



**Royal
HaskoningDHV**
Enhancing Society Together



Final Environmental Scoping Report:
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**

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Novashni (Sharleen) Moodley

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Bronwen Griffiths

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Malcolm Roods

¹ Items in this **formatting** throughout the document have been changed from the Draft Scoping Report

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Glossary

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.

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.

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.

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.

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.

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.

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 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 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 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 EMP 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 – household water, construction rubble, garden waste and certain dry industrial and commercial waste which does not pose an immediate threat to man or the environment.

Hazardous Waste – waste that may cause ill health or increase mortality in humans, flora and fauna.

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

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

Interested and Affected Party – for the purposes of Chapter 5 of the NEMA and in relation to the assessment of the environmental impact of a listed activity or related activity, means an interested and affected party contemplated in Section 24(4)(a)(v), and which includes - (a) any person, group of persons or organisation interested in or affected by

such operation or activity; and (b) any organ of state that may have jurisdiction over any aspect of the operation or activity.

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

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.

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.

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 should also ensure that only significant issues and reasonable alternatives are examined.

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).

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.

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 shallow water, and which land in normal circumstances supports or would support vegetation typically adapted to life in saturated soil.

Abbreviations and Acronyms

CBD	Central Business District
C-PLAN	Conservation Plan
CSIR	Centre for Scientific and Industrial Research
DAEA	Department of Agriculture and Environmental Affairs
DED TEA	Department of Economic Development, Tourism and Environmental Affairs
DMOSS	Durban Metropolitan Open Space System
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
EKZNW	EzemVelo KwaZulu-Natal Wildlife
ESS	Environmental Scoping Study
ETM	eThekweni Municipality
EWS	eThekweni Water and Sanitation
GHG	Green House Gases
HRA	Health Risk Assessment
I&AP	Interested and Affected Parties
IDP	Integrated Development Plan
IWWMP	Integrated Waste Water Management Plan
MHI	Major Hazardous Installation
NDOHS	National Department of Human Settlements
NDOT	National Department of Transport
NEMA	National Environmental Management Act
NEM:WA	National Environmental Management Waste Act
NEM:AQA	National Environmental Management Air Quality Act
NGO	Non-Governmental Organization
PFD'S	Process Flow Diagram
PoS	Plan of Study
PPP	Public Participation Process
SANBI	South African National Biodiversity Institute
SDB	South Durban Basin
SEA	Strategic Environmental Assessment
SIA	Social Impact Assessment
SR	Scoping Report
SR&TFU	Solids Removal and Treatment Facilities Upgrade
SWMP	Stormwater Management Plan
SWWTW	Southern Waste Water Treatment Works

TRS

Total Reduced Sulphur

USEPA

United States Environmental Protection Act

VOC

Volatile Organic Carbon

PUBLIC REVIEW OF THE FINAL SCOPING REPORT

This Final Scoping Report and PoS for EIA is available for comment for a period of **21 days** from Friday 5 September 2014 until Friday 26 September 2014. This report is essentially the draft Scoping Report previously circulated for comment (from 23 May to 02 July 2014), amended and updated in response to the comments received. The changes or additions made to this report have been **highlighted in teal** for ease of reference, save for minor changes. Copies of this Scoping Report are available at strategic public places in the project area (see below) and upon request from Royal HaskoningDHV.

- ✿ Southern Waste Water Treatment Works, 2 Byfield Road, Merewent,
- ✿ Merebank Library, Bombay Square, 12 Natraj Lane, Merebank, Durban, 4052
- ✿ Royal HaskoningDHV website: www.rhdhv.co.za

OPPORTUNITIES FOR PUBLIC REVIEW

The following methods of public review of the Scoping Report are available:

- ✿ Completing the comment sheet enclosed with the Background Information Document (BID);
- ✿ Written submissions by e-mail or fax; and
- ✿ Telephonic submissions.

DUE DATE FOR COMMENT ON FINAL SCOPING REPORT

26 SEPTEMBER 2014

SUBMIT COMMENTS AND QUERIES TO:

Ms Novashni Sharleen Moodley

Royal HaskoningDHV

6 Payne Street, Pinetown, 3610

Tel: (031) 719 5500

Fax: (031) 719 5505

Novashni.moodley@rhdhv.com



Executive Summary

Project Background and Introduction

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 the land use is closely shared with residential areas.

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 from this site is discharged through outfalls that serve the Central Works and the Southern Works wastewater treatment facilities, which are owned and operated by the eThekweni Municipality. The SWWTW discharges to sea outfall of 4.2 km in length with 34 diffusers discharging at a depth of 54 – 64 m.

The SWWTW receives 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 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 and the Jacobs Trunk Sewer which serves the residential areas of Yellow Wood Park and Woodlands and the industrial areas of Jacobs and Mobeni discharges sewage effluent that is a combination of domestic and industrial in origin. 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.

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.

Regulatory Environmental Requirements

The KwaZulu-Natal Department of Economic Development, Tourism and Environmental Affairs (KZN DED TEA) (formerly known as the KwaZulu-Natal Department Agriculture and Environmental Affairs [KZN DAEA]), is the lead authority for this EIA process and the development needs to be authorised by this Department in accordance with the National Environmental Management Act (NEMA) (as amended).

The Environmental Impact Assessment (EIA) Regulations under the NEMA consist of three (3) categories of activities namely: Listing Notice 1 Activities (GNR. 544 of 2010) which require a Basic Assessment Process, Listing Notice 2 Activities (GNR. 545 of 2010) which require Scoping and EIA for authorisation and Listing

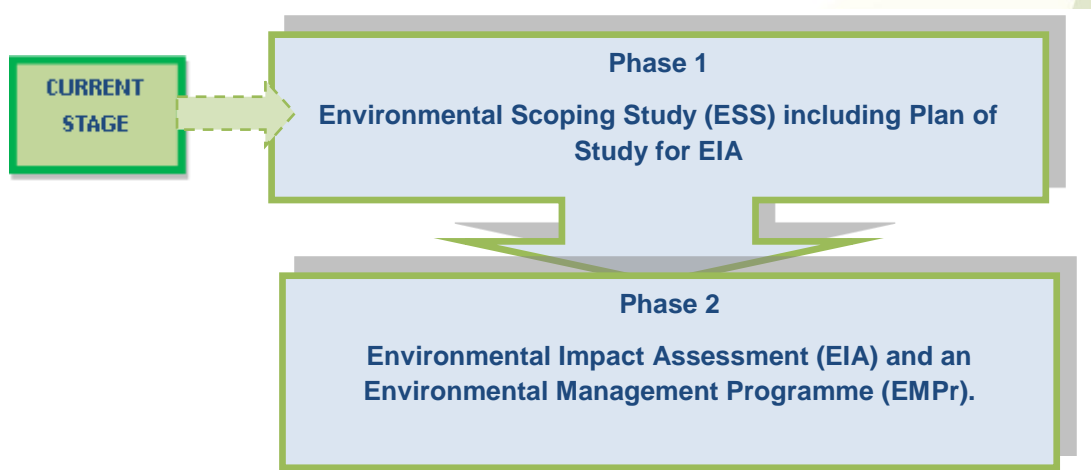
Notice 3 Activities (GNR 546 of 2010) which requires a Basic Assessment process for specific activities in identified sensitive geographical areas.

During November 2013, the EIA Regulations underwent an amendment in conjunction with the waste related regulations. This resulted in the culmination of GNR. 921 of waste related activities and the transfer of waste water activities to GNR. 544 and 545, thereby allowing the Provincial **DED TEA** to issue waste management licences from the pollution and waste management directorate for waste water management activities. Given these amendments and that the SWWTW was commissioned prior to the enactment of the Environmental Conservation Act (Act No.73 of 1989, “ECA”), upfront consultation with both National and Provincial environmental authorities was undertaken by RHDHV to determine the activities which will require application for authorisation.

The environmental impacts associated with the proposed project require investigation in compliance with the EIA Regulations (2010) published in GNR. 543 read with Section 24 (5) of the NEMA (Act No. 107 of 1998) (as amended). The National Environmental Management: Waste Act – NEM:WA (Act No. 59 of 2008) and Government Notice No. R 921 of 29 November 2013 must also be complied with for the application of a waste management licence.

To clarify, the site thus pre-dates EIA legislation (i.e. pre-ECA & NEMA) and therefore holds no environmental permit, authorisation or Waste Management License (NEM:WA). This is not non-compliance, but an indication of the age of the site. The site does however hold both a Water Use Licence and a Coastal Waters Discharge Permit.

The required environmental studies include the undertaking of an Environmental Impact Assessment (EIA) process for both environmental authorisation and a waste management licence. This process is being undertaken in two phases:

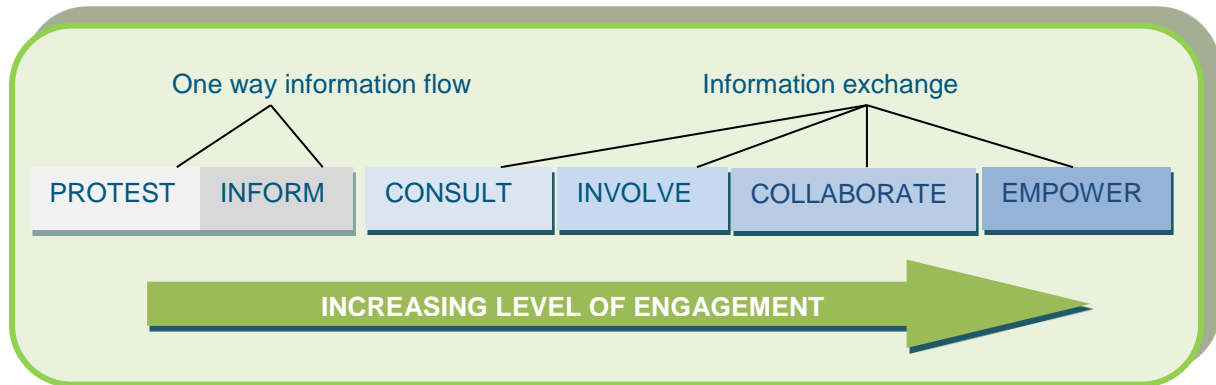


Public Participation Process

Phelamanga Projects is working with Royal HaskoningDHV on the Public Participation Process (PPP) for this Project.

It is imperative to note that the study area is one with a historical disadvantage being plagued by pollution and poor spatial planning. It is for this reason that several non-governmental organisations and activists have mobilised and strengthen the community’s involvement in all developments alike, as well the current status of the environment. RHDHV perceives this is a benefit as a substantial portion of environmental assessments are based on information exchange and as an environmental assessment practitioner; one is reliant on the

indigenous knowledge which will optimistically be parted by the community. The figure below depicts the approach taken by RHDHV, where one way information flow is avoided and information exchange is promoted, thereby enabling a higher level of engagement.



THE STAKEHOLDER ENGAGEMENT SPECTRUM (DEAT, 2002)

Scoping Report and Purpose of the Report

In line with the requirements of the NEMA EIA Regulations, this Scoping Report provides a brief description of the predevelopment environment, specifically in terms of the biophysical and socio-economic environment of the study area. Furthermore, the report provides a description of the activities undertaken for the Scoping Phase and Public Participation Process (PPP), as well as the way forward in the form of a Plan of Study for EIA.

The first phase of the EIA process is the Scoping Phase in which the environmental issues are scoped and issues and concerns with respect to the project are identified so that technical specialists can evaluate them during the subsequent Environmental Impact Assessment Phase.

The Final Scoping Report (document at hand) is now available to the public for review and comment for a period of 21 days. The previous review period for the Draft Scoping Report was 40 days and the report was made available to the public for review and comment during this period. Following the public comment period held for the draft Scoping Report, the Report has been herein updated producing this Final Scoping Report, which will be submitted to the KZN DED TEA for consideration. After the acceptance of the Scoping Report, the impact assessment phase will commence.

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 and are elaborated on in this report.

Key Findings of the Scoping Process

Some of the anticipated impacts that will be addressed in the EIA phase or/and in the EMP are:

- ✦ Noise impact in relation to construction as well as operation of the works (Pumpstation etc.);
- ✦ Traffic impacts during the construction and operational phase due to minor increases in trucks;
- ✦ Social Impacts of the development with regard to job opportunities etc.;
- ✦ Cumulative and downstream impacts on coastal waters;
- ✦ Disturbance of possible graves on site;

- ✦ Generation, handling and disposal of waste generated by project activities;
- ✦ Minimal loss of vegetation; and
- ✦ Generation of explosive biogas.
- ✦ The status quo of odour and pathogen mobility is not envisaged to change as a result of the proposed upgrades.

Way Forward

A Plan of Study for EIA has been included as part of this Scoping Report and provides the purpose of the EIA phase and an indication of the environmental processes planned. It outlines the proposed scope of work for the specialists during the EIA phase, and how potential environmental impacts will be rated. The Plan of Study for EIA further explains the overall deliverables of the EIA phase and what the proposed timeframes associated with these are. It also provides an indication of the way forward for the project, in terms of future reports to be distributed and the associated review timeframes.

During the EIA Phase the following specialist studies will be conducted (depending on the outcomes of the departmental Scoping Report review) in order to further investigate potential adverse impacts on the environment as a result of the proposed project:

- ✦ Air Quality Assessment;
- ✦ Integrated Waste Water Management Plan;
- ✦ Life Cycle Assessment;
- ✦ Biodiversity Scan;
- ✦ Heritage Assessment;
- ✦ Major Hazardous Installation Risk Assessment; and
- ✦ Social Impact Assessment.

Furthermore, the scoping phase identified the need for a *Traffic Impact Assessment (TIA)*.

In summary, the following changes or updates have been made to this final version of the Scoping Report and have been highlighted in teal for ease of reference:

Explanation on how the listed activities were identified	Page: 9
Explanation of the need for both the CWDP and WUL	Page: 19
Section on Climate Change	Page: 23
Update to the public participation process thus far	Page: 57 – 60
Addition to the potential impacts	Page: 64
Inclusion of the plan of assessment of noise impacts	Page: 75 – 76
Inclusion of the plan of assessment of Traffic Impacts (TIA)	Page: 76 – 77
Update of the name of the Competent Authority	throughout document

General updates / changes

throughout document

1 INTRODUCTION

1.1 Project Overview

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 1-2.



Figure 1-1: Site locality

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



Figure 1-2: Locality plan (wider context)

The SWWTW receives 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 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. Figure 1-3 depicts the current process flow at SWWTW.

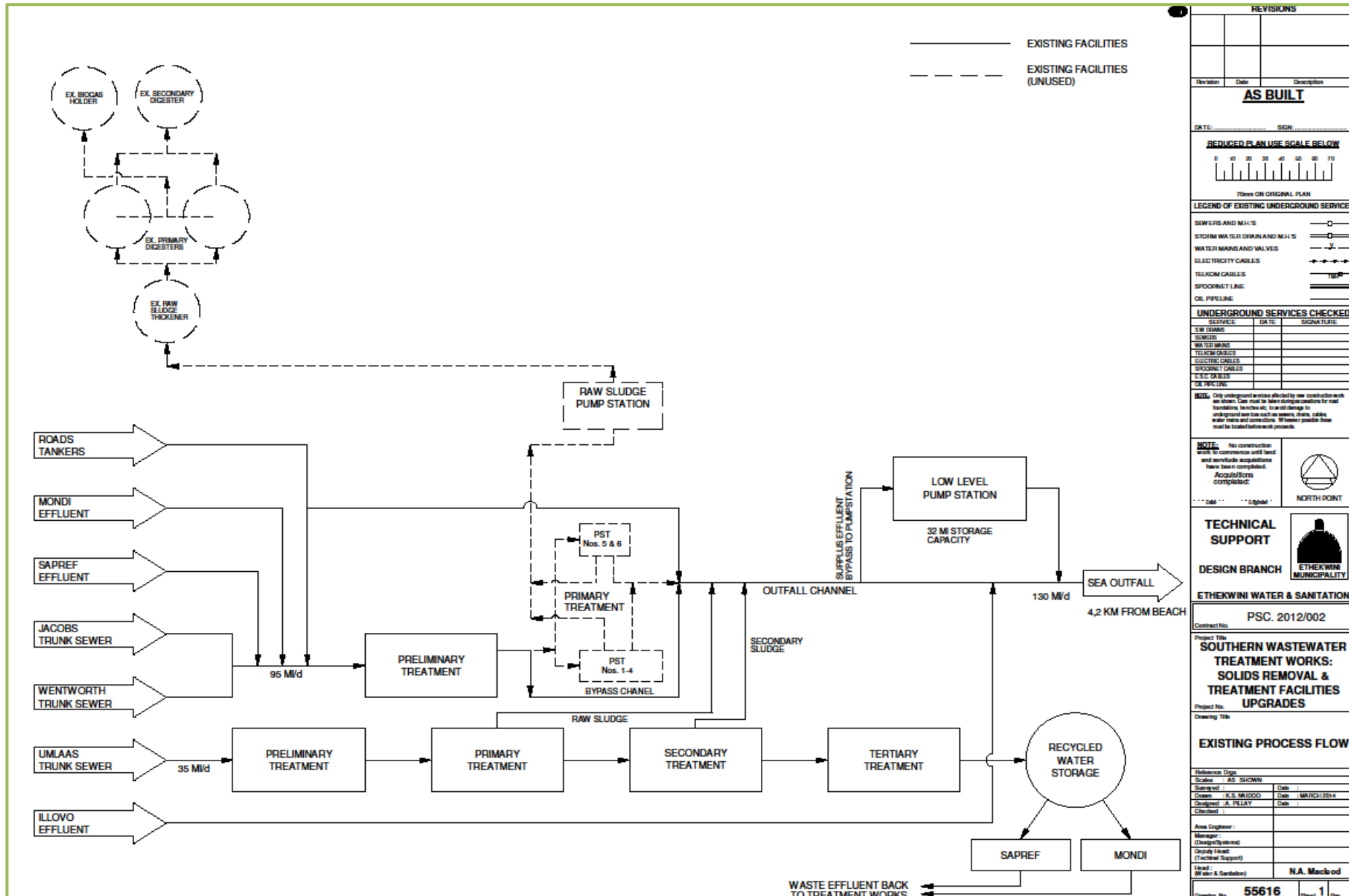


Figure 1-3: Current process flow diagram

2 TERMS OF REFERENCE

The KwaZulu-Natal Department of Economic Development, Tourism and Environmental Affairs (DED TEA) (previously known as the Department of Agriculture and Environmental Affairs [KZN DAEA]), is the lead authority for this EIA process and the development needs to be authorised by this Department in accordance with the National Environmental Management Act (NEMA) (as amended).

The EIA Regulations under the NEMA consist of three (3) categories of activities namely: Listing Notice 1 Activities (GNR 544 of 2010) which require a Basic Assessment Process, Listing Notice 2 Activities (GNR 545 of 2010) which require Scoping and EIA for authorisation and Listing Notice 3 Activities (GNR 546 of 2010) which requires a Basic Assessment process for specific activities in identified sensitive geographical areas.

During November 2013, the EIA Regulations underwent an amendment in conjunction with the waste related regulations. This resulted in the culmination of GNR 921 of waste related activities and the transfer of waste water activities to GNR 544 and 545, thereby allowing the Provincial DED TEA to issue waste management licenses from the pollution and waste management directorate for waste water management activities.

Given these amendments and that the SWWTW was commissioned prior to the enactment of the Environmental Conservation Act (Act No.73 of 1989) (ECA) (and therefore currently holds no ECA permit or Waste Management License), upfront consultation with both National and Provincial environmental authorities was undertaken by RHDHV to determine the activities which will require application for authorisation. Refer to **Appendix A** for departmental correspondence in this regard.

Table 1: Listed Activities According To Listing Notices 1 and 2 of the EIA Regulations (2010)

Relevant notice:	Activity No (s)	Description (Verbatim and as per applicability to proposed development)
GNR 544 Basic Assessment	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. <i>The precautionary principal is exercised in the inclusion of this activity, pertaining to possible stormwater outlet structures within 32 m from the Umlaas Canal.</i>
	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; <i>This activity is applicable to the storage tank to be constructed which may have a wall of 5 m height.</i>
	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 ; <i>There will potentially be the construction of facilities for the storage of dangerous goods, not exceeding 500 m³. These include the storage of biogas and sewage.***</i>
	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

Relevant notice:	Activity No (s)	Description (Verbatim and as per applicability to proposed development)
		<p>footprint or throughput capacity of the port or harbour;</p> <p>(ii) the construction of a port or harbour, in which case activity 24 of Notice 545 of 2010 applies;</p> <p>(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.</p> <p><i>This activity applies for any structures constructed for the upgrading and replacement of 70 m of the sea outfall pipeline and which may be kept on site for more than 6 weeks and hence not be considered temporary.</i></p>
	16	<p>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 –</p> <p>(i) fixed or floating jetties and slipways;</p> <p>(ii) tidal pools;</p> <p>(iii) embankments;</p> <p>(iv) rock revetments or stabilising structures including stabilising walls;</p> <p>(v) buildings of 50 m² or more; or</p> <p>(vi) infrastructure covering 50 m² or more –</p> <p>but excluding</p> <p>(a) if such construction or earth moving activities will occur behind a development setback line; or</p> <p>(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;</p> <p>(c) where such construction or earth moving activities is undertaken for purposes of maintenance of the facilities mentioned in (i) – (vi) above; or</p> <p>(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.</p> <p><i>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.</i></p>
	17	<p>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.</p> <p><i>The precautionary principal is exercised in the inclusion of this activity pertaining to the planting of vegetation along the dunes for stabilisation post pipe laying may take place.</i></p>
	18	<p>The infilling or depositing of any material of more than 5 m³ into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock or more than 5 m³ from:</p> <p>(i) a watercourse;</p> <p>(ii) the sea;</p> <p>(iii) the seashore;</p> <p>(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 –</p> <p>but excluding where such infilling, depositing, dredging, excavation, removal or moving;</p> <p>(a) is for maintenance purposes undertaken in accordance with a management plan agreed to by the relevant environmental authority; or</p> <p>(b) occurs behind the development setback line.</p> <p>This is of relevance for impacts of infilling and associated with the refurbishing and upgrading of</p>

Relevant notice:	Activity No (s)	Description (Verbatim and as per applicability to proposed development)
		interconnecting pipe-work on site and the replacement of sea-outfall pipe above the high water mark.
	40	<p>The expansion of</p> <ul style="list-style-type: none"> (i) jetties by more than 50 m²; (ii) slipways by more than 50 m²; (iii) buildings by more than 50 m²; or (iv) infrastructure by more than 50 m² <p>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 the development setback line.</p> <p>The precautionary principal is exercised in the inclusion of this activity pertaining to the expansion of buildings by more than 50 m²; or Infrastructure by more than 50 m² within 32 m of the Umlaas Canal and the beach.</p>
	42	<p>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 m³ or more.</p> <p><i>There will potentially be the expansion of facilities for the storage of dangerous goods; the intention is that it is not to be expanded by more than 80 m³. This includes the storage of biogas.</i></p>
	43	<p>The expansion of structures in the coastal public property where the development footprint will be increased by more than 50 m², 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.</p> <p><i>The precautionary principal is exercised in the inclusion of this activity pertaining to activities of the general upgrades which will include refurbishments and replacements to the sea outfall pipeline and possible maintenance buildings; however, it is yet to be confirmed if the development footprint will increase by 50 m² or more in the coastal public property.</i></p>
	45	<p>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 –</p> <ul style="list-style-type: none"> (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 50m²; (vi) infrastructure by more than 50m²; (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 – <p>where such expansion will result in an increase in the development footprint of such facilities, but excluding where such expansion occurs:</p> <ul style="list-style-type: none"> (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. <p><i>The precautionary principal is exercised in the inclusion of this activity pertaining to activities of the general upgrades which will include refurbishments and replacements to the sea outfall pipeline and possible</i></p>

Relevant notice:	Activity No (s)	Description (Verbatim and as per applicability to proposed development)
	55A	<p><i>maintenance buildings, possible 100 m inland of the high water mark of the sea.</i></p> <p>The construction of facilities for the treatment of effluent, wastewater or sewage with a daily throughput capacity of more than 2,000 m³ but less than 15,000 m³. (Amendment i.t.o. GNR 922, 29 November 2013) <i>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 Southern Waste Water Treatment Works has not been historically licenced having been commissioned prior to the Environment Conservation Act (Act No. 73 of 1989).</i></p>
	55B	<p>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 m³. (Amendment i.t.o. 922, GNR 29 November 2013) <i>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.</i></p>
GNR 545 Full Scoping and EIA	56	<p>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) & 22(iii); 25; 26; 27(iii) & (iv); 28; 39; 45(i) – (iv) & (vii) – (xv); 50; 51; 53; and 54. <i>The precautionary principal is exercised in the inclusion of this activity pertaining to the eThekweni Water and Sanitation Department expressing the interest in further development of the SWWTW to refine the treatment process and discharge less solids out to sea in future years.</i></p>
	3	<p>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 m³. <i>The precautionary principal is exercised in the inclusion of this activity pertaining to 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 m³ cubic metres. This refers to the storage of biogas.</i></p>
	24	<p>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:</p> <ul style="list-style-type: none"> (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; (viii) tunnels; or (ix) underwater channels; <p>but excluding –</p> <ul style="list-style-type: none"> (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. <p><i>The upgrades will involve construction or earth moving activities within 100 m of the high water mark of the</i></p>

Relevant notice:	Activity No (s)	Description (Verbatim and as per applicability to proposed development)
		<i>sea for structures such as the replacement of 70 m of the sea outfall pipeline, predominantly on shore.</i>
	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 waste water (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 Basic Assessment	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 <i>The precautionary principal is exercised in the inclusion of this activity pertaining to the clearance of 300 m² 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 DAEA, dated 13.02.2014.</i>
GNR 921 Waste Related Activities	1	The storage of general waste in lagoons <i>The storage of general waste (sludge) will be undertaken in 350 m³ silos on the site, for a period of a few days prior to being trucked to a landfill site. The waste water treatment works facility constitutes a “lagoon” hence the triggering of this activity.</i>
	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. <i>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.</i>
	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. <i>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.</i>
	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.

The changes discussed above had particular implications for wastewater treatment and to a certain degree lessens 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 GNR 921 but then go on to specifically exclude effluent, wastewater and sewage. These specific activities were moved on exclusion from the waste activities into the general EIA activities for assessment under the general NEMA (not MEM:WA) EIA regulations. The reasoning or understanding behind this is that the impacts of sewage / wastewater / effluent (latter dependent on constituents) are relatively well understood and mitigated. Furthermore, sewage especially cannot be treated as hazardous due to the fact that such flows (if contained) throughout cities 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, rather than being considered as a waste. Nonetheless, given the relative infancy of this viewpoint, RHDHV will undertake 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.

*** 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.

2.1 Approach to the EIA Studies

The environmental impacts associated with the proposed project require investigation in compliance with the Environmental Impact Assessment Regulations (2010) published in Government Notice Regulation (GNR) No. 543 read with Section 24 (5) of the National Environmental Management Act – NEMA (Act No. 107 of 1998) (as amended). The proposed project therefore requires to be assessed by conducting a Scoping (current phase of which this report is the final product) and Environmental Impact Assessment (EIA).

The National Environmental Management: Waste Act – NEM: WA (Act No. 59 of 2008)(as amended) and Government Notice No. R 921 of 29 November 2013 must also be complied with for the application of a waste management licence. Chapter 5 of the NEM: WA states that the application of a waste management licence and the decision making process of the issuing of a waste licence must be co-ordinated with Chapter 5 of the NEMA. Given that waste activities applied for are assessed according the NEMA (via the EIA or Basic Assessment process), the triggering of activities listed in GNR 921 Category A (see Table 1) requires that a Basic Assessment be conducted for the undertaking of those waste activities specifically. However, in the interest of inclusivity and a holistic approach, the competent authority, the DED TEA, has granted permission to assess the impacts of the waste activities as part of the broader EIA (refer to Appendix A3 for the letter issued to the EAP in this regard). This is termed an “up scaling” and the motivation for this approach is as such:

- ✦ Listing Notice 2 activities are triggered for the development and Category A impacts will in addition to these activities be assessed. There is therefore a situation whereby a full EIA is already required.
- ✦ As is evident in the Scope of Works, Waste Water Treatment Works projects are very complex, which must be properly assessed during an EIA process, therefore, by incorporating the Category A activities into the Scoping and EIA process, an in depth assessment of these activities will be given effect to.
- ✦ Undertaking one application process will optimize the Environmental Impact Assessment and result in reduced administrative load on the Department.
- ✦ Less report writing would also have a limited impact on the project budget and will allow the applicant to responsibly spend public (rate payers) funding as required by the Public Finance Management Act (PFMA).
- ✦ Two (2) separate public participation processes (PPP) meeting, or one integrated process which tries to explain to the Interested and/or Affected Parties (I&APs) the nature of two (2) separate permitting processes being run together, may lead to confusion or stakeholder fatigue. Further, by keeping the BAR-specific activities still on the table during the second iteration of the PPP, it allows I&APs the opportunity to make comments thereon for the duration of the overall process.

Thus, by integrating the processes into one cohesive product that meets the legislative needs it is furthermore transparent and appropriate to the nature of the environmental implications thereof. Therefore, the required environmental studies include the undertaking of an Environmental Impact Assessment (EIA) process for both environmental authorisation and a waste management licence. This process is being undertaken in two phases:

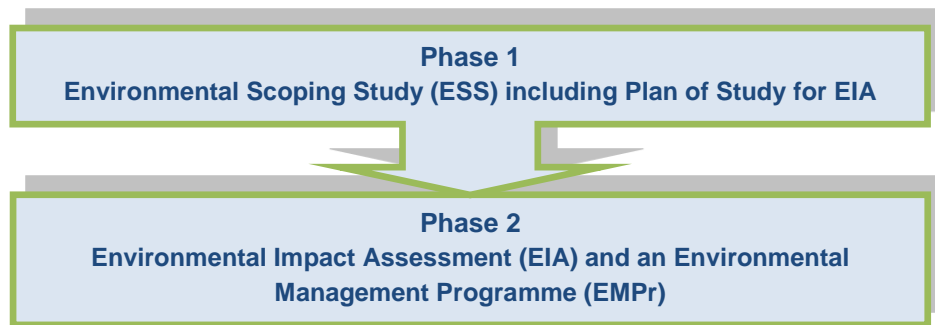


Figure 2-1: Simplified phases of the EIA process

These reports must be made available to the public, stakeholders and relevant departments for review and comment prior to being finalised for further review and comment and thereafter submission to the KZN DED TEA review and acceptance (

Figure 2-2).

2.1.1 Environmental Scoping Study

Scoping is the process of determining the spatial and temporal boundaries (i.e. extent) and key issues to be addressed in an environmental assessment. The main purpose of scoping is to focus the environmental assessment on a manageable number of important questions. Scoping should also ensure that only significant issues and reasonable alternatives are examined. The ESS provides a description of the receiving environment and how the environment may be affected by the development of the proposed project. Desktop studies making use of existing information will be used to highlight and assist in the identification of potential significant impacts (both social and biophysical) associated with the proposed project.

Additional issues for consideration will be extracted from feedback from the public participation process, which commenced at the beginning of the Scoping phase, and will continue throughout the duration of the project. All issues identified during this phase of the study have been documented within this final version of the Environmental Scoping Report and have been highlighted in teal for easy reference. Thus, this final Environmental Scoping Report (document at hand) hereby provides a record of all issues identified as well as any fatal flaws, in order to make recommendations regarding the project and further studies required to be undertaken within the EIA phase of the proposed project.

2.1.2 Environmental Impact Study

The Environmental Impact Assessment phase will aim to achieve the following:

- ✿ to provide an overall assessment of the social and biophysical environments of the affected area by the proposed project;
- ✿ to undertake a detailed assessment of the preferred alternatives in terms of environmental criteria including the rating of significant impacts;
- ✿ to identify and recommend appropriate mitigation measures (to be included in an EMPr) for potentially significant environmental impacts; and
- ✿ to undertake a fully inclusive public participation process to ensure that I&AP issues and concerns are recorded and commented on and addressed in the EIA process (the EIA process is illustrated in Figure 2-2).

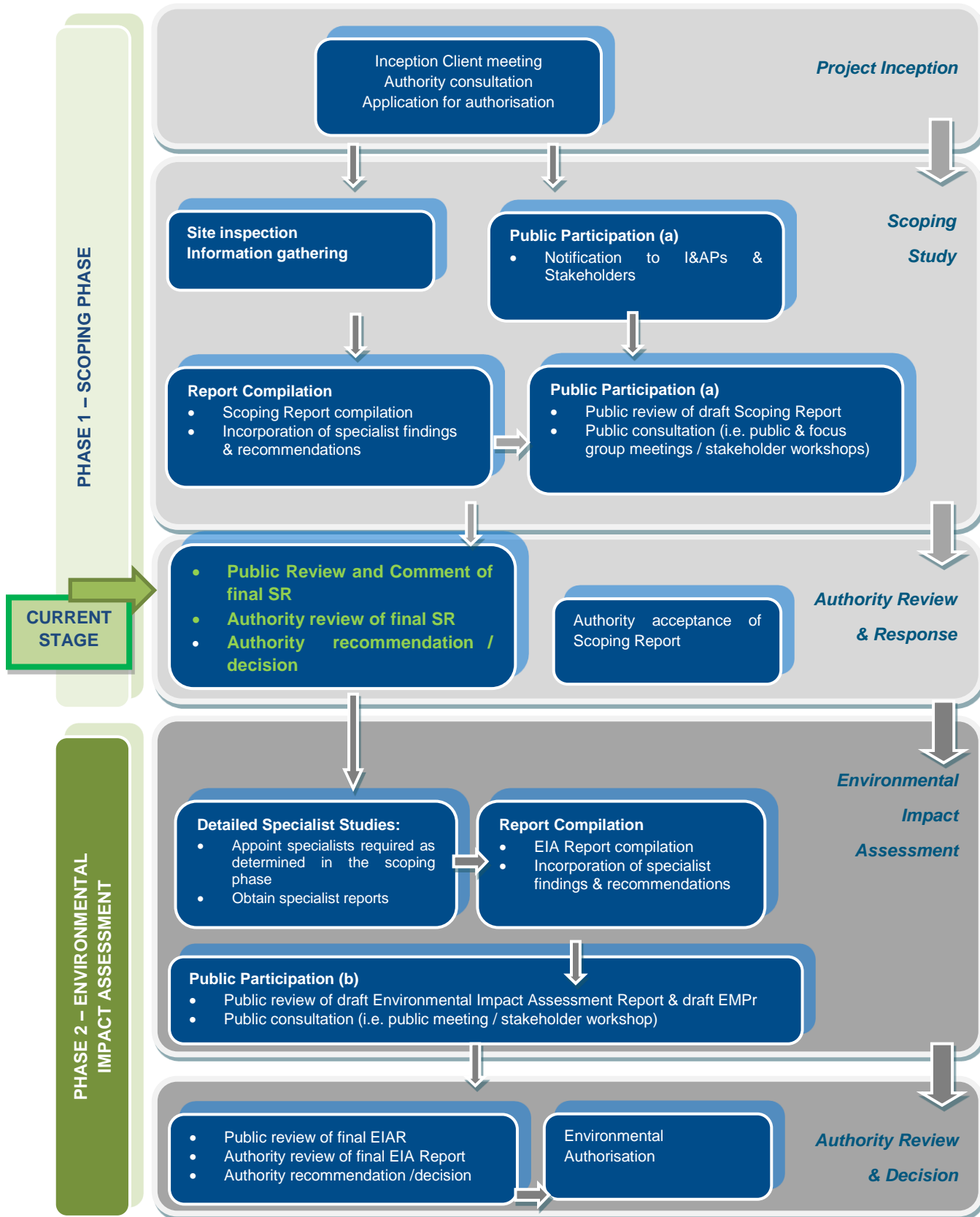


Figure 2-2: Approach to the Scoping / EIA Studies

2.1.3 Details of the Project Proponent

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

Table 2: 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

2.1.4 Details of the Environmental Assessment Practitioner

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



Royal HaskoningDHV has been involved in and/or managed several of the largest Environmental Impact Assessments undertaken in South Africa to date. A specialist area of focus is on assessment of multi-faceted projects, including the establishment of linear developments (national and provincial roads, and power lines), bulk infrastructure and supply (e.g. wastewater treatment works, pipelines, landfills), electricity generation and transmission, the mining industry, urban, rural and township developments, environmental aspects of Local Integrated Development Plans (LIDPs), as well as general environmental planning, development and management.

Table 3: EAP details

DETAIL	ROYAL HASKONINGDHV		
Contact Persons	Malcolm Roods	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	Master of Science Pr.Sci.Nat: 400169/11	BSc (Hons) Environmental Science
Experience	12 years	16 years	5 years

2.2 Structure of the Report

The report has been structured to comply with the format required by the NEMA. The contents are as follows:

Table 4: Report structure

CHAPTER	CONTENT
Chapter 1 Introduction	Introduction and background to the project.
Chapter 2 Terms of Reference	Terms of reference of the study and listed activities.
Chapter 3 Legal Framework	Includes an explanation on all applicable legislation.
Chapter 4 Project Description and Motivation	Includes the project justification and a description of the proposed activities.
Chapter 5 Project Alternatives	Consideration of alternatives (design/layout, site and no-go) for the project.
Chapter 6 Description of Study Area	A description of the biophysical and social environment.
Chapter 7 Public Participation Process	Overview of the public participation process conducted to date.
Chapter 8 Potential Impacts associated with the Project	A description of the environmental impacts on the biophysical and social environment.
Chapter 9 Plan of Study for the EIA	Plan of Study for the EIA study including specialist studies required for the EIA study.
Chapter 10 Conclusions and Recommendations	Conclusions and recommendations of the Environmental Scoping Study.

3 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:

3.1 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) and given further expression.

3.2 National Legislation and Regulations

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

3.2.1 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 overarching 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 law;
- ✦ 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.

3.2.2 EIA Regulations (2010)

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

3.2.3 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.*”

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

The project needs to comply with the NEM: Biodiversity Act in providing the cooperative governance in biodiversity management and conservation. Biodiversity Act 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: Biodiversity Act 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.
- ✦ Alien invasive species control and enforcement.

3.2.4.1 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.

3.2.4.2 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.

3.2.4.3 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.

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

The nature of the proposed project includes activities listed in GN R.921 of the Waste Regulations (2010 as amended November 2013) – refer to Table 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.

3.2.6 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
- ✦ 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 Department of environmental affairs (DEA) for a coastal waters discharge permit 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 3.2.3** 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 licences / 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 DWA.

3.2.7 *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.

3.2.8 *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.

3.2.9 *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
- ✦ 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.

3.2.10 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 m² 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.

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

The NEMA Air Quality Management Act (NEMA:QA) states the following as its 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.”

3.2.12 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 fires through firebreaks.

3.2.13 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.

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

The Act has the 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 from the prescribing of building standards and for the matters connected therewith.”

3.2.15 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.

3.2.16 Sustainable Development

The principle of Sustainable Development has been established in the Constitution of the Republic of South Africa (Act 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.

3.3 Climate Change Consideration

Climate change is a major global challenge in the 21st Century, with Africa as one of the most vulnerable regions to its predicted impacts due to low adaptive capacity. In literature, the effects of climate change on water availability are well documented with projections indicating an increase in water stress populations due to decreasing water availability, ultimately resulting in increasing wastewater reuse for the Africa Region. Climate resilient wastewater treatment options must be identified to protect human health and environment. Studies have found that activated sludge may be the most climate resilient wastewater treatment option. Though the activated sludge process is not a first choice option for developing countries due to its high energy, capital and skills requirements, studies indicate a need for its modification to make it viable and sustainable for developing countries in the face of climate change². Anaerobic solid stabilisation is generally a more environmentally friendly treatment technology than aerobic treatment due to its low solids generation rate, low electrical energy requirements and the production of a usable biogas. This viewpoint is now gaining more attention as the US debates implementation of the Kyoto Protocol which requires ratifying countries to commit to reducing their emissions of carbon dioxide (CO₂) and other greenhouse gases (GHG's) or to engage in emissions trading if they maintain or increase emissions of these gases. This project proposes anaerobic digestion as part of the project description is for the settled solids (referred to as primary [or raw] sludge) to be removed and stabilised through a process of anaerobic digestion, before being dewatered.

Changes in the climate system due to anthropogenic emission of long-lived GHGs is unmistakable, as is now evident from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice and rising global average sea level. Global average sea level rose at an average rate of 1.8mm per year over 1961 to 2003 and at an average rate of about 3.1mm per year from 1993 to 2003, while temperature increase is widespread over the globe and is greater at higher northern latitudes. Studies point towards a dryer situation for the future, with a possible increase in wastewater reuse due to decreasing water availability³.

² Adonadaga M (2014). Climate Change Effects and Implications for Wastewater Treatment Options in Ghana. *Journal of Environment and Earth Science*, Vol.4, No.8, 9-17.

³ Fiss C.E. and Smith S. (undated). Green industrial wastewater treatment utilizing Anaerobic processes.

When considering a project of this magnitude, it is important to consider the impacts associated with climate change. This was also highlighted as a gap during the scoping public review period. As such, it is prudent to state here that the terms of reference of the specialist studies have been amended to include the evaluation of impacts associated with climate change.

4 PROJECT DESCRIPTION

4.1 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 agriculture and/or landfill;
- ✦ 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 4-1 depicts the scope of work proposed.

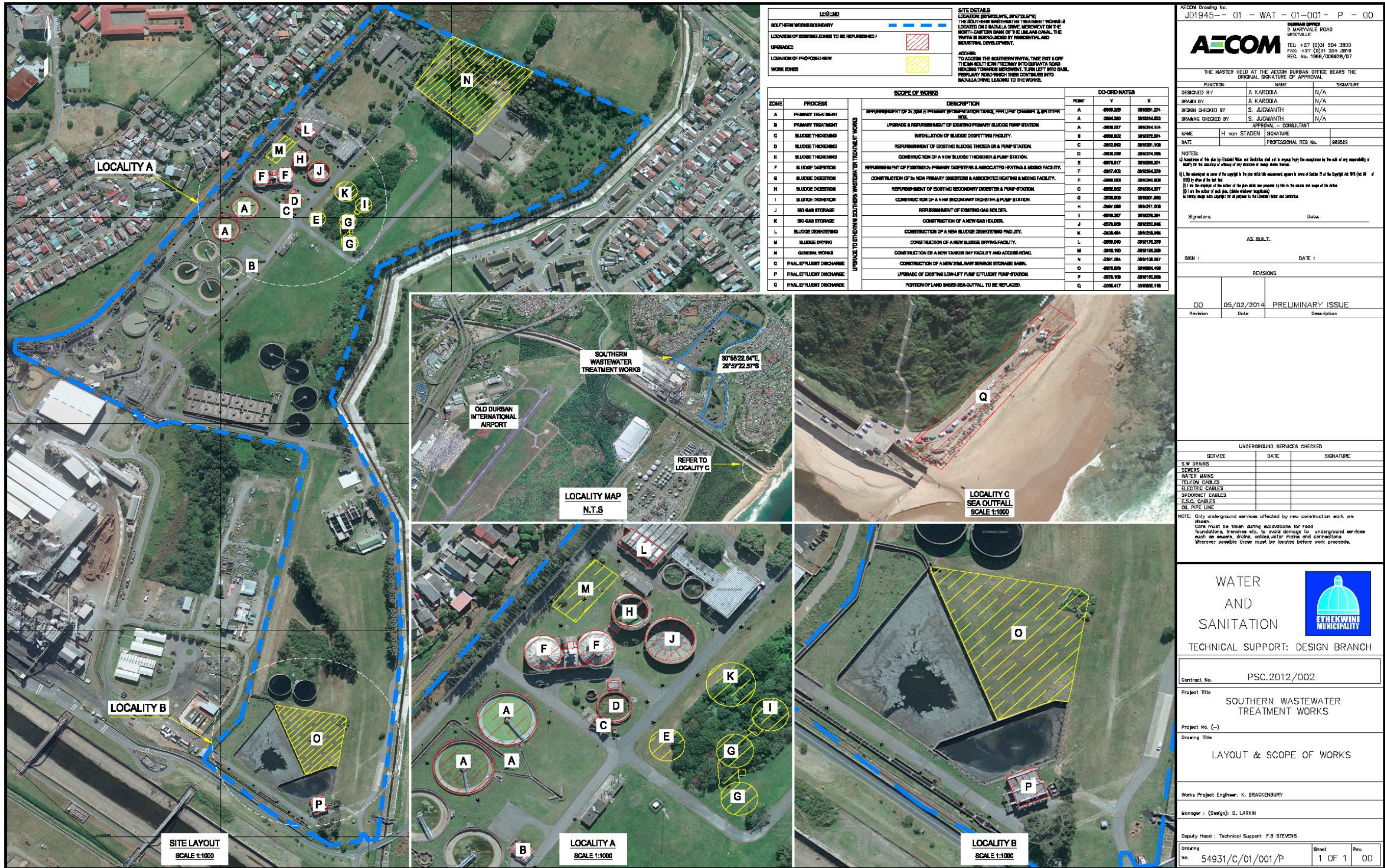


Figure 4-1: Proposed scope of works

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 35M³/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 phases as described below.

4.1.1 Phase 1

- (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) Establishment a new mechanical sludge thermal drying facility on site.
- (h) Provide additional effluent storage capacity of 23 Million litres at existing low level pumping station and replace all old pumps with new pumps.
- (i) Replace the last 70 m of the landline section of the sea outfall pipeline with new 2 x 1,000 m diameter pipe.
- (j) Construct new road tanker effluent discharge bays in close proximity to the entrance of the Works.
- (k) Install new medium voltage and low voltage electrical cables and equipment.
- (l) Minor road works and a new access road.

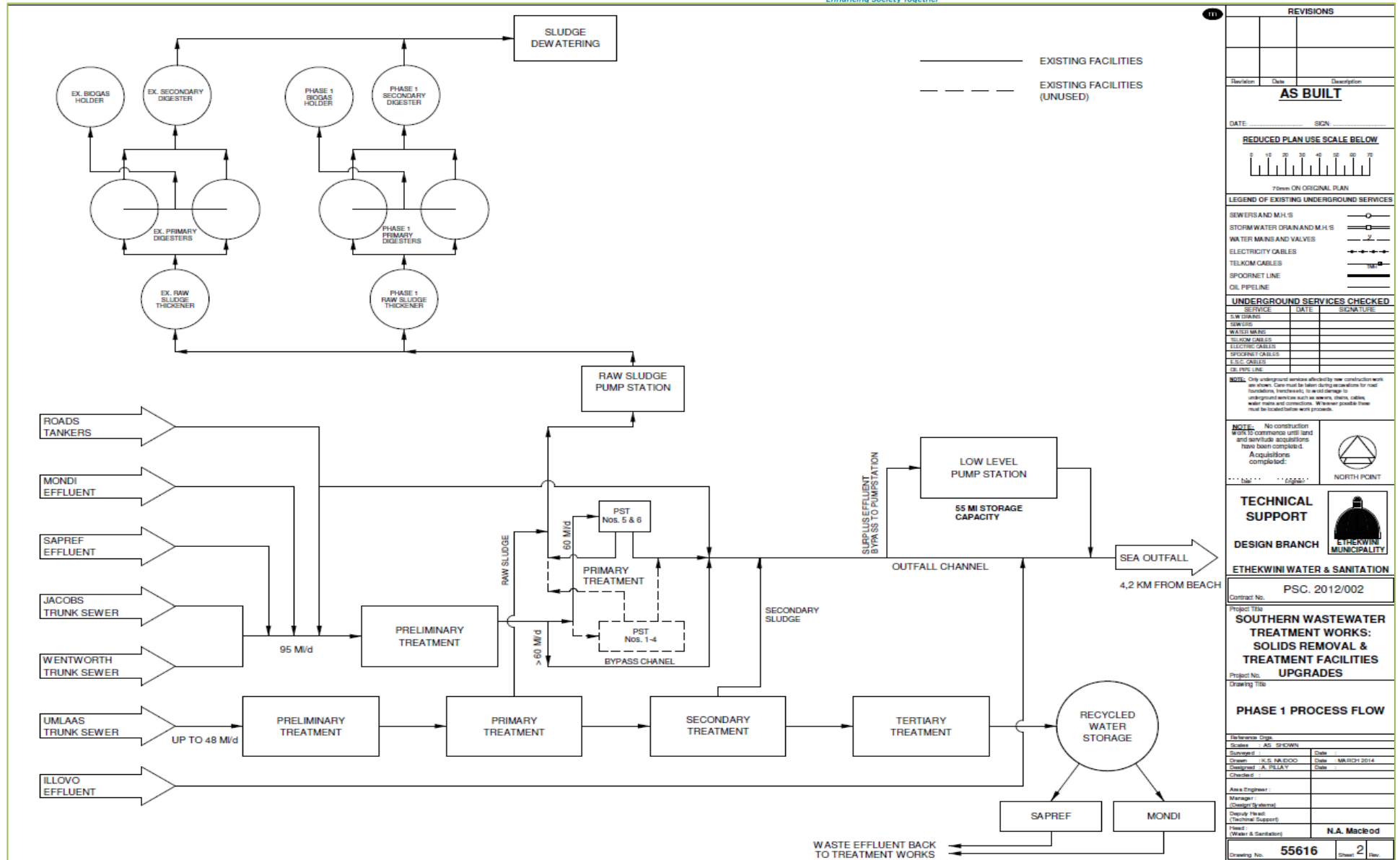


Figure 4-2: Phase 1 process flow diagram

4.1.2 Phase 2

- (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.
- (e) Install additional mechanical sludge dewatering equipment.

It is important to note that the timing of Phase 2 is still to be confirmed but is dependent on growth of the catchments served by this treatment works.

4.2 Project Motivation

The eThekweni Municipality, whilst complying with the conditions of the coastal waters discharge permit and water use license (and hence are discharging effluent out to sea within the defined parameters and thereby managing the impact thereof), has identified the need to reduce the suspended solids going out to sea via sea outfall.

Of primary importance and motivation was the identification of the modification of benthic macrofauna in close proximity to the SWWTW sea outfall as reported on the 2011/2012 Sea Outfalls Report (Centre for Scientific and Industrial Research [CSIR], 2012). Please refer to Appendix E1 for the full report. This report provides a univariate and multivariate analysis of benthic macrofaunal community structure for the 2011 survey of the Durban outfalls monitoring programme and provides clear evidence that the seabed near the SWWTW outfall is enriched with particulate organic material. Benthic macrofaunal community structure in close proximity to the outfall has been modified because of this enrichment. This is manifested by reduced biodiversity and an increased abundance of opportunist *Capitellid polychaetes*. Comparison with earlier surveys reveals a gradual increase of this effect over the past decade. 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. It is for this reason that the solids removals and treatment facilities upgrades are proposed.

While the option of sea disposal is financially viable and a good economical solution, environmental pressures are requiring that the eThekweni Water and Sanitation (EWS) Department investigate measures to reduce the solids disposed of at sea. Furthermore, the EWS is planning for the likelihood that the current authorisations could be withdrawn or made more restrictive. These plans include the cessation of discharging of sludge to sea from the Southern areas.

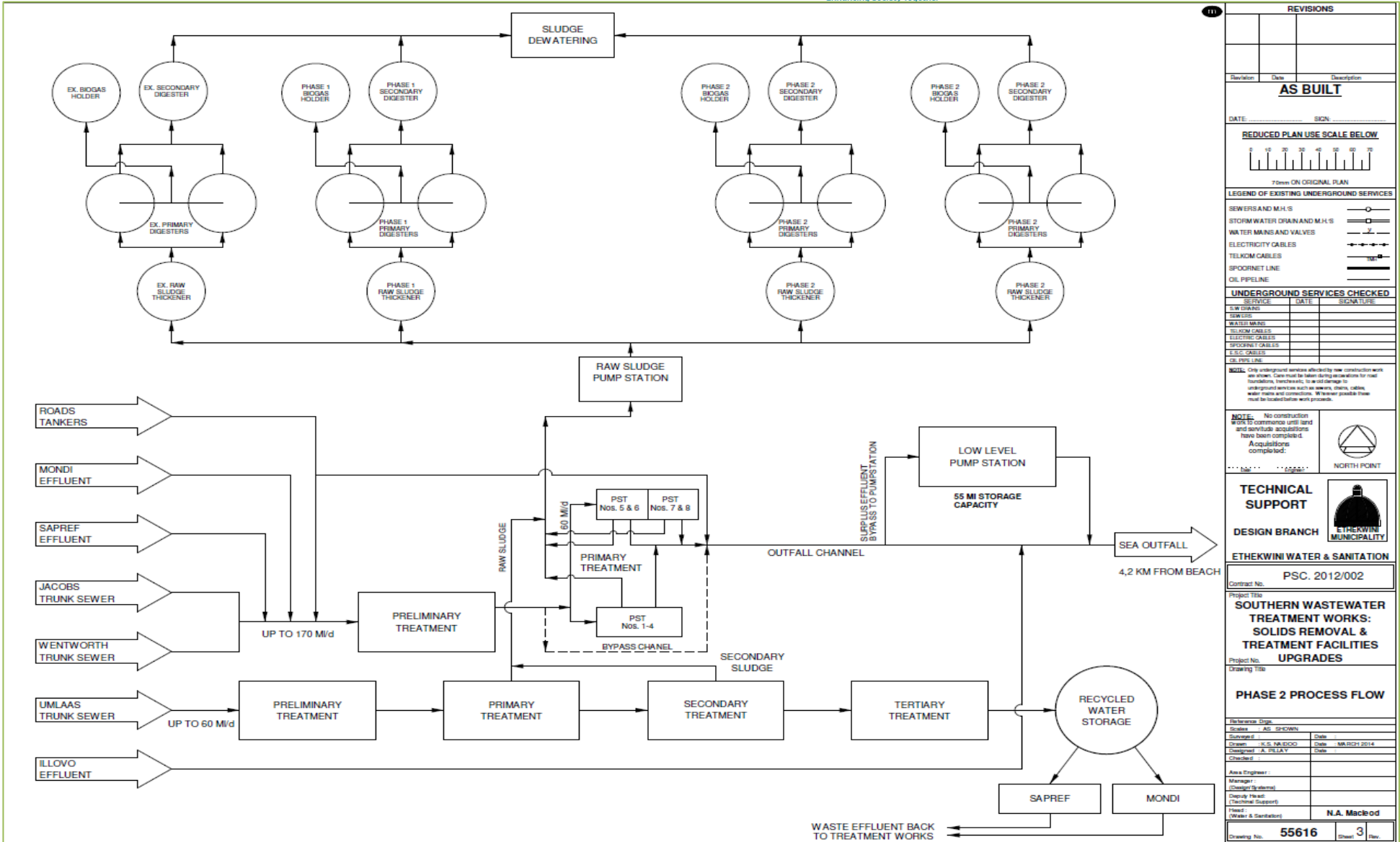


Figure 4-3: Phase 2 process flow diagram

5 PROJECT ALTERNATIVES

In terms of the EIA Regulations, Section.28 (1) (c) feasible alternatives are required to be considered as part of the environmental investigations. In addition, the obligation that alternatives are investigated is also a requirement of Section 24(4) of the National Environmental Management Act (Act No. 107 of 1998) (as amended). An alternative in relation to a proposed activity refers to the different means of meeting the general purpose and requirements of the activity (as defined in GNR 543 of the EIA Regulations, 2010), which may include alternatives to:

- ✦ the property on which or location where it is proposed to undertake the activity;
- ✦ the type of activity to be undertaken;
- ✦ the design or layout of the activity;
- ✦ the technology to be used in the activity; and
- ✦ the operational aspects of the activity
- ✦ the option of not implementing the activity

5.1 Site Alternatives

No offsite or other site alternatives have been investigated due to the fact that the upgrades are proposed at the existing works and no additional development will encroach beyond the boundaries of the current works thereby limiting the development footprint.

5.2 Design or Layout Alternatives

5.2.1 *Alternative 1 (Preferred)*

The first and preferred alternative for design or layout involves the refurbishment of two old unused primary digesters, secondary digester, gas holder and thickener; as well as replicating the old structures across the road so that in total there will be four primary digesters, two secondary digesters, two gas holders and two thickeners. Figure 5-1 depicts this alternative.



Figure 5-1: Preferred alternative design and layout

5.2.2 Alternative 2

Alternative two involves the demolition of the existing structures (primary digesters, secondary digester and gas holder) and the construction of new structures that are approximately twice the capacity of the existing structures. In this alternative, the demolition of the existing infrastructure presents a noise issue is therefore the less favourable alternative. Furthermore, having larger structures creates a negative aesthetic impact.

Refer to figure Figure 5-2 for the layout plan of this alternative.

5.2.2.1 Alternative One versus Alternative Two

At this stage, **Alternative One** (Figure 5-1) is therefore preferred for the following reasons:

- ✦ Having multiple components allows for greater redundancy if a problem should occur with any of the structures, i.e. if the nozzles in one primary digester blocks up to 50% of capacity could be lost, however, this alternative minimises this loss to only 25%.
- ✦ Having a smaller capacity per component reduces the amount of sludge that would have to be disposed of should there be a problem with the process in a particular structure causing the sludge inside not to be properly stabilised.
- ✦ Having two smaller gas holders reduces the amount of gas stored in a particular point, therefore reducing the risk of a potential hazard.
- ✦ Not demolishing the older structures to rebuild the same capacity saves money and reduces the carbon footprint during the construction period.

This will however, be confirmed during the Environmental Impact Assessment phase.



Figure 5-2: alternative 2, demolition of old sludge handling facilities and construction of new facilities

5.3 No-go Alternative

This option involves retaining status quo. It must be noted that this will mean that the initial infrastructure in place will remain unused and that the quantity of solids being disposed of to sea remains the same.

It is imperative to note that the proposed upgrades presents only benefits in the sense that infrastructure in place will be refurbished to be brought back into operation and thereby increase the physical treatment process and allow for significantly less solids to be disposed via sea outfall. In so doing, the development footprint does not increase, odours will not increase, no volumes received or disposed of will increase or decrease and the long term objective of the works to release effluent free of solids to sea will be that much closer to fruition.

In this alternative, the treatment process remains as such:

Domestic Effluent - Effluent undergoes preliminary and primary treatment. Thin raw sludge is deposited into effluent channel leading to the sea outfall. Settled effluent is transported to the Veolia Water Treatment plant for further treatment.

Industrial Effluent - Effluent undergoes preliminary treatment before being diverted towards the sea outfall.

Refer to Figure 5-3.



Figure 5-3: No go alternative – maintenance of status quo

6 GENERAL DESCRIPTION OF THE STUDY AREA

6.1 Biophysical factors

6.1.1 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 Table 5.

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 15th November to 30th 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.

Table 5: Climate data for Durban (1961 – 1990; data from the World Meteorological Organization and the National Oceanic and Atmospheric Administration

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

6.1.2 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 6-1 depicts the site geology aspects.

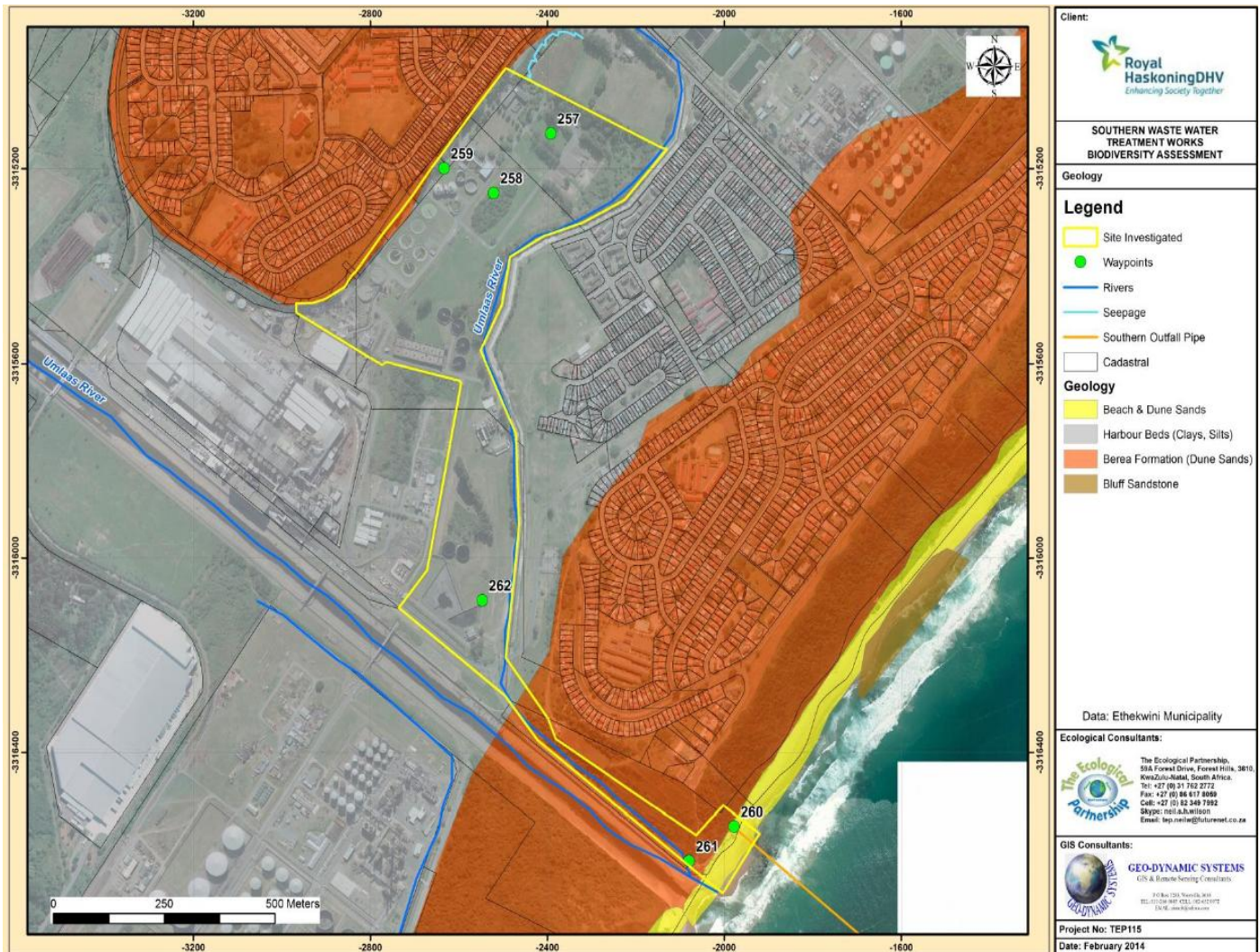


Figure 6-1: Study area geology

6.1.3 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 6-3**. 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 is consulted and it was determined that only activity 12 is triggered pertaining to the removal of 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 also present (Plates 1-4 in Figure 6-2). 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 6-2 (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 6-3) 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, must be eradicated and should be replaced with indigenous species native to the area to create more of a natural ecosystem with different types of natural habitat.

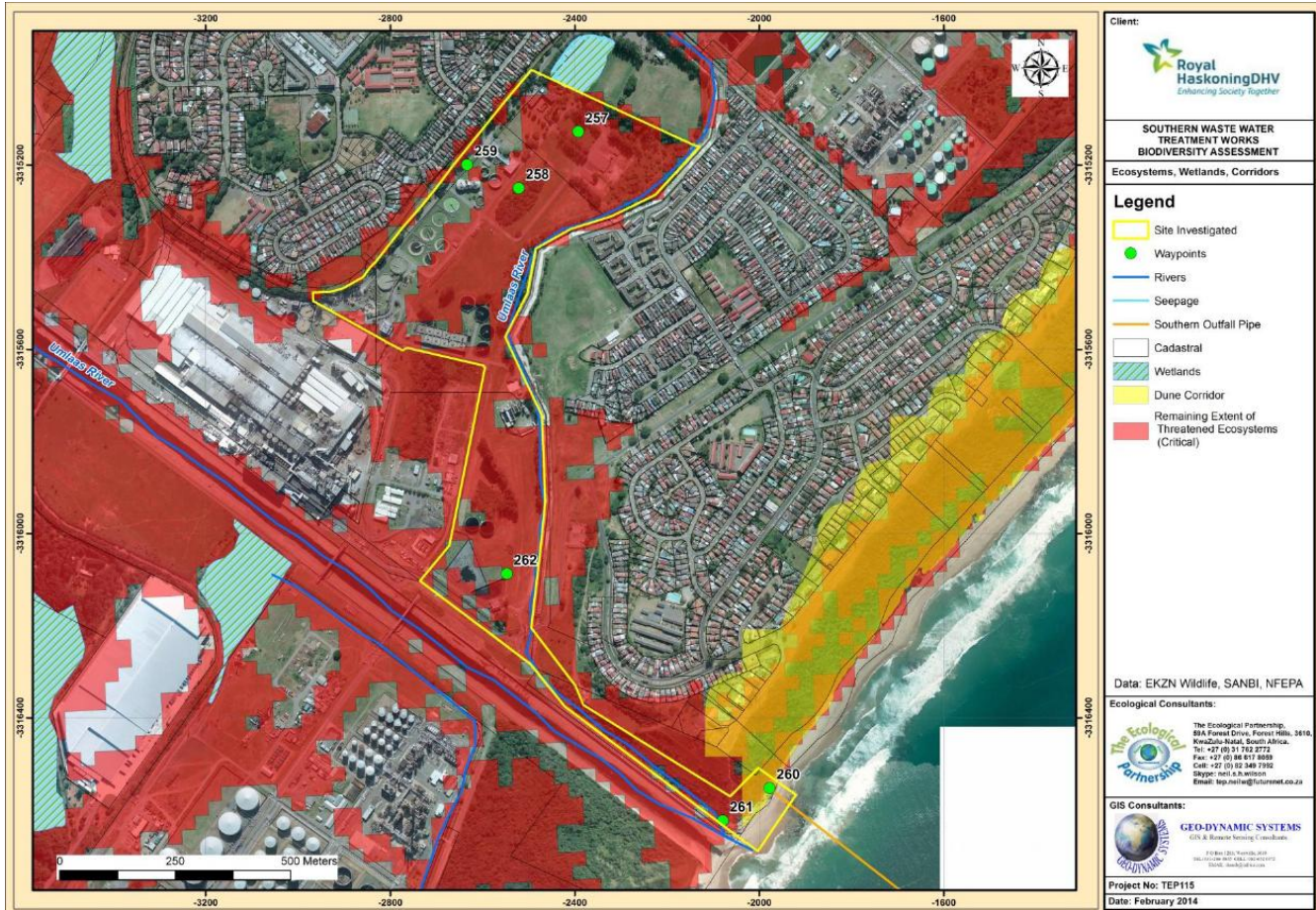


Figure 6-3: Critically threatened ecosystems of the study area

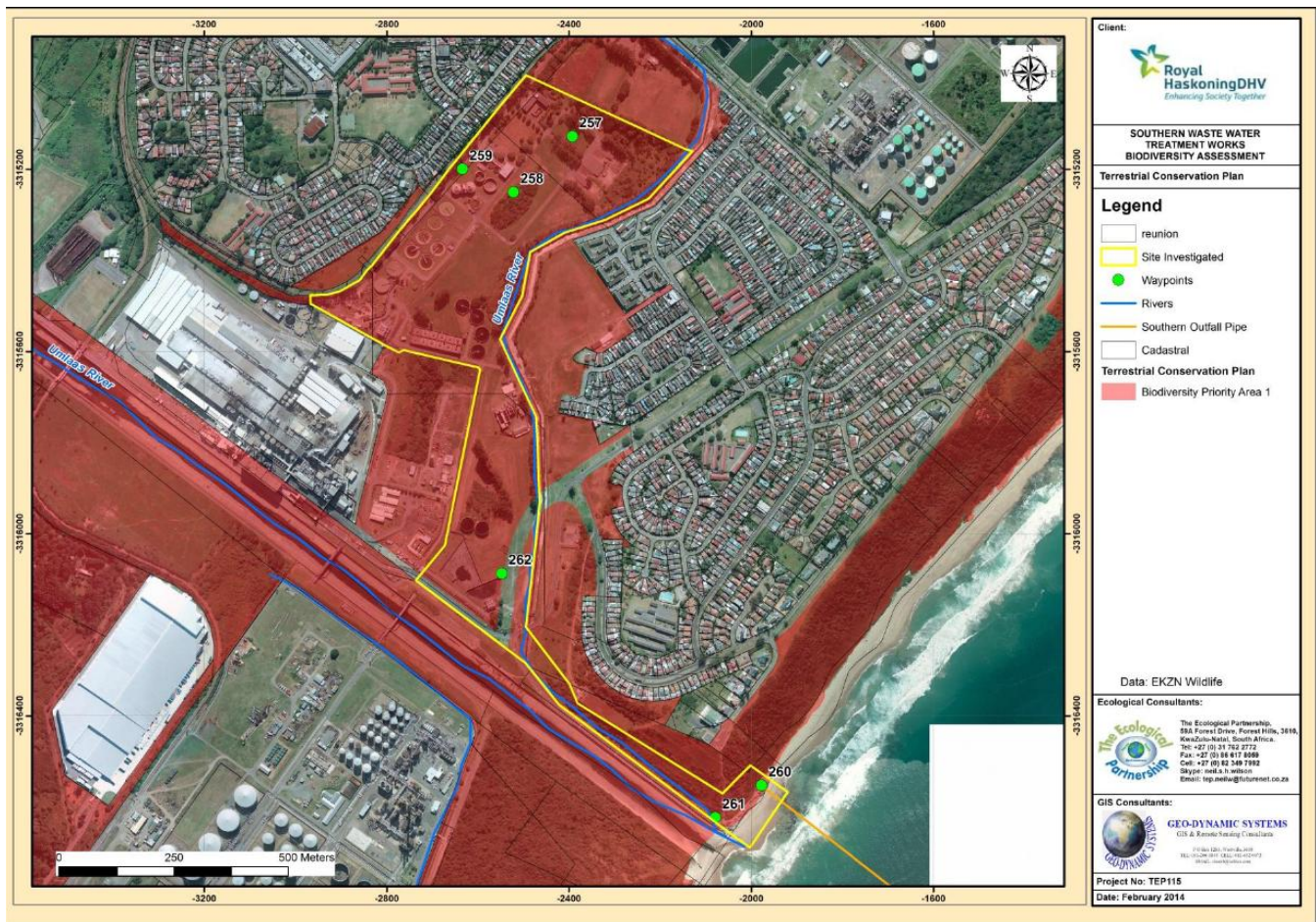


Figure 6-4: Biodiversity Priority Areas of Ezemvelo KZN Wildlife's Terrestrial Conservation Plan

6.1.4 Air Quality

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

6.1.4.1 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 inversions is most common over 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).

6.1.4.1.1 *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 6-5 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.

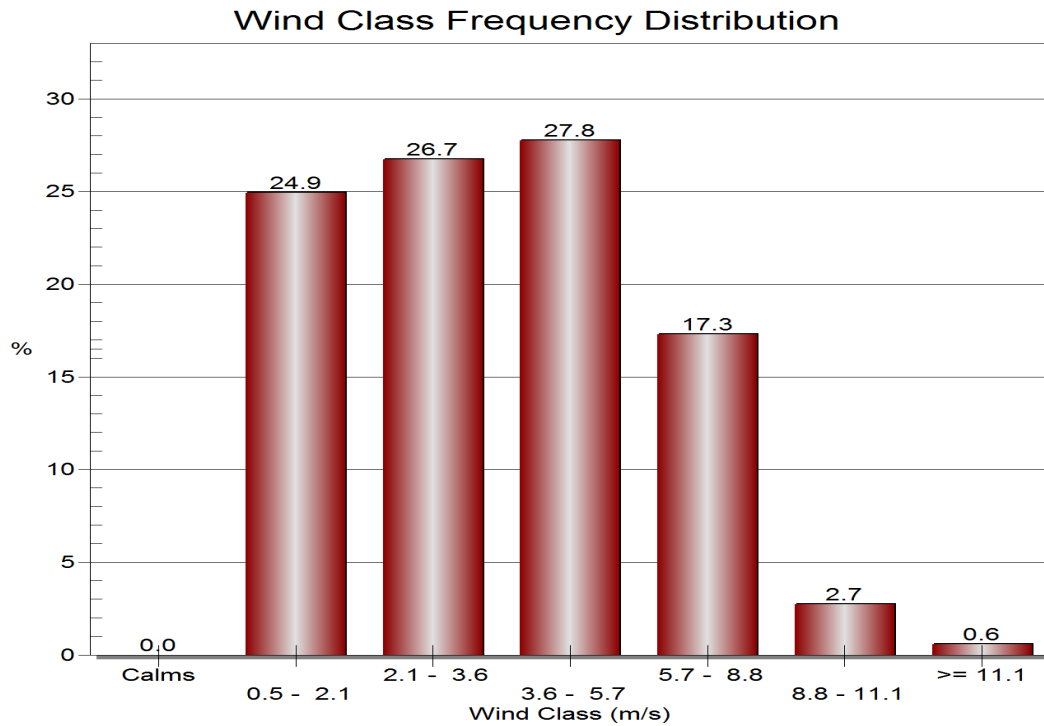


Figure 6-6: Wind class frequency distribution

6.1.4.1.2 Atmospheric Stability

Atmospheric stability is commonly categorised into one of seven stability classes. These are briefly described in Table 6 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 6: 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

6.1.4.1.3 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 6-7** below. Daily average summer temperatures ranged between 22.5 – 25.1°C, while the average winter temperatures ranged between 16.8 – 20.0°C. 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.

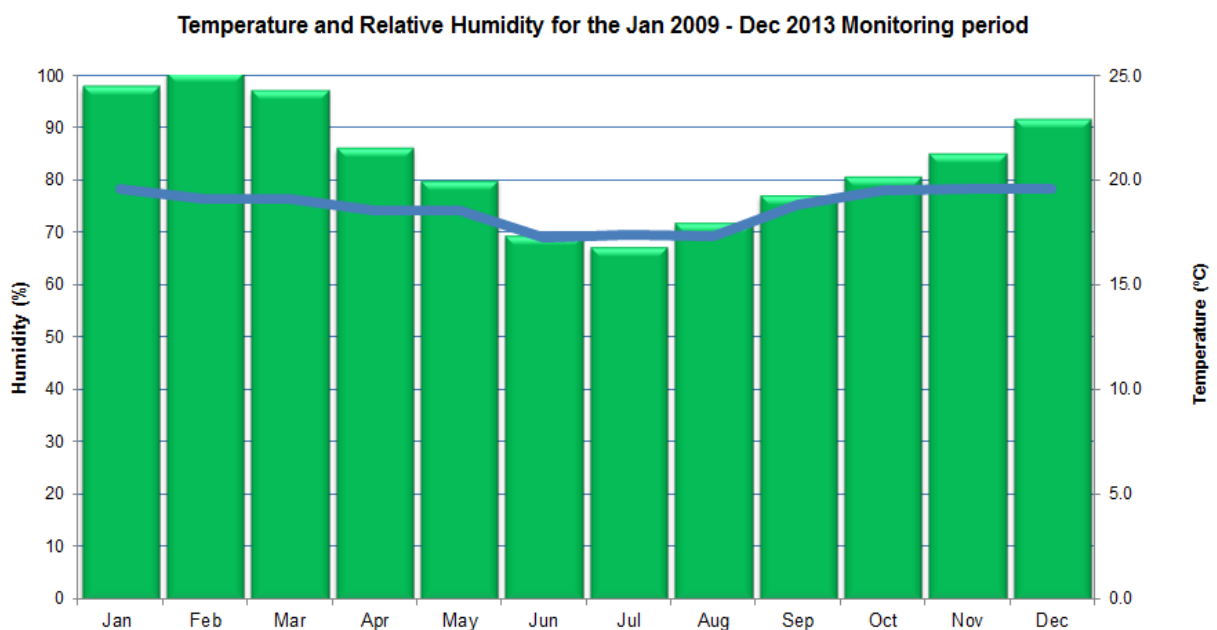


Figure 6-7: Average Temperature and Relative Humidity for the Jan 2009 – Dec 2013 Monitoring Period

6.1.4.1.4 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).

Summary of the total rainfall profile for the January 2009 – December 2013 monitoring period is illustrated in Figure 6-8 below. The spring and summer months recorded the highest rainfall with 242.26 mm and 250.76mm respectively. The winter months recorded the lowest average of precipitation with 92.24mm.

Average Precipitation for the SWWTW for the Jan 2009 - Dec 2013 Monitoring Period

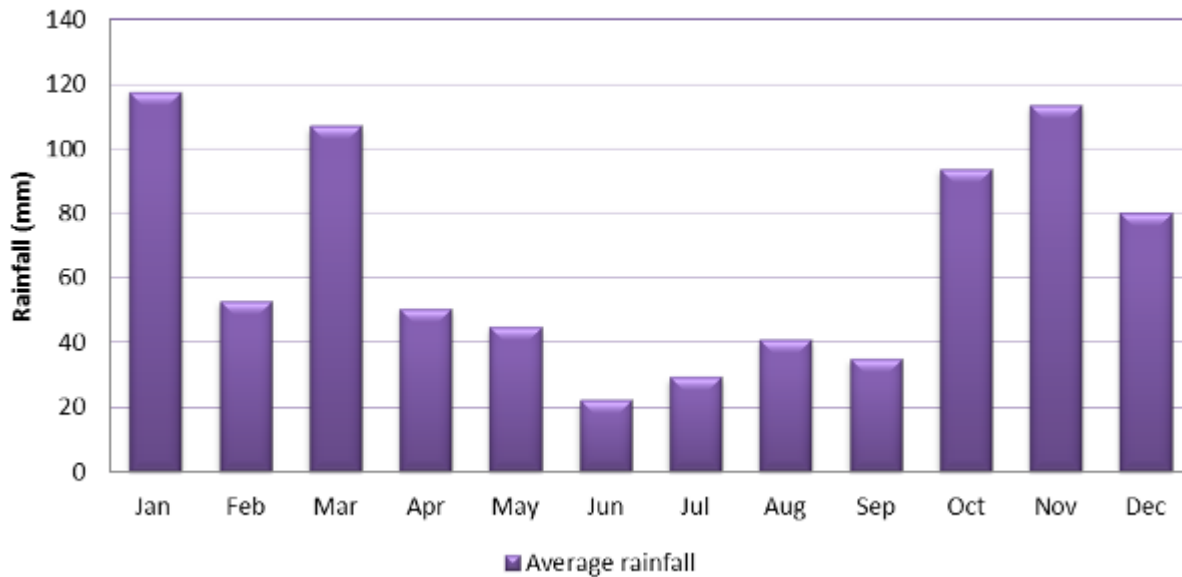


Figure 6-8: Average Precipitation for the Jan 2009 – Dec 2013 Monitoring Period for the SWWTW.

6.1.4.2 Baseline Air Quality

The eThekweni 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 (SO₂), Nitrogen dioxide (NO₂), Particulate matter (PM₁₀) and Total reduced sulphur (TRS).

Table 7: Location of Monitoring stations and parameters measured.

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	

Monitoring station	SO ₂	NO ₂	PM ₁₀	TRS
Warwick		x		
City Hall		x	x	

6.1.4.2.1 Sulphur Dioxide

Sulphur Dioxide (SO₂) 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 SO₂ include coughing, phlegm, chest discomfort and bronchitis.

Figure 6-9 below illustrates the annual trends in SO₂ from 2004 - 2009. There is gradual decrease in the annual concentrations of SO₂ since 2004. The monitoring stations with the exception of the 2004 exceedance at the southern works all fell below the annual SO₂ limit of 50 µg/m³.

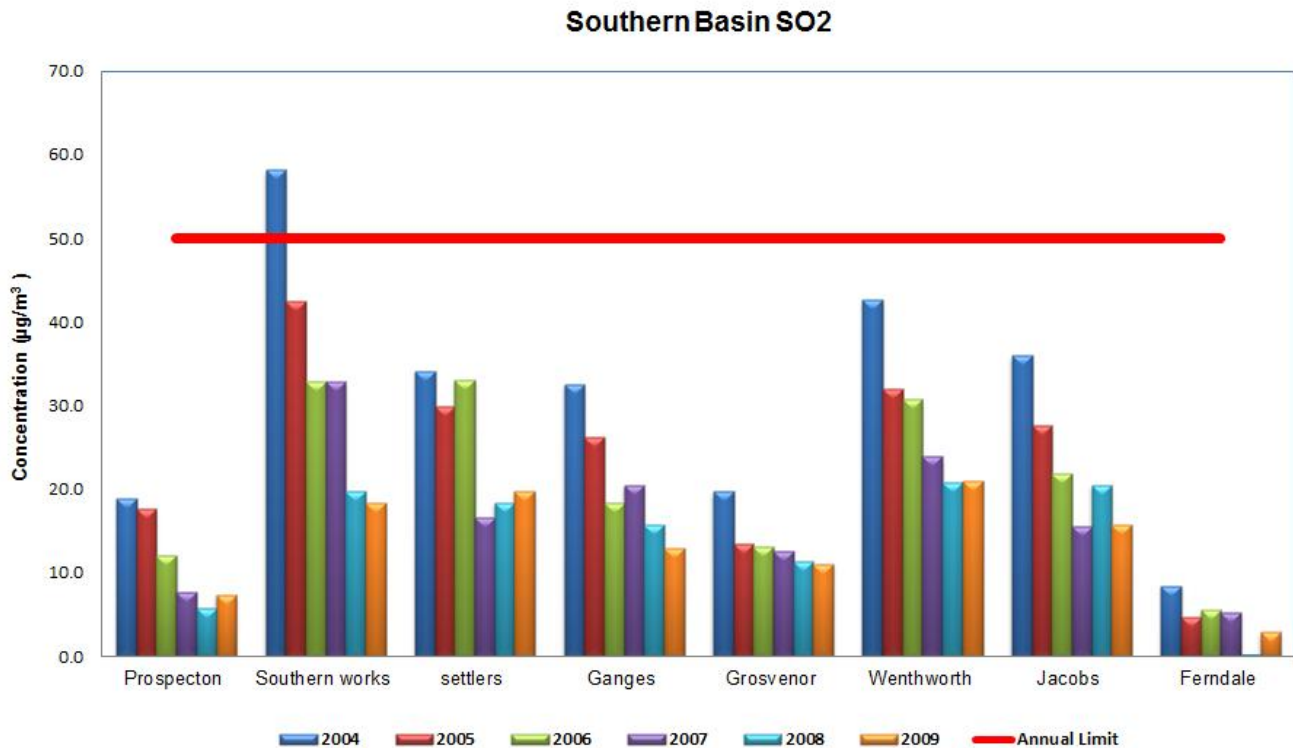


Figure 6-9: Sulphur dioxide concentration (µg/m³) annual trends (2004 – 2009).

6.1.4.2.2 Nitrogen Dioxide

Air quality guidelines and standards issued by most other countries and organisations tend to be given exclusively for Nitrogen Dioxide (NO₂) concentrations as NO₂ is the most important species from a human health point of view. NO₂ is an irritating 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 NO₂ is not very soluble in aqueous surfaces. Exposure to NO₂ is linked with increased susceptibility to respiratory infection, increased airway resistance in asthmatics and decreased pulmonary function.

Figure 6-10 below illustrates the annual trends in NO₂ from 2004 – 2009. The monitoring station located at the Ganges School exceeded the annual limit of 40 µg/m³ for NO₂ on 4 occasions in 2004, 2005, 2006 and 2009. The Warwick monitoring station exceeded the annual limit of NO₂ during the 2004 and 2008 monitoring period, while the City Hall and Jacobs Monitoring station exceeded the annual standard in 2006 and 2007 respectively.

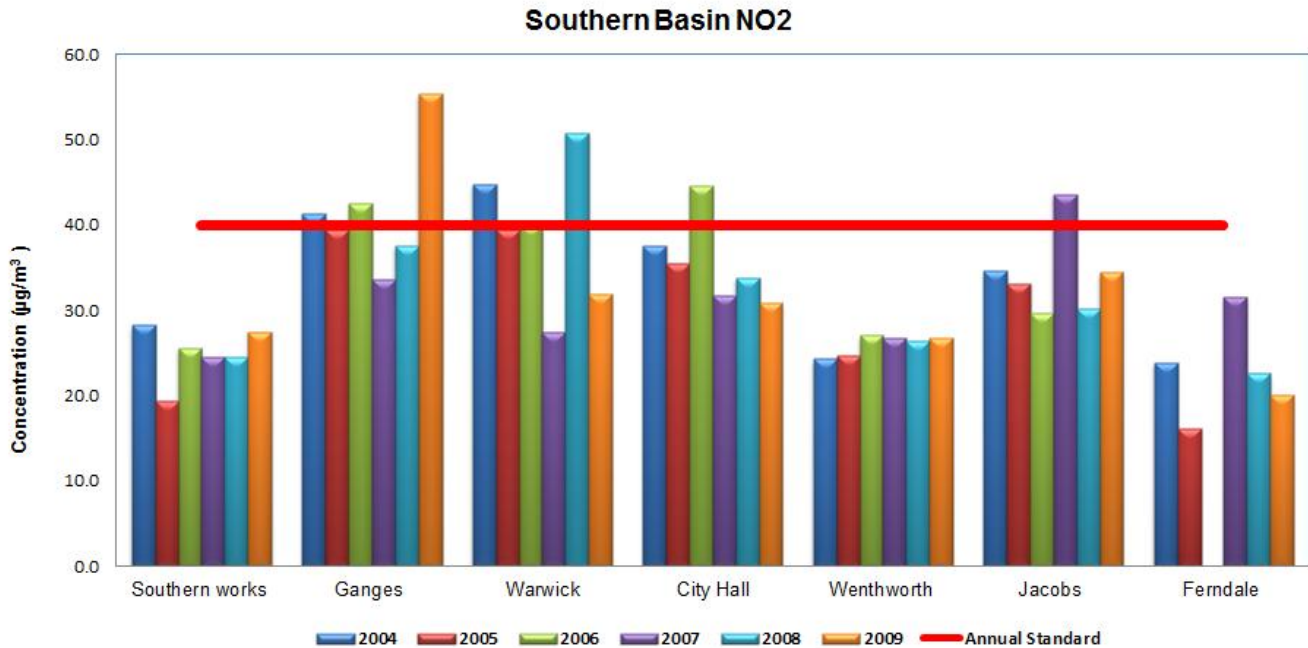


Figure 6-10: Nitrogen dioxide concentration (µg/m³) annual trends from 2004 – 2009.

6.1.4.2.3 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. Particulate matter includes dust, smoke, soot, pollen and soil particles (Kemp, 1998). Particulate matter 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 (USEPA, 1996). **PM is a complex mixture of extremely small particles and liquid droplets. The size of particles is directly linked to their potential for causing health problems. USEPA is concerned about particles that are 10 micrometers in diameter or smaller because those are the particles that generally pass through the throat and nose and enter the lungs. Once inhaled, these particles can affect the heart and lungs and cause serious health effects. 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.

Particulate matter 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).

Figure 6-11 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/m³. The highest concentrations (µg/m³) in PM₁₀ were experienced at the Ganges monitoring station.

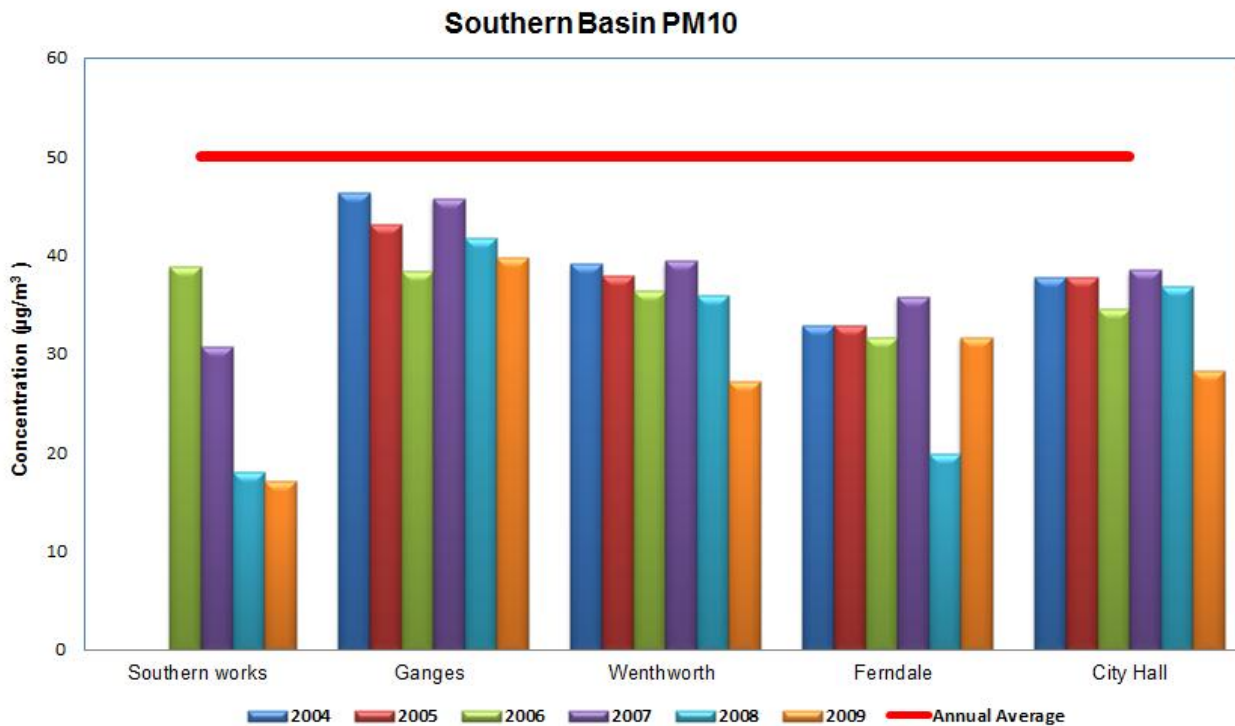


Figure 6-11: Particulate Matter concentration (µg/m³) annual trends from 2004 – 2009.

6.1.4.2.4 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 6-12 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.

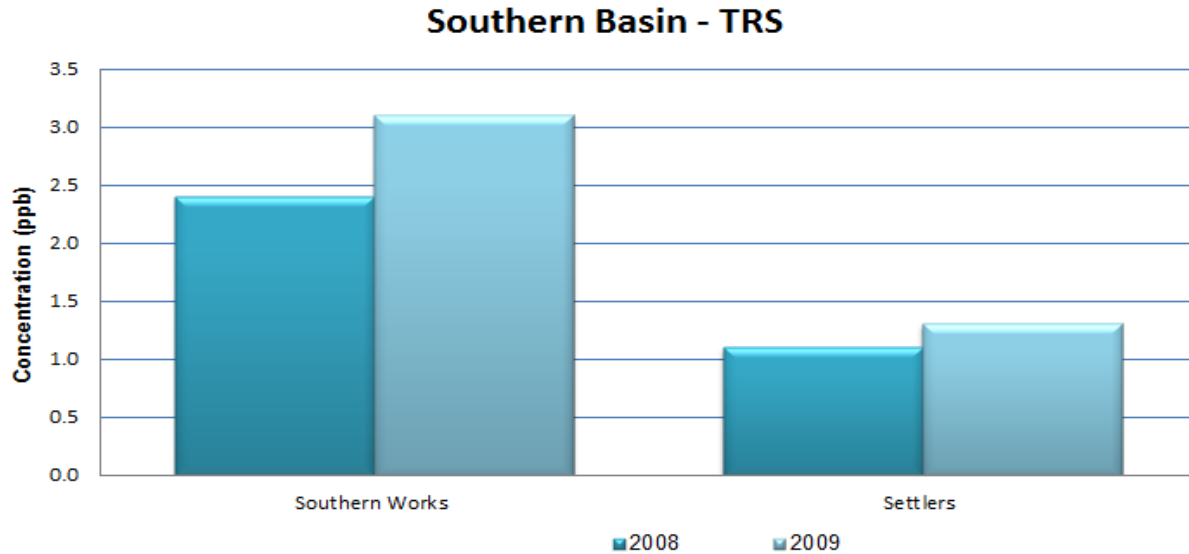


Figure 6-12: TRS concentration (ppb) during the 2008-2009 monitoring period.

6.1.5 Vegetation, Fauna and Water

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.**

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 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.

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 need to be identified and 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 to area G. The oval area 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). 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.*)

6.1.6 Sea Outfall Monitoring

eThekweni Municipality is authorised to discharge sludge to sea from SWWTW. The works has a design capacity of 230 Ml/day, and predominantly receives domestic effluent but with significant industrial effluent. The potential impact on receiving water is measured via an annual monitoring programme conducted by 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 outfalls of both the Central Works and the SWWTW are shown in Figure 6-13 below. 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 – a 64 m in the case of the Southern Works outfall (about 4.2 km off the shoreline).

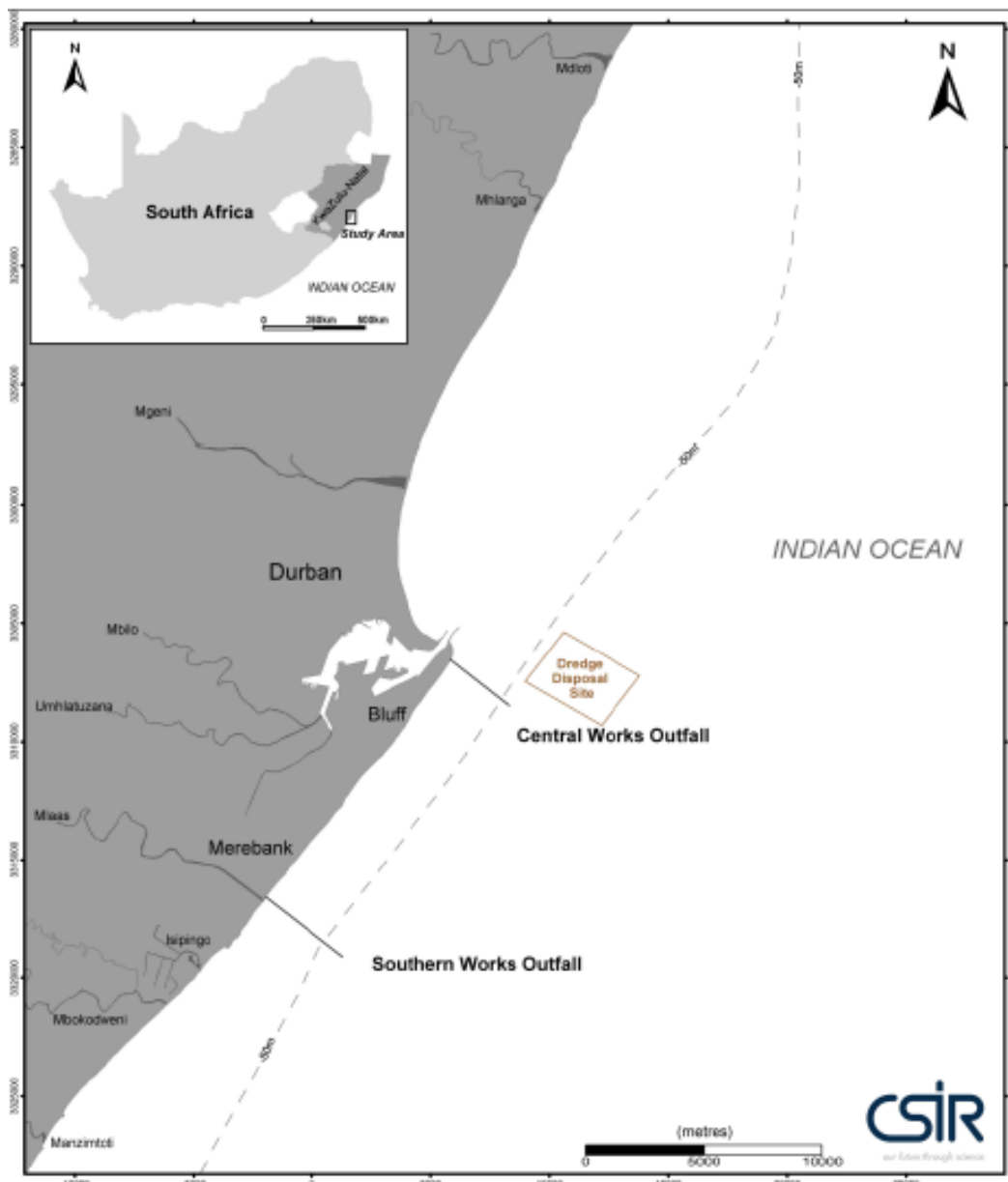


Figure 6-13 Location of the central works outfall and the southern works outfall

6.2 Socio-economic factors

6.2.1 Heritage and Cultural Value

The phase 1 Heritage Impact Assessment conducted by eThembeni Cultural Heritage presented the following findings:

Table 8: Findings of the HIA

Heritage Resource Type	Observation
Places, Buildings, Structures and equipment	None were identified within the proposed development area
Places associated with oral traditions or living heritage	None were identified within the proposed development area
Landscapes	None were identified within the proposed development area
Natural features	None were identified within the proposed development area
Traditional burial places	None were identified within the proposed development area
Ecofacts	None were identified within the proposed development area
Geological sites of scientific or cultural importance	None were identified within the proposed development area
Archaeological Sites	None were identified within the proposed development area
Historical settlements and townscapes	None were identified within the proposed development area
Public monuments and memorials	None were identified within the proposed development area
Battlefields	None were identified within the proposed development area

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. It is highly unlikely that any discrete heritage resources, such as archaeological sites, would have been present in the area in the first place, since the reed beds of the uMlazi River and estuary would have been eschewed by hunter-gatherers and farmers in the past. Any such sites are likely to have been destroyed by periodic flooding of the river and more recent industrial earthworks.

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.). It is therefore the opinion of the Heritage specialists appointed that the proposed development is unlikely to disturb such remains, since construction activities are likely to be restricted to deposits overlying potentially fossiliferous strata and/or deposits that have already been subject to massive environmental disturbance as described above.

All existing structures proposed for upgrade are industrial and utilitarian in nature, younger than 60 years, and have no heritage significance. Accordingly, no permits from Amafa are required to alter these structures. It is therefore unlikely that the second phase of the EIA will require a phase 2 Heritage Impact Assessment.

6.2.2 Socio-Economic Profile of the Receiving Environment

6.2.2.1 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, nearly 26.85% indentured men returned to India, but most 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, the rest lived in wood and iron structures. By the 1940's the Pegging Acts of 1942 – 43 and the Ghetto Act of 1946 were passed. This act 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>).

6.2.2.2 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’ 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: “*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.*”

6.2.2.2.1 *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 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.

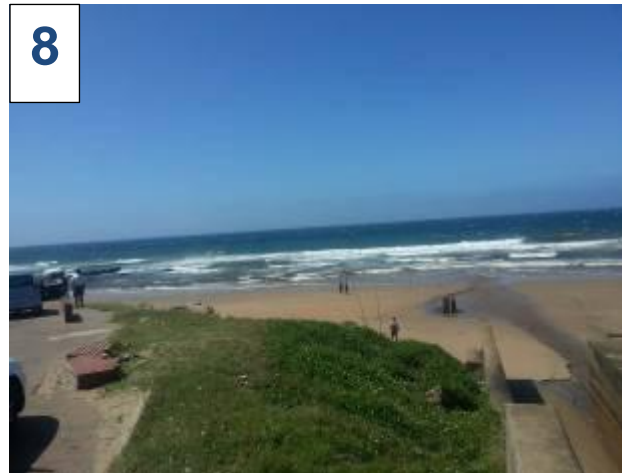


Figure 6-14: Plates 5 to 8: Residences en route to SWWTW (5), road to SWWTW (6), formal developed homes in close proximity to SWWTW (7), and the potentially affected beach area (8).

7 PUBLIC PARTICIPATION PROCESS

Public participation is a process that is designed to enable all interested and affected parties (I&APs) to voice their opinion and/ or concerns which enables the practitioner to evaluate all aspects of the proposed development, with the objective of improving the project by maximising its benefits while minimising its adverse effects. I&APs include all interested stakeholders, technical specialists, and the various relevant organs of state who work together to produce better decisions.

The primary aims of the public participation process are:

- ✦ to inform interested and affected parties (I&APs) and key stakeholders of the proposed application and environmental studies;
- ✦ to initiate meaningful and timeous participation of I&APs;
- ✦ to identify issues and concerns of key stakeholders and I&APs with regards to the application for the development (i.e. focus on important issues);
- ✦ to promote transparency and an understanding of the project and its potential environmental (social and biophysical) impacts (both positive and negative);
- ✦ to provide information used for decision-making;
- ✦ to provide a structure for liaison and communication with I&APs and key stakeholders;
- ✦ to ensure inclusivity (the needs, interests and values of I&APs must be considered in the decision-making process);
- ✦ to focus on issues relevant to the project, and issues considered important by I&APs and key stakeholders; and
- ✦ to provide responses to I&AP queries.

The public participation process must adhere to the requirements of Regulations (GNR 543) under the NEMA. The public participation process for the SWWTW Solids Removal and Treatment Facilities Upgrade EIA process will be undertaken according to the stages outlined below.

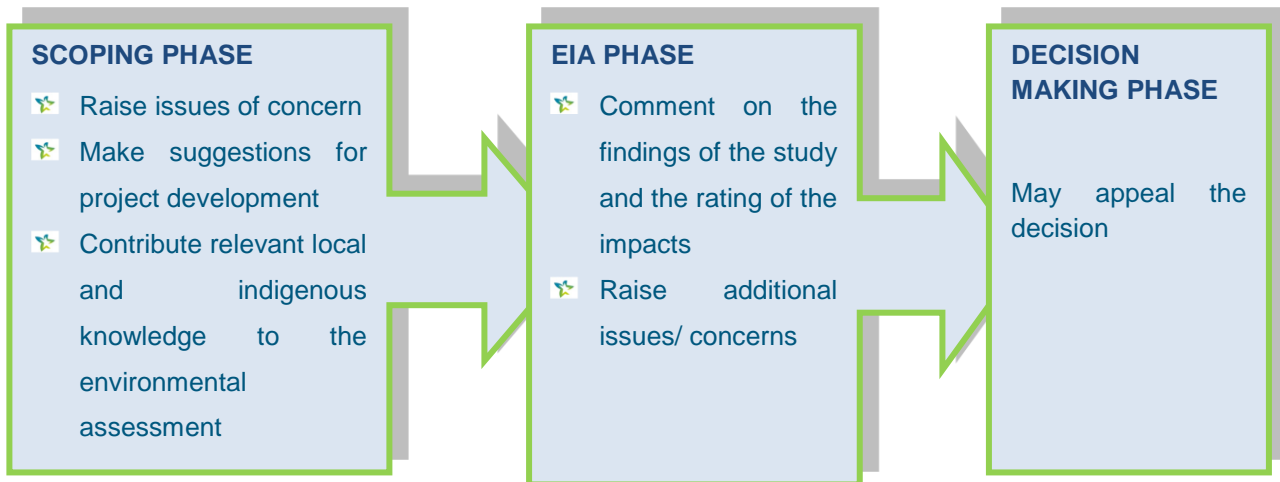


Figure 7-1: Responsibilities of I&APs in the different PPP stages

Phelamanga Projects is working with Royal HaskoningDHV on the Public Participation Process (PPP) for Project. It is imperative to note that the study area is one with a historical disadvantage being plagued by and poor spatial planning. It is for this reason that several non-governmental organisations and activists mobilised and strengthen the community’s involvement in all development alike, as well the current environment. RHDHV perceives this is a benefit as a substantial portion of environmental assessments on information exchange and as an environmental assessment practitioner, one is reliant on the knowledge which is hope will be parted by the community.

Figure 7-2 depicts the approach taken by RHDHV, where one way information flow is avoided and information exchange is promoted, thereby enabling a higher level of engagement.

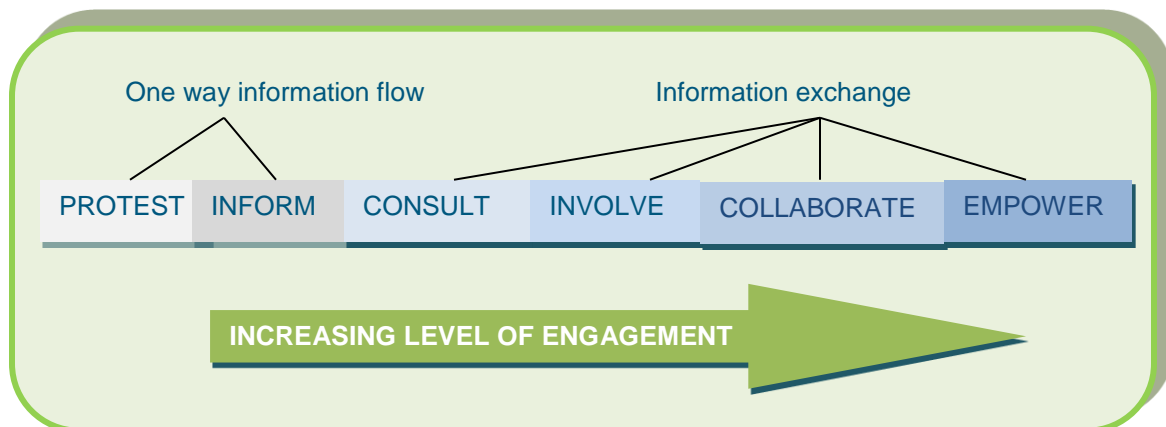


Figure 7-2: The stakeholder engagement spectrum (DEAT, 2002).

For the purposes of the scoping phase, the PPP aims to ensure that the full range of stakeholders is informed about project scope. In order to achieve this, a number of key activities have taken place and will continue to take place. These included the following:

- ✦ The identification of stakeholders is a key deliverable at the outset, and it is noted that there are different categories of stakeholders that must be engaged, from the different levels and categories of government, to relevant structures in the NGO sector, to the communities of wards of residential dwellings which surround the works;
- ✦ The development of a living and dynamic database that captures details of stakeholders from all sectors;

- ✦ The convening of focused and general meetings with stakeholders at different times throughout the EIA process;
- ✦ The engagement of public leaders to whom the public generally turn for information, keeping such individuals well informed about process and progress;
- ✦ The fielding of queries from I&APs and others, and providing appropriate information;
- ✦ The convening of specific stakeholder groupings/fora as the need arises;
- ✦ The preparation of reports (both baseline and impact assessment) based on information gathered throughout the EIA via the PPP and feeding that into the relevant decision-makers;
- ✦ The PPP includes distribution of pamphlets or Background Information Documents and other information packs; and
- ✦ Where appropriate site visits may be organised, as well as targeted coverage by the media.

Specifically the SWWTW Solids Removal & Treatment Facilities Upgrade (SR&TFU) EIA PPP has entailed the following activities.

7.1 Authority Consultation

The competent authority which is the KZN DED TEA is required to provide an environmental authorisation (whether positive or negative) for the project. The KZN DED TEA was consulted from the outset of this study, and has been engaged throughout the project process.

Authority consultation included the following activities:

- ✦ Consultation in the form of upfront meetings with Mr Mahlangu of the DEA and with Ms Naidoo of the DED TEA.
- ✦ Submission of an application for environmental authorisation in terms of Section 26 of the EIA Regulations (2010) on 25 March 2014.
- ✦ Approval of the application documentation by KZN DED TEA (then DAEA) was received on 27 March 2014 (EIA Activities) and 09 April 2014 (WML Application) with the following DAEA reference number DM/0032/2014 and DM/WML/0050/2014 (see Appendix A4).

7.2 Consultation with Other Relevant Stakeholders

Consultation with other relevant key stakeholders were and will continue to be undertaken through telephone calls and written correspondence in order to actively engage these stakeholders from the outset and to provide background information about the project during the Environmental Scoping Phase. An introductory meeting was held on 14 April 2014 (Refer to Appendix B5 for the minutes of this meeting). **Furthermore, a focus group meeting (FGM) was held on 19 May 2014 and a public meeting (PM) was held on 21 May 2014 as part of the scoping phase.**

The identified stakeholders of this project include:

Table 9: Key Stakeholders Contacted As Part of the Public Participation Process

OWNERS AND OCCUPIERS OF LAND ADJACENT TO THE SITE	
Refer to detailed database in Appendix B8	
LOCAL AUTHORITY	
Diane van Rensburg	eThekweni Municipality
PROVINCIAL AUTHORITY	
Felicity Elliot	Ezemvelo KZN Wildlife
Weziwe Tshabalala	Amafa aKwaZulu-Natali
Omar Paruk	KZN Department of Agriculture and Environmental Affairs – Coastal Unit
Natasha Govender	KwaZulu-Natal Department of Agriculture and Environmental Affairs
STATE DEPARTMENTS	
Ms N Mdlalose / Ms H Aboobaker	National Department of Water Affairs
Roy Ryan	Department of Transport

7.2.1 Focus Group Meeting

The FGM was held on 19 May 2014 at the SWWTW. The focus group members were invited by direct email invitation. The following identified focus group members were invited to the Focus Group Meeting:

Table 10: Identified Focus Group Members

LOCAL AUTHORITY	
Diane van Rensburg	eThekweni Municipality
Andrew Mather	eThekweni Municipality Coastal Unit
PROVINCIAL AUTHORITY	
Felicity Elliot / Andy Blackmore	Ezemvelo KZN Wildlife
Weziwe Tshabalala	Amafa aKwaZulu-Natali
Omar Paruk	KZN Department of Agriculture and Environmental Affairs – Coastal Unit
Natasha Brijlal	KwaZulu-Natal Department of ED TEA
STATE DEPARTMENTS	
Ms N Mdlalose / Ms H Aboobaker	National Department of Water Affairs
Michele Schmid	Department of Transport
NGOs and Local Business	
Farida Khan	Centre for Health and Environmental Education and Awareness
Desmond D'sa	South Durban Community Environmental Alliance
Di Jones	WESSA and CoastWatch
Bobby Peak	Groundwork
Rafiq Gafoor	Mondi Ltd
Zakhira	Crisis Careline

The meeting was unfortunately poorly attended. However, the contributions were significant and useful. The following key aspects arose during the focus group meeting:

1. Motivation for the project was raised for discussion.
2. General support for the solid removal and sludge re-use.
3. Persisting concern with remaining industrial waste (this industrial waste will however, be treated).
4. Concern over high levels of Zinc as reported in the CSIR sea outfalls report (2011).

5. General discussions were held on the public consultation efforts.
6. Lengthy discussions were held on air quality (H₂S, TRS).
7. Reuse of water – can only be done with further treatment.
8. Emphasis was placed on the fact that the SWWTW is moving towards best practice which is an on-going process and long term goal.

7.3 Site Notification

The NEMA EIA Regulations require that a site notice be fixed at a place conspicuous to the public at the boundary or on the fence of the site where the activity to which the application relates and at points of access or high through traffic. The purpose of this is to notify the public of the project and to invite the public to register as stakeholders and inform them of the PP Process. Royal HaskoningDHV erected ten site notices at various noticeable locations around the perimeter of the site (refer to Appendix B3).

7.4 Advertising

In compliance with the EIA Regulations (2010), notification of the commencement of the EIA process for the project was advertised in a local and provincial newspaper as follows:

- ✦ Merebank Rising Sun on 13 May 2014
- ✦ The Mercury on 7 May 2014

(Refer to Appendix B2). Interested and affected parties (I&APs) were requested to register their interest in the project and become involved in the EIA process. The primary aim of these advertisements was to ensure that the widest group of I&APs possible was informed and invited to provide input and questions and comments on the project.

7.5 Identification of Interested and Affected Parties

I&APs were identified primarily through an existing database as well as from responses received from the notices mentioned above. E-mails were sent to key stakeholders and other I&APs on the existing database, informing them of the application for the project, the availability of the draft Environmental Scoping Report (ESR) for review and indicating how they could become involved in the project. The contact details of all identified I&APs are updated on the project database, which is included in Appendix B8.

This database will be updated on an on-going basis throughout the EIA process.

7.6 Briefing Paper

A briefing paper or Background Information Document (BID) for the project was compiled in English (refer to Appendix B5). The aim of this document is to provide a brief outline of the application and the nature of the development. It is also aimed at providing preliminary details regarding the EIA process, and explains how I&APs could become involved in the project.

The briefing paper was distributed to all identified I&APs and stakeholders, together with a registration / comment sheet inviting I&APs to submit details of any issues, concerns or inputs they might have with regards to the project. Vibrant Direct Pty Ltd was commissioned to distribute 3,000 BID extracts (a shortened version of the full BID) directly to household post boxes and distribute at the nearest intersection.

7.7 Public Meeting

A public meeting was held on 21 May 2014 at the Merebank Community Centre (refer to Appendix B6) with regrettably poor attendance. There was one attendee who did provide the following input for discussion:

1. Noise impacts
2. Request for TIA
3. European processes / international standards were discussed.
4. The EIA team were made aware that the public did not see the site notices. It was explained that a possible reason for this was that the notices were taken down along with the election campaign posters.

7.8 Issues Trail

Issues and concerns raised in the public participation process during the EIA process have been and will continue to be compiled into an Issues Trail. The ESS-phase Issues Trail is attached as Appendix B9, in which all comments received and responses provided have been captured.

7.9 Public Review of the Scoping Report

All registered I&APs were notified of the availability of the report at the meetings and electronically.

The draft ESR, together with the Plan of Study for EIA was made available for authority and public review for a total of 40 days from 23 May 2014 to 2 July 2014. The report was made available at the following public locations within the study area, which are all readily accessible to I&APs:

- ✦ The Merebank Library; 2 Natraj Lane, Merebank;
- ✦ EWS Offices at 3 Prior Road, Durban;
- ✦ Southern Waste Water Treatment Works – 2 Byfield Road Merewent; and
- ✦ Electronically on the Royal HaskoningDHV Website : www.rhdhv.co.za

The Final Scoping Report (document at hand) and PoS will be made available for a 21 day period from 22 August 2014 to 12 September 2014, thereafter; the CA review of the report will begin. For this review, the report will be available at:

- ✦ The Merebank Library; 2 Natraj Lane, Merebank;
- ✦ Southern Waste Water Treatment Works – 2 Byfield Road Merewent; and
- ✦ Electronically on the Royal HaskoningDHV Website: www.rhdhv.co.za

7.10 Final Environmental Scoping Report

The final stage in the Environmental Scoping Study process entails the capturing of responses and comments from I&APs on the draft ESR in order to refine the ESR, and ensure that all issues of significance are addressed. The final Environmental Scoping Report (document at hand) is the product of this and will be put out for public review and comment once again for 21 days before being submitted to KZN DED TEA for review and decision-making as detailed above in section 7.9.

7.11 PPP Summary

Table 11: Summary of Public Participation Process of the scoping phase thus far

ACTIVITY	DESCRIPTION	REFERENCE
Identifying stakeholders	Stakeholders were identified and a database of all I&APs were compiled.	Appendix B
Publishing newspaper adverts	The Mercury and the Merebank Rising Sun	Appendix B
Distribution of a BID	BIDs were distributed electronically and by hand to I&APs	Appendix B
Erection of site notices	Ten A2 site notices were erected on the perimeter of the site.	Appendix B
Preparation of an on-going Issues Trail	Comments, issues of concern and suggestions received from stakeholders thus far have been captured in a Comment and Response Report.	Appendix B
Release of the Draft Scoping Report	The Draft Scoping Report has been advertised and made available for a period of 40 days for public review and comment.	Appendix B
Public Meetings / Open Days	An introductory meeting was held and a further focus group and public meeting were held during the Scoping Phase.	Appendix B
Release of final Scoping Report	The final Scoping Report (document at hand) is made available for a period of 21 days for public review and comment. This is invited by way of email invitation to all registered I&APs.	Appendix B

8 POTENTIAL IMPACTS ASSOCIATED WITH THE PROJECT

This Environmental Scoping Study (ESS) aims to identify the **potential** positive and negative impacts (both biophysical and social) associated with the proposed upgrades at the SWWTW. The potential impacts have been identified through baseline investigations and below are summaries per phase.

8.1 Construction Phase

The construction phase of this project refers to the land which is to be developed and lasts only while the proposed development is being constructed. The following potential impacts will be considered in the Impact Assessment Phase:

Table 12: Potential Construction Phase Impacts

AFFECTED ENVIRONMENT	ANTICIPATED IMPACT
BIOPHYSICAL IMPACTS	
Geology	✳ No disturbance of surface geology for the development is anticipated.
Topography	✳ Temporary alteration of topography during the period of replacement of the sea outfall pipeline.
Soils	✳ Possible contamination of soils due to spillage, leakage, incorrect storage and handling of chemicals, oils, lubricants, fuel and other hazardous material.
Geohydrology (groundwater) , Hydrology (surface water) and Coastal Waters	✳ Possible but unlikely contamination of surface and groundwater due to spillage, leakage, incorrect storage and handling of chemicals, oils, lubricants, fuel and other hazardous material. ✳ No impact on Coastal Waters during construction.
Vegetation	✳ Minimal loss of vegetation ✳ Removal of alien invasive species ✳ The negative impacts on indigenous biodiversity will be negligible due to the fact that the upgrades are within a disturbed footprint. A few indigenous tree species will be lost.
Wetlands	✳ No potential negative impacts on the adjacent wetland (refer to biodiversity scan report) and/or loss of wetlands is anticipated.
Agricultural	✳ None.
Air Quality	✳ During the construction assessment phase it is expected that, the main sources of impact will result due to vehicle movement within the plant area. These predicted impacts cannot be quantified, primarily due to the lack of detailed information related to scheduling and positioning of construction related activities. Instead, a qualitative description of the impacts will be provided in the EIA study. This will involve the identification of possible sources of emissions and the provision of details related to their impacts. ✳ Construction usually consists of a series of different operations, each with its own duration and potential for dust generation. Dust emission will vary from day to day depending on the phase of

AFFECTED ENVIRONMENT	ANTICIPATED IMPACT
	<p>construction, the level of activity, and the prevailing meteorological conditions⁴.</p> <p>✚ The following possible sources of fugitive dust have been identified as activities which could potentially generate dust during construction operations at the site:</p> <ul style="list-style-type: none"> ▪ Scraping; ▪ Debris handling; ▪ Emergency venting; and ▪ Truck transport and dumping of debris.
Noise	<p>✚ Noise will be generated during the construction; however with the appropriate mitigation measures in place the impact will be minimal.</p>
Waste	<p>✚ The potential waste streams for the project include general, hazardous and sewage waste.</p> <p>✚ General waste generated on site includes domestic waste and building rubble. General waste will not have a significant impact on the environment provided that the correct waste streams are used for the disposal of the waste.</p> <p>✚ Hazardous waste will be generated through the spillage of raw material. All material cleared after a spillage must be treated as hazardous waste and disposed off at a hazardous waste disposal site.</p> <p>✚ Generation and disposal of sewage waste of temporary construction toilets.</p>
Health and Safety	<p>✚ The safety of the construction staff could be compromised unless adequate safety measures are implemented.</p>
Odour	<p>✚ Release of odours as a result of the chemical toilets on site.</p>
Spillage and incidents	<p>✚ Contamination of soils, surface and groundwater due to spillage, leakage, incorrect storage and handling of: Chemicals; Oils; Lubricants; Fuels; and Other Hazardous Materials is possible though highly limited due to construction work to take place on concretized, developed land.</p> <p>✚ Fires or explosions may occur which would result in a significant risk to the biophysical and socio-economic environment.</p>
Sites of Archaeological, Historical and Cultural Significance	<p>✚ While no items of archaeological or heritage significance are envisaged, there is always the possibility of the disturbance of possible graves or other sites of cultural significance on site.</p>
SOCIO-ECONOMIC IMPACTS	
Employment	<p>✚ The development will result in job creation and provision of employment.</p>
Housing	<p>✚ None.</p>
Population Changes	<p>✚ Job creation during the construction phase could result in the influx of people to the area. However, this should be temporary.</p>

⁴ **U.S Environmental Protection Agency, (1996).** Compilation of Air Pollution Emission Factors (AP-42), 6th Edition, Volume 1, as contained in the *AirCHIEF (AIR Clearinghouse for Inventories and Emission Factors) CD-ROM (compact disk read only memory)*, US Environmental Protection Agency, Research Triangle Park, North Carolina. Also available at URL: <http://www.epa.gov/ttn/chief/ap42/>.

AFFECTED ENVIRONMENT	ANTICIPATED IMPACT
Public Disturbance	<ul style="list-style-type: none"> It is anticipated that an 8 hour period will be required for construction on the beach during beach pipeline tie-ins. Furthermore, there is the possibility of bypassing sewage onto the beach for this activity to be completed. Notification will be provided for this. This however, will be done in the last stage of the construction activities, after the storage dams are installed as these dams are a form of mitigation in that they will have a 10 hour storage capacity. It is therefore possible that no sewage bypass will occur.
Uncontrolled settlements	<ul style="list-style-type: none"> None envisaged.
Traffic	<ul style="list-style-type: none"> Traffic disruptions and congestion during construction period.
Security and Social Ills	<ul style="list-style-type: none"> Contractors, the influx of people and potential job creation will result in the proliferation of social ills and issues such as crime, prostitution, the spread of HIV/AIDS, informal settlements etc.
Safety	<ul style="list-style-type: none"> The safety of the construction staff could be compromised unless adequate safety measures are implemented. The digestion process produces flammable biogas which is a potential hazard to workers on site and the general public.
Visual	<ul style="list-style-type: none"> Alteration of existing visual perspective will be slightly altered.

8.2 Operational Phase

The following potential environmental impacts have been considered for the operational phase:

Table 13: Potential operation phase impacts

AFFECTED ENVIRONMENT	ANTICIPATED IMPACT
BIO-PHYSICAL IMPACTS	
Soils	<ul style="list-style-type: none"> None.
Vegetation	<ul style="list-style-type: none"> Minimal/ negligent loss of vegetation, however a continued alien invasive eradication programme will constitute a positive impact.
Wetlands	<ul style="list-style-type: none"> None.
Geohydrology (groundwater) and Hydrology (surface water) and Coastal Waters	<ul style="list-style-type: none"> Possible Cumulative & Downstream impacts. A reduced impact on marine life due to decreased suspended solids disposed to sea.
Agricultural	<ul style="list-style-type: none"> None.
Air Quality	<ul style="list-style-type: none"> Generation of biogas (a condition of the current status). Generation of fumes from vehicle emissions may pollute the air.
Noise	<ul style="list-style-type: none"> Noise disturbance from pump stations (not to be increased from current state)
Waste	<ul style="list-style-type: none"> No increase or decrease due to proposed upgrades.
SOCIO-ECONOMIC IMPACTS	
Employment	<ul style="list-style-type: none"> The completion of the development will lead to the stimulation of direct and indirect job creation.

AFFECTED ENVIRONMENT	ANTICIPATED IMPACT
	Particularly, 4 operators, 4 shift assistants, & 1 technician will be required to operate the facilities developed.
Population Changes	None.
Provision of infrastructure	The project will result in the upgrade of infrastructure and therefore increased efficiency of the works as a waste water treatment facility.
Housing	No impact on housing.
Recreational facilities	None.
Traffic	There will be a minor increase in trucks for the removal of sludge from site.
Security and Social Ills	None.

8.3 Decommissioning Phase

There is no decommissioning phase for this project.

8.4 Cumulative Impacts

Cumulative impacts associated with the project will be further investigated in detail during the EIA study. Of particular importance is the cumulative impact on coastal waters due to sea disposal of raw sludge, which cumulatively is negatively impacting on benthic macro-fauna and the greater marine environment. This is an aspect that will be assessed in the EIA phase.

9 PLAN OF STUDY FOR ENVIRONMENTAL IMPACT ASSESSMENT

Potential environmental impacts (biophysical and social) associated with the proposed SWWTW upgrade, have been identified in the Environmental Scoping Study (ESS).

No fatal flaws or highly significant impacts have been identified to date. All potentially significant and cumulative impacts will be further investigated and assessed within the Environmental Impact Assessment (EIA) phase of the project.

Mitigation measures will be contained in the Environmental Management Programme (EMPr) to be compiled during the EIA phase. Mitigation measures recommended in the ESS will also be included in the EMPr.

The EIA phase will aim to adequately assess and address all potentially significant environmental issues in order to provide the KwaZulu-Natal Department of Economic Development, Tourism and Environmental Affairs (KZN ED TEA) with sufficient information to make an informed decision regarding the proposed project.

9.1 Purpose of the EIA

The purpose of the EIA is to provide / determine:

- ✦ An assessment of the environment likely to be affected by the proposed project;
- ✦ An assessment of the environments likely to be affected by any identified alternatives;
- ✦ An assessment of the extent, duration, intensity, probability and significance of the identified potential environmental, social and cultural impacts of the proposed project;
- ✦ A comparative assessment of the identified design and layout alternatives and their potential environmental, social and cultural impacts;
- ✦ The appropriate mitigation measures for each significant impact of the proposed project;
- ✦ Details of the engagement process with I&AP's followed during the course of the assessment and an indication of how the issues raised have been addressed;
- ✦ Identify knowledge gaps and report on the adequacy of predictive methods, underlying assumptions and uncertainties encountered in compiling the required information;
- ✦ A description of the arrangements for monitoring and management of environmental impacts; and
- ✦ Inclusion of technical and supporting information as appendices, if available.

9.2 Approach to undertaking the EIA Phase of the Project

The following points below outline the proposed approach to undertaking the EIA phase of the project. It is believed that the proposed approach will adequately fulfil the competent authority's (KZN DED TEA) requirements, the requirements of the EIA Regulations (2010) and the objectives of environmental best practice, so as to ensure transparency and to allow an informed decision regarding the project to be made.

9.2.1 Authority Consultation

On-going consultation with KZN DED TEA, the Municipality (eThekweni Municipality), Ward Councillors, mobilised organisations and all other authorities identified during the Environmental Scoping Study (ESS) phase of the project (and further ones that may be identified during the EIA phase) will continue throughout the duration of the project. Authority consultation is therefore seen as a continuous process that takes place until completion of the environmental investigations.

The KZN DED TEA assessing officer will be updated on a regular basis, so as to ensure their continued understanding of the proposed project and to ensure that all requirements are met by the environmental team.

9.2.2 Detailed Project Description

A detailed project and location description will be developed and included in the EIA Report. This will include a description of the property, need and desirability for the project, components of the proposed project (i.e. detailed facility design, etc.) and a timeline for the delivery of the different phases of the project.

9.2.3 Detailed Studies to be undertaken in the EIA Phase – Specialist Studies

The following specialist studies have been commissioned and will play a crucial role in the EIA process:

9.2.3.1 Biodiversity Assessment

The Ecological Partnership will undertake a detailed study of the biodiversity affected by the proposed upgrades and will determine the extent of the impact thereof.

The scope of work to be assessed and the terms of reference for the biodiversity scan are therefore as such (where the planning phase has been completed as part of the scoping phase of the EIA):

Planning Phase:

- ✦ Ezemvelo KZN Wildlife's (EKZNW's) Conservation Plan (C-Plan) and Strategic Environmental Assessment (SEA) databases will be interrogated for relevant biodiversity information for the project area.
- ✦ The South African National Biodiversity Institute's (SANBI's) database will be interrogated for relevant biodiversity information for the project area.
- ✦ Initially, an overview of the impact on biodiversity will be obtained by reconnaissance and rapid assessment of the upgrade footprint, accompanied by the engineer, who will have a sound knowledge of the extent of the whole footprint.

Fieldwork:

- ✦ A detailed plant and animal survey of the footprint will be undertaken, focusing on rich biodiversity areas such as the strip of coastal forest, sandy beach and rocky shore, across which the outfall pipeline passes.
- ✦ Plant and animal species which are threatened, of conservation concern and specially protected will be recorded.
- ✦ Sensitive biodiversity areas will be recorded.
- ✦ Necessary buffers will be identified and recorded.
- ✦ Alien plant invader species will be recorded.

Species Identification:

- ✦ Any plant and animal species which cannot be identified in the field will be identified in the specialist's ecolab using identification aids, including a dissecting microscope.

GIS Work:

- ✦ GPS positions will be taken of the following features in the footprint of the upgrade:
 - Extent of indigenous vegetation.
 - Plant and animal species which are threatened, of conservation concern and specially protected.
 - Sensitive biodiversity areas.
 - Recommended buffers.
 - Other important ecological features relating to biodiversity.
- ✦ The GPS data gathered in the field will be collated, plotted on maps and interpreted.
- ✦ EKZNW's C-Plan and SEA data for the project area will be mapped.
- ✦ SANBI's data for the project area will be mapped.
- ✦ eThekweni Municipality's DMOSS, which is relevant to the project area, will be mapped.

Biodiversity Assessment Report:

Preparation of detailed Biodiversity Assessment Report containing:

- ✦ GIS map work.
- ✦ Description of the project area, including:
 - Areas with low or no biodiversity.
 - Areas with moderate levels of biodiversity.
 - Areas with high levels of biodiversity.
- ✦ Description of the biophysical environment of the footprint, including:
 - Description of the vegetation types.
 - Description of the indigenous vegetation's extent.
 - Description of the sandy beach above the high-water mark.
 - Description of the rocky shore above the high-water mark.
- ✦ Description of the biodiversity, including:
 - Indigenous species.
 - Threatened species.
 - Species of conservation concern.
 - Specially protected species.
 - And alien plant invaders.
- ✦ Description of sensitive biodiversity areas.
- ✦ Description of recommended buffers.
- ✦ Analysis and interpretation of the above.

- ✦ Identification and evaluation of negative impacts on the biodiversity.
- ✦ Identification and description of biodiversity mitigation measures.
- ✦ An accurate scientific assessment, based largely on empirical data gathered in the field.

9.2.3.2 Air Quality Impact Assessment

The specialist consultant will undertake to critically assess the impacts on air quality as a result of the proposed upgrades. The terms of reference for the Air Quality Assessment are as follows, where the baseline assessment has been completed as part of the scoping phase.

Baseline assessment

- ✦ A qualitative assessment on the atmospheric dispersion potential will be carried out.
- ✦ Site specific meteorological data will be sourced from the South African weather services for a period of 5 years. If this is not available data will be purchased from Lakes Environmental in Canada. Input parameters that will be assessed includes: wind field, temperature, atmospheric stability, precipitation, pressure and relative humidity.
- ✦ Sensitive receptors in relation to the proposed activities will be identified by a site visit and through satellite imagery.
- ✦ All existing sources of pollution within the vicinity will be qualitatively assessed.
- ✦ In order to assess the possible cumulative air quality impacts, monitored ambient and meteorological data will be sourced for the area under investigation. If there is no ambient monitored data available, sampling will be undertaken with the use of active pumps (AirCheck 2000). These samples will be taken at the plant fence line, for a period of 8 hours with the pollutants assessed being hydrogen sulphide and ammonia. Further sampling of total VOC will also be taken using a hand held device called the MiniRae 3000 to assess potential impacts.
- ✦ It is also advised that during this sampling on site meteorological data (wind speed, wind direction, ambient temperature, and humidity) be sampled to determine the potential direction from which the pollutants collected originated from. This will be done with the use of the Grimm, which will measure these variables continuously during the sample period. To facilitate this sampling the client will need to provide the consultant with a secure place to install the device with an electrical point.
- ✦ The study is to include an analysis of movement of pathogens, a study of the potential for the spread of disease by flies and the analysis of the health impacts of effluent.

Impact Assessment Phase

- ✦ A qualitative assessment will be included as part of the air quality impact assessment construction phase, the detail of which will be based on the information provided by the client and from information sources from available literature on the subject.
An assessment of the operational phase of the proposed project will be undertaken by evaluating (where possible) both fugitive and point source emissions. These evaluations may result in the estimation of emissions with both health and odour impacts.
- ✦ The USEPA Water 9 model will be used for estimating air emissions from individual waste constituents. Water 9 contains a set of model units used to describe the WWTW, and required effluent characteristics, that are used together to provide an estimate of emissions expected to be released from each component

of the plant. The model is able to evaluate a full facility that contains multiple waste water inlet streams, multiple collection systems and complex treatment configurations. Water 9 also allows separate emission estimates for each individual compound that is identified as constituents in the waste. The model has the ability to utilise site specific compound property values, estimates of the total air emission from the wastes are obtained by summing of the individual compounds.

- ✦ Emission rates and source characteristics obtained from Water 9 will be input into the AerMod View dispersion model to predict the off-site air quality impacts. A list of requirement will be sent to the client upon acceptance of this proposal.
- ✦ The Carbon footprint of the waste water treatment works will be calculated at no additional cost to the client to determine the greenhouse gas emission caused by the WWTW operations.
- ✦ Meteorological input data for the model will be sourced from the South African Weather services for a 5 year period, which are able to provide hourly average meteorological readings. If this data is not available data will be sourced from Lakes Environmental in Canada.
- ✦ An assessment of compliance will be conducted using available health risk screening levels obtained for the pollutants identified. Comparison will be made to both locally and internationally available health risk levels for these pollutants.
- ✦ A qualitative assessment of the decommissioning phase of the proposed operations will be included as part of the air quality impact assessment phase, the detail of which will be based on the information provided by the client and from information sources from available literature on the subject.
- ✦ A comprehensive draft and final Air Quality Impact Assessment Report will be compiled for submission to the EAP compiling the EIA and to the authorities for review respectively as required.

Management Plan Development and Buffer Zone Delineation

- ✦ Once impacts as described above have been assessed, as part of the management measures to be defined for the site, buffer zones will be delineated around the site. This will inform the distance around the site where impacts associated with health, odour and even cancer risk can be expected.
- ✦ In addition to the buffer zone delineation process, a monitoring protocol will be outlined in order to allow for the continued assessment of impacts, as well as the indication of how well mitigation measure are being implemented on site.
- ✦ A list of management measures to be deployed on site will also be defined.

The impact of the proposed operations would be based on a screening health risk assessment approach.

Details of On Site Monitoring Proposed

- ✦ Passive sampling
 - Odour emissions such a TRS (Total Reduced Sulphur), ammonia and VOCs can be quantified through monitoring with the use of passive samplers. The essential parts of the passive samplers are the adsorbing cartridge, diffusive body, supporting plate and the adhesive label with unique bar code indication. Apart from the adsorbing cartridge, if not differently stated, all other components can be repeatedly used for several sampling experiments.
 - The technique relies on the diffusion of analytes through a diffusive surface onto an adsorbent (Figure 2 1). After sampling the analytes are chemically desorbed by solvent extraction or thermally desorbed and

analysed. Passive sampling does not involve the use of heavy and encumbering pumping systems; it is not impacted by power disruptions, does not require extensive supervision, is noiseless, non-flammable and does not present an explosive hazard.

- The radiello system uses a cylindrical outer surface that acts as a diffusive membrane in which gaseous molecules move axially and parallel towards the adsorbent bed and coaxial to the diffusive surface.
- The combination of low detection limits, high uptakes rates and high capacity allows for sampling time in the range of 15 minutes to 30 days (1ppb-1,000 ppb).

Grimm analyser

- ✦ The Grimm analyser takes a continuous air sample with a flow controlled pump. The particles are measured by the physical principle of orthogonal light scattering.
- ✦ The environmental particle analysers have the ability to provide real time information on source apportionment of particulates.
- ✦ The capabilities to measure real time PM₁₀, PM_{2.5} and PM₁ values, combined with meteorological data, permits and accurate source identification.
- ✦ The ability to see aerosol particles size changes in the PM values will help our understanding in determining the type of contamination.

9.2.3.3 Life Cycle Assessment

The specialist will identify the impacts as determined by the complete life-cycle at the works and will as part of the assessment conduct a risk assessment. The scope of work for the life cycle assessment is as follows:

- ✦ Review the design document. The required documentation includes:
 - Flow diagrams (PFD's with mass and Energy balance data);
 - High level Process description;
 - High level control philosophy (if available);
 - Plot plan.
- ✦ Site visit to familiarize with the site layout and clarify any risk related design aspects with the client and/or operations.
- ✦ Facilitate a process risk review meeting in Durban. During the risk review meeting risks and possible mitigating actions/proposals will be identified. Attendees with relevant experience in designing and operating WWTW (and specifically AD units) must be present during the meeting.
- ✦ After the risk review meeting, a report summarizing the outcomes and recommendations from the meeting will be compiled.

9.2.3.4 Heritage Assessment

The specialist consultant will undertake a heritage impact assessment for the proposed development in terms of the KwaZulu Heritage Act No. 10 of 1997 if requested to continue as part of the acceptance of this scoping report by KZN DED TEA.

A heritage impact assessment is not limited to archaeological artefacts, historical buildings and graves. It is far more encompassing and includes intangible and invisible resources such as places, oral traditions and rituals. In

the KwaZulu-Natal Heritage Act 1997 a heritage resource is defined any place or object of cultural significance i.e. of aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technological value or significance.

9.2.3.5 Major Hazardous Installation Risk Assessment

The specialist consultant will after having initially assessed the site in the scoping phase, conduct a full phase 2 risk assessment as the facility does pose a risk from a Major Hazardous Installation (MHI) perspective.

At present in South Africa the classification of a facility as an MHI depends on firstly whether there is any notifiable substance on site hazardous substance that is listed in the General Machinery Regulations of the Occupational Health and Safety Act is processed, handled or stored, and the content exceeds the quantity stipulated. Pressurized methane is a listed material with a threshold quantity of 15 tons. The largest single storage unit of methane at the SWWTW site is less than 2 tons (5,000 m³ primary digester, 60% of volume methane with a SG of 0.55 kg/m³). Therefore the site would not be a compulsory MHI by this criterion.

However, there is a second clause in the definition of an MHI. This clause relates to the ability to cause a major incident or catastrophe. At present this is understood to mean the potential to fatally impact on public persons outside the site. If there are large explosions, fires or releases of toxic gases that, under abnormal accident conditions, could have major offsite impacts the facility should be classified as an MHI.

None of the existing operational facilities on site are expected to pose a major hazard, and thus only the facilities involved in the re-commissioning and upgrade project have been included in this classification study. The digestion process produces flammable biogas, consisting of roughly 40% carbon dioxide, and 60% methane (note there will be a small component of hydrogen disulphide and other contaminants). Thus there will be flammable gas present inside all the digesters (with volumes of between 4,500 m³ and 5,000 m³), as well as inside the gas holder and related piping. The sludge drying facility will possibly also be fuelled by biogas, and thus a loss of containment scenario could result in the presence of biogas inside the drying building.

Once phase 2 of the upgrade is complete, and assuming all vessels / digesters are filled to capacity with only biogas, there could be a maximum possible inventory of 71,500 m³ i.e. ± 67 tons. If this site were in Europe or the UK, it would also be considered an MHI Site. Natural gas (methane) is a named substance as per Part 2 of Schedule 1 of the COMAH Regulations. A site would need to have more than 50 tons of natural gas to be considered a LOWER TIER COMAH site. Those sites having more than 200 tons of would be UPPER TIER COMAH sites. The SWWTW site with a maximum inventory of ± 67 tons of natural gas would be considered a LOWER TIER COMAH site by this criterion. This is relevant, as in South Africa the MHI regulations are under review, and we are expecting to follow the European system more closely in future.

CO₂ is an asphyxiant, and H₂S is extremely toxic, and both are present in biogas. However H₂S accounts for less than 1% of the gas' volume and the asphyxiating effects of CO₂ do not extend very far from the point of release. In ISHECON's (the commissioned specialists) experience, a 5,000m³ release of biogas will only have toxic effects up to a maximum of 25 m from the point of origin, and thus due to the location of the facilities in relation to the site boundaries, the toxic hazards of biogas would not affect the site's MHI classification.

Hazardous scenarios

This is preliminary MHI screening study and therefore only 6 potential worse case events have been modelled to determine if there are possible offsite impacts. The scenarios are all related to biogas releases, or internal explosions inside the vessels.

1. Primary digester internal explosion (due, for example, to inadequate purging during maintenance and ignition of flammable vapours inside the vessel).
2. ~~Secondary digester internal explosion (due, for example, to inadequate purging during maintenance and ignition of flammable vapours inside the vessel)~~ – considered inapplicable as the digesters will be open.
3. Biogas (gas) holder internal explosion (due, for example, to inadequate purging during maintenance and ignition of flammable vapours inside the vessel).
4. Sludge drying building internal explosion (due to loss of containment of biogas into building and subsequent ignition thereof).
5. Biogas transfer line rupture and explosion of flammable vapours gas.
6. Biogas gas holder catastrophic rupture and explosion of flammable vapours gas.
7. Note that events with substances that are not chemically hazardous, such as a dust explosion in dried compost silos are not considered in this MHI screening. These types of events are well known and protection against them should be incorporated in good design and operations of the facility.

Consequence analysis

The possible fires and explosions resulting from the above failure events were modelled using PHAST 6.7. The table below indicates the distances to the MHI thresholds, i.e. the distance up to which there may be fatal impacts under worst case conditions. The table compares these to the distances to the site boundary.

Table 14: MHI Thresholds

No	Failure	Possible Resultant Event	Distance to MHI Threshold	Distance to Site Boundary	MHI
1	Primary digester internal explosion (due for example to inadequate purging during maintenance).	Explosion	57	42	Yes
2	Secondary digester internal explosion (due for example to inadequate purging during maintenance).	Explosion	55	60	No
3	Biogas holder internal explosion (due for example to inadequate purging during maintenance).	Explosion	55	90	No
4	Sludge drying building internal explosion (due to loss of containment of biogas into building and subsequent ignition thereof).	Explosion	29	28	Marginal
5	Biogas transfer line rupture and explosion of flammable vapours.	Delayed explosion	42	65	No
6	Biogas gas holder catastrophic rupture and explosion of flammable vapours.	Delayed explosion	110	90	Yes
		Flash fire	60	90	No

From the above it is clear that only the catastrophic rupture of one of the gas holders, or an internal explosion inside the digesters that are situated within 60 m of the site boundary will lead to major offsite effects. As a result of these potential failure scenarios, the site must be classified as a Major Hazard Installation.

It is therefore the rationale provided above upon which the Phase 2 Risk Assessment will be based for the EIA Phase.

9.2.3.6 Integrated Waste Water Management Plan

The Integrated Waste Water Management Plan (IWWMP) is strategic process to achieve the goals of sustainable and integrated water and waste resources planning and management. The IWWMP is intended to provide an integrated platform of information assembly, impact analysis and generation of key management actions with regard to the proposed development. The key components upon which the study will be based are the following:

- ✦ Consultation with the relevant stakeholders for the identification of the relevant issues relating to this particular development;
- ✦ Information gathering and risk categorisation process (all sampling of wastewater, treated water, groundwater, stream/river water, sediment and waste has not been budgeted for);
- ✦ A description of the development and its interaction with the water resources in the area under study;
- ✦ Identification of site specific water use and waste management activities including monitoring and control activities relating to the development in operational mode;
- ✦ Specific and relevant topics to be explored would be: waste assessment and craterisation, process water use and treatment, storm water management, groundwater management, water reuse and reclamation and waste minimisation as it may be applicable;
- ✦ Subjecting the activities in the proposed development to a risk analysis exercise with the objective to establish what problems needs to be solved and management actions required;
- ✦ Formulation of a set of strategies and actionable objectives for the sustainable water use or waste management approach for the current development. This will lead to a range of management measures to meet the set goals and objectives. These management measures will form the action items in the IWWMP which will be integrated into the EMPr ;
- ✦ Development of documentation with a set of key management interventions to assist the relevant Departments to make a decision in respect of authorisation of water use and on-going management thereof and to guide the developer as to the set of actions that requires implementation and on-going monitoring and evaluation.

Due to the fact that the product of this assessment is a workable, implementable management plan, none of the scope above has begun in the scoping phase, but will form part of the EIA phase in its entirety.

9.2.3.7 Social Impact Assessment

The first phase of the Social Impact Assessment (SIA) provided a baseline description of the study area, specifically focusing on the communities living and working in close proximity to the proposed development. The potential impacts of the proposed development on the social environment will be identified and assessed in terms of an agreed assessment methodology in the EIA phase. Mitigation measures will be proposed to enhance the positive impacts and reduce the significance of the negative impacts.

The scope of work to be completed in the EIA phase is as follows:

Impact, Mitigation and Management Measures

Utilising the data encompassed within the social baseline, the following will be undertaken:

- ✦ Conduct a few focus group meetings with sensitive stakeholders as necessary and if available (landowners and other potentially directly affected people);

- ✦ Assess the data collected during the public participation exercises;
- ✦ Impact identification and assessment. Following the data collection activities, the social specialist will identify the impacts that are associated with the construction and operation of the proposed project. The identification of potential positive and negative impacts will be informed by the all data included within the Baseline description (which accounts for all data gathering). The findings of the other specialist impact assessment studies will be reviewed and used to inform the impact assessment component of the SIA; and
- ✦ Identification of management and mitigation measures. Management and mitigation measures to address the identified impacts will be recommended and drafted. These measures will be formulated to maximise the positive impacts and reduce the extent of the negative impacts.

9.2.3.8 Noise nuisance

The project does not contribute to an increase in noise, but will in fact reduce noise nuisance due to the planned installation of technologically advanced equipment and machinery. It is for this reason that a noise assessment was not originally considered to be warranted. Nonetheless, the existing activities contribute to noise in the receiving environment and will therefore be assessed in the impact ratings in the EIA phase. For this task, the expertise of the RHDHV in house noise specialist will be utilised.

Environmental Noise in South Africa

The Environment Conservation Act, 1989 (Act No. 73 of 1989) (ECA) has been superseded by the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA). The National Noise Control Regulations which was promulgated under the ECA was since 1998 promulgated under provincial laws as a stand alone article. This ensured that the Noise Control Regulations will be valid and in future will be incorporated in its own national law. The NEM: Air Quality Act (NEM:AQA) only mentions the aspect of noise impacts once, which in turns implies that the Provincial Noise Control Regulations are enforceable by law and the noise impact assessments should be done in accordance with NEMA.

As the Provincial Noise Control Regulations only specifies that the local authority has the authority to grant exemptions, prescribe noise impact assessments and issue penalties the South African National Standards (SABS/SANS) issued noise monitoring and assessment guideline documents (SANS 10103 and 10328). These documents can be followed when determining the impact of different projects on the surrounding environment and to assess the level of impact.

The SANS 10328 standard forms the basis on which noise impact investigations should be conducted, it is laid out to follow the steps of basic screening, scoping and full impact assessment – dependant on the type and scope of planned project. The environmental impact investigation has to:

- ✦ identify all the issues that could have an effect on the environment,
- ✦ assess the impact of the identified issues on the environment, and
- ✦ identify probable alternatives and assess their impact on the environment.

Noise can have an effect on the environment and should therefore form part of the relevant environmental impact study and report. However, contrary to most of the other environmental issues that have to be assessed subjectively, the assessment of the impact of noise on the environment can be done scientifically and objectively by following the procedures and methodology described in the SANS 10328 and 10103 documents.

South African National Standards (SANS)

SANS 10103 should also be adhered to for the measurements of noise levels at specific locations. This document prescribes the methodology on how the noise measurements should be conducted (indoor and outdoor), the placement of the sound level meter, the specification to which the sound level should adhere to, the duration of

measurements and the functionality recording of sound at the specific locations. This document also prescribed the typical rating noise levels per land use district allowed, as there is no promulgated maximum allowed noise levels, these values should be adhered to (see table below).

Table 15: Typical rating levels for noise in districts (adapted from SANS 10103:2008)

Type of District	Equivalent Continuous Rating level for Noise ($L_{Req,T}$) (dBA)					
	Outdoors			Indoors (with windows open)		
	Day/Night ($L_{Req,dn}$)	Day ($L_{Req,d}$)	Night ($L_{Req,n}$)	Day/Night ($L_{Req,dn}$)	Day ($L_{Req,d}$)	Night ($L_{Req,n}$)
a) Rural	45	45	35	35	35	25
b) Suburban (with little road traffic)	50	50	40	40	40	30
c) Urban	55	55	45	45	45	35
d) Urban (with one or more of the following: workshops, business premises and/or main roads)	60	60	50	50	50	40
e) Central Business Districts	65	65	55	55	55	45
f) Industrial District	70	70	60	60	60	50

The SANS 10103 document also has a group response table, describing the potential group/community response that can be expected if an impact is predicted to impact on an area. In the International Finance Corporation Environmental Health and Safety document section 1.7 it states that no receptor should experience an increase more than 3 dBA, as this would defiantly have an impact on the receptor. The table below is the taken from SANS 10103 and states the group/community response.

Table 16: Categories of community/group response (adapted from SANS 10103:2008)

Excess ($\Delta L_{Req,T}$) ^a dBA	Estimated Community/Group response	
	Category	Description
0 – 10	Little	Sporadic Complaints
5 – 15	Medium	Widespread Complaints
10 – 20	Strong	Threats of community/group action
>15	Very Strong	Vigorous community/group action

NOTE: Overlapping ranges for the excess values are given because a spread in the community reaction might be anticipated.

a. $\Delta L_{Req,T}$ should be calculated from the appropriate of the following:

- $L_{Req,T} = L_{Req,T}$ of ambient noise under investigation MINUS $L_{Req,T}$ of the residual noise (determined in the absence of the specific noise under investigation);
- $L_{Req,T} = L_{Req,T}$ of ambient noise under investigation MINUS the maximum rating level of the ambient noise given in Table 1 of the code;
- $L_{Req,T} = L_{Req,T}$ of ambient noise under investigation MINUS the typical rating level for the applicable district as determined from Table 2 of the code; or
- $L_{Req,T} =$ Expected increase in $L_{Req,T}$ of ambient noise in the area because of the proposed development under investigation.

9.2.3.9 Traffic Impact Assessment

The scoping phase identified the need for a Traffic Impact Assessment (TIA). This is specifically attributed to the possible increase in truck trip frequencies as well as the re-design of the tanker facility within the SWWTW. The TIA will include the following:

- ✦ Provide a description of the scope of work of the TIA
- ✦ Traffic data collection at 1 intersection only
- ✦ 1 Site visit, documented by photographs, the site visit will include and existing road condition assessment
- ✦ A meeting with the relevant road authority
- ✦ Traffic data analysis
- ✦ Traffic Generation analysis
- ✦ Traffic Engineering Analysis
- ✦ Access Condition Assessment
- ✦ Internal Circulation Assessment
- ✦ Traffic Impact assessment
- ✦ Mitigation measures
- ✦ Report and drawings

9.2.3.10 Other

Further to the specialists scoped above, specialist support for public engagement is provided by Phelamanga Projects due to their extensive experience in the South Durban Basin. Specialist support is also gained for the Coastal Water Discharge Permit and Water Use Licence compliance requirements.

9.2.4 Environmental Impact Assessment

An EIA will be undertaken to determine the effects of the proposed project on the environment. The EIA will comprise of the following:

- ✦ An assessment of the environment likely to be affected by the proposed project, including cumulative environmental impacts;
- ✦ An assessment of the environment likely to be affected by the identified alternative land use or developments, including cumulative environmental impacts (if applicable);
- ✦ An assessment of the extent, duration, intensity, probability and significance of the identified potential environmental, social and cultural impacts of the proposed development, including cumulative impacts;
- ✦ A comparative assessment of the identified land use and development alternative and their potential environmental, social and cultural impacts (if applicable); and
- ✦ Inclusion of technical and supporting information as appendices, if any.

9.2.5 Impact Assessment Methodology

The potential environmental impacts associated with the project will be evaluated according to it nature, extent, duration, intensity, probability and significance of the impacts, whereby:

Impact Ratings

The following parameters are used to describe the impact / issues in this assessment:

1. Nature

This is a brief written statement of the environmental aspect being impacted upon by a particular action or activity.

2. Extent (E)

Extent refers to the area over which the impact will be expressed. Typically, the severity and significance of an impact have different scales and as such bracketing ranges are often required. This is often useful during the detailed assessment phase of a project in terms of further defining the determined significance or intensity of an impact.

- ✦ Site (1) – Within the construction site.
- ✦ Local (2) – Within a radius of 2 km of the construction site.
- ✦ Regional (3) – the scale applies to impacts on a provincial level and parts of neighbouring provinces.
- ✦ National (4) – the scale applies to impacts that will affect the whole South Africa.

3. Duration (D)

Duration indicates what the lifetime of the impact will be.

- ✦ Short-term (1) – less than 5 years.
- ✦ Medium-term (2) – between 5 and 15 years.
- ✦ Long-term (3) – between 15 and 30 years.
- ✦ Permanent (4) – over 30 years and resulting in a permanent and lasting change that will always be there.

4. Intensity (I)

Intensity describes whether an impact is destructive or benign.

- ✦ Very High (4) - Natural, cultural and social functions and processes are altered to extent that they permanently cease.
- ✦ High (3) - Natural, cultural and social functions and processes are altered to extent that they temporarily cease.
- ✦ Moderate (2) - Affected environment is altered, but natural, cultural and social functions and processes continue albeit in a modified way.
- ✦ Low (1) - Impact affects the environment in such a way that natural, cultural and social functions and processes are not affected.

5. Probability (P)

Probability describes the likelihood of an impact actually occurring.

- ✦ Improbable (1) - Likelihood of the impact materialising is very low.
- ✦ Possible (2) - The impact may occur.
- ✦ Highly Probable (3) - Most likely that the impact will occur.
- ✦ Definite (4) - Impact will certainly occur.

6. Cumulative (C)

In relation to an activity, means the impact of an activity that in itself may not be significant but may become significant when added to the existing and potential impacts eventuating from similar or diverse activities or undertakings in the area.

7. Significance (S)

Significance is determined through a synthesis of impact characteristics. Significance is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. The total number of points scored for each impact indicates the level of significance of the impact.

Refer below and to Table 17 for an explanation of the risk assessment methodology.

Table 17: Significance Rating of Classified Impacts

Score		Elaboration
- (13 - 16 points)	NEGATIVE VERY HIGH	Permanent and important impacts. The design of the site may be affected. Intensive remediation is needed during construction and/or operational phases. Any activity which results in a “very high impact” is likely to be a fatal flaw.
- (10 - 12 points)	NEGATIVE HIGH	These are impacts which individually or combined pose a significantly high negative risk to the environment. These impacts pose a high risk to the quality of the receiving environment. The design of the site may be affected. Mitigation and possible remediation are needed during the construction and/or operational phases. The effects of the impact may affect the broader environment.
- (7 - 9 points)	NEGATIVE MODERATE	These are impacts which individually or combined pose a moderate negative risk to the quality of health of the receiving environment. These systems would not generally require immediate action but the deficiencies should be rectified to avoid future problems and associated cost to rectify once in HIGH risk. Aesthetically and/or physically non-compliance can be expected over a medium term. In this case the impact is medium term, moderate in extent, mildly intense in its effect and probable. Mitigation is possible with additional design and construction inputs.
- (4 - 6 points)	NEGATIVE LOW	These are impacts which individually or combined pose a deleterious or adverse impact and low negative risk to the quality of the receiving environment, and may lead to potential health, safety and environmental concerns. Aesthetically and/or physical non-compliance can be expected for short periods. In this case the impact is short term, local in extent, not intense in its effect and may not be likely to occur. A low impact has no permanent impact of significance. Mitigation measures are feasible and are readily instituted as part of a standing design, construction or operating procedure.
0	NEUTRAL	Impact is neither beneficial nor adverse. These are impacts which cannot be classified as either positive or negative or classified and null and void in the case of a negative impact being adequately mitigated to a state where it no longer renders a risk.
+(4 - 6 points)	POSITIVE LOW	These are impacts which individually or combined pose a low positive impact to the quality of the receiving environment and health, and may lead to potential health, safety and environmental benefits. In this case the impact is short term, local in extent, not intense in its effect and may not be likely to occur. A low impact has no permanent impact of significance.
+(7 - 9 points)	POSITIVE MODERATE	These are impacts which individually or combined pose a moderate positive effect to the quality of health of the receiving environment. In this case the impact is medium term, moderate in extent, mildly intense in its effect and probable.
+(10 - 12 points)	POSITIVE HIGH	These are impacts which individually or combined pose a significantly high positive impact on the environment. These impacts pose a high benefit to the quality of the receiving environment and health, and may lead to potential health, safety and environmental benefits. In this case the impact is longer term, greater in extent, intense in its effect and highly likely to occur. The effects of the impact may affect the broader environment.
+(13 - 16 points)	POSITIVE VERY HIGH	These are permanent and important beneficial impacts which may arise. Individually or combined, these pose a significantly high positive impact on the environment. These impacts pose a very high benefit to the quality of the receiving environment and health, and may lead to potential health, safety and environmental benefits. In this case the impact is long term, greater in extent, intense in its effect and highly likely or definite to occur. The effects of the impact may affect the broader environment.

Significance is determined through a synthesis of impact characteristics. Significance is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. The total number of points scored for each impact indicates the level of significance of the impact as depicted in Table 17.

The suitability and feasibility of all proposed mitigation measures will be included in the assessment of significant impacts. This will be achieved through the comparison of the significance of the impact before and after the proposed mitigation measure is implemented. Mitigation measures identified as necessary will be included in an EMPr.

The EMPr will form part of the EIA Report.

9.2.6 EIA Report

The EIA Report (EIAR) will contain the following:

- ✦ Details of the EAP who compiled the report and their expertise to carry out an EIA;
- ✦ Detailed description of the activity(ies);
- ✦ A description of the environment that might be affected by the activity and the manner in which the physical, biological, social, economic and cultural aspects of the environment may be affected by the proposed activity;
- ✦ Details of the public participation process conducted during the Scoping Phase and the on-going consultation during the EIA phase;
- ✦ Description of the need and desirability of the activity including advantages and disadvantages that the activity may have on the environment and the community that may be affected by the activity;
- ✦ An indication of the methodology used in determining the significance of potential environmental impacts;
- ✦ A summary of the findings and recommendations of any specialist report or report on a specialised process;
- ✦ A description of all environmental issues that were identified during the environmental impact assessment process, an assessment of the significance of each issue and an indication of the extent to which the issue could be addressed by the adoption of mitigation measures;
- ✦ An assessment of each identified potentially significant impact, including cumulative impacts, the nature of the impact, the extent and duration of the impact, the probability of the impact occurring, the degree to which the impact can be reversed, the degree to which the impact may cause irreplaceable loss of resources and the degree to which the impact can be mitigated;
- ✦ A description of any assumptions, uncertainties and gaps in knowledge;
- ✦ An opinion as to whether the activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation;
- ✦ An environmental impact statement which contains a summary of the key findings of the environmental impact assessment; and a comparative assessment of the positive and negative implications of the activity.
- ✦ A draft Environmental Management Programme (EMPr) and
- ✦ Copies of any specialist reports and reports on specialised processes.

9.2.7 Draft Environmental Management Programme (EMPr)

During the compilation of the EIA, a draft EMPr will be compiled in accordance with the EIA Regulations (2010).

The draft EMPr will provide the actions for the management of identified environmental impacts emanating from the project and a detailed outline of the implementation programme to minimise and/or eliminate the anticipated negative environmental impacts.

The draft EMPr will provide strategies to be used to address the roles and responsibilities of environmental management personnel on site, and a framework for environmental compliance and monitoring.

The EMPr will include the following:

- ✦ Details of the person who prepared the EMPr and the expertise of the person to prepare an EMPr;
- ✦ Information on any proposed management or mitigation measures that will be taken to address the environmental impacts that have been identified in the EIA Report, including environmental impacts or objectives in respect of operation or undertaking of the activities, rehabilitation of the environment and closure where relevant;
- ✦ A detailed description of the aspects of the activity that are covered by the draft EMPr;
- ✦ An identification of the persons who will be responsible for the implementation of the measures;
- ✦ Where appropriate, time periods within which the measures contemplated in the draft EMPr must be implemented;
- ✦ Proposed mechanisms for monitoring compliance with the EMPr and reporting thereon;
- ✦ An environmental awareness plan; and
- ✦ Procedures for managing incidents which have occurred as a result of undertaking the activity and rehabilitation measures.

9.2.8 Public Participation Process

The primary aims for the public participation process include the following:

- ✦ meaningful and timeous participation of I&APs;
- ✦ promoting transparency and an understanding of the proposed project and its potential environmental (social and biophysical) impacts;
- ✦ accountability for information used for decision-making;
- ✦ serving as a structure for liaison and communication with I&APs;
- ✦ assisting in identifying potential environmental (social and biophysical) impacts associated with the development; and
- ✦ the needs, interests and values of I&APs must be considered in the decision-making process.

9.2.8.1 Advertising

The primary aim of adverts in the EIA phase is to provide information regarding the availability of reports for public review, as well as, if necessary, the advertisement of dates of public meetings.

9.2.8.2 Identification of and Consultation with Key Stakeholders

The identification of I&APs and key stakeholders will continue into the EIA phase of the project as the public participation process is a continuous process that runs throughout the duration of an environmental study.

9.2.8.3 I&AP Database

All I&AP information (including contact details), together with dates and details of consultations and a record of all issues raised is recorded within a comprehensive database of I&APs. This database will be updated on an on-going basis throughout the project, and will act as a record of the communication/involvement process.

9.2.8.4 Consultation and Public Involvement

Consultation with I&APs is considered to be critical to the success of any EIA process. Therefore, one-on-one consultation (via telephone calls, fax and emails) and a public meeting during the EIA phase will be undertaken.

The aim of this process will be to provide I&APs with details regarding the process and to obtain further comments regarding the project. Minutes of all meetings held will be compiled and forwarded to all attendees. These minutes will also be included in the EIA Report.

9.2.8.5 Issues Trail

All issues, comments and concerns raised during the public participation process of the EIA study will be compiled into an Issues Trail. This Issues Trail will be incorporated as part of the EIA Report.

9.2.8.6 Public Review of the Draft Environmental Impact Report

The draft EIA Report will be made available at public places for public review and comment. A 40 day period will be allowed for this review process. An advertisement indicating the availability of this report for public scrutiny will be placed in the local newspaper. I&APs registered on the project database will be notified of the availability of this report by correspondence.

9.2.8.7 Authority Review of the Environmental Impact Report

After the public review period, all relevant comments received from the public will be considered and included into a final EIA report. This final document will be put out for public review and comment once again for a 21 day period prior to being submitted to KZN DED TEA for final review and decision-making.

9.2.9 Other Authorisation / Licensing Requirements

In addition to the authorisation required from the KZN DED TEA a waste license is applied for and while only Category A listed activities are triggered (requiring only a Basic Assessment), the application for this is assessed in the broader EIA as permitted by the KZN DED TEA in support of facilitating a streamlined and holistic process (Appendix A).

Furthermore, in compliance with the conditions of the Water Use Licence (WUL) held by the SWWTW, the DWA will be consulted and informed of the proposed project (upgrades) and going forward will remain compliant with the conditions of the WUL.

Authorisation in the form of Amafa Approval will also be obtained.

Lastly, the Coastal Waters Discharge Permit will be converted from the DWA template to the DEA template to remain compliant. It is important to note that it is not an offence to continue to discharge effluent from land-based sources into coastal waters (unless otherwise informed), if an application for a discharge permit has already been made. It is further noted that the DEA has five years, since the commencement of the NEM:ICMA, to review all previous discharge authorisations issued prior to the commencement of the NEM:ICMA.

Following the DEA's observation of applications received my numerous applicants which were not deemed sufficient to allow for an informed technical assessment, the Department reviewed the Department of Water Affairs' "*Operational policy for the disposal of land-derived water containing waste to the marine environment of South Africa: Guidance on Implementation - Sub-Series No. MS 13.3, (251pp)*" to identify interim specific technical criteria to be applied in assessing applications received. These were presented in a draft publication, which is attached for ease of reference, and include detail in respect to:

- ✦ Scope of study area and features;
- ✦ Biogeochemical processes (water column and sediment);
- ✦ Marine ecology;
- ✦ Microbiological Factors;
- ✦ Hydraulic design;
- ✦ Achievable dilution;
- ✦ Sedimentation/re-suspension of solid phase particles;
- ✦ Compliance with environmental quality objectives;
- ✦ Pipeline construction and design;
- ✦ Monitoring programmes; and
- ✦ Contingency Planning.

9.2.10 Environmental Authorisation

On receipt of the environmental authorisation (positive or negative) for the project, I&APs registered on the project database will be informed and its associated terms and conditions by correspondence.

10 CONCLUSIONS AND RECOMMENDATIONS

This Environmental Scoping Study (ESS) for the SWWTW Solids Removal and Treatment Facilities Upgrade has been undertaken in accordance with the Environmental Impact Assessment Regulations (2010) published in Government Notice Regulation 543 of 18 June 2010 read with Section 44, of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (as amended).

In line with Regulation 28 (Chapter 3) of the EIA Regulations, this issues-based ESS aimed to identify and provide:

- ✦ A description of the on-going activity;
- ✦ A description of the environment that may be affected by the activity and the manner in which the physical, biological, social, and economic aspects of the environment may be affected by the proposed activity;
- ✦ The identification of all legislation and guidelines applicable to the development;
- ✦ A description of environmental issues and potential impacts, including cumulative impacts, that have been identified;
- ✦ Details of the public participation process conducted to date; and
- ✦ A Plan of Study for Environmental Impact Assessment (refer to Chapter 9 of this document) including the methodology that will be adopted in assessing the potential impacts that have been identified, including specialist studies or specialised processes that will be undertaken.

Some of the anticipated impacts that will be addressed in the EIA phase and/or in the EMPr are:

- ✦ Noise impact in relation to construction as well as operation of the works (Pumpstation etc.);
- ✦ Traffic impacts during the construction and operational phase due to minor increases in trucks;
- ✦ Social Impacts of the development with regard to job opportunities etc.;
- ✦ Cumulative and Downstream impacts on coastal waters;
- ✦ Disturbance of possible graves on site (EIA);
- ✦ Generation, handling and disposal of waste generated by project activities (EMPr);
- ✦ The status quo of odour and pathogen mobility is not envisaged to change as an outcome of the proposed upgrades;
- ✦ Minimal loss of vegetation; and
- ✦ Generation of explosive biogas.

The information contained in this ESS provides a comprehensive description of the aim, purpose and benefit of the proposed development. In addition the ESS provides a basic description of the predevelopment environment in which this development is planned and which will be impacted upon, positively as well as negatively.

The aim of the environmental investigations and in particular the EIA Phase is to ensure that the positive impacts are enhanced and the negative impacts are eliminated or reduced as far as possible.

The Plan of Study for the EIA contained in this report, describes the proposed way in which this will be done.

Based on the ESS undertaken, it can be concluded that at this point there appears to be no fatal flaws associated with the project. From the outcomes of the Scoping phase, it is the view of the EAP that all possible environmental red flags/sensitivities have been identified. The full extent of bio-physical and socio-economic impacts associated with the proposed development however needs to be determined and assessed in the EIA phase. It is further the view of the EAP that although positive spin offs are associated with the development (i.e. job creation, etc.), the EIA phase must carefully consider all aspects of the environment equally (social, environmental and economical) to determine a way forward for the development.



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