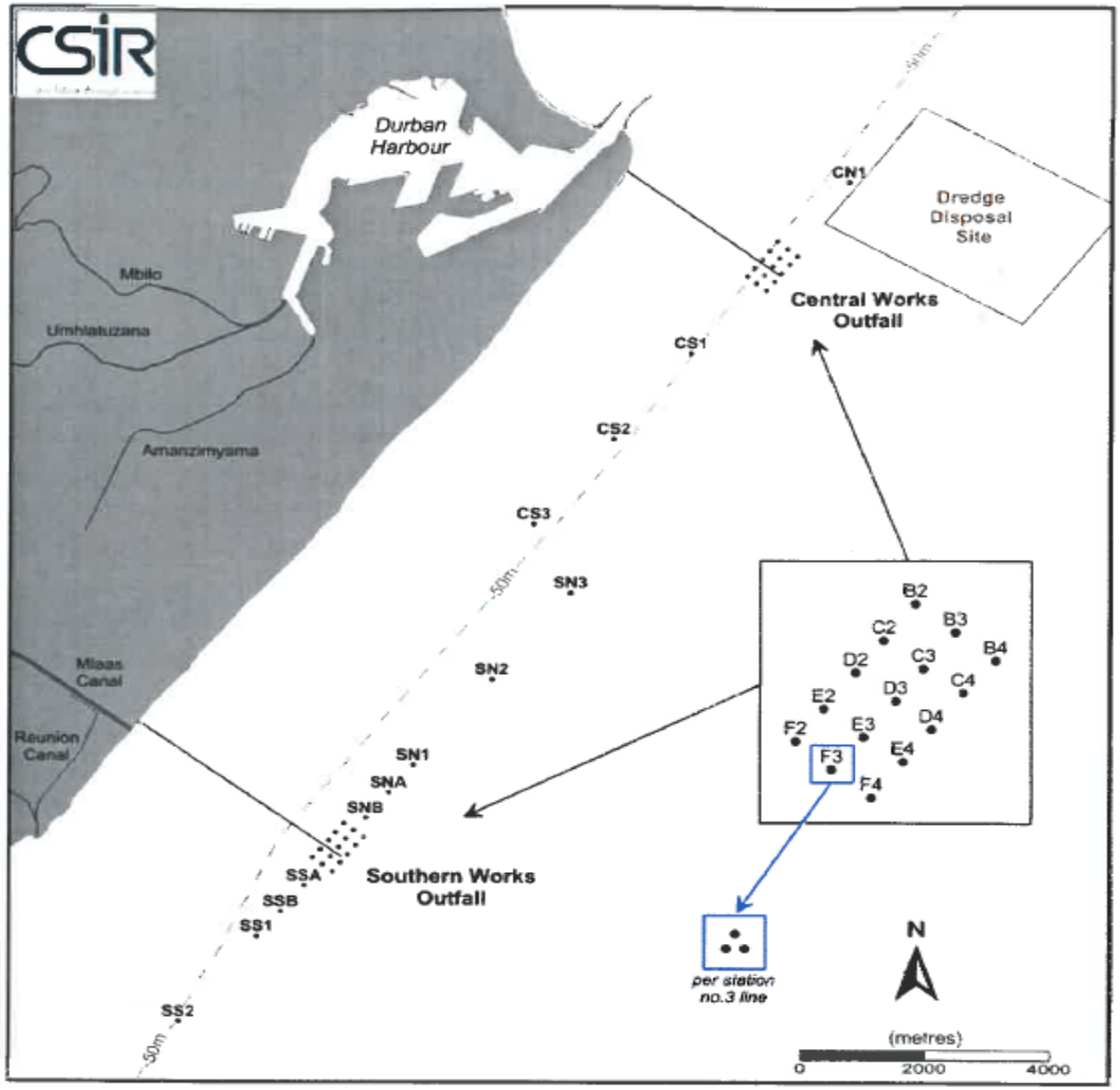


Figure 1-14 Location of the central Works outfall and the southern Works outfall

1.1.6.1 Monitoring Points

The CSIR assessment (CSIR 2014 [report for surveys undertaken in 2013]) entailed sampling of final the effluent from the Central Works and Southern Works wastewater treatment facilities. Water samples were collected from the surface, middle and bottom of the water column at the margin of the zone of dilution for the

two (2) Works. The sampling design was characterised by single stations and reference sites; both selected in a region situated between 2000m to 6000m to the



northeast and southwest of the outfall diffusers.

Figure 1-15: Sampling points of the CSIR sea outfall water quality monitoring (CSIR, 2013/2014)

The SWWTW outfall had two (2) single stations (SW2 and SW5) and five (5) reference points (SS1, SS2, SN1, SN2, SN3), while the Central Works had two (2) single stations (CW2 and CW5) and four (4) reference points (CN1, CS1, CS2 and CS3). The zone of initial dilution taken for the Central Works and SWWTW was about 144m and 177m respectively. Figure 1-15 presents a map showing the monitoring positions, while Table 1-3 shows the variables measured *in situ* and in water samples collected.

Table 1-3: Water quality variables measured in situ and in water samples for the 2013 survey of the Durban outfalls monitoring programme

Class	Variable (*in situ*)	Class	Variable (water sample)	Class	Variable (water sample)
Conventional	Temperature Salinity pH Dissolved oxygen Turbidity Chlorophll-a	*Conventional* *Nutrients* *Bacteria*	Total suspended solids Ammonia Nitrite Nitrate+Nitrite Orthophosphate Silica Faecal coliforms Faecal streptococci	*Toxicity testing* *Metals*	Sea urchin fertilization Arsenic Cadmium Copper Chromium Manganese Mercury Nickel Lead Zinc

Some of the results recorded from the CSIR (2013/ 2014) water quality monitoring of the SWWTW outfall are summarised hereunder.

- Values and concentrations of the majority of physical and chemical variables were found to be compliant with the South African Water Quality Guidelines for Coastal Marine Waters (Natural Environment) (DWAF, 1995.)
- Non-compliances in pH, Dissolved Organics (DO) and Zinc were observed at some of the sites.
- The zinc concentration in the bottom water at one of the sites (SW5) was found to be substantially higher than concentrations at other sites, and exceeded the water quality guideline of 25mg.ℓ^{-1}.
- Analysis of benthic macrofaunal community structure and composition provided clear evidence that the sea bed near the SWWTW outfall is enriched with particulate organic matter, characterised by lower diversity and large quantity of opportunist, pollution tolerant organisms, as reported on in the 2011/2012 report which formed the base motivation for undertaking the upgrades to the SWWTW. The chemical oxygen demand, manganese and zinc were found to be the most influential in driving biological variability at the SWWTW outfall sites.

Refer to Appendix F1 for the full CSIR report.

Further to the CSIR monitoring of sea outfall effluent, the EWS' current chemical analysis of the effluent disposed of to sea undertakes to monitor the following:

- Ammonia (free) (mg/l N)
- Arsenic (ug/l)
- Cadmium (ug/l)

- Calcium (mg/l)
- Chloride (mg/l)
- Chrome (ug/l)
- COD (mg/L O2)
- Conductivity (mS/m)
- Copper (mS/m)
- Copper (ug/l)
- Cyanide (mg/l)
- Lead (ug/l)
- Magnesium (mg/l)
- Mercury (ug/l)
- Nickel (ug/l)
- Nitrate + Nitrite (mg/l N)
- Ortho phosphate (mg/l P)
- pH
- Potassium (mg/l)
- PV4 (mg/L O2)
- Selenium (ug/l)
- Settlable solids (ml/l)
- Sodium (mg/l)
- Sulphate (mg/l)
- Sulphide (mg/l)
- Suspended solids (mg/l)
- Vegetable oils (mg/l)
- Zinc (ug/l)

1.1.6.2 CSIR Durban Outfalls Report – Previous years

2012

The CSIR produced a report in 2012, as a follow- on report back to the previous year's report. The main objectives remain the same. The most relevant portions of the report are reproduced hereunder.

Metals were more frequently detected at concentrations exceeding the method detection limit and, with few exceptions, at higher concentrations in Southern Works final effluent. In fact, metals in Central Works final effluent were usually at concentrations below the method detection limit. This difference makes sense considering the bulk of the wastewater handled by the Southern Works wastewater treatment facility is derived from industry while that handled by the Central Works wastewater treatment facility is mostly of a domestic nature. Relatively few (<35%) of the organic chemicals analysed were detected in final effluent from either wastewater treatment facility at concentrations exceeding the method detection limit.

The Southern Works effluents showed Minimum Acceptable Toxicant Dilutions (MATD) ranging from 26 to 225, the latter being the only exceedance of 200. MATD is as determined from the fertilisation success of gametes of the sea urchins *Echinometra mathaei* and *Tripneustes gratilla* exposed to serial dilutions of the effluent. In fact, MATD in 7 of the 12 tests were lower than 100. This indicates there was little risk of toxicity beyond the zone of the initial dilution for this outfall, which has lowest theoretical minimum initial dilution of 261. The variability in MATD for Central Works effluents was high, ranging from 30 to 252, with the latter exceeding the lowest theoretical minimum initial dilution of 229 for this outfall.

Of the various physical, chemical and biological variables measured *in-situ* at the margin of the zone of initial dilution for the Central Works and Southern Works outfalls; none showed anomalies that could confidently be attributed to effluent discharge. Faecal indicator bacteria counts provided the clearest effluent signal. None of the water samples was found to be toxic to sea urchin gametes, with the exception of the middle and bottom water samples collected at a site situated 4,000 m to the southwest of the Southern Works outfall diffuser. The magnitude of toxicity was however deemed to be very low.

The findings of the 2012 survey of the Durban outfalls monitoring provide clear evidence that the discharge of effluent has impaired sediment quality in the vicinity of the diffuser sections of the Central Works and Southern Works outfalls. The impacts were, however, more frequent and of a greater spatial extent and severity in the vicinity of the Southern Works outfall. Sediment near both outfalls was characterised by high faecal indicator bacteria colony forming unit counts. In fact, faecal indicator bacteria were detected at all sites, including the reference sites, providing evidence that effluent was impinging on the benthic environment across the study area.

Univariate and multivariate analysis of benthic macrofaunal community structure and composition for the 2012 survey of the Durban outfalls monitoring programme provided clear evidence that the seabed near the Southern Works outfall is enriched with particulate organic matter. The benthic macrofaunal community in the vicinity of the outfall diffuser has been modified because of this enrichment. Comparison to previous surveys reveals a gradual increase in this effect over the past 13 years. However, data for the 2012 survey indicates a marked improvement compared to surveys previous to that.

The 2012 Outfalls Report analyses and discusses the physical, chemical and biological characteristics of the water column near the Central Works and Southern Works outfalls as measured on a single occasion in May 2013. The major objectives were to (1) determine whether effluent signals were evident in the marine receiving environment, and (2) to determine whether water quality at and beyond the margin of the zone of initial dilution was compliant with the South African Water Quality Guidelines for Coastal Marine Waters (Natural Environment) (DWAF, 1995) at the time of monitoring.

2011

The toxicity of final effluent from Central Works wastewater treatment facility was often higher than the toxicity of final effluent from the Southern Works wastewater treatment facility. This was contrary to expectation considering that the Southern Works wastewater treatment facility receives a high volume of industrial effluent, which was expected to reveal in a higher toxicity. Problems experienced at the Central Works wastewater treatment facility may be a reason for the generally higher and more variable toxicity recorded for final effluent from this facility.

With regards to water quality, of the various physical, chemical and biological variables measured in-situ at the margin of the zone of initial dilution for the Central Works and Southern Works outfalls; none showed anomalies that could confidently be attributed to effluent discharge. Faecal indicator bacteria counts provided the clearest effluent signal. None of the other indicators measured provided signals that could confidently be attributed to effluent discharge. None of the water samples was toxic to sea urchin gametes.

The findings of the 2011 survey of the Durban outfalls monitoring provide clear evidence that the discharge of effluent has impaired sediment quality in the vicinity of the diffuser sections of the Central Works and Southern Works outfalls. The impacts were, however, more frequent and of a greater spatial extent and severity in the vicinity of the Southern Works outfall. Sediment near both outfalls was characterised by high faecal indicator bacteria colony forming unit counts. In fact, faecal indicator bacteria were detected at all sites, including the reference sites, providing evidence that effluent was impinging on the benthic environment across the study area.

Sediment near the Southern Works outfall and to a far lesser degree and extent at the Central Works outfall was enriched with particulate organic matter. This has presumably caused the higher chemical oxygen demand of sediment near both outfalls as compared to reference sites, although once again the effects were more pronounced near the Southern Works outfall. At the Southern Works outfall, the accumulation of organic matter and the associated chemical and probably also biological oxygen demand clearly exceeded the rate of re-ventilation of the sediment with dissolved oxygen. This is evident in the strong aroma of hydrogen sulphide and discolouration of the sediment.

Univariate and multivariate analysis of benthic macrofaunal community structure for the 2011 survey of the Durban outfalls monitoring programme provides clear evidence that the seabed near the Southern Works outfall is enriched with particulate organic material. Benthic macrofaunal community structure in close proximity to the outfall has been modified because of this enrichment. While this impact is not considered to pose an immediate ecological threat, its expansion is cause for concern and should be accounted for in management considerations.

1.2 Socio-economic factors

1.2.1 Heritage and Cultural Value

All proposed upgrades of this project are located in an area that has been subject to many decades of industrial development, including environmental disturbance on a substantive scale, such as the construction of the uMlazi River Canal immediately to the south.

The proposed development area has high paleontological sensitivity requiring a field assessment and protocol for finds. However, Amafa aKwaZulu-Natali has indicated that this recommendation depends on the nature of the development and the environment and it is the responsibility of the heritage practitioner to assess the likelihood of impacts on paleontological remains (J van Vuuren pers. comm.). Please refer to section **Error! Reference source not found.** for detailed heritage findings.

1.2.2 Socio-Economic Profile of the Receiving Environment

1.2.2.1 Brief Overview of the History of Human Settlement in the Merebank Area

Between November 1860 and 1911 nearly 152,184 indentured workers from across India arrived in Durban. By 1910, approximately 26.85% indentured men returned to India, but most (close to three-quarters) chose to stay and thus constituted the forbearers of the majority of present-day South African Indians.

Indentured labourers had to be given accommodation by their employers; however, they had to find their own way after indenture. Those who turned to agriculture usually stayed on the land which they were renting. The government realised that there was an escalating housing problem and thus set aside several locations for Indians in areas around the then 'Natal.' The main areas that Indians were allowed to occupy were beyond the Umgeni River, in Riverside and Prospect Hall and further inland at Duikerfontein and Sea Cow Lake. Springfield and Sydenham were also predominantly Indian. Indians also settled in areas such as Mayville, Cato Manor, Clairwood and Magazine Barracks, and the Bluff.

By 1936, approximately 20% of Indians owned houses in Durban that were made of brick, stone, or concrete, with the rest living in wood and iron structures. By the 1940's the Pegging Acts of 1942–43 and the Ghetto Act of 1946 were passed. The Ghetto Act specifically gave the government the right to remove and destroy shacks and homes in some areas under the pretext of improving unsanitary living conditions.

The Ghetto Act paved the way for the Group Areas Act passed in 1950, which proclaimed certain areas 'White'. This meant that the non-White communities who found themselves in these areas would have to be moved to other areas designated as 'Indian', 'Coloured', or 'African'. Therefore, Indian residents in Durban, like all non-White South Africans, were segregated by race.

By the 1950's Indians were removed from the residential areas of Mayville, Cato Manor, Clairwood and Magazine Barracks, and the Bluff. One of the areas they were resettled to, had, over time purpose-built houses replacing the poor settlements.

By the late 1950's a reconstructed Merebank offered cheap houses for which the purchaser had ten years to pay (http://www.sahistory.org.za/indian-community).

1.2.2.2 The South Durban Basin and its Health Challenges

The South Durban Basin (SDB) is an area approximately 4 km wide and 24 km long, extending from the Durban Central Business District (CBD) southward toward Umbogintwini. In present day, it contains a mixture of industrial (including heavy industry, chemical storage facilities, sewage works and a number of smaller industries) and residential areas in close proximity to each other. This was allowed to develop as a result of poor planning practices.

The SDB is also a focal point of major transport routes, including highways and a harbour.

Communities in the SDB started to express concern about deteriorating air quality as far back as the 1960's, and efforts intensified in the 1980's and 1990's as air quality deteriorated even further. Persistent complaints to Government about high pollution level, odours, chemical leaks, flares, visible emissions and health complaints ultimately led to a national response to the problem.

The Minister of Environmental Affairs and Tourism at the time (Mr Valli Moosa), decided that "*the peculiarities and worrying levels of pollution in the South Durban area warranted a singular and co-ordinated approach from Government*."

Various issues of concern were debated between representatives of government, industry and community and a way forward to addressing the pollution 'hot spot' problem was formulated. Subsequent to that the South Durban 'Multi-point Plan" was officially announced by the Minister in November 2000.

There are many ‘key achievements’ noted in the South Durban Basin Multi-Point Plan Case Study report (October 2007), but for the purpose of highlighting health issues the following is extracted:

“*Health risk and epidemiological study completed in June 2006. Results indicated higher air pollution concentrations were associated with reduced lung function in children with asthma. Children attending school in south Durban had an increased risk of persistent asthma compared to those in the north, while adults residing in the south had a higher incidence of hay fever than their northern counterparts.*”

There are many ‘problem areas and outstanding issues’ also noted in the report, but for the purpose of highlighting health issues the following is extracted:

“*There are no noticeable odour reductions and no indication of improvements in Volatile Organic Carbons (VOC’s) and other chemicals, despite activities to reduce VOC emissions.*”

1.2.2.2.1 Health Study and Risk Assessment for Durban South Multipoint Plan (Feb 2007)

The broad objectives of the study were:

- To determine the health status of the south Durban residents, with specific reference to respiratory health outcomes and other chronic diseases and to determine the relationship between environmental pollution, those identified health outcomes and the quality of life within the community, particularly among susceptible populations; and
- To describe the range of ambient exposures and to assess the potential risks posed by such exposure to the health of the community in the south of Durban.

The purpose of the Health Risk Assessment (HRA) was to estimate the effects of ambient air pollutants on human health, emphasising chronic or long term impacts (for example cancer) due to inhalation exposures.

The assessment was considered to be a screening level risk assessment.

The risk assessment and its supporting information identify a number of toxic contaminants. The study states that it:

“*identified a number of toxic contaminants of potential concern that warrant attention due to health risks including cancer and non-cancer effects*” (Page 71, Health Study and Risk Assessment).

A site visit of the directly impacted areas was undertaken by the social specialist in March 2014. Plates 5-8 below depict the surroundings of the study area.

Figure 1-16: Plates 5 to 8: Residences en route to SWWTW (5), road to SWWTW (6), formal developed homes in close proximity to SWWTW (7), and the potentially affected beach area (8)

APPENDIX C: ENVIRONMENTAL AUTHORISATION

COASTAL WATERS DISCHARGE PERMIT

WATER USE LICENSE

PERMITS

To be inserted once issued

APPENDIX D: APPROVED LAYOUT PLAN

To be inserted once issued

APPENDIX E: DECLARATION OF UNDERSTANDING AND ADOPTION OF THE EMPR

DECLARATION OF UNDERTANDING OF THE ENVIRONMENTAL MANAGEMENT PROGRAMME

DEVELOPER: ETHEKWINI MUNICIPALITY

I, _____

representing _____

declare that I have read and understood the contents of the Environmental Specifications (which include the Environmental Management Programme, the Environmental Authorisation, the Project Specifications and this guideline document) for Contract _____

_____

I also declare that I understand my responsibilities in terms of enforcing and implementing the Environmental Specifications for the aforementioned Contract.

Signed: _____

Place: _____

Date: _____

Witness 1: _____

Witness 2: _____

DECLARATION OF UNDERTANDING OF THE ENVIRONMENTAL MANAGEMENT PROGRAMME

CONSULTING ENGINEER: AECOM

I, _____

representing _____

declare that I have read and understood the contents of the Environmental Specifications (which include the Environmental Management Programme, the Environmental Authorisation, the Project Specifications and this guideline document) for Contract _____

_____

I also declare that I understand my responsibilities in terms of enforcing and implementing the Environmental Specifications for the aforementioned Contract.

Signed: _____

Place: _____

Date: _____

Witness 1: _____

Witness 2: _____

DECLARATION OF UNDERTANDING OF THE ENVIRONMENTAL MANAGEMENT PROGRAMME

PRINCIPAL CONTRACTOR

I, _____

representing _____

declare that I have read and understood the contents of the Environmental Specifications (which include the Environmental Management Programme, the Environmental Authorisation, the Project Specifications and this guideline document) for Contract _____

_____

I also declare that I understand my responsibilities in terms of enforcing and implementing the Environmental Specifications for the aforementioned Contract.

Signed: _____

Place: _____

Date: _____

Witness 1: _____

Witness 2: _____

DECLARATION OF UNDERTANDING OF THE ENVIRONMENTAL MANAGEMENT PROGRAMME

SUB-CONTRACTOR

I, _____

representing _____

declare that I have read and understood the contents of the Environmental Specifications (which include the Environmental Management Programme, the Environmental Authorisation, the Project Specifications and this guideline document) for Contract _____

_____

I also declare that I understand my responsibilities in terms of enforcing and implementing the Environmental Specifications for the aforementioned Contract.

Signed: _____

Place: _____

Date: _____

Witness 1: _____

Witness 2: _____

DECLARATION OF UNDERTANDING OF THE ENVIRONMENTAL MANAGEMENT PROGRAMME

ENVIRONMENTAL CONTROL OFFICER

I, _____

representing _____

declare that I have read and understood the contents of the Environmental Specifications (which include the Environmental Management Programme, the Record of Environmental Authorisation, the Project Specifications and this guideline document) for Contract _____

_____

I also declare that I understand my responsibilities in terms of enforcing and implementing the Environmental Specifications for the aforementioned Contract.

Signed: _____

Place: _____

Date: _____

Witness 1: _____

Witness 2: _____

APPENDIX F: STORMWATER MANAGEMENT PLAN

To be inserted once complete

APPENDIX G: PRIMARY ACTIONS REQUIRED BY THE CONTRACTOR FOR COMPLIANCE WITH THE EMPR

PRIMARY ACTIONS REQUIRED BY THE CONTRACTOR FOR COMPLIANCE WITH THE EMPr

1. PRIOR TO COMMENCEMENT

1.1 Method Statements

Where relevant, method statements, shall be provided by the Contractor within fourteen (14) days of receipt of the Letter of Acceptance. All activities, which require method statements may only commence once the method statements have been approved by the ECO/ Developer.

1.2 Environmental Awareness Course

The Contractor shall organise and finalise the logistics and date of the Environmental Awareness Course with the ECO/ Developer before the commencement date.

2. INITIAL TWO WEEKS AFTER COMMENCEMENT

2.1 Demarcation of the Site

Where required, one of the first actions to be undertaken by the Contractor shall be to erect and maintain a temporary fence along the boundaries of the Site camp, and around any no-go areas, to the satisfaction of the ECO/ Developer.

2.2 Environmental Awareness Course

The Contractor shall ensure all management staff attends the awareness course to be held in or before the first week after the commencement date.

2.3 Follow-on from the Environmental Awareness Course

The Contractor shall be responsible for ensuring that the information presented at the course along with the requirements in the EMPr are presented to the rest of his staff including all labour and mechanical staff as well as to Sub-contractors and their staff. During construction, if new personnel will be coming onto Site, the Contractor shall be responsible for providing awareness training and induction, thus ensuring that these personnel are aware of the environmental specifications on Site.

2.4 Method Statement Awareness

Where applicable, the Contractor shall provide job-specific training on an *ad hoc* basis when workers are engaged in activities, which require method statements.

3. DURING THE CONSTRUCTION PERIOD

3.1 Copy of the EMPr and Familiarisation

A copy of the EMPr and its relevant Project Specification clauses shall be available on Site, and the Contractor shall ensure that all the personnel on Site (including Sub-contractors and their staff) as well as suppliers, are familiar with and understand the specifications contained in the EMPr.

3.2 Method Statements

Other Method Statements, which are required during construction, must be submitted to the Developer for approval 14 days prior to the proposed commencement of the activity. This may include emergency construction method statements.

3.3 Watchmen

Where applicable, the Contractor shall ensure that a watchman is present on Site during all non-working hours, including public holidays.

3.4 Materials Handling, Use and Storage

The Contractor shall ensure that any materials delivery drivers are informed of all procedures and restrictions (e.g. which access roads to use, no-go areas, speed limits, noise, etc.) required by the EMPr before they arrive at Site and off load any materials.

4. AFTER CONSTRUCTION IS COMPLETE

4.1 Site Clean Up

The Contractor must clear and clean the Site and ensure that everything not forming part of the Permanent Works is removed from Site.

4.2 Revegetation and Rehabilitation

The Contractor must be responsible for rehabilitating and revegetating all areas to the satisfaction of the ECO/ Developer as detailed in the Revegetation Specification and project specifications.

APPENDIX H: EXAMPLE OF A WEEKLY CHECKLIST FOR THE CONTRACTOR'S ENVIRONMENTAL OFFICER

CONTRACTORS ENVIRONMENTAL OFFICER WEEKLY CHECKLIST
(Example)

Contract: _____

ENVIRONMENTAL ASPECT	YES/NO (✓or X)	COMMENTS
All new personnel on site are aware of the content of the EMPr and have been through the environmental awareness course.		
Contractor's camp is neat and tidy and the labourer's facilities are of an acceptable standard.		
Sufficient and appropriate fire fighting equipment is visible and readily available in the appropriate places, e.g. next to the fuel depot or where "hot work" is underway.		
Waste control and removal system is being maintained.		
Boundary and other fences are being maintained.		
Drip trays are being utilised where there is a risk of incidental spillage.		
Bunds/ drip trays are being emptied on a regular basis (especially after rain).		
No leakages are visible from construction vehicles.		
Refuelling of vehicles is occurs within the workshop or, if outside the workshop, drip trays are being used.		
No-go areas remaining natural features and trees have not been damaged.		
Dust control measures (if necessary) are in place and are working effectively.		
Erosion and stormwater control measures (if necessary) are in place and are effective in controlling erosion.		
Stockpiles of topsoil are located within the boundary of the site, do not exceed 2 m in height and are protected from erosion.		
Spoil stockpiles are located within the boundary of the		

site, do not exceed 2 m in height and are protected from erosion.		

Completed by: _____

Sign: _____

Date: _____

APPENDIX I: EXAMPLE OF A MONTHLY CHECKLIST FOR THE CONTRACTOR'S ENVIRONMENTAL OFFICER

CONTRACTORS ENVIRONMENTAL OFFICER MONTHLY CHECKLIST
(Example)

Contract: _____

NO.	ENVIRONMENTAL ASPECT	YES/NO (✓or ✗)	COMMENTS
1	Construction sites are demarcated or fenced.		
2	No stockpiling outside demarcated construction site.		
3	Soil/ sand stockpiles are stabilised.		
4	Stockpiles are not higher than two (2) meters.		
5	Fencing of trees and sensitive features is up to date.		
6	No protected trees or features are disturbed or damaged.		
7	Fencing as above is maintained and checked.		
8	No material or equipment is left inside fenced off areas.		
9	All site staff are environmentally inducted.		
10	A safety officer has been appointed on site.		
11	First aid is available on site.		
12	Site and safety officer qualified in a basic first aid.		
13	Emergency telephone numbers are displayed on site.		
14	All workers in the vicinity of up level works to wear hard hats.		
15	Fire extinguishers (minimum two per site camp).		
16	Additional fire extinguisher required for “hot works”.		
17	Fire extinguisher inspection details available.		
18	Water sources to be used in the case of a fire are known.		
19	Fire extinguishers can be reached (not packed away in containers etc.).		
20	Workers are familiar with fire extinguisher operation.		
21	Cooking fires are cleared with the ECO.		
22	Cooking fires controlled in site camps with fire to prevent spills.		
23	No smoking or cooking close to flammable substances.		

NO.	ENVIRONMENTAL ASPECT	YES/NO (✓or ✗)	COMMENTS
24	Fuels stored in site campus and measures implemented to prevent spills.		
25	Bulk fuel is bunded at 110% of volume.		
26	Bulk fuel bunds are protected from filing with rain water.		
27	At least 1 205 kg spill remediation product on site.		
28	Spill remediation product is being used on any hydrocarbon spills.		
29	One toilet is available for every 10 workers.		
30	Workers do not have to walk more than 100 m to toilets.		
31	Workers are using toilets for their ablutions.		
32	Toilets are clean and hygienic.		
33	Toilets are secure and cannot blow ever.		
34	Toilets do not stand in or near watercourses.		
35	Chemical toilet emptying schedule is available.		
36	No spillage takes place when chemical toilets are empted.		
37	Construction littler (bags, tags, wire, plastic, strapping etc) is removed.		
38	Waste disposal programmes are available.		
39	Bins are emptied regularly according to a program.		
40	At least one worker is nominated each day to collect waste.		
41	Waterproof rubbish pins with secure lids are available on site.		
42	Rubbish bins as above in eating areas and site camps.		
43	Site camps are kept tidy at all times.		
44	Food preparation and eating restricted to site campus and eating areas.		
45	Smoking restricted to site camps and eating areas.		
46	Noise pollution is minimised.		
47	Drip trays used on all fuel driven equipment (pumps, generators, etc.).		
48	Site plant that drips fuel/ oil are not allowed to work.		

NO.	ENVIRONMENTAL ASPECT	YES/NO (✓or ✗)	COMMENTS
49	Drip trays under any leaking plant as above.		
50	Refueling of equipment to be done without fuel spillage.		
51	Hauling tracks have sheeting to prevent material spillage.		
52	Traffic safety implemented when constructing near public roads.		
53	All public road surfaces kept clean of building material, mud and sand.		
54	All site and equipment to be in good working order.		
55	Servicing of vehicles is done in site campus with the necessary drip trays.		
56	Construction water is not allowed to flow off site.		
57	Storm water flows are not obstructed.		
58	Temporary stormwater attenuation structures are being maintained and are functioning appropriately.		
59	Workers do not enter sensitive, fenced or no go areas.		
60	Not site staff are allowed into sensitive areas.		
61	Any historical or pre historical finds are reported to ECO.		
62	Any animals naturally reported on site are rescued (notify ECO).		
63	Where required indigenous plants are rescued.		
64	Where possible topsoil is stockpiled for later re-use.		
65	Cleared areas are stabilised as required (prevent erosion).		
66	Sand and stone imports do not introduce alien plants.		
67	Building materials are prepared in bunded batching plants.		
68	Concrete batching plants make provision for contaminated water.		
69	Sediments are allowed to settle before water is released.		
70	Contaminated water is pumped into conservancy tanks.		
71	Concrete batching plants are inspected by the ECO.		

NO.	ENVIRONMENTAL ASPECT	YES/NO (✓or ✗)	COMMENTS
72	On-site concrete mixing is done in mixing pans.		
73	Shutter boards are not oiled on mixing grounds.		
74	Unnecessary concrete spills do not take place (e.g., off mixing pans).		
75	Sedimentation ponds available for concrete batching plants.		
76	No detergents to be allowed to enter natural water systems.		
77	Erosion to be prevented by stabilisation in consultation with the ECO.		
78	Dust production to be minimised.		
79	Dust control by water or surface coverage must be implemented.		
80	Danger tape to be used around all open excavations.		
81	Used equipment to be removed off site.		
82	Site access is controlled.		
83	Regular working hours are kept on site.		
84	Register of all site accidents are kept.		
85	Register of public complaints is being kept.		
86	No pets are allowed on site.		
87	Residents activities are not disrupted or disturbed .		
88	Disturbance to adjacent residents is minimised.		
89	Adjacent residents and .offices notified of activities such as blasting.		
90	Copy of Environmental Management Programme on site in an up to date Environmental File.		
91	Sub-contractors aware of environmental management process.		
92	Sub-contractors workers have been environmentally inducted.		
93	Sub-contractors aware of the prescriptions in the EMPr.		
94	Environmentally sensitive matters are reported to the ECO.		
95	ECO contact number available on site.		
96	Requested Method Statements handed to ECO.		

NO.	ENVIRONMENTAL ASPECT	YES/NO (✓or ✗)	COMMENTS
97	Works take place according to approved Method Statements.		
98	Site notes from Developer are adhered to.		
99	Environmental Site Meetings are attended.		
100	Are you proud of the environmental status of your site?		

Completed by: _____

Sign: _____

Date: _____

APPENDIX J: LIST OF CONSTRUCTION ACTIVITIES REQUIRING METHOD STATEMENTS

LIST OF CONSTRUCTION ACTIVITIES THAT WILL REQUIRE METHOD STATEMENTS

Specified Contractors shall provide method statements for approval by the Developer and ECO prior to work commencing on aspects of the project deemed or identified to be of greater risk to the environment, when called upon to do so by the Developer. Statements from Contractors may be required by the ECO for specific sensitive actions. Construction activities, which shall need a method statement includes, but is not limited to:

ACTIVITY	SPECIFICS
Access Routes and Roads	• Location of proposed temporary access routes • Rehabilitation of temporary access routes
Construction Traffic Safety Plan	• Signage to be erected and management measures to be put in place to ensure safe access and egress of construction traffic
Alien Plant Clearing	• Method of control to be used for the eradication or control of alien vegetation
Blasting	• Details of all methods and logistics associated with blasting (if required)
Borrow Pit	• Establishment and use of any new borrow pit
Cement / Concrete Batching	• Location, layout and preparation of cement/ concrete batching facilities including the methods employed for the mixing of concrete including the management of runoff water from such areas
Emergency	• Emergency construction Method Statements
Environmental Awareness Course	• Logistics for the environmental awareness course for all the Contractor's employees • Logistics for the environmental awareness course for the Contractor's management staff
Fire, Hazardous and Poisonous substances	• Handling and storage of hazardous waste • Emergency spillages procedures and compounds to be used • Emergency procedures for fire • Use of herbicides, pesticides and other poisonous substances • Methods of the disposal of hazardous building materials, including asbestos, fibre claddings, refrigerants and coolants.
Fuels and Fuel Spills	• Methods of refuelling vehicles and plant • Details of methods for fuel spills and clean up operations
Stormwater management	• Construction site drainage design and management and layout and preparation of temporary sediment retention structures as well as additional methods of erosion control, including erosion of spoil materials
Site Establishment	• Layout and preparation of the construction camp • Method of installing fences required for 'no go' areas, working

Dust Prevention	• Measures proposed to prevent dust from affecting visibility along adjacent provincial roads
Sources of materials	• Details of materials imported to the site (where applicable)
Vegetation clearing	• Method of vegetation clearing during site establishment

Changes to the way the works are to be carried out must be reflected by amendments to the original approved Method Statement; amendments require the signature of the ECO and the Developer, denoting that the changed methodology or works are necessary for the successful completion of the works, and are environmentally acceptable. The Contractor will also be required to sign the amended Method Statement thereby committing him/ herself to the amended Method Statement. All method statements shall form part of the EMPr documentation and are subject to all terms and conditions contained in the EMPr.

Note that a method statement is a point of departure for understanding the nature of the intended actions to be carried out and allows for all parties to review and understand the procedures to be followed in order to minimise risk of harm to the environment. Changes to, and adaptations of, method statements can be implemented with the prior consent of all parties.

A method statement describes the scope of the intended work in a step-by-step description in order for the Developer and ECO to understand the Contractors intentions. This shall enable them to assist in devising any mitigation measures, which would minimise environmental impact during these tasks. For each instance where it is requested that a Contractor submit a method statement to the satisfaction of the Developer and ECO, the format should clearly indicate the following:

What - a brief description of the work to be undertaken;
How - a detailed description of the process of work, methods and materials;
Where - a description/sketch map of the locality of work (if applicable); and
When - the sequencing of actions with due commencement dates and completion date estimates.

The Method Statement can only be implemented once approved by the ECO and Developer.

The Contractor (and, where relevant, any sub-contractors) must also sign the Method Statement, thereby indicating that the works will be carried out according to the methodology contained in the approved Method Statement.

The ECO will use the Method Statement to audit compliance by the Contractor with the requirements of the approved Method Statement.

This Method Statement must contain sufficient information and detail to enable the Developer and ECO to apply their minds to the potential impacts of the works on the environment. The Contractor will also need to thoroughly understand what is required of him/ her in order to undertake the works.

The page overleaf provides a pro forma method statement sheet, which needs to be completed for each activity requiring a method statement in terms of the EMPr.

METHOD STATEMENT PROFORMA

CONTRACT: _____ DATE: _____

PROPOSED ACTIVITY (give title of method statement and reference number from the EMPr):

WHAT WORK IS TO BE UNDERTAKEN (give a brief description of the works)?

WHERE ARE THE WORKS TO BE UNDERTAKEN (where possible, provide an annotated plan and a full description of the extent of the works):

START AND END DATE OF THE WORKS FOR WHICH THE METHOD STATEMENT IS REQUIRED:

Start Date:

End Date:

HOW THE WORKS ARE TO BE UNDERTAKEN (provide as much detail as possible, including annotated sketches and plans were possible):

DECLARATIONS

1. ENVIRONMENTAL CONTROL OFFICER

The work described in this Method Statement, if carried out according to the methodology described, is satisfactory and mitigated to prevent avoidable environmental harm:

_____ _____

(Signed) (Print Name)

Dated:_____

2. PERSON UNDERTAKING THE WORKS

I understand the contents of this Method Statement and the scope of the works required of me, I further understand that this Method Statement may be amended on application to other signatories and that the ECO and Developer will audit my compliance with the contents of this Method Statement.

_____ _____

(Signed) (Print Name)

Dated:_____

3. APPROVING AUTHORITY (i.e. PM)

The works described in this Method Statement are approved.

_____ _____

(Signed) (Print Name)

Designation:_____ Dated:_____

APPENDIX K: METHANE MATERIAL SAFETY DATA SHEET

MSDS - Methane

METHANE

MTH

Common Synonyms Marsh gas Natural gas	Gas	Colorless	Musk odor
	Liquid floats and boils on water. Flammable visible vapor cloud is produced		

Stop discharge if possible. Keep people away.
Shut off ignition sources and call fire department.
Stay upwind and use water spray to "knock down" vapor.
Evacuate area in case of large discharge.
Avoid contact with liquid and vapor.
Notify local health and pollution control agencies.

Fire

FLAMMABLE
Flashback along vapor trail may occur.
May explode if ignited in an enclosed area.
Stop discharge if possible.
Cool exposed containers and protect men effecting shutoff with water.
Let fire burn.

Exposure

CALL FOR MEDICAL AID.

VAPOR
Not irritating to eyes, nose or throat.
If inhaled, will cause dizziness, difficult breathing, and loss of consciousness.
Move to fresh air.
If breathing has stopped, give artificial respiration.
If breathing is difficult, give oxygen.

LIQUID
Will cause frostbite.
Flush affected areas with plenty of water.
DO NOT RUB AFFECTED AREAS.

Water Pollution

Not harmful to aquatic life.

1. RESPONSE TO DISCHARGE

(See Response Methods Handbook)
Issue warning-high flammability
Restrict access
Evacuate area

2. LABEL

2.1 Category: Flammable gas
2.2 Class: 2

3. CHEMICAL DESIGNATIONS

3.1 **CG Compatibility Class:** Paraffin
3.2 **Formula:** CH_4
3.3 **IMO/UN Designation:** 2.1/1971
3.4 **DOT ID No.:** 1971
3.5 **CAS Registry No.:** 74-82-8

4. OBSERVABLE CHARACTERISTICS

4.1 **Physical State (as shipped):** Liquefied gas
4.2 **Color:** Colorless
4.3 **Odor:** Mild, sweet

5. HEALTH HAZARDS

5.1 **Personal Protective Equipment:** Self-contained breathing apparatus for high concentrations; protective clothing if exposed to liquid.
5.2 **Symptoms Following Exposure:** High concentrations may cause asphyxiation. No systemic effects, even at 5% concentration in air.
5.3 **Treatment of Exposure:** Remove to fresh air. Support respiration.
5.4 **Threshold Limit Value:** Not pertinent (methane is an asphyxiant, and limiting factor is available oxygen)
5.5 **Short Term Inhalation Limits:** Data not available
5.6 **Toxicity by Ingestion:** Not pertinent
5.7 **Late Toxicity:** None
5.8 **Vapor (Gas) Irritant Characteristics:** Vapors are nonirritating to the eyes and throat.
5.9 **Liquid or Solid Irritant Characteristics:** No appreciable hazard. Practically harmless to the skin, because it evaporates quickly, but may cause some frostbite.
5.10 **Odor Threshold:** 200 ppm
5.11 **IDLH Value:** Data not available

6. FIRE HAZARDS

6.1 **Flash Point:** Flammable gas
6.2 **Flammable Limits in Air:** 5.0%-15.0%
6.3 **Fire Extinguishing Agents:** Stop flow of gas
6.4 **Fire Extinguishing Agents Not to be Used:** Water
6.5 **Special Hazards of Combustion Products:** None
6.6 **Behavior in Fire:** Not pertinent
6.7 **Ignition Temperature:** 1004°F
6.8 **Electrical Hazard:** Class I, Group D
6.9 **Burning Rate:** 12.5 mm/min
6.10 **Adiabatic Flame Temperature:** 2326 (Est.)
6.11 **Stoichiometric Air to Fuel Ratio:** 17.16 (Est.)
6.12 **Flame Temperature:** Data not available

7. CHEMICAL REACTIVITY

7.1 **Reactivity With Water:** No reaction
7.2 **Reactivity with Common Materials:** No reaction
7.3 **Stability During Transport:** Stable
7.4 **Neutralizing Agents for Acids and Caustics:** Not pertinent
7.5 **Polymerization:** Not pertinent
7.6 **Inhibitor of Polymerization:** Not pertinent
7.7 **Molar Ratio (Reactant to Product):** Data not available
7.8 **Reactivity Group:** 31

8. WATER POLLUTION

8.1 **Aquatic Toxicity:** None
8.2 **Waterfowl Toxicity:** None
8.3 **Biological Oxygen Demand (BOD):** None
8.4 **Food Chain Concentration Potential:** None

9. SHIPPING INFORMATION

9.1 **Grades of Purity:** Research grade, pure grade
9.2 **Storage Temperature:** -260°F
9.3 **Inert Atmosphere:** No requirement
9.4 **Venting:** Safety relief

10. HAZARD ASSESSMENT CODE

(Fire Hazard Assessment Handbook)

A-B-C-D-E-F-G

11. HAZARD CLASSIFICATIONS

11.1 **Code of Federal Regulations:** Flammable gas
11.2 **MAS Hazard Rating for Bulk Water Transportation:**

Category	Rating
Fire	4
Health	
Vapor Irritant	0
Liquid or Solid Irritant	0
Poisons	0
Water Pollution	
Human Toxicity	0
Aquatic Toxicity	0
Aesthetic Effect	0
Reactivity	
Other Chemicals	0
Water	0
Self Reaction	0

11.3 **NFPA Hazard Classification:**

Category	Classification
Health Hazard (Blue)	1
Flammability (Red)	4
Reactivity (Yellow)	0

12. PHYSICAL AND CHEMICAL PROPERTIES

12.1 **Physical State at 15°C and 1 atm:** Gas
12.2 **Molecular Weight:** 16.04
12.3 **Boiling Point at 1 atm:** −258.7°F = −161.5°C = 111.7°K
12.4 **Freezing Point:** −296.5°F = −182.5°C = 90.7°K
12.5 **Critical Temperature:** −116.5°F = −82.5°C = 190.7°K
12.6 **Critical Pressure:** 668 psia = 45.44 atm = 4.60 MN/m²
12.7 **Specific Gravity:** 0.422 at −164°C (liquid)
12.8 **Liquid Surface Tension:** 14 dynes/cm = 0.014 N/m at −161°C
12.9 **Liquid Water Interfacial Tension:** (est.) 50 dynes/cm = 0.050 N/m at −161°C
12.10 **Vapor (Gas) Specific Gravity:** 0.55 1.0
12.11 **Ratio of Specific Heats of Vapor (Gas):** 1.308
12.12 **Latent Heat of Vaporization:** 219.4 Btu/lb = 121.9 cal/g = 5.100 X 10⁵ J/kg
12.13 **Heat of Combustion:** −21,517 Btu/lb = −11,954 cal/g = −500.2 X 10⁵ J/kg
12.14 **Heat of Decomposition:** Not pertinent
12.15 **Heat of Solution:** Not pertinent
12.16 **Heat of Polymerization:** Not pertinent
12.25 **Heat of Fusion:** 13.96 cal/g
12.26 **Limiting Value:** Data not available
12.27 **Reid Vapor Pressure:** Very high

NOTES

APPENDIX L: SPILL CONTINGENCY PLAN

1 SPILL CONTINGENCY PLAN

1.1 Intent

A spill contingency plan is required for all undertakings involving the handling and storage of petroleum products or hazardous materials. Spill preventative measures are the best means of avoiding accidental release of fuel which can adversely affect the environment. This plan is intended to prevent spills and, in the event of a spill, to minimize the impact of the spill on the environment. The purpose of this Spill Contingency Plan is to:

- Facilitate the prompt, efficient and safe clean-up of materials spilled during the construction and operational phases during the development; and
- Identify the reporting procedures in the event of a spill.

This spill contingency plan is applicable to all site staff, contractors and service providers, employees and visitors to the site.

1.2 Material Safety Data Sheets

A register with details of all hazardous materials must be included in the Health and Safety File. The supplier of these hazardous materials must provide Material Safety Data Sheets (MSDS) for all products which must be displayed where hazardous materials are stored. The MSDS should include the following information:

- Product and Company Identification;
- Composition/Information on ingredients;
- Hazards Identification;
- First-Aid Measures;
- Fire-fighting measures;
- Handling and storage;
- Exposure control/personal protection;
- Physical and chemical properties;
- Stability and reactivity;
- Toxicological information;
- Ecological information;
- Disposal considerations;
- Transport information;

- Regulatory information; and
- Any other applicable information.

This should be provided free of charge from the supplier. Should a MSDS not be provided, the supplier should issue sufficient information to enable the Contractor to take the necessary measures as regards to health, safety and environmental.

1.3 Handling and Storage

All activities must be appropriately carried out as per the Hazardous Chemical Substances Regulations 1995, Section 14:

Labelling, packaging, transportation and storage

"An employer shall, in order to avoid the spread of contamination of an HCS1, take steps, as far as is reasonably practicable, to ensure:

a) *That the HCS in storage or distributed are property identified, classified and handled in accordance with SABS 072 and SABS 0228;*
b) *that a container or a vehicle in which an HCS is transported is clearly identified, classified and packed in accordance with SABS 0228 and SABS 0229; and*
c) *That any container into which an HCS is decanted is clearly labelled with regard to the contents thereof."*

1.3.1 Hazardous Materials

Hazardous materials should be managed as follows:

- Proper designated areas and storage facilities must be provided for all hazardous materials to prevent spillage into the environment;
- All hazardous materials storage facilities must be located on an impermeable surface and must be enclosed by a sealed bund wall. The bund wall must be capable of containing 110% of the maximum volumes stored to ensure that soil or watercourses are not polluted in the event of a spill in the storage areas;
- Rainwater contained within the bund wall is to be regarded as potentially contaminated and must not be released into the environment, unless it is established by chemical analysis (e.g. COD) that the water is not contaminated;
- Mixing of volumes of bitumen and asphalt cement must take place in a controlled environment on a designated impermeable surface equipped with an SOG trap. The trap must not overflow and the waste captured must be disposed of at a registered landfill site or recycled;

- The Depot Manager must ensure the all Safety, Health and Environmental risks of spills are communicated to all employees. All employees should also receive task specific training for handling of any hazardous material. Casual and contractors labourers' are to be familiarized with all the relevant precautions when they are employed (Occupation Health and Safety Act 85 of 1993, Section 13);
- The Depot Manager should ensure that a site-appropriate spill kit and relevant personal protective equipment (PPE) is readily available in the event of a spill;
- The transfer of fuel must be stopped prior to overflowing, leaving room for expansion;
- All machinery must be maintained in good working order as to prevent soil and groundwater pollution from leaks and spills;
- All hazardous waste must be stored in designated containers and be disposed of at a registered landfill site;
- Vehicles transporting dangerous or hazardous chemicals may only be washed in a designated washing bay, equipped with an SOG trap;
- Smoking must be prohibited near the use of any hazardous material and flammable substances;
- Fire Extinguishers must be readily available where any hazardous materials are being stored or used;
- The area where a spill has occurred must be rehabilitated after the spill has been cleaned up;
- Drip trays should be used under generators and cement/bitumen mixers to shield the soil or vegetation below; and
- Where possible, oil should be recycled.

Most spills are caused by operator error, poor operation practices and inadequate maintenance. Common operator errors are overfilling, valves left open, poor transfer procedures, lack of product monitoring, and poor maintenance practices. Operational errors can be greatly reduced through:

- Task specific training:
  - A list of emergency contacts and numbers for important on-site staff and their roles, chemical spill response agencies, waste companies, and necessary authorities must be displayed and communicated to all employees. A secondary staff member must be appointed to co-ordinate responses to spills and emergencies in the absence of the Depot Manager;
  - Location of spill kits should be communicated to operating personnel as well as other employees;
  - Spill response training will need to be provided for the person(s) that are appointed to attend to spills;
  - Task specific training must be provided for those employees monitoring and handling any hazardous material. Proof of this training should be kept in the Health and Safety File;
  - Safety training at each depot shall include operational procedures, emergency procedures, safe working procedures, information on specific hazards, first aid and fire-fighting, and proper use of PPE;
  - Unauthorized persons shall not be permitted access to storage areas;
  - Instructions and phone numbers shall be posted publicly regarding the report of a spill, particularly in residential areas; and

- Routine sampling schedules (including groundwater monitoring where necessary) must be setup and implemented. A competent person must be appointed to undertake these tasks.

- Awareness of the critical nature of spill prevention:
  - Employees must be educated on the effects of the hazardous substances that are used to the local environment through discharge to stormwater systems, watercourses and beaches;
  - Employees must be educated on the nature of the product with regard to spills – Some of this information should be included in the Material Safety Data Sheet (MSDS); and
  - Employees must be educated on the toxicity of stored fuels and oils to humans, plants and animals. Petroleum contains a mixture of compounds that are hazardous to organism health. (eg. Benzene which are cancer causing agents, Hydrocarbons which are linked to problems ranging from headaches to respiratory diseases.)
- Proper and continuous supervision of procedures:
  - Proper procedures must be in place for handling and storage of the hazardous materials. E.g. Portable equipment (e.g. generators and pumps) should be placed on impervious surfaces, alternatively adequate drip trays need to be provided; and when unreeling a fuel transfer hose, the nozzle must be in an upright position and be kept clear of the ground when returned to the storage position;
  - Workers must know and follow all procedures;
  - All employees must attend the procedural training as procedures may change; and
  - All procedures and records must be checked to verify compliance and record all findings.

2 ENVIRONMENTAL EMERGENCY RESPONSE PLAN

2.1 Intent

The environmental emergency procedures for all sites 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 / stormwater systems) and land;
- Accidental spillage of hazardous substances (typically oil, petrol, diesel and bituminous products);
- Accidental toxic emissions into the air; and
- Specific environmental and ecosystem effects from accidental releases or incidents.

2.2 Response Procedure

In the event of a spill, the following procedure should be followed:

- Isolate and demarcate the area to protect all employees or visitors to the site;
- Immediately contain the spill to the spill area – i.e. ensure that spill does not run/flow away: the most common method is to place either absorbent or non-absorbent dikes around the perimeter of the spill;
- Identify nature of spill, for example paint, bitumen or diesel;
- Identify the source of the spill and stop the leak if possible, and safe to do so;
- Remove any sources of ignition;
- Assess the level of the spill;
- Report spill to ECO and KwaZulu-Natal Department of Economic Development, Tourism and Environmental Affairs (EDTEA);
- Locate spill kit where applicable or wait for the hazmat service provider/fuel company to arrive to assist;
- Consult the Material Safety Data Sheets (MSDSs): MSDS are used to determine the necessary PPE required for a response to spill situations (for example protective suits, boots, gloves and/or respiratory protection);
- Identify method of cleanup and potential hazards;
- Protect stormwater drains or sewers, or any other point of access to the environment;
- Proceed with recovery of spilled fuel and clean up;
- Arrange for the appropriate disposal of the spilled material;
- All hazardous waste must be contained in separated designated containers and disposed of at registered landfill sites;
- In the event of small spills, arrangements for remediation must be made immediately;
- Spills must not be washed off onto the street, into watercourses or stormwater systems. No spills should be hosed into the natural environment;
- Records of the spill must be maintained in an Incidents register with:
  - Nature of incident;
  - Cause of incident;
  - Clean up measures; and
  - Mitigation measures taken.
- Where relevant, record in non-compliance register;
- The Contractor must retain Safe Disposal Certificates for any materials associated with chemicals/chemical spills disposed to landfill, to submit to DEA
- Adjustments should be made, if necessary, to the operational and emergency procedures and the Environmental Management System to prevent future occurrences; and
- In the event of a significant spill, the Contractor is to raise an incident report and report to relevant authorities i.e. DEA, and Department of Water and Sanitation (DWS) should it be required.

2.3 Spill Response Supplies

An emergency spill kit (e.g. Drizit kit) and designated hazardous waste bin must be available and visible at each site. The following supplies should be maintained and records of inspections should be kept at all times:

- Spill kits;
- Sorbents, including hydrocarbon absorbent;
- Absorption pads and booms;
- Personal protective equipment (PPE);
- Caution tape and cones; and
- Tools, particularly a spade or scoop, and drums.

2.4 Notification

A list of the appropriate people to be notified in the event of a spill should be available on site with their contact details.

2.5 Conclusion

Any significant spill has the ability to endanger employees' health or lives, create environmental damage and have a large financial impact. Therefore it is imperative that all the necessary precautions are taken to prevent spillage.