

**Draft BAR: Appendix F – DRAFT ENVIRONMENTAL MANAGEMENT
PROGRAMME REPORT (Draft EMPr)**

In terms of the **National Environmental Management Act** (Act No. 107 of 1998, as amended) & 2014
Environmental Impact Regulations (as amended, 2017) for:

**DRAFT ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT
UPGRADE OF A WASTE WATER TREATMENT WORKS AND BULK SEWERS,
REPLACING OF SMALL-BORE SANITATION SYSTEM AT WOODLANDS
KOUKAMMA LOCAL MUNICIPALITY, SARAH BAARTMAN DISTRICT
MUNICIPALITY , EASTERN CAPE
DEDEAT REFERENCE: EC09/C/LN1&3/M/49-2026**

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DATE:

29 September 2026

ENVIRONMENTAL MANAGEMENT PROGRAMME REQUIREMENTS:

Appendix 4 of Regulation 982 of the 2014 EIA Regulations (as amended, 2017) published in terms of the NEMA, contains the required contents of an Environmental Management Programme (EMP). The table below serves as a summary of how these requirements were incorporated into this EMPR:

An EMPR must comply with section 24N of the Act and include:-

(a) Details of – (i) The EAP who prepared the EMPR; and (ii) The expertise of the EAP to prepare an EMPR, including a curriculum Vitae;	This EMPR was prepared by Claire De Jongh. Please see attached CV of the EAP (Annexure 3).
(b) A detailed description of the aspects of the activity that are covered by the EMPR as identified by the project description;	Section 5 - ENVIRONMENTAL MANAGEMENT PROGRAMME
(c) a map at an appropriate scale which superimposes the proposed activity, it associated structures, and infrastructure on the environmental sensitivities of the preferred site, indicating any areas that should be avoided, including buffers;	Annexure 4
(d) A description of the impact management outcomes, including management statements, identifying the impacts and risks that need to be avoided, managed and mitigated as identified through the environmental impact assessment process for all phases of the development including – (i) planning and design; (ii) pre-construction activities; (iii) construction activities; (iv) rehabilitation of the environment after construction and where applicable post closure; and (v) where relevant, operation activities;	Draft BAR
(f) a description of proposed impact management actions, identifying the manner in which the impact management outcomes contemplated in paragraph (d) will be achieved, and must, where applicable, include actions to – (i) avoid, modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation; (ii) comply with any prescribed environmental management standards or practises; (iii) comply with any applicable provisions of the Act regarding closure, where applicable; and (iv) comply with any provisions of the Act regarding financial provision for rehabilitation, where applicable;	Section 5 - ENVIRONMENTAL MANAGEMENT PROGRAMME
(g) the method of monitoring the implementation of the impact management actions contemplated in paragraph (f);	Section 5 - ENVIRONMENTAL MANAGEMENT PROGRAMME Section 7 - Error! Reference source not found.
(h) the frequency of monitoring the implementation of the impact management actions contemplated in paragraph (f);	Section 7 - Monitoring and Compliance Section 8 – Audit Process
(i) an indication of the persons who will be responsible for the implementation of the impact management actions;	Section 3.3 – Project Responsibilities Section 12 - Responsibilities
(j) the time periods within which the impact management actions contemplated in paragraph (f) must be implemented;	Section 5 - ENVIRONMENTAL MANAGEMENT PROGRAMME Section 5.1 – Planning and Design Section 5.2 – Construction Section 5.3 - Operations
(k) the mechanism for monitoring compliance with the impact management actions contemplated in paragraph (f);	Section 7 - Monitoring and Compliance
(l) a program for reporting on compliance, taking into account the requirements as prescribed by Regulations;	Section 8 – Audit Process
(m) an environmental awareness plan describing the manner in which – (i) the applicant intends to inform his or her employees of any environmental risk which may result from their work; and	Section 3.3 – Project Responsibilities Section 11. - DRAFT STAFF / RESIDENT CONDUCT CONTROL AND INFORMATION SHEET

(ii) risks must be dealt with in order to avoid pollution or the degradation of the environment; and	
(n) any specific information that may be required by the competent authority.	Draft BAR and appendices

Glossary of Terms

BAR	Basic Assessment Report – A tool used by the EAP to submit to the competent authority if listed activities is triggered in Regulations GNR 327 and GNR 324 as per NEMA to make a decision regarding a proposed development.
DFFE	Department Forestry Fisheries and Environment – the national authority for sustainable environmental management and integrated development planning.
DEDEAT	Eastern cape Department of Economic Development, Environmental Affairs and Tourism
CBA	CBA Critical Biodiversity Area – Areas in a natural condition that are required to meet biodiversity targets, for species, ecosystems or ecological processes and infrastructure.
CMP	Coastal Management Plan
EAP	Environmental Assessment Practitioner – An EAP and a specialist, appointed in terms of regulation 12(1) or 12(2) must – (a) be independent. (b) Have expertise in conducting environmental impact assessments or undertaking specialist work as required, including knowledge of the Act, these regulations and any guidelines that have relevance to the proposed activity. (c) Ensure compliance with these Regulations (d) Perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the application. (e) Take into account, to the extent possible, the matters referred to in regulation 18 when preparing the application and any report, plan or document relating to the application; and (f) Disclose to the proponent or applicant, registered and affected parties and the competent authority all material information in the possession of the EAP and, where applicable, the specialist, that reasonably has or may have the potential of influencing – i. Any decision to be taken with respect to the application by the competent authority in terms of these regulations; or ii. The objectivity of any report, plan or document to be prepared by the EAP or specialist, in terms of these Regulations for submission to the competent authority; unless access to that information is protected by law, in which case it must be indicated that such protected information exists and is only provided to the competent authority. (2) In the event where the EAP or specialist does not comply with sub regulation (1)(a), the proponent or applicant must, prior to conducting public participation as contemplated in chapter 5 of these regulations, appoint another EAP or specialist to externally review all work undertaken by the EAP or specialist, at the applicants cost. (3) An EAP or specialist appointed to externally review the work of an EAP or specialist as contemplated in sub regulation (2), must comply with sub regulation (1).
ECO	Environmental Control Officer – A site agent who needs to ensure that all environmental authorisation and conditions are adhered to during the construction phase of the project
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme – can be defined as “an environmental management tool used to ensure that undue or reasonably avoidable adverse impacts of the construction, operation and decommissioning of a project are prevented; and that the positive benefits of the projects are enhanced”.
ESA	Ecological Support Area – Areas that are not essential for meeting biodiversity targets, but that play an important role in supporting the functioning of Pas or CBAs, and are often vital for delivering ecosystem services.

KKLM	Koukamma Local Municipality
NEMA	National Environmental Management Act (Act 107 of 1998) as amended 2017 – national environmental legislation that provides principles for decision-making on matters that affect the environment.
PA	Protected Area - A protected area is an area of land or sea that is formally protected by law and managed mainly for biodiversity conservation. Protected areas recognised in the National Environmental Management: Protected Areas Act (Act 57 of 2003) (hereafter referred to as the Protected Areas Act) are considered formal protected areas in the NPAES. This is a narrower definition of protected areas than the International Union for Conservation of Nature (IUCN) definition. ¹ The NPAES distinguishes between land-based protected areas, which may protect both terrestrial and freshwater biodiversity features, and marine protected areas.
SANBI	South African National Biodiversity Institute
SBDM	Sarah Baartman district Municipality

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1. INTRODUCTION

In accordance with the Integrated Environmental Management Guidelines published by the Department of Forestry, Fisheries, and the Environment (DFFE) in 1992, the purpose of an Environmental Management Programme (EMPr) is “to describe how negative environmental impacts will be managed, rehabilitated or monitored and how positive impacts will be maximised”.

Section 28 of NEMA (National Environmental Management Act, Act 107 of 1998) states that:

Duty of care and remediation of environmental damage -

"(1) Every person who causes, has caused, or may cause significant pollution or degradation of the environment must take reasonable measures to prevent such pollution or degradation from occurring, continuing or recurring, or, in so far as such harm to the environment is authorised by law or cannot be reasonably avoided or stopped, to minimise and rectify such pollution or degradation of the environment"

This draft EMPr must be read in conjunction with the draft Basic Assessment Report and all related appendices dated October 2024. All recommendations, relevant conditions and mitigation measures provided in these documents have been included in the EMPr and must be adhered to.

This EMPr must form an integral part of the contract documents, as it outlines the methodology & duties required so that the project objectives can be achieved in an environmentally sustainable manner; with particular reference to the prevention and mitigation of environmental impacts caused by planning, construction and operational phases and activities associated with this project.

These requirements will have a financial impact on the project's costings.

This EMPr is a dynamic document that may require updating during the project phases in response to new and changing circumstances to mitigate environmental impacts.

Relevant changes and updated EMPr must be submitted to the Eastern cape Department of Economic Development, Environmental Affairs and Tourism (DEDEAT) for approval.

1.2 Purpose of the EMPr

The purpose of this EMPr is to ensure that the negative environmental impacts of the proposed activities are managed, mitigated and kept to a minimum during the planning, construction and operational phases of the proposed development. The EMPr focuses on providing practical measures to avoiding negative environmental impacts and enhance positive environmental impacts where possible.

Once the EMPr is approved by DEDEAT it is seen as a legal binding document on the following affected parties:

- 1 Project Applicant (Koukamma Local Municipality (KKLM))
- 2 Project planning team including for example, engineers (SMEC SA)
- 3 All contractors and subcontractors (to be awarded as per tender process requirements)
- 4 Operational management team (KKLM and / or to be awarded as per tender process requirements)

Copies of this EMPr must be kept on site and all senior personnel are expected to familiarise themselves with the content of this EMPr.

Contractor method statements **must be aligned to relevant conditions in the EMPr and any conditions of the EA** (if attained).

It is suggested that the EMPr be reviewed on a five (5) year basis if required. Should any amendments need to be made during operational phase, **written authorisation should be obtained from DEDEAT.**

1.2 The Polluter-Pays Principle

This principle provides for “the costs of remedying pollution, environmental degradation and consequent adverse health effects and of preventing, controlling or minimizing further pollution, environmental damage or adverse health effects must be paid for by those responsible for harming the environment.” The Polluter Pays Principle will be rigorously applied throughout the construction phase of this project.

2. PROJECT DETAILS

The site is located on Farm Palmiet River 585, Remainder of Erf 1, Woodlands. Woodlands is a small residential suburb approximately 10 km southwest of the town of Kareedouw in Koukamma Municipality, Sarah Baartman District Municipality, Eastern Cape province. It lies approximately 1 km south of the N2 and 6 km west of the R402.

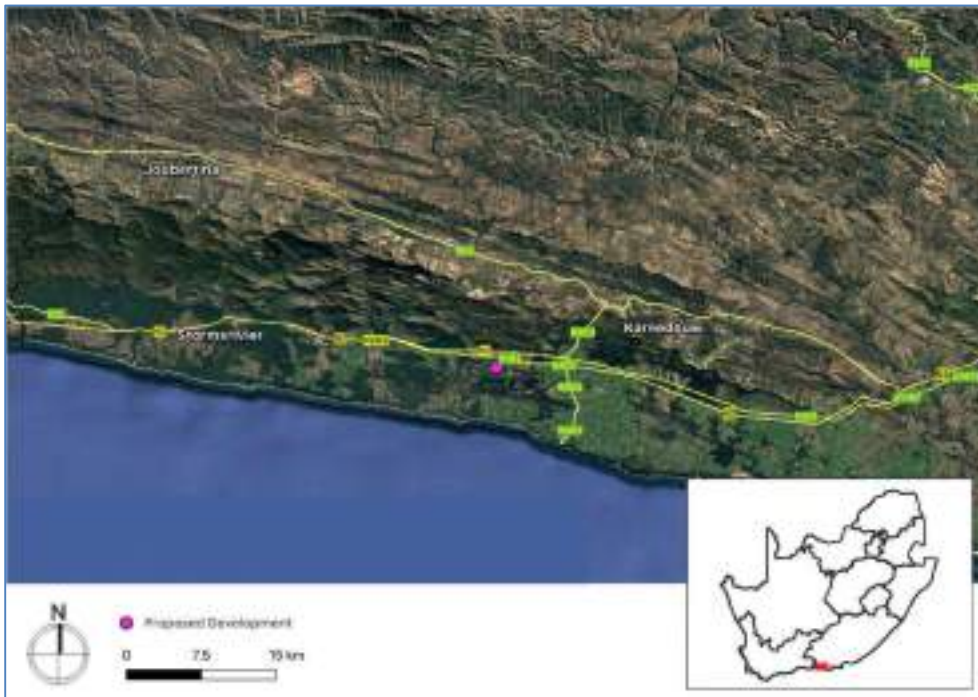


Figure 1: Locality map (adapted from CTS Heritage)



Figure 2: Overview Map. 1:50 000 Topographical Map for the development area (adapted from CTS Heritage)

The WWTW is located 0.5km south of the southwestern boundary of the Woodlands Settlement. The existing Woodlands sanitation service consists of digester tanks and a 110mm diameter small bore gravity sewer reticulation system. Effluent from digesters is removed by means of vacuum tankers (honey-suckers), transported, and disposed of at the Wastewater Treatment Works (WWTW) at Woodlands Settlement.

The hydraulic and treatment capacity of the existing treatment plant have been studied during the concept and design phases. The proposed activities for the upgrade entails the replacing of small-bore sanitation system at Woodlands and entails:

- Replacement of internal Sewer Reticulation of the woodlands area.

Decommissioning

- Discontinue current digester tank system; replace internal reticulation pipes with 160mm diameter class 34 uPVC pipes.
- Design of new sewer infrastructure for the proposed development.
- Installation of a Bulk Sewer Main.

Reticulation

- The new system will operate as a gravity sewer, directing all pipes towards the settlements lower points.
- The alternative 1 Bulk Sewer Main runs adjacent to the boundary of the Woodlands Development. A 160mm diameter pipe, operating at 80% capacity, is sufficient for the development. To accommodate more than the anticipated 20% stormwater ingress, the pipe size will increase to a 200mm diameter class 34 uPVC pipe for the final 900 meters, connecting to the WWTW. Manholes should be placed every 80m, at pipe bends and at all pipe connections.

Site layout and placement of bulk pipe line

The site layout has been revised to exclude infrastructure from sensitive aquatic areas as far as possible. Site layout 2 and pipeline route 3 is deemed an acceptable layout option (Appendix A); this layout is placed outside the delineated wetland area as far as possible with only a short distance traversing the wetland south of the pipeline route.

Design Capacity

The plant shall be designed for waterborne domestic sewage for the following flows:

ADWF – 500 kl/d,

There is an additional requirement for receiving sewage from “honey suckers”

Future hydraulic load calculations (taking into account planned SDF housing in the area) provided by SMEC are as follows:

ADWF – 462.37 kl/d,

PDWF – 869.45 kl/d,

PWWF – 1041.122 kl/d.

Head of Works

- The head of works will consist of:
 - A tanker dumping area
 - 1x 10mm coarse mechanical screen
 - 2x degritting channels.

Sewage treatment process

Waste water treatment processes have been investigated, and the preferred treatment process is the Biological Nutrient Removal process consisting of anaerobic (no oxygen), anoxic (no oxygen, some nitrate), and aerobic (with oxygen) zones. Clarification will be applied (settling of activated sludge - Flux loading in summer can be expected to be 50 kg TS/m²/day and 65kg/m²/day in winter);

Effluent Treatment

Treated effluent will gravitate to 2x chlorine contact tanks. Effluent will then be discharged to a perennial stream south of the site and eventually reach the Groot Rivier.

Sludge Management

Sludge management options have been investigated and two sludge drying beds and dried sludge storage area is provided for in the design. Sludge is aimed to be treated to sludge classification a1A for beneficiation of surrounding community members and / or off-site disposal at registered waste site.

Stormwater Management

A stormwater dam whereby the excess flow overflows at the Inlet works and gravitates to a stormwater dam has been provided in the layout.

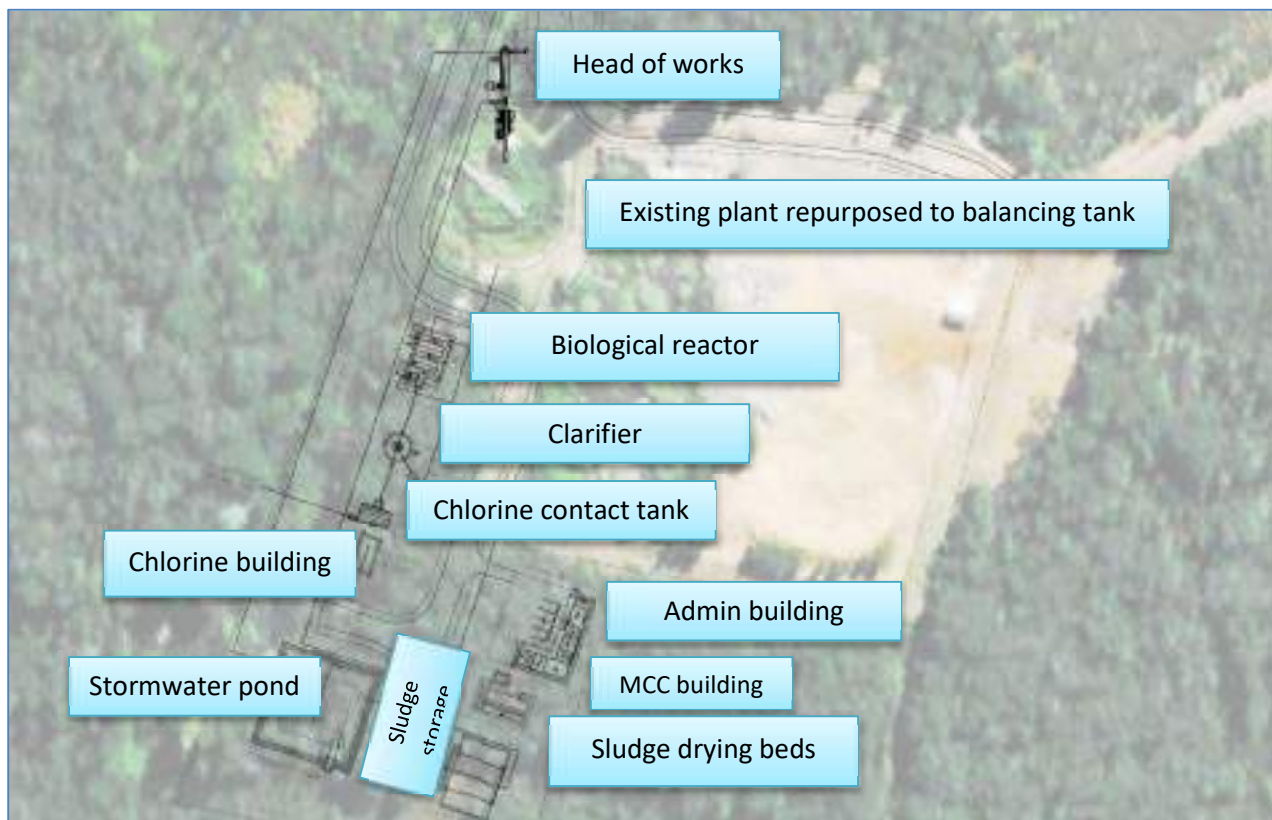


Figure 3: Layout of wastewater treatment components and management facilities (adapted from SMEC, EC0047-WWTW-00-001, REV 0 – Appendix C)

Comprehensive project details are provided in the Basic Assessment Report (BAR) and not repeated in the draft EMPr. A copy of the draft BAR and all appendices should be kept by the holder of EA (if attained, i.e., KKLM) and relevant construction / operational managers.

The main impacts associated with the proposed activity includes the following:

- Impacts to watercourses
- Disturbance to vegetation and catchment area due to alien invasive species
- Soil loss, soil erosion and dust impacts resulting in impacts on vegetation, water courses and loss of valuable topsoil

- Incorrect management of sludge stream resulting in unnecessary waste generation and loss of a potential resource
- Incorrect waste management resulting in unnecessary waste generation and loss of a potential resource
- Positive impact on socio-economic conditions as a result of employment opportunities
- Positive impact on social conditions as a result of an upgraded and effective WWTW system
- Negligible impacts on heritage resources with the implementation of relevant conditions contained within this draft EMPr.

The EMPr contains all the mitigation measures to prevent / reduce negative environmental impacts and enhance positive impacts. These mitigations measures are a combination of measures recommended by the specialist assessments and recommendations by the EAP. **This EMPr must be updated with all conditions of the environmental authorisation (EA) if attained.**

3. LEGISLATIVE REQUIREMENTS

3.1 Signing of the EMPr

The acknowledgement form at the back of the approved EMPr is to be signed by the holder of the Environmental Authorisation (the Applicant), the Contractor, and the ECO; acknowledging that all parties are familiar with the requirements of the EMPr. All employees are to be made aware of the conditions as contained in the EMPr as well as the contractual conditions relating to the environment as contained in the contract document.

3.2 Legislation

Of importance are all national, provincial and municipal by-laws and regulations

Relevant environmental legislation and guidelines:

- ***National Environmental Management Act (Act 107 of 1998) and EIA Regulations***

Section 28 of National Environmental Management Act (No 107 of 1998) (NEMA) imposes a general duty of care on any person who causes, has caused or may cause significant pollution or degradation of the environment to take reasonable measures to prevent such pollution or degradation from occurring, continuing or recurring, or is so far as such harm to the environment is authorised by law or can reasonably be avoided or stopped, to minimise and rectify such pollution or degradation of the environment.

The NEMA 2014 Environmental Impact Assessment (EIA) Regulations (as amended, 2017) sets out a list of identified activities that may not commence without environmental authorisation from the competent authority. The upgrade of the Waste water treatment works

National Water Act (Act 36 of 1998)

Section 19 of the NWA deals with pollution prevention, in particular where pollution of a water resource occurs or might occur as a result of activities on land. The person who owns, controls, occupies or uses the land in question is responsible for taking measures to prevent pollution of water resources. If measures are not taken, the catchment management agency concerned may itself do whatever is necessary to prevent the pollution or to remedy its effects and to recover all reasonable costs from the persons responsible for the pollution.

Section 21 of NWA sets out general principles for water use. The use, storage, and/or disposal of wastewater (and sludge) is classified as a Section 21(e) (irrigation of wastewater or other controlled activities) and/or 21(g) (disposing of waste in a manner which may detrimentally impact on a water resource) water use activity by the NWA. This includes the storage of water containing waste for the purpose of either re-use or disposal. The irrigation of land with waste or water containing waste generated by a wastewater treatment plant is governed by the General Authorisations (GN 665 of 2013).

The Woodlands WWTW currently had a valid General Authorization in place dated 28 September 2017. The GA (Ref 27/2/2/K480/7/8) allowed for a volume of **1772.8 m³/annum** into the Groot River. (S21f)

An integrated Water Use License (WUL) for the proposed WWTW upgrade has been obtained from the DWS (**Mzimvubu to Tsitsikamma CMA**) on **8 July 2026** for the following water uses:

- Section 21(c) of the Act: Impeding or diverting the flow of water in a watercourse.
- Section 21(i) of the Act: Altering the bed, banks, course, or characteristics of a watercourse.
- Section 21(f) of the Act: Discharging waste or water containing waste into a water resource. (182 500 m³/annum / 500 m³/day)

The WUL is provided in Appendix G of the BAR.

Note: Section 21 (e) of the Act: Reuse of effluent for irrigation – has not been included in the current WULA and will need to be applied for in the future should KKLM intend to reuse the treated effluent.

- **National Environmental Management: Waste Act 59 Of 2008**

The DFFE is responsible for the licencing of hazardous waste management activities, and the Member of Executive Council (MEC) is the licencing authority for general waste producing activities and those listed in GNR 921. Section 74 of NEMWA caters for the application of exemptions, provided reasonable motivation and supporting documents are offered.

- The Minister is also responsible for regulating waste management activities that will affect more than one province or across international boundaries.
- Or any activities where two or more waste management activities are to be undertaken at the same facility.

Certain activities can be exempt from acquiring licences (WML) in terms of the new legislation emanating from the NEMWA amendment act, Regulations, Norms and Standards from 2013.

- **Waste classification and management regulations (GNR 634 of 2013)**

In terms of the general notice (GN R. 634) of the Waste Classification and Management Regulation 4 (WCMR), ***“all waste generators must ensure that the waste they generate is classified in accordance with SANS 10234 within 180 days of generation, except in cases where the waste is on the pre-classified list”*** (Annexure 1 of GN R.634). Waste classification according to South African National Standard (SANS) 10234 is based on the Global Harmonised System and indicates the physical, health and environmental hazards. The SANS 10234 covers the harmonised criteria for classification of potentially hazardous substances and mixtures, including wastes, in terms of its intrinsic properties or hazards. The standard does not contain threshold concentrations for chemicals to determine potential risk. If a chemical is present in the material, it is considered to have potential risk. The classification criteria include:

- Physical hazards (explosiveness, flammability, oxidising, etc.);
- Health hazards (toxicity, carcinogenicity, corrosiveness etc.); and
- Environmental hazards (aquatic toxicity, bioaccumulation, etc.).

Wastewater sludge is not listed under item 2 of Annexure 1 and ***therefore requires classification and assessment***. SANS 10234 primarily classifies chemical substances and mixtures and sludge may not meet the hazard identification and classification criteria under SAN10234 for a hazardous waste (based on chemical composition). However, the potential presence of pathogenic and/ or infectious agents in sludge may pose a health hazard to the public and workers and compels hazardous classification and an accompanying safety data sheet for sludge.

Note – Woodlands WWTW is designed to treat household wastewater.

Extracted from THE DEVELOPMENT OF A FRAMEWORK FOR THE REVIEW OF THE SLUDGE MANAGEMENT GUIDELINES, WRC, August 2024:

All stakeholders agreed that a specific classification system is required for wastewater sludge. The current 3-tier classification system is still applicable, but the microbiological indicators and pollutant limits should be updated based on recent local and international research findings. The pollutant class limits for sludge intended for disposal should be aligned with the concentration thresholds of the Waste Classification and Management Regulations (GNR 634 of 2013).

- ***National norms and standards for the assessment of waste for landfill disposal (GNR 635 of 2013)***

GNR 635 is applicable to disposal (on-site and off-site) of wastewater sludge on land. The standards provide the requirements for the assessment of waste prior to disposal to landfill and requires the identification of chemical substances in the waste, both total concentrations (TC) and leachable concentrations (LC) of the elements. Based on the waste assessment (Type 0-4) applicable barrier design requirements will apply (GNR 636 of 2013). These regulations are applied for the assessment of wastewater sludges in the sector. ***Volume 3 of the sludge guidelines which deals with the on-site and off-site disposal of wastewater sludge*** still refer to the Minimum Requirements, 2006 and ***therefore need to be aligned with GNR 635.***

- ***GN R. 715 of 2018 promulgated in terms of the NEMWA***

The regulations (GNR 715 of 2018) ***provides a method to exclude stabilised wastewater sludges suitable for beneficial use from the legal definition of waste.*** GN R. 715 of 2018 was promulgated in terms of the NEMWA with the purpose to:

- Apply for the exclusion of a waste stream (or portion thereof) for beneficial use from the definition of waste
- Exclude permitted uses of a waste stream (or portion thereof) from the definition of waste and
- Promote diversion of waste from landfill disposal to its beneficial use.

- ***List of Waste Management Activities that have, or are likely to have a detrimental effect on the environment, 2009 as amended,***

GNR 921, 2013;

GNR 332, 2014;

GNR 633, 2015;

GNR 41175, 2017

A waste management license is not required for the upgraded WWTW system in terms of the Waste management activities, GN 921, 2013 (as amended) published in terms of the National Environmental Management: Waste Act (Act 59 of 2008) (NEMWA).

It is important to note that any WWTW treating only domestic sewage waste has the potential to generate two very valuable agricultural input resources (treated effluent and sludge), and this should be strongly considered by the KKLM in all future planning around the settlement.

Treatment of organic waste using composting is being considered by the KKLM. Any composting facility and operation on site will require compliance to the Composting Norms and standards.

All sludge management guidelines 2006 – 2009, apply to the sludge management on the woodlands WWTW site as a combination of management methods are currently being considered including:

- Reuse of sludge by farmers
- Reuse of sludge by brickmakers
- Further composting of sludge onsite
- Offsite disposal

Category C: Norms and Standards for Storage of Waste, 2013 will apply to the sludge generated from the upgraded Woodlands WWTW treatment process. The relevant norms and standards are included as an appendix G the BAR and the sludge handling process must be aligned to this should composting take place on site. Composting of sludge via the 1. Anaerobic process and 2. aerobic process is recommended for the treated sludge at woodlands WWTW; the design of the WWTW does accommodate such a process. A sludge storage facility is included in the site plan.

- ***GNR 982 NATIONAL NORMS AND STANDARDS FOR DOMESTIC WATER AND SANITATION SERVICES, 08 SEPTEMBER 2017 (DWS)***

GNR 982 states that wastewater and sludge shall be managed by local authorities and service providers in an environmentally acceptable manner by adhering to the Guidelines for the Utilisation and Disposal of Wastewater Sludge Volumes 1 to 6 (Herselman & Snyman, 2006). These guidelines replace all previous guidelines that are currently being implemented by the local authorities.

Water Research council (WRC) Sludge Management Guidelines of 2006 and 2009 and THE DEVELOPMENT OF A FRAMEWORK FOR THE REVIEW OF THE SLUDGE MANAGEMENT GUIDELINES

Volume 1: Selection of management options (Snyman and Herselman, 2006a, TT 261/06)

Volume 2: Requirements for the agricultural use of sludge (Snyman and Herselman, 2006b; TT 262/06) •

Volume 3: Requirements for the on-site and off-site disposal of sludge (Herselman and Snyman, 2009, TT 349/09) •

Volume 4: Requirements for the beneficial use of sludge (Herselman and Moodley, 2009, TT 350/09) •

Volume 5: Requirements for the thermal sludge management practices and for commercial products containing sludge (Herselman et al., 2009, TT 351/09)

NOTE – The above guidelines are included in Appendix G of the draft BAR and should be followed as applicable to sludge management at Woodlands WWTW site and operations.

- ***National Environmental Management Act: Biodiversity Act (Act 10 of 2004)(NEMBA)***
- ***Environmental Conservation Act (Act 73 of 1989) (ECA)***
- ***Conservation of Agricultural Resources Act (Act 43 of 1993) (CARA)***
- ***Provincial Nature and Environmental Conservation Ordinance No 19 of 1974 (PCNO)***

CARA provides for control over the utilization of the natural agricultural resources in order to promote the conservation of the soil, the water sources and the vegetation and the combating of weeds and invader plants.

NEMBA and CARA provides a list of Alien invasive species requiring removal (NEMBA supersedes CARA).

Collection and translocation of NEMBA threatened or protected species (TOPS) or species listed in the Nature Conservation Ordinance No. 19 of 1974 will require the relevant permits to be in place.

Search and rescue by a suitable specialist will need to be carried and required permits be in place irrespective of whether an Environmental Authorisation and accompanying EMPr is required.

Disturbance / removal of trees protected in terms of the National forest Act will also require a permit.

- ***The Fertilisers, Farm Feeds, Agricultural Remedies and Stock Remedies Act (Act 36 of 1947)***

This Act will apply in cases where wastewater sludge is used to generate a soil ameliorant or fertiliser.

Note – should composting of sludge occur at Woodlands WWTW site and the end-product beneficiated to surrounding communities (recommended) this act will apply.

- ***National Heritage Resources Act 25 of 1999***

Should any buried archaeological resources, human remains or burials be uncovered during the course of development activities, work must cease in the vicinity of these finds. Eastern Cape Provincial Heritage Resources Authority (ECPHRA) must be contacted immediately in order to determine an appropriate way forward.

Chance Fossil Finds Protocol (CFFP): A Chance Fossil Finds Protocol, as incorporated into this draft Environmental Management Programme (EMPr) (Appendix 1), is to be used to guide on-site personnel during all ground-disturbing activities.

- ***National Health Act, 2003 (Act No 61 Of 2003) and 2013 The National Norms and Standards***

Vacant land and unoccupied buildings must be maintained clean at all times, free from the following conditions:

- Accumulation of refuse, debris, including glass, paper, rags, tins, trash, ash and coal, including dead animals;
- Overgrown weeds, trees, long grass, and existence of undergrowth, shrubs or any poisonous plants;
- Accumulation of wrecked motor vehicles, chassis, engine or other part of a motor vehicle which is unsightly and may pose a health nuisance;
- Offensive smells; stagnant waters; and
- Any conditions resulting in the breeding of flies or mosquitoes, habourage of rodents and other vermin.

- ***The Fertilisers, Farm Feeds, Agricultural Remedies and Stock Remedies Act (Act 36 of 1947)***

This Act will apply in cases where wastewater sludge is used to generate a soil ameliorant or fertiliser.

- ***National Environmental Management: Integrated Coastal Management Act (Act 204 of 2008) as amended (NEM: ICMA)***

Section 28(1) of NEMA contains duty of care and provides that every person who causes or has caused or may cause significant pollution of the environment must put in place reasonable measures to prevent such pollution or degradation from occurring, continuing or recurring in so far as such harm to the environment is authorised by law or cannot be reasonably avoided or stopped, to minimise and rectify such pollution or degradation to the environment.

Statutes are amended periodically; it is the Applicant's responsibility to ensure a competent person (EAP or similar) identifies relevant legislation relevant to the proposed activity

3.3. Project Responsibilities

Responsibility for the implementation of the EMPr lies with the Applicant who must retain the services of a suitably experienced Environmental Control Officer (ECO) who will monitor the construction processes and activities periodically.

The project Applicant will be responsible for the following:

- Adhering to the approved EMPr.
- Ensure that all employed Contractors and Architects are aware of and understand the conditions of the EMPr.
- Has the right to remove any person or appointed contractors or personnel from site if the contravene with the EMPr.
- Appoint an external Environmental Control Officer and palaeontologist
- The holder of the Environmental Authorisation (if attained) must notify the competent authority of the commencement of activities 14 days prior to such commencement taking place.

The responsibilities of the Design team and Contractors include but are not limited to the following:

- Adhere with the conditions and recommendations of the EMPr or any other legally binding documentation.
- Prevent actions that may cause harm to the environment.
- Correct non compliances identified during audits
- Be responsible for any remedial activities in response to an environmental incident within their scope of influence.
- Ensure compliance of all site personnel and / or visitors to the EMPr and any other authorisations.

- Nomination of site control officer
- Appointment of external Environmental Control Officer (ECO)
- Compilation of method statements (A preliminary method statement has been compiled by SMEC and included as Annexure 2 of this EMP)

The site control officers' responsibilities must include, *inter alia*:

- Carry out daily inspections required to ensure compliance with the EMP and conditions of EA
- Keep records (waste disposal imported materials etc) for audit purposes
- Record all incidents and complaints for audit purposes
- Ensure training is carried out as required during construction phase; keep training records for audit purposes
- Report incidents to site manager / ECO

The ECO's responsibilities must include, *inter alia*:

- Carry out preconstruction, monthly, post construction audit to ensure compliance with EMP and conditions of EA
- Guide, advise and consult the relevant authority on environmental issues during construction.
- Guide, advise and consult any contractors who will be involved in this project.
- Revise the EMP as required and inform the relevant parties of the changes.
- Ensure staff are adequately trained on environmental responsibilities as applicable

Fines for noncompliance of EMP to be predetermined by Project Applicant and contractor

4. REPORTING PROCEDURES

4.1 Documentation

The following documentation must be kept on site in order to record compliance with the EMP: An Environmental File which includes:

- Copy of the EMP;
- Copy of the EA;
- Permits as and if required
- Reports submitted to ECPHRA
- Communications Register – including records of complaints,
- Audit reports including written Corrective Action Instructions.
- Incident Register
- Waste Documentation such as, but not necessarily limited to: Waste transport and Disposal records
- Service slips of any chemical ablation facilities
- Material Safety Data Sheets (MSDSs) for any hazardous substances used during construction and operations

4.2. Incident / complaint Register

The Applicant will put in place an Environmental Register and will ensure that the following information is recorded for all complaints / incidents:

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

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

4.3. Monthly Audit Report and Non-conformance report if required

Monthly external audits recommended for duration of construction including pre-construction and post construction report. Conditions of EA (if issued) and EMPr requirements will be audited including the EM file.

Non compliances will be identified and actions / recommendations provided with timeframes to address the NC.

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

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

- Details of non-conformance;
- Any equipment involved;
- Any chemicals or hazardous substances involved;
- Work procedures not followed;
- Nature of the risks and other physical aspects;
- Actions agreed to by all parties following consultation to adequately address the non-conformance in terms of specific control measures and should take the hierarchy of controls into account;
- Agreed timeframe by which the actions documented in the NCR must be carried out; and
- ECO should verify that the agreed actions have taken place by the agreed completion date, when completed satisfactorily; the ECO and Applicant should sign the Close-Out portion of the Non-Conformance Form and file it with the contract documentation.

4.4. Emergency Response

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

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

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

5. ENVIRONMENTAL MANAGEMENT PROGRAMME

It is important that mitigation measures are strictly adhered to and that all measures are taken to reduce the disturbance footprint wherever possible to minimize negative impacts.

5.1. PLANNING AND DESIGN

The proposed activities for the upgrade of bulk sewers, replacing of small-bore sanitation system at Woodlands is as follows:

- Replace Internal Sewer Reticulation of the woodlands area.
- Design new sewer infrastructure for the proposed development.
- Realign and replace the Bulk Sewer Main.
- Refurbish the existing Waste Water Treatment works.

The proposed development requires an environmental authorisation (EA) to be issued as part of the planning phase of the project. Part of the EA process is the draft EMPr which requires approval from the CA (DEDEAT). If the EA is obtained, then the EMPr is legally binding, and the applicant must ensure that EM requirements are included in the budget and planning and construction process. If this is not done, then the EMPr will not be implemented and before mitigation impacts can be expected to occur.

All Phases

WWTW Site, site layout, access road; no go alternative – Planning Team

Holder of EA and planning, construction and operation management:

- Ensure suitable management plan in place to address current septic tank system on site; this must include specific phases to accommodate existing influent, honey suckers that will be used to clear sewage as a temporary measure while the sewer network is being upgraded, and the method on how de-sludging activities from the current septic tank system will take place safely.
- Ensure correct installation and operation of works
- Ensure designs of infrastructure take into account measures to prevent leachate impacts on soil, groundwater and surface water
- Ensure designs of infrastructure take into account measures to prevent erosion impacts at access roads and effluent outlets
- Ensure a stormwater management plan is in place for the site and stormwater ponds are adequately sized
- Ensure sludge operational management is in place in accordance with relevant guidelines once sludge compost / reuse / disposal options are decided upon
- Ensure operational management is in place for monitoring of effluent quantity and quality and dried sludge quantity and quality; any pollution detected to be addressed immediately
- Ensure suitable storage facilities are on site to manage all waste streams; ensure no disposal of general or hazardous waste on site for lifetime of operation; any waste must be discarded off site at licensed landfill site and proof of disposal kept
- Lifetime of electrical plant estimations - MV switchgear and transformers (25 years); LV Motor Control Centres (15 years); Electrical installation (15 years) ; Instrumentation, Control and Automation equipment (10 years) – ensure correct planning in place to upgrade and replace electrical components as required
- Lifetime of buildings and concrete structures estimations (45 years) - ensure correct planning in place to maintain and upgrade structural components as required

Pipeline route 1; Pipeline route 2; Pipeline route 3

- The environmentally preferred site is route 3, where the line will cross the narrowest section of the wetland; the crossing is approximately 37 m, and the proposal is that the pipeline should daylight across the wetland on concrete supports with as few supports in the wetland as possible to be used. Exposure of the pipeline would reduce impacts to the wetland for maintenance and improve the detection of leaks.
- Pipeline supports should be designed and constructed to minimise the footprint of disturbance, both during the construction and the operational phase. Pipeline joints should be minimised over and adjacent to the wetland as far as possible to reduce the likelihood of leaks directly into the wetland. Ensure suitable design, approved by DWS, is in place for the crossing.
- Specify the use of lockable polymer concrete manhole covers to reduce the risk of vandalism to the sewer line.
- Ensure all mitigation measures are in place for construction phase, particularly with regards to stormwater management and erosion prevention measures during construction.
- Ensure ongoing maintenance along the bulk line for life of operations.
- Emergency response procedure must be in place to address contamination spills along pipeline for life of operation and should include cleanup materials, PPE, bioremediation materials and emergency contact numbers
- Lifetime of pipework is estimated at 30 years – ensure adequate planning in place to upgrade the pipework as required prior to 30 years post installation

Effluent management (no go; treatment via BNR and chlorine contact tank and SWMP)

Treatment of effluent

- The environmentally preferred option is the installation of the proposed treatment option in combination with the chlorine contact tanks to reduce / eliminate the E.coli levels currently in the environment.
- Ensure chlorine tanks are well maintained and operated to ensure correct dosage is applied throughout operations.
- Ensure SW pond is suitably built, lined, operated effectively

Discharge of effluent and stormwater from emergency pond (no go; treated with SWMP)

Flooding, Erosion and sedimentation

Erosion prevention and stormwater measures to include:

- Design of the WWTW has allowed for additional flows due to stormwater ingress during high rainfall events. Stormwater will be diverted to the stormwater pond southwest of the site from where it will be recirculated to the head of works for treatment. The stormwater pond is supported and recommended to mitigate the impact of stormwater ingress.
- In case of very high inflows of stormwater, an emergency overflow from the stormwater pond must be constructed in such a way the water is delivered to the watercourse downslope without causing erosion to the slope, stream banks, or stream bed. A stepped gabion structure with stilling basin is recommended.
- The outflow of treated wastewater must be constructed to ensure flows (anticipated at 0.6-1m/s) will not cause erosion of the slope, stream bank or stream bed into which it flows. Like the above a stepped gabion structure with stilling basin is recommended.
- Outlets into the stream from the chlorine contact tank and the stormwater pond should not have a perpendicular entry to the stream that could cause erosion on the opposite bank.
- The design should include bund walls around the biological reactor.
- A pipeline should be installed between the outlet of the chlorine contact tank and the stormwater pond. This should be an emergency outlet that could utilise the storage provided by the stormwater pond on a temporary basis and to recirculate the sewage for treatment in the event of equipment failure in the WWTW. This would only function if capacity in the stormwater pond was available and would reduce or prevent serious pollution of the watercourse due to the discharge of partially treated or untreated sewage (in the event of an equipment failure).

- The following sketch shows a pipe outlet that can be retrofitted for open channels as well; which means it will work for the effluent outlet as well as the stormwater overflow. The following is proposed by the design engineer:
 Pipe diameter – 0.45m
 W – 1.2m; H – 0.9m; L – 1.6m
 a – 0.9m; b – 0.7m; c – 0.6m; d – 0.2m; e – 0.05m; f – 0.3m; g – 0.6m
 tw = tf = tb = tp – 0.15m
 k = 0.08m

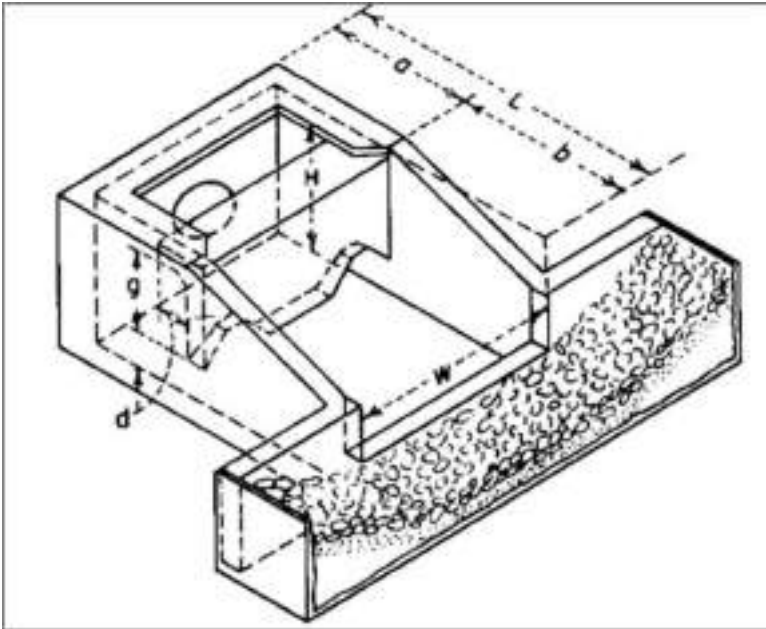


Figure 4: Concept design of effluent structure and stormwater control (SMEC, August 2025)

Sludge management (drying beds / beneficiation / offsite disposal)

Incorrect management of sludge leading to soil, surface and groundwater contamination

Incorrect treated sludge management leading to site contamination

Reuse versus off-site disposal of sludge

- The sludge drying beds are required to be suitably sized, lined and bunded and leachate returned to head of works therefore keeping the entire system contained with minimal risk of direct ground and indirect water contamination.
- The drying beds must be sized correctly to accommodate the incoming daily sludge and allow for a ten to fifteen day drying time (as required) to achieve the recommended dried percentage (as required per sludge management guidelines, i.e. 75 to 90 %) and this must be shown in a sludge operational procedure for the site. Tarpaulin / cover is recommended for sludge drying beds (relatively small drying bed area of estimated 250m² per bed) and used if wet weather on site.
- The dried sludge storage area should be sized to store dried sludge for a maximum of 90 days; it is recommended to be an enclosed, shaded facility to prevent stormwater ingress (resulting in wetting of sludge) and further drying. This facility should be suitably sized to also allow for further composting to provide KKLM this option for end use.
 - This facility will then need managed as per the composting norms and standards. Sludge can be dried to 50-60 % in drying beds and moved for composting; further composting will need additional vegetation added (i.e. AIS removed; landscaping waste); a number of composting methods using various biota are available for consideration by the KKLM.

- The sludge must be managed as per the sludge management guidelines; there is to be no disposal of sludge, or any waste, on site at any point of the treatment process and all facilities will need to be suitably lined / roofed / bunded as required.
- The dried sludge must be tested and if it meets the A1a classification as anticipated it is encouraged to be beneficiated to surrounding community members (e.g farmers / plantations) or reused in nearby brick manufacturing operations. Compost can be beneficiated / sold to local nurseries in the area or any interested person, use in landscaping on site / in local municipal area; many relevant guidelines state that composting can be beneficial for municipalities to generate revenue to assist in operational management of WWTW.
- The last option will be the offsite disposal of sludge to a licensed landfill site, with suitable capacity.
- A sludge management operational plan must be put in place by the KKLM once the most feasible option / options is /are decided upon after the relevant cost benefit analysis is done. A combination of composting, beneficiation, and reuse is recommended with offsite disposal as a last option.
- The sludge management guidelines, composting norms and standards is provided in Appendix G for further information

All - Site 1; pipeline (preferred 3); BNR design; sludge drying beds; effluent discharge; internal reticulation and small bore installation

Groundwater contamination

- Ensure the WWTW comply with SANS standards (SANS1200 Part K:Civil Engineering Standard Specifications, SANS10400:The National Building Regulations and Building Standards Act, SANS 1913:Planning, Design, and Construction of Sanitation Systems, SANS 10252&SANS10253:Water Supply and Drainage Installations, SANS1913:Planning, Design, and Construction of Sanitation Systems), NWA, Water Quality Guidelines (DWAF), NEMA & EIA Regulations, DWS WWTW Design Guidelines.
- All areas where potential leachate may occur are to be covered with impermeable materials (including sludge management sites).
- Ensure all waste Containment and Infrastructures are correctly designed and constructed:
 - Use synthetic/geotextile liners and impermeable surfaces approved by the Department of Water and Sanitation (DWS) in areas where sewage and associated waste are handled.
 - Construct all sewer lines and pipes to ensure leak-proof systems that prevent contamination.
 - Ensure that sewage holding tanks and accommodation facilities are properly managed to prevent overflow and spillage.
 - Ensure proper stormwater management infrastructure is in place.
 - Ensure emergency procedures are in place to rapidly repair WWTW should failure occur.
 - Set up a comprehensive monitoring system to monitor the effluent quality.
 - Incorporate monitoring network as implemented during the construction phase into operational phase monitoring.
 - The WWTW and associated pipework to be monitored regularly for any leakages.
- It is recommended that the limitations of the groundwater study (i.e. no site-specific data available on the shallow subsurface or deep geological strata; detailed aquifer parameters) be addressed once the boreholes are installed. The acquired information will be used to accurately mitigate the risk.
- To ensure the long-term protection of groundwater quality, mitigation measures should be implemented, focusing on:
 - Early detection of contaminants or leaks through regular groundwater quality monitoring.
 - Strict management of potential contamination sources, particularly wastewater treatment and effluent disposal, to prevent pollutants from infiltrating the water table.
 - Proper site planning and containment strategies to minimize the risk of accidental spills or seepage into the subsurface.

Monitoring Requirements

- To effectively monitor and safeguard groundwater quality, the installation of dedicated monitoring boreholes is essential.
- It is recommended that three boreholes be installed: one upgradient of the site to establish baseline (background) groundwater quality, and two downgradient to detect and track any potential contamination migrating from the site.
- The exact locations of the monitoring boreholes should be determined once the final spatial footprint of the WWTW has been established. However, it is essential that all boreholes are sited within 150 metres or closer to the facility to ensure effective monitoring of potential groundwater impacts.
- The boreholes should be installed prior to the construction phase in order to establish baseline groundwater quality. This is essential for detecting any early signs of contamination during the construction phase. Monitoring will continue throughout the operational phase to ensure that the groundwater remains uncontaminated and that any potential issues are detected and addressed promptly.
- The boreholes should be appropriately designed and constructed to ensure that they provide reliable and accurate data throughout the project lifespan
- The following specifications are recommended for the piezometer installation:
 - **Borehole Diameter and Depth:** Drilling should not be smaller than 165mm in diameter. The depth should be sufficient to monitor the water table and deeper groundwater.
 - **uPVC Casing Diameter:** The borehole must be fitted with class 12, flush fit, threaded ended uPVC and be slotted from approximately 2.5m to the end of hole depth. The diameter of the PVC casing should not be less than 110 mm to provide adequate flow of groundwater and to allow for proper monitoring and sampling.
 - **Gravel/Filter Pack:** The hole annulus surrounding the borehole should be filled with a gravel/filter pack (typically between 2 and 3 mm in diameter). This ensures proper filtration and prevents fine particles from entering the borehole, which could potentially affect the accuracy of measurements.
 - **Bentonite Seal:** The top 2 meters of the annulus should be filled with a bentonite seal to prevent surface water or other contaminants from entering the piezometer and affecting groundwater readings.
 - **Protection and Marking:** Each borehole should be equipped with lockable protection to prevent tampering and damage. The boreholes should also be clearly marked and easily identifiable to ensure proper operation and maintenance throughout the development lifecycle.
- The construction of the boreholes should be supervised and managed by a qualified geohydrologist to ensure that the installations meet industry standards and are placed in optimal locations for monitoring purposes. The geohydrologist should oversee the entire process, from design to installation, ensuring that the piezometers are constructed in accordance with best practices. No installation should be undertaken without the consultation or supervision of a geohydrologist, as their expertise is critical for the successful monitoring of groundwater quality and levels.
- A comprehensive groundwater monitoring program should be developed to outline the specific parameters to be monitored, as well as the frequency of sampling and analysis. Table 1 below presents a proposed list of parameters and recommended monitoring frequencies that should be included in the program. It is essential that this data be captured in an appropriate electronic database, which will facilitate easy retrieval and submission to the relevant authorities as required by regulations. Additionally, the data should be reviewed by a geohydrologist on a quarterly basis to ensure that no contamination is occurring and that groundwater quality remains within acceptable limits
- Groundwater sampling should be conducted in accordance with the SANS 5667-11:2015 standard, which outlines the procedures for groundwater sampling, including the use of proper equipment, handling protocols, and analytical methods. Following these standards ensures that the data collected is accurate, reliable, and consistent, allowing for effective monitoring and timely intervention if necessary.

- By implementing these mitigation measures and ensuring regular, systematic monitoring, the risk of groundwater contamination can be significantly reduced, and the long-term sustainability of local water resources can be maintained. The early detection capabilities afforded by the piezometer network will provide valuable insights into groundwater quality, allowing for proactive management and timely corrective actions if any issues are identified. The comprehensive monitoring program, in conjunction with the oversight of qualified professionals, will help ensure that both the development and the surrounding environment are adequately protected throughout the project lifecycle

Table 1: Proposed Monitoring Requirements (DHS consulting, 2025)

Class	Parameter	Frequency	Motivation
Physical	Static groundwater levels	Monthly	Temporal variation
Chemical	Faecal Coliforms, COD, pH, Ammonia as Nitrogen, Nitrate/Nitrite as Nitrogen, Chlorine as free Chlorine, EC, Orthophosphate as phosphorous, Fluoride, Soap oil or grease, Major ions and trace elements.	Effluent Monthly, Monitoring Boreholes Quarterly	Changes in chemical and of groundwater contamination system to implement management

5.2. Construction and decommissioning as appropriate

All - Site 1; pipeline (preferred 3); BNR design; sludge drying beds; effluent discharge; internal reticulation and small-bore installation, roads

Inadequate planning and Non-compliance with Conditions of the Environmental Authorisations

Planning – Planning Team

- An Environmental Control Officer (ECO) should be appointed at the start of construction phase of the WWTW upgrade to provide feedback on compliance with authorisation conditions to various regulatory departments.
- Prior to commencement of construction, during the site establishment phase, the ECO must work closely with the construction team, resident engineer and site surveyor to establish and demarcate areas that workers, vehicles and materials cannot disturb or enter. Laydown areas, management areas and no-go areas to be correctly mapped and demarcated on site prior to start of construction. Together with the ECO and construction team, identify suitable access, parking and turning areas for vehicles for each phase of the construction work.
- The ECO must ensure that all conditions of environmental authorisations are discussed and fully explained to the construction team. The construction team must have copies of the EAs on file in their site office.
- The ECO should check in and report back on progress at a minimum once a month until the project concludes.
- The ECO should ensure that photos are taken of all areas where work will be carried out before, during and after completion. These should be submitted as part of a report for commencement and completion of the work to be supplied to both the Department of Environmental Affairs and Water Affairs.
- The ECO must use a clarity tube (available from GroundTruth) to measure water clarity at the downstream site prior to commencement of construction. Thereafter, measurements should be taken and recorded (in cm) at this point each time the ECO is on site. Natural variation in water clarity is acceptable within 10% of the baseline value. Anything higher may be reflective of high levels of disturbance which requires mitigation.
- An annual audit is recommended to be carried out during operational phase and include any maintenance activities carried out for the year

Loss of heritage, archaeological, palaeontological resources

Construction Planning and Construction

- Suitable training to be provided to contractors on steps to take should heritage resources be uncovered during construction.
- Should any buried archaeological resources, human remains or burials be uncovered during the course of development activities, work must cease in the vicinity of these finds. Eastern Cape Provincial Heritage Resources Authority (ECPHRA) must be contacted immediately in order to determine an appropriate way forward.
- A Chance Fossil Finds Protocol is provided in Appendix 1 of this EMP to guide on-site personnel during all ground-disturbing activities.

Construction and maintenance during operations (include in training to contractors and subcontractors)

- Archaeological Sites may include early / middle stone artefacts (hand held tools have been found in sounding area)
- Paleontologically site may include fossils
- No heritage structures are on site / along pipeline route
- Monitoring during excavations to be done on ongoing basis by site control officer and any sites exposed to be reported to the ECO (photographs, coordinates) who must report the find to the ECPHRA. THE CFP must be followed. Steps provided by ECPHRA regarding the find to be followed

With the implementation of these mitigation measures, the proposed Woodlands WWTW and sewer upgrade can proceed with negligible risk to archaeological and palaeontological heritage.

Unnecessary loss of vegetation, disturbance to watercourses and disturbance to fauna

Planning Phase - Planning – Design Team

Construction and maintenance as required (include in training to contractors and subcontractors)

- Search and rescue to be carried out prior to construction and relevant permits applied for. Relocate flora, keep rehabilitation, store and reuse / dispose as required. Ground-dwelling animals / nests / eggs must be searched for.
- No clearing outside of footprint to take place. Surrounding intact Humansdorp Shale Renosterveld is to be conserved and not harmed during the construction process unnecessarily.
- No animals are to be harmed or killed during the course of operations. Workers are NOT allowed to snare any faunal species. Contractual fines to be imposed on any employee who is found attempting to harm fauna on site or in surrounding areas.
- If any animals are seen on site, a photo or a video should be taken if possible (to assist in identification) and all fauna encountered on site should be reported to the ECO immediately. This is important when:
 - An animal is harmed or compromised in any way during construction.
 - Any animal with limited mobility is found on site (e.g. tortoises, moles, chameleons).
 - Any potentially dangerous animal is encountered. This includes any potentially venomous animal (e.g. snakes, scorpions)
 - For any assistance with snake removals/relocations, identifications or bite treatment contact the African Snakebite Institute.
- No-go areas must especially focus on all wetland and / or stream habitat with a 5m buffer. These areas must be delineated using suitable fencing and stakes with clear signs indicating no go area. Consider Implementation of fines for gross negligence and ignoring No-go areas
- The importance of No-go areas must be clearly communicated to site workers and contractors through a site induction, which is required each time new workers enter the site.
- As far as possible, existing areas of disturbance, and existing tracks should be used for vehicle access.
- This must be clearly communicated to all drivers and demarcated using danger tape, reflectors or similar.

- Identify materials and equipment laydown areas away from wetlands and other watercourses as far as is practical. Consider that materials, temporary toilets, leaked fuel and litter can wash downslope during heavy rainfall and must therefore be bunded, secured, covered or surrounded by sandbags to prevent impacts to aquatic habitats. The ECO must inspect these areas for compliance.
- Check weather reports for rainfall predictions on a weekly and daily basis. Postpone work during rainfall and ensure the site has been prepared to prevent wash off of materials etc.
- As far as possible, work should be undertaken by hand using spades, pickaxes etc. However, it is acknowledged that work on this scale will require the use of heavy vehicles in some areas such as TLBs.
- Perimeter fencing must not restrict movement of wildlife along the drainage line in any way.

Maintenance

- Ongoing maintenance is likely to be required in the long-term, which could include re-excavation of portions of the pipelines and associated WWTW infrastructure for maintenance/replacement of defective components and leak repair. All measures in BAR and accompanying EMPr should be adhered for any maintenance requirements. Any excavated areas must be stabilised and rehabilitated

Stormwater Runoff Causing Erosion, Sedimentation and Pollution During Construction

Construction and maintenance as required (include in training to contractors and subcontractors)

- Ensure that heavy machinery does not compact soil or disturb vegetation outside of these demarcated footprint areas
- Ensure stockpiled materials such as topsoil, subsoils, or any other mobile materials are bunded with sandbags to prevent their loss during rainfall. Topsoil must always be kept separate from other materials and protected from loss and contamination at all times.
- Ensure that construction activities do not cause any preferential flow paths and concentrated surface runoff during rainfall events.
- Ensure that vegetation clearing is conducted in parallel with the construction progress to minimise erosion and runoff.
- Rainwater that must be pumped out of excavations (holes, trenches, foundations) after heavy rainfall cannot be discharged to stormwater drains or into a watercourse. A temporary coffer dam must be established using sandbags as the walls and bidim geotextile fabric as the liner. Water must be pumped into this and will seep through the bidim, leaving the majority of fine sediment behind in the fabric.
- Reduce transport of sediment down slopes through use of structures such as silt fences, biodegradable coir logs and soil saver biodegradable matting
- Construct haybale check dams within concentrated flow paths to encourage water pooling and seepage through the haybale, while sediment remains in drains
- Protect stormwater drains which lead to aquatic habitats with sandbags to prevent silt-laden water from entering drains.
- Revegetate exposed areas once construction has been completed with grass. In terrestrial areas, a mixture of oats (*Avena sativa*), buffalo grass (*Stenotaphrum secundatum*) and kweek (*Cynodon dactylon*) is preferable. No kikuyu to be used.

Soil disturbance

Construction and maintenance as required (include in training to contractors and subcontractors)

- Construction disturbance to be kept to the 'settlement side' of the sewer line route as opposed to the wetland side. Disturbance includes vehicles, workers, excavated soil from the trench and stockpiled materials. This

would mean that the wetland would be protected from construction works for the most part by the pipeline trench itself.

- Topsoil should be cleared in a phased manner as per sequence of construction activities. Topsoil removed (maximum 300mm depth) (including lawn and vegetation) must be suitably stockpiled within boundaries of the erf on a level area at no more than 1 meter in height in an area that will not be disturbed by construction for use in rehabilitation and landscaping on the site. Topsoil must be stored with removed vegetation and covered with tarpaulin / shade cloth to prevent loss of soil/ erosion / dust generation.
- Practice 'first out, last in' for soil excavated in trenches. Topsoil is highly valuable, and it is imperative that all topsoil is replaced as the uppermost soil layer. Subsoils should not be mixed with topsoil. Topsoil has a valuable seedbank and organic matter which will greatly promote rapid regrowth of vegetation once the trench is refilled.
- Stockpile all soils at a maximum 1.5-meter height
- No driving on soil stockpiles permitted
- Where possible, excavated sods of earth containing intact plants should be saved for replacement to preserve vegetation and fast-track revegetation at conclusion of the works.
- Excavations by hand and other access required in the wetland should be done using wooden boards placed over vegetation to give workers an easier footing in wet soils and minimise soil disturbance.
- Excavations for pipe supports in the wetland will likely require pumping of water out of the excavation given that the soil is fully saturated. The water is likely to have very low oxygen levels and high redox values which represent very different water quality to any surface water in the wetland. This water should therefore be spread over adjacent terrestrial areas where it can flow back to the wetland slowly, instead of being directed straight into the wetland where it could impact aquatic fauna.
- When constructing the crossing through the wetland area, work from both sides of the wetland towards the middle point, if possible, to avoid disturbing habitat through back-and-forth movements.
- Subsoil stockpiles must be stockpiled within boundary of the WWTW or on settlement side of the pipeline; subsoil stockpiles must not be higher than 1.5m. they should be placed on flat areas and covered with tarpaulin / shade cloth to prevent erosion / dust generation. Excavated materials to be re used as far as possible (i.e. as fill material); excavation materials not re-used are to be removed off site as quickly as possible and disposed at an appropriately licensed waste site.
- To prevent dust - During strong wind conditions it may be necessary to halt operations until conditions improve; Exposed areas should be wetted during windy / dry conditions
- Allow a maximum disturbance footprint of 2m around infrastructures / alongside pipeline excavation
- Construction site must be cleared of all waste material, rubble, and debris associated with the construction phase at regular intervals during, and at the conclusion of the construction phase.

Working in and Adjacent to the Drainage Line for Construction of the WWTW and Associated Outlets

Construction and maintenance as required (include in training to contractors and subcontractors)

- If the outlet location is flexible within a few metres, then the route selection should strongly consider avoiding the removal of large, indigenous trees as far as possible. The reason is the significant role trees play in stabilising slopes and soil.
- Work down steep slopes must be undertaken by hand with the minimal footprint of disturbance as far as possible.
- No vegetation, soil or rocks may be discarded into the stream. All material removed from the site should be carried up the slope. Topsoil must be stockpiled separately, max 1.5 m height, protected from stormwater and retained for reuse following conclusion of the works.

- Consider (in discussion with the ECO) whether an instream silt fence will be required to minimise siltation during construction (only works in very low flows). Alternatively, place haybales or silt fencing along the base of any earthworks to minimise sedimentation of the stream.
- The use of gabions must follow best practice for installation including the use of bidim geotextile to prevent erosion behind gabions, the correct sizing of stones, and levelling of areas for gabions.
- Gabion boxes should be constructed of poly-coated wire to reduce the likelihood of vandalism through cutting and theft.
- Construction of any fencing along the western boundary of the WWTW should be positioned along the top of the slope and as far away from the watercourse and 1:100-year floodline as possible. Pedestrian gates should be included to allow for inspection and maintenance of the two outflows from the WWTW.

AIS Displacing indigenous flora and fauna; decrease of natural runoff in catchment area

Construction and maintenance as required (include in training to contractors and subcontractors)

- The use of kikuyu grass is not supported in any rehabilitation efforts as this is a classified alien plant and considered highly invasive in wetlands.
- All AIS within the WWTW site construction footprint, including alongside the pipeline between settlement and pipeline to be removed on an ongoing basis (as required) by the construction team and for 3 months following construction.
- Thereafter, the KKLM to resume ongoing AIS clearing.
- AIS management plan to be put in place for life of operations

General Waste pollution and Hazardous Waste pollution

Construction – Planning

- An incident/complaints register must be established and maintained on-site.
- Suitable storage, drip trays, ablution facilities, bins, skip to be provided as required
- Waste management plan to deal with all general waste streams
- Waste management area on site, with WWTW site boundary - Through each phase of construction have a designated area which is marked out for eating, resting, rubbish disposal, and sanitation (cleaning drinking, washing water and toilets).
- Identify closest registered waste site
- Maintain records of disposal / ablution service

Construction and maintenance as required (include in training to contractors and subcontractors)

- Under no circumstances may solid waste be burnt or buried on site / surrounding area; Any waste cement should be allowed to dry and be disposed of in skips at the site. No waste cement should be discarded in aquatic habitats under any circumstance.
- Waste management must follow waste hierarchy – avoid, reduce, reuse, recycle, dispose
- No Littering
- Provide adequate bins for disposal of personal waste (e.g. lunch wrappers) as well as a waste area for larger waste materials (e.g. concrete rubble).
- All workers must be made aware that no rubbish may be disposed of in aquatic habitats or any other place beside the waste bins provided under any circumstance.
- Contractors must monitor construction vehicles to ensure that they are not overly full – thus increasing the likelihood of spillage of debris on the site. Ensure any debris spilled onto roads is cleared up.
- Specific area within WWTW must be designated for the temporary management of various waste streams. Bins / skip must be available for collection, separation and storage of waste streams - i.e. general waste

(plastic, paper, tin, glass, organic et), construction waste (wood, concrete, metal scrap etc), hazardous waste (fuels, oils, sludge). Area to be designated for storage of excess subsoils, construction rubble.

- Where possible, construction and general wastes on-site must be reused or recycled.
- All solid waste collected must be disposed of at a registered waste disposal site on a regular basis; waste materials must be removed from site as quickly as possible and not stockpiled on site. A certificate of disposal must be obtained by the construction site manager and kept on file and be made available for review at any time.
- Corrective action must be undertaken immediately if a complaint is received.

Post Construction - Construction Team

- Upon the completion of construction, the area will be cleared of all construction materials.

Hazardous waste management

- Concrete mixing (dagha) should be done using mixing trays equipped with raised side and placed outside the 5 m buffer of the wetland; cement is a pollutant that must not be allowed to flow into the watercourse.
- Ablution facility to be provided as necessary at a ratio of 1:10; ablution facility must be secured to prevent being blown over and must be regularly serviced. Service slips to be kept on record by site manager for audit purposes.
- Provide an appropriate number of temporary toilets and ensure they are cleaned by a registered company on a regular basis.
- Do not leave machinery / vehicles running unnecessarily. Service machines and vehicles regularly to prevent unnecessary fumes and leaks.
- Ensure cleaning materials, volatile materials and other hazardous materials (e.g. chemicals) are securely stored within a suitable sealable non-corrosive container. Ensure lids are secure to avoid unnecessary release into the environment. Store on a bunded area covered with roof and secure with lock and key.
- If machinery using fuels and oil required for construction (i.e. generators, compactors)
- Refuelling must take place with drip tray / on designated bunded area and roofed area – refuelling to take place only within designated area within WWTW site – not near wetlands
- Drip trays must be placed under such equipment when standing – do not leave any fuel equipment standing within 5 meters of wetland area / along pipeline route – all machinery must be parked in designated area within boundary of WWTW site overnight and all hazardous materials and waste stored under lock and key
- In the event of a major spill or leak of contaminants, the relevant administering authority must be immediately notified as per the notification of emergencies/incidents.
- Spill kit in place - Any spills must receive the necessary clean-up action. Appropriate arrangements to be made for appropriate collection and disposal of all cleaning materials, absorbents, and any contaminated soils. This must be stored in separate designated container on site for offsite disposal at licensed waste disposal site.
- Spilled cement or concrete must be cleaned up as soon as possible and disposed of at a suitably licensed waste disposal site.
- Install the sewage and wastewater infrastructure according to applicable national SANS standards (SANS1200 Part K:Civil Engineering Standard Specifications, SANS10400:The National Building Regulations and Building Standards Act, SANS 1913:Planning, Design, and Construction of Sanitation Systems, SANS 10252&SANS10253:Water Supply and Drainage Installations), DWS Guidelines and adhere to municipal regulations & by-laws.
- Site to be monitored regularly for contaminant spillages and if detected, contact spillage remediation companies.
- Separate, tightly cover and monitor toxic substances to prevent spills and possible site contamination.
- Cover stockpiles of building materials like cement, sand and other powders.

- Regularly inspect stockpiles for spillages and store away from waterways or drainage areas.
- Collect any wastewater generated from site activities during construction in settlement tanks then screen, discharge the clean water, and dispose of remaining sludge according to environmental regulations.
- Install at least three monitoring boreholes into the water table, one upstream and two downstream of site.

Unintentional and uncontrolled fires can have high significant impacts on the social and natural environment

Construction and maintenance as required (include in training to contractors and subcontractors)

- No cigarette butts or burning substances are permitted to be released into the environment. All cigarette butts to be extinguished first and then disposed of in a waste receptacle provided.
- No burning of waste – put in place waste management measures to ensure waste is moved off site timeously, particularly AIS slashed material which can be a fire risk if it is not chipped and spread.
- Fire response measures to be in place at risk areas along site (I,e fire extinguishers, fire emergency response water)
- If a fire is detected it must be attended to immediately.
- Fire emergency response measures and associated training to be in place.
- Ensure emergency numbers are on hand for fire response in the area.

Contractors are encouraged to be in close contact with South African weather Services at all times to receive early warning details of floods, droughts, high winds and potential fires in the area and plan accordingly

Noise impacts

Construction and maintenance as required (include in training to contractors and subcontractors)

- Sufficient notice to be given to the residents with an indication of a work schedule and expected work commencing on their households
- Working hours to be restricted to daytime hours (i.e. 7:30 am – 5:30pm)
- No major construction work to take place after hours or on Sundays or on public holidays.
- A complaints register should be kept to document complaints and the corrective action taken.
- No loud music to be allowed on site.
- All vehicles and machinery must be kept in good working condition.
- Put in place waste management measures

Income generation

Construction and maintenance as required (include in training to contractors and subcontractors)

- Use local reputable contractor
- Use local materials, where possible.
- Make use of local services where required and possible
- Do not pay any cash wages on site to minimise criminal risk to employees

Ensure requirements of health and safety act and labour act are in place as required

5.3. Operational phase

All - Site 1; pipeline (preferred 3); BNR design; sludge drying beds; effluent discharge; internal reticulation and small-bore installation, roads

AIS Displacing indigenous flora and fauna; decrease of natural runoff in catchment area

- 6-8 months post-construction site inspection of impacted areas (including aquatic habitats) to take place to ensure that:
 - Indigenous revegetation has occurred and at least 70% vegetation cover has been achieved through passive regrowth.
 - Assess the level of alien plant invasion within development footprint areas and along pipeline route – if AIS present, they will need to be removed; AIS removed from areas close to watercourse are recommended to be replaced with indigenous soil binding vegetation suitable to the habitat and surrounding vegetation
- AIS management plan recommended to be put in place for life of operations

Unintentional and uncontrolled fires can have high significant impacts on the social and natural environment

Construction and maintenance as required (include in training to contractors and subcontractors)

- No cigarette butts or burning substances are permitted to be released into the environment. All cigarette butts to be extinguished first and then disposed of in a waste receptacle provided.
- No burning of waste – put in place waste management measures to ensure waste is moved off site timeously, particularly AIS slashed material which can be a fire risk if it is not chipped and spread.
- Fire response measures to be in place at risk areas along site (I,e fire extinguishers, fire emergency response water)
- If a fire is detected it must be attended to immediately.
- Fire emergency response protocol and required measures and associated training to be in place.

Ensure emergency numbers are on hand for fire response in the area

Income generation

- The Detail design report states that the facility is envisioned to be operated by eight to ten persons during the day. Ensure an operator is on site at all times during the day and on call during weekend and evening hours
- Ensure all employees meet the requirements of operators of WWTW
- Ensure all employees are adequately trained to effectively operate the WWTW and ongoing training as required
- Do not pay any cash wages on site to minimise criminal risk to employees
- Secure access must be in place and ensure crime, vandalism and theft of equipment's is prevented as far as possible
- Ensure requirements of health and safety act and labour act are in place as required

Pipeline Blockages, Sewage Spills, and Operational Issues

- Ensure the ongoing use of lockable polymer concrete manhole covers to minimise acts of vandalism and dumping in sewer lines.
- Add signage to manholes and pipelines informing passersby of the manhole ID and telephone number to call and report leaks. This should ideally be in English / Afrikaans / isiXhosa and can be spray painted onto infrastructure to prevent theft of signs.
- 6-8 months post-construction and start of new treatment plant, a site inspection to take place on all disturbed areas (including aquatic areas - pipeline crossing and outlets) to ensure that:
 - No evidence of dumping.
 - Ensure outlets have suitable erosion prevention measures in place (e.g no slumping of gabions) and address as required
 - Water samples to be taken at identified two sampling points testing for the required parameters.
 - Provide results of post construction audit to competent authorities (DEDEAT, DWS)
- Groundwater monitoring to continue for lifetime of operations;

- Daily inspection of equipment by operators to take place - If problem / leak detected attend to it immediately
- Communication using information pamphlets to woodlands residents to encourage no disposal of items that can cause blockages discarded in flushing toilets, or placed in drains is recommended for consideration by KKLM
- Annual external legal EA and WUL (if attained) audit recommended annually for the site

Groundwater contamination, aquatic impact, flora and fauna, health impacts

- Implement an effective stormwater management system to prevent runoff from coming into contact with waste
- Divert and control stormwater to reduce contamination risks.
 - (Refer to SW Pond – planning and subsequent construction and operations)
- By implementing these measures, the risk of groundwater contamination, infrastructure failure, and regulatory non-compliance can be significantly reduced.

Risk of Increased Access to Aquatic Habitats for Dumping

- Dispose of all waste at registered landfill sites; on-site dumping and disposal in surrounding areas are strictly prohibited.
- Properly clean up and dispose of spills or sludge at a registered landfill site to prevent environmental hazards.
- Ensure that all waste-handling surfaces are impermeable to prevent leaks and seepage.
- While beyond the scope of this project, the municipality is encouraged to improve service delivery for the disposal of solid waste in a formalised facility. Disposal of solid waste is currently an environmental and human health concern. Furthermore, existing areas of dumping should be cleaned up as a priority.
- Certainty regarding the disposal for sludge and screenings must be provided by the municipality. Under no circumstances can either of the above be dumped in any watercourse.
- Encourage the regeneration of indigenous vegetation along disturbed areas which will create a physical barrier to dumping
- Vehicle access to wetland areas can be restricted with installation of wooden poles or lockable bollards. However, this would not restrict access by people on foot or using wheelbarrows.
- Improved service delivery for the settlement going forward, and an effort to clean up existing dumping areas
- Signs stating “no liter, use bin” for example, and public bins provided in Woodland’s settlement should be considered by the KKLM to reduce litter in area and also reduce number of screenings at WWTW resulting from litter in SW drains;

General Waste pollution and Hazardous substance management

Operations – Planning

- An incident/complaints register must be established and maintained on-site.
- Suitable hazardous substances storage facilities, drip trays, ablution facilities, bins, skips etc., to be provided as required
- Waste management plan to deal with all general waste streams
- Designated Waste management area on site
- Designated area for storage of hazardous materials and substances on site
- Identify closest registered waste site
- Maintain records of disposal and site ablution service with honey sucker

Construction and maintenance as required (include in training to permanent staff, contractors and subcontractors)

- Under no circumstances may any solid waste be burnt or buried on site / surrounding area
- Waste management must follow waste hierarchy – avoid, reduce, reuse, recycle, dispose

- No Littering
- Specific area must be designated for the management of various waste streams stored on site during operations and must be adequately sized, equipped with roof, non-permeable floor and bunded (if required). i.e. general waste (plastic, paper, tin, glass, organic), construction waste (wood, concrete, metal scrap etc), hazardous waste (fuels, oils, sludge). Provide adequate bins for disposal of personal waste (e.g. lunch wrappers). Ensure regular offsite removal of waste to suitably licensed disposal / transfer site and keep proof of offsite removal. Where possible wastes on-site must be reused or recycled.
- Specific area must be designated for storage of all hazardous materials and substances required for operations and / or maintenance. Ensure cleaning materials, volatile materials and other hazardous materials (e.g. chemicals) are securely stored within a suitable sealable non-corrosive container. Ensure lids are secure to avoid unnecessary release into the environment. Store on a bunded area covered with roof and secure with lock and key.
- Refuelling required on site must take place with drip tray / on designated bunded area and roofed area – refuelling to take place only within designated area within WWTW site – not near wetlands at any time
- Concrete mixing done using mixing trays and placed outside the 5 m buffer of the wetland; Spilled cement or concrete must be cleaned up as soon as possible and disposed of at a suitably licensed waste disposal site.
- Monitor service and operational vehicles to ensure that they are not overly full – thus increasing the likelihood of spillage of debris on the site. Ensure any debris spilled onto roads is cleared up.
- Do not leave machinery / vehicles running unnecessarily. Service machines and vehicles regularly to prevent unnecessary fumes and leaks.
- If machinery using fuels and oil required for construction (i.e. generators, compactors), drip trays must be placed under such equipment when standing; all machinery must be parked in designated area within boundary of WWTW site overnight and all hazardous materials and waste stored under lock and key
- Provide an appropriate number of temporary toilets and ensure they are cleaned by a registered company on a regular basis. Honey sucker to empty conservancy tank on site and place at head of works
- Corrective action must be undertaken immediately if a complaint is received.
- In the event of a major spill or leak of contaminants, the relevant administering authority must be immediately notified as per the notification of emergencies/incidents.
- Spill kit in place - Any spills must receive the necessary clean-up action. Appropriate arrangements to be made for appropriate collection and disposal of all cleaning materials, absorbents, and any contaminated soils. This must be stored in separate designated container on site for offsite disposal at licensed waste disposal site.
- Site to be monitored regularly for contaminant spillages and if detected, contact spillage remediation companies.
- Cover stockpiles of building materials like cement, sand and other powders if in use for maintenance activities

Health impacts from pollution in the area

Construction and maintenance as required (include in training to contractors and subcontractors)

- Installation, construction and operations of the WWTW and supporting infrastructure to comply to mitigation measures and conditions of EA and WUL (if attained)
- Ensure effective operational management and maintenance of supporting facilities, ongoing electricity supply and a sufficient number of trained operators are on site, on an ongoing basis.
- Ensure compliance with **the National Norms and Standards relating to environmental health in terms of National Health Act, 2003**
 - *Vacant land and unoccupied buildings must be maintained clean at all times, free from the following conditions:*
 - *Accumulation of refuse, debris, including glass, paper, rags, tins, trash, ash and coal, including dead animals;*

- *Overgrown weeds, trees, long grass, and existence of undergrowth, shrubs or any poisonous plants;*
- *Accumulation of wrecked motor vehicles, chassis, engine or other part of a motor vehicle which is unsightly and may pose a health nuisance;*
- *Offensive smells; stagnant waters; and*
- *Any conditions resulting in the breeding of flies or mosquitoes, habourage of rodents and other vermin.*

Climate Change

- The WWTW components and accompanying infrastructure has been placed outside flood areas; the preferred pipeline will cross over a wet area for a distance of approximately 40 meters; the pipeline will be raised over this area and maintained for lifetime of operations to ensure no leaks and / or spillages occur in this area
- The site is in a high rainfall area and climate change is expected to bring about more frequent storm events with more frequent extreme hot and dry periods, exacerbating flooding at times and exacerbating drought periods at times. The site has taken into considering stormwater control measures for the construction phase and has but in place fold control mechanisms on site using bunding, stormwater pond and suitable discharge outlets points.
- Reuse of effluent is encouraged in future planning for woodlands as it can assist during times of excessive flooding (divert 0.5 kilolitres away from the receiving catchment during flood times), and it can assist in times of droughts / or when fire water may be required in Woodlands or nearby areas (droughts and fires have occurred within the past ten years in the Easten and western Cape).
- Operators are encouraged to be in close contact with South African weather Services at all times to receive early warning details of floods, droughts, high winds and potential fires in the area.
- Greenhouse gases will be generated indirectly through the use of pumpstations and electricity required to keep the wwtw functional; the site is based in Woodlands, Eastern Cape and coal-electricity will be used, however wind – electric generating project in south Africa have increased over the last ten years, but no renewable facilities (solar/ wind) has been proposed to power Woodlands WWTW. The facilities proposed on site are also not conducive to solar panelled roofs, however, where possible (example administrative building; chlorine building), this is encouraged to be incorporated into design. A back up generator is proposed and recommended to ensure power at the plant is maintained at all times to prevent failure of operations.
- Transport requirements to bring in materials and workers to site for construction will directly result in GHG emissions via fuel emissions.
- Transport offsite to transport treated sludge for reused / disposal will directly result in GHG emissions via fuel emissions; reuse of sludge at destinations in close proximity to the site (e.g farmers, plantations; landscaping use) is therefore encouraged; the reuse of sludge is preferred over disposal to prevent cumulative disposal at landfills which is a source of methane and a greenhouse gas with more ability to trap heat than water vapour and carbon dioxide. Therefore, even if sludge is to be transported further for a reuse option, this is preferred over offsite disposal at a landfill.
- Ensuring all leachate from sludge drying and holding facilities is returned to head of works and ensuring the sludge is only stored on site for 90 days post drying treatment, will also prevent accumulation of methane on the site and ensure it is treated until it can be safely reused / disposed off-site (least preferred)

6. EMP Targets – Planning, Construction, Operations

Aspect: Planning Activities

Impact: Noncompliance to conditions of Environmental Authorisation can have financial implications and lead to delays in the project. Insufficient budget, planning and responsibility allocated for environmental management will result in unmitigated impacts.

Responsibility: Holder of EA, engineers, town planners as applicable

The following is a summary checklist that can be used to ensure compliance to mitigation measures for planning phase:

Targets:

- ✓ EA in place
- ✓ Final designs approved
- ✓ Final plans approved
- ✓ ECO appointed
- ✓ Local contractor appointed
- ✓ EMPr and EA distributed to construction team
- ✓ Training completed
- ✓ EM file in place
- ✓ Search and Rescue and required Permits in place
- ✓ Notice submitted to DEDEAT and DWS and CFP submitted to ECHRA

Aspect: Construction Activities

Impact: Noncompliance to conditions of Environmental Authorisation can have financial implications, loss of indigenous plants and animals, spread of alien invasive plants, erosion and polluting activities.

Insufficient budget, planning and responsibility allocated for environmental management will result in unmitigated impacts.

Responsibility: Holder of EA, contractors / maintenance contractors as applicable

The following is a summary checklist that can be used to ensure compliance to mitigation measures for construction activities

Targets:

- ✓ EM file kept updated
- ✓ ECO monthly audit reports
- ✓ Necessary training provided as per scope of work and records kept i.e., toolbox talks
- ✓ Working hours: Restrict to weekdays between 07:00 to 17:00; Saturday 08:00 to 13:00; no Sundays or public holidays
- ✓ No blanket clearing of vegetation.
- ✓ Designated footprint and demarcated laydown area, no unnecessary disturbance to vegetation (2meter disturbance); Laydown, stockpiles areas, waste management area, Pegs / tape / screening material as required for demarcation of site clearing footprint
- ✓ No go areas designated
- ✓ Topsoil separated; stockpiled at 1 m height, suitably mulched and reused
- ✓ Subsoils reused where necessary; excess is disposed correctly
- ✓ No disturbance of indigenous plants outside development footprint
- ✓ No AIS in construction footprint
- ✓ No disturbance to fauna
- ✓ Ablution facilities (Ratio of 1:10)
- ✓ Waste plan in place

- ✓ No refuelling on site; no service of vehicles on site
- ✓ Drip trays, spill kits and hazardous waste bin as required
- ✓ Mixing containers and plastic liners (cement)
- ✓ Water cart / shade cloth for dust control
- ✓ Fire prevention training provided, and records kept
- ✓ Sand bucket for disposal cigarettes
- ✓ Fire response measures in place; emergency numbers on hand
- ✓ Code of conduct
- ✓ Incident / complaint register in place
- ✓ Records of waste management / toilet service
- ✓ External monthly audits carried out and kept on record
- ✓ Close out audits and any actions required
- ✓ No waste at end of construction; disturbed areas revegetated

Aspect: Operational Activities

Impact: Noncompliance to conditions can result in unnecessary loss of indigenous plants, erosion and coastal risk

Responsibility: Holder of EA

The following is a summary checklist that can be used to ensure compliance to mitigation measures for operational activities

- ✓ No fires beyond erf
- ✓ No additional paths created
- ✓ No removal vegetation beyond erf

Project Aspects to be completed by construction team

Activity:	Description of activity (i.e. AIS clearing, construction of road, maintenance activity)			
Responsible person:				
Aspect	Nature / Description	Required		Notes
		✓	✗	
Scope of work	Description of scope of work and accompanying method statement / s	✓		
Designs / Plans completed	As required for scope of work			
Environmental Training	Environmental training required (i.e. excavations – archaeology; ongoing – litter; AIS; no -go)			
Health and safety	As required – HS File, first aid etc.			
Workforce	Number of workers required?			
	Required environmental management training (i.e. waste, soil management etc)			
	Local labour			
Suppliers	Local suppliers			
Transport and traffic	Transport required for site workers?			
	Access and parking requirements			
Site clearing	Area to be cleared			
	Permits on hand; Plants removed and stored			
Vegetation management	No disturbance to vegetation outside footprint	✓		
	Remove alien invasive from footprint as required	✓		
	Pegs / screening material for designating footprint			
Topsoil management	Top 300 mm soil with indigenous vegetation intact			

Activity:	Description of activity (i.e. AIS clearing, construction of road, maintenance activity)			
Responsible person:				
Aspect	Nature / Description	Required		Notes
		✓	✗	
	Stockpile separately			
	Compost separately as mulch elsewhere in landscaping / public open space area			
Earthworks and subsoil management, erosion control / archaeology and Palaeontology resources	Area and depth to be excavated			
	Volume of material to be excavated per component			
	Duration of earthworks component			
	Where will excavated material be stored on site; subsoils covered; Rocks for landscaping; excess for landfill;			
	Shade cloths / water cart – dust control			
	Palaeontologist on site during excavations	✓		
Building material and equipment	Nature of required materials and equipment			
	Storage requirements / laydown areas for materials / equipment			
	Hazardous materials / substances – sealed containers, bunded area, non-permeable flooring, secure, equipped with roof.			
Waste management	Ablution facilities – Required? Number? Service Provider? Record of service to be kept	✓		
	General waste bins			
	Drip trays, cement mixing trays, plastic liners,			
	Spill kits, hazardous waste bins			
	Skip			
	Service providers (waste / ablutions)			
	Construction rubble – designated area / skip as required			
	General waste – General waste bins with lids and labelled / storage area			
	Hazardous waste – drip trays / spill kits / storage area			
Drinking water and lunch area	Quantity required? Lunch area provided? Source of drinking water?			
Existing structures	Location of existing structures / infrastructures that may be in construction footprint			
Working hours	Working hours – no Sundays, no public holidays, no night time.	✓		

7. Monitoring and Compliance

The monitoring and compliance of the development should take place as follows:

- The ECO has the authority to instruct the Applicant to cease a particular operation causing or liable to cause significant environmental damage, and issue fines or penalties for non-compliance of the Environmental Management Programme/ EMPr.
- An Environmental Control Officer (ECO) must audit the site and compile an audit report on a monthly basis until construction completed; site is tidy, revegetation of disturbed areas
- The holder of the environmental authorisation (the Applicant) is responsible to ensure that an environmental audit report is submitted to the DEDEAT as per the timeframes stipulated in the Environmental Authorisation (EA).

8. Auditing Process

The terms of reference for the audits must comprise the following:

- Develop a checklist against which the criteria can be referenced during the audit.
- During the audit process, key individuals involved with the management of the project are to be given the opportunity to comment on issues being audited and will be invited to accompany the auditor during the site inspection.
- Compile an audit report on the implementation of the EMPr and compliance to the Environmental Authorisation and submit this report to the competent authority (DEDEAT).

Compliance ratings against which the listed criteria are assessed are as follows:

Symbol	Rating	Interpretation
Y	Yes	Evidence of compliance
P	Partial	Evidence of partial compliance
N	No	Evidence of non-compliance
NR	Not Relevant	The condition or commitment is not relevant at this stage of the development or it is inappropriate
NA	Not Audited	Not audited

8.1. Non-Compliance

Definition

The non-compliance is defined as, and will be issued for:

- Any deviation by the Applicant from the environmental conditions and requirements as set out in the EA and EMPr, or;
- Any contravention by the Applicant of environmental legislation, or;
- Any unforeseen environmental impact resulting from direct or indirect actions or activities on site that would be considered as a significant impact. Significance will be determined by the Environmental Control Officer (ECO) but will be informed by geographic extent, duration, lasting effects of the impact and extent of remediation to the impact.

Types of non-compliances issued

Two types of non-compliances may be issued:

A. Stop Works Non-Compliance

Stop Works Non-Compliance will require that all works as described in the non-compliance will stop immediately and may only continue on a formal written permission from the ECO.

Stop Works Non-Compliance will be issued under the following conditions:

- Total disregard by the Applicant to the environmental conditions and requirements listed in the EA and EMPr;
- An activity that if left unattended will escalate the degree, severity or extent of the environmental impact.

B. General Non-Compliance

A general non-compliance will allow work and activity by the receiving party to continue while the corrective action takes place.

8.2. Issuing a Non-Compliance

Non-compliance may be issued to:

- The Applicant
- Any representative of the Applicant

8.3. Process of Issuing Non-Compliance

The appointed Environmental Control Officer (ECO) may issue a formal non-compliance to the Applicant. A copy of the non-compliance issued will be placed in the EMPr file. The Applicant will be responsible for returning a formally signed off corrective action (as per template) to the ECO to be placed in the EMPr file. The ECO will be required to sign-off on the corrective action, indicating that it has been completed within the timeframes and to the satisfaction of the ECO.

In the event of damage being caused, the contractor will be responsible for the cost of cleanup, repair and /or rehabilitation as necessary, as well as being liable for the fine. Where there is erosion damage, pollution to the environment, or contravention of the no-go policy, the contractor is required to reinstate the conditions to normal as determined by the ECO. Spot fines up to a maximum value of R10 000 per offence can be instituted at the discretion of the ECO for any breach or non-compliance in terms of the EMPr. Fines issued will increase exponentially for repeat offences.

8.4. Failure to complete corrective actions

In the event that the Applicant fails or refuses to complete the corrective action, either at all or within the allocated timeframe, the ECO shall,

- Inform DEDEAT in writing that a condition of approval for the project is not being met.

The DEDEAT office is responsible for resolving the impasse with the Applicant.

The Applicant is deemed not to have complied with the EA and EMPr if:

- Within the boundaries of the site and site extensions there is evidence of contravention of clauses;
- Environmental damage occurs due to negligence; inappropriate actions taken by the Applicant or any of his staff.

On receiving a notice of non-compliance the Applicant is required to swiftly address the issue/s taking all corrective actions required to rectify the situation. Penalties will be applied for non-compliant situations. Penalties/fines are advocated to ensure corrective measures are successfully undertaken and the necessary standard of rehabilitation is achieved.

The penalty associated with a chemical spill is not a set amount but will depend on the nature and extent of the spill; the cost of any soil and /or groundwater monitoring and any soil and /or groundwater remediation required by authorities will be to the Applicant's account.

The imposition of such a penalties / fines shall not preclude the relevant competent authority from applying an additional penalty in accordance with statutory powers.

Failure to redress the cause shall be reported to the relevant authority for them to deal with the transgression as deemed fit.

8.5. Unlawful Activity/ies

NEMA and its Regulations entitle environmental authorities to administer a fine not exceeding R 5 million- or 10-years imprisonment and/or a fine and imprisonment for a person guilty of an unlawful activity. The Act makes allowance for the rectification of unlawful activity and may charge up to R1 million administration fees over and above the remediation costs.

NEMA makes provision for damages to be awarded by the courts where loss or damage has occurred as a result of a contravention of other environmental statutes. Importantly, NEMA provides for the liability of conviction of employees, managers, agents and directors for any offences resulting from the failure to take all the reasonable steps that were necessary under the circumstances to prevent the commission of an offence.

9. AMENDMENTS TO THE EMPr

This EMPr outlines the environmental practices and mitigation measures to be adhered to during the construction, operational phases, and rehabilitation in order to curtail and/or minimise potential negative impacts and promote sound environmental practises.

Any major issues not covered in the EMPr as submitted, will be addressed as an addendum to this EMPr, and submitted for approval. The EMPr is a living document and is subject to change from time to time in consultation with the DEDEAT. Any amendments to the EMPr will require approval from the DEDEAT.

10. ENFORCING THE EMPr

The holder of the Environmental Authorisation (EA) has a responsibility to ensure that all those people involved in the project are aware of and familiar with the environmental requirements for the project (this includes casual labour, etc.). The EA and EMPr shall be part of the terms of reference for all stakeholders.

All senior and supervisory staff members shall familiarise themselves with the full contents of the EA and EMPr. They shall know and understand the specifications of the EA and EMPr and shall be able to assist other staff members in matters relating to the EA and EMPr.

TABLE OF RESPONSIBLE PARTIES BELOW:

Responsibility	Role	Name of Responsible Party	Contact details
Applicant		Koukamma Local Municipality	
Engineers			
Contractors			
Site Manager			
Site Control Office			
External Environmental control Officer			
Heritage consultant			
Permits DEDEAT			
DWS official			
DEDEAT official			
ECPHRA official			
External auditor (operations)			
Operational manager			
Suppliers - operations			
Service providers			

11. DRAFT STAFF / RESIDENT CONDUCT CONTROL AND INFORMATION SHEET

ALL STAFF MUST OBEY THE FOLLOWING RULES:	
1	DO NOT tamper with or destroy nesting sites, lairs or any other form of animal shelter.
2	DO NOT feed the native animals.

3	DO NOT leave the project site untidy and strewn with rubbish that will attract pests.
4	DO NOT bring any pets onto the project site.
5	DO NOT trespass onto private properties not linked to the project.
6	DO NOT carry a weapon onto the project site or in the vehicles transporting workers to and from the site.
7	DO NOT set fires.
8	DO NOT cause any unnecessary disturbing noise
9	DO NOT drive a vehicle under the influence of alcohol.
10	DO NOT exceed the national speed limits on public roads or exceed the recommended speed limits in this management plan (where applicable)
11	DO NOT drive a vehicle that is generating excessive noise / leaking / excessive fuels (such vehicles must be reported and repaired as soon as possible).
12	DO NOT litter along the roadsides, including both public and private roads.
13	DO NOT remove or destroy vegetation around the site without the prior consent of the Applicant and Environmental Control Officer.
14	DO NOT tamper with, destroy or remove vegetation from any areas that have been fenced off or marked.
17	DO NOT operate critical items of mechanical equipment without having been trained and certified.
18	ALL employees must undergo the necessary safety training and wear the necessary protective clothing at all times.
19	NO unsocial behaviour will be permitted e.g., excessive shouting, hooting etc.
20	NO ad-hoc activities are to be undertaken e.g. fires for cooking, the use of surrounding bush as a toilet facility is strictly forbidden
21	NO trespassing on private / commercial properties adjoining the site is forbidden.
22	NO worker may be forced to do work that is potentially dangerous or for what he / she is not trained to do.

12. RESPONSIBILITIES

The “Responsibility” column is merely a guide and does not relieve the Applicant of his responsibilities in terms of overall compliance with the EA and EMPr.

FUNCTION	RESPONSIBILITY
Applicant / Holder of EA (if attained)	- The Applicant is ultimately responsible for the ensuring compliance with all the requirements associated with the construction, operation, rehabilitation and decommissioning phases of the project. - The Applicant is responsible to ensure that all necessary communication and submission of required documentation concerning this project is submitted to the relevant authorities.
Contractor / s / Subcontractor/s	- The Contractor is required to adhere to the EMPr and is responsible to ensure that all staff appointed also adhere the EMPr. - Ensures that all staff are made aware of the need to conduct activities in an environmentally responsible manner. (Contractor) On instruction by the ECO, ensures that storm/surface water controls are established. - Ensures prompt remediation of any sewage spills. - Stockpiles are protected from aeolian effects, stormwater effects, or being driven over by workers. - Ensures that a “clean-site” policy is applicable at all times. - Ensures that all complaints by residents are dealt with promptly. - Is responsible for any contravention/s by staff or any non-compliance with the EMPr.
Site control office	- Daily inspections - Record keeping - Ensure measures are in place during construction activities - Report and finding of unearthed heritage resources to ECO / site manager / ECPHR - Ensure removal of AIS within construction footprint area - Ensure no flora and fauna are intentionally disturbed / harmed during construction; only vegetation within footprint and AIS may be cleared - Ensure effective daily waste management and litter control - Ensure appropriate storage and management of hazardous material and use of measure to prevent spillages - Ensure complaints / incidents are responded to and recorded and reported as required
Environmental Control Officer (ECO)	- An external ECO is to have access to the site at all times, for the purpose of inspections to ensure that the environmental conditions of the EMPr as well as the conditions stipulated to in the EA and the recommendations made in the EIR are being implemented and adhered to. - The ECO to carry out monthly audits to ensure compliance with EMPr and EA (if attained) and submit the reports to project team and relevant authorities - The need for any deviations or variations in the environmental conditions must be reported to the DEDEAT for approval prior to these being undertaken. - The ECO must be fully cognisant with the contents of the Environmental Authorisation as well as this EMPr and any other applicable legislation
Competent Authority - DEDEAT	The Compliance Officer appointed by the Competent Authority is responsible for the ensuring that the Applicant, Contractor, and ECO are compliant with the provisions of the EA and EMPr.
DEDEAT	Responsible for issuing any SCC permits for fauna and smaller plants
Department of Water and Sanitation and catchment	Responsibility for water use license compliance

management agency	
ECPHRA	Responsible for issuing of permits required for any discovered artefacts during excavation / site clearing activities

ACKNOWLEDGEMENT FORM

Record of signatures providing acknowledgment of being aware of and committed to complying with the contents of this Environmental Management Programme (EMPr), which relates to the environmental mitigation measures for the project outlined below, and the environmental conditions contained in all other contract documents.

PROJECT NAME:

DEDEAT REF:

DWS REF

APPLICANT:

Signed: Date:

CONTRACTOR / SITE MANAGER

Signed: Date:

SITE CONTROL OFFICER

Signed: Date:

EXTERNAL ENVIRONMENTAL CONTROL OFFICER

Signed: Date:

ANNEXURE 1: CHANCE FIND PROTOCOL



CHANCE FINDS OF PALAEONTOLOGICAL MATERIAL

(Adopted from the HWC Chance Fossils Finds Procedure: June 2016)

Introduction

This document is aimed to inform workmen and foremen working on a construction and/or mining site. It describes the procedure to follow in instances of accidental discovery of palaeontological material (please see attached poster with descriptions of palaeontological material) during construction/mining activities. This protocol does not apply to resources already identified under an assessment undertaken under s. 38 of the National Heritage Resources Act (no 25 of 1999).

Fossils are rare and irreplaceable. Fossils tell us about the environmental conditions that existed in a specific geographical area millions of years ago. As heritage resources that inform us of the history of a place, fossils are public property that the State is required to manage and conserve on behalf of all the citizens of South Africa. Fossils are therefore protected by the National Heritage Resources Act and are the property of the State. Ideally, a qualified person should be responsible for the recovery of fossils noticed during construction/mining to ensure that all relevant contextual information is recorded.

Heritage Authorities often rely on workmen and foremen to report finds, and thereby contribute to our knowledge of South Africa's past and contribute to its conservation for future generations.

Training

Workmen and foremen need to be trained in the procedure to follow in instances of accidental discovery of fossil material, in a similar way to the Health and Safety protocol. A brief introduction to the process to follow in the event of possible accidental discovery of fossils should be conducted by the designated Environmental Control Officer (ECO) for the project, or the foreman or site agent in the absence of the ECO. It is recommended that copies of the attached poster and procedure are printed out and displayed at the site office so that workmen may familiarise themselves with them and are thereby prepared in the event that accidental discovery of fossil material takes place.

Actions to be taken

One person in the staff must be identified and appointed as responsible for the implementation of the attached protocol in instances of accidental fossil discovery and must report to the ECO or site agent. If the ECO or site agent is not present on site, then the responsible person on site should follow the protocol correctly in order to not jeopardize the conservation and well-being of the fossil material.

Once a workman notices possible fossil material, he/she should report this to the ECO or site agent. Procedure to



follow if it is likely that the material identified is a fossil: - The ECO or site agent must ensure that all work ceases immediately in the vicinity of the area where the fossil or fossils have been found;

- The ECO or site agent must inform SAHRA of the find immediately. This information must include photographs of the findings and GPS co-ordinates;
- The ECO or site agent must compile a Preliminary Report and fill in the attached Fossil Discoveries: Preliminary Record Form within 24 hours without removing the fossil from its original position. The Preliminary Report records basic information about the find including:
 - The date
 - A description of the discovery
 - A description of the fossil and its context (e.g. position and depth of find) - Where and how the find has been stored
 - Photographs to accompany the preliminary report (the more the better): - A scale must be used
 - Photos of location from several angles
 - Photos of vertical section should be provided
 - Digital images of hole showing vertical section (side);
 - Digital images of fossil or fossils.

Upon receipt of this Preliminary Report, SAHRA will inform the ECO or site agent whether or not a rescue excavation or rescue collection by a palaeontologist is necessary.

- Exposed finds must be stabilised where they are unstable and the site capped, e.g. with a plastic sheet or sand bags. This protection should allow for the later excavation of the finds with due scientific care and diligence. SAHRA can advise on the most appropriate method for stabilisation.
- If the find cannot be stabilised, the fossil may be collect with extreme care by the ECO or the site agent and put aside and protected until SAHRA advises on further action. Finds collected in this way must be safely and securely stored in tissue paper and an appropriate box. Care must be taken to remove the all fossil material and any breakage of fossil material must be avoided at all costs.

No work may continue in the vicinity of the find (within 10m) until SAHRA has indicated, in writing, that it is appropriate to proceed.



FOSSIL DISCOVERIES: PRELIMINARY RECORDING FORM		
Name of project:		
Name of fossil location:		
Date of discovery:		
Description of situation in which the fossil was found:		
Description of context in which the fossil was found:		
Description and condition of fossil identified:		
GPS coordinates:	Lat:	Long:
If no co-ordinates available then please describe the location:		
Time of discovery:		
Depth of find in hole		
Photographs (tick as appropriate and indicate number of the photograph)	Digital image of vertical section (side)	
	Fossil from different angles	
	Wider context of the find	
Temporary storage (where it is located and how it is conserved)		
Person identifying the fossil Name:		
Contact:		
Recorder Name:		
Contact:		
Photographer Name:		
Contact:		

Professional Services: Upgrade of Bulk Sewers, Replacing of Small-Bore Sanitation System at Woodlands

To	Department of Water & Sanitation	Date	11 February 2026
From	Damian Sharp, Pr Civil Technologist	No. of pages	2
Reference	DWS 22/23-058		
Subject	Preliminary Construction Method Statement		

1. Introduction and Purpose

This method statement describes the preliminary construction methodology for a Wastewater Treatment Works (WWTW), including all associated civil, structural, hydraulic, and environmental control measures. It outlines the sequence of works, construction approach for each treatment unit, and measures to ensure safety, quality, and environmental protection, including downstream erosion protection at the treated effluent outlet. Once the Contractor is appointed, a more detailed method statement will be developed following this method statement as a baseline.

2. Scope Of Works

The WWTW comprises the following treatment units and associated infrastructure:

1. Head of Works (Inlet Works)
2. Balancing Tank
3. Biological Reactor Tank
4. Clarifier
5. Chlorine Contact Tank
6. Sludge Drying Beds
7. Pollution Control Pond
8. Treated Effluent Outlet Works including erosion protection measures

This method statement applies to all construction activities from site establishment through to final reinstatement.

3. Site Establishment and Preliminaries

1. Establish site offices, storage areas, laydown areas, and welfare facilities.
2. Secure the site with appropriate fencing, access control, and signage.
3. Set out works using approved survey control points.

4. Identify and protect existing services and environmentally sensitive areas.
5. Implement the Environmental Management Programme (EMPr) and Health & Safety Plan.

4. Earthworks and Excavations

1. Clear and grub the site within approved working areas.
2. Strip and stockpile topsoil separately for later reuse.
3. Excavate for structures to be constructed using appropriate plant.
4. Temporary shoring or battering of excavation sides will be provided where required.
5. Dewatering will be implemented as necessary to maintain dry and stable working conditions.
6. Founding levels will be inspected and approved by the Engineer prior to blinding.

5. Construction of Treatment Units

5.1 Head of Works (Inlet Works)

1. Construct reinforced concrete foundations and walls for screens, grit channels, and inlet chambers.
2. Install mechanical components, screens, and channels as per supplier specifications.
3. Ensure accurate alignment and levels to maintain hydraulic performance.

5.2 Balancing Tank

1. Prepare formation and place blinding concrete.
2. Construct reinforced concrete base slab, walls, and roof (where applicable).
3. Install inlet, outlet, overflow, and drainage pipework.
4. Apply internal protective coatings where specified.

5.3 Biological Reactor Tank

1. Construct base slab, walls, and internal baffles in reinforced concrete.
2. Install pipework, diffusers, and associated fittings.
3. Ensure watertight construction through appropriate joint detailing and curing.

5.4 Clarifier

1. Excavate and prepare foundations to be constructed.
2. Construct reinforced concrete base slab, walls, and central structures.
3. Install inlet stilling arrangements, launder channels, and outlet weirs.
4. Verify levels and tolerances critical to clarifier performance.

5.5 Chlorine Contact Tank

1. Construct reinforced concrete tank including baffles to ensure required contact time.
2. Install dosing points, inlet and outlet pipework.
3. Apply chemical-resistant coatings where specified.

5.6 Sludge Drying Beds

1. Prepare subgrade and install underdrainage system.
2. Place filter layers (gravel and sand) to specified gradings.
3. Construct perimeter walls or embankments.
4. Provide access walkways and drainage connections.

5.7 Pollution Control Pond

1. Excavate to constructed and levels.
2. Shape side slopes and compact pond floor.
3. Install liner system (if specified) and inlet/outlet structures.
4. Provide erosion protection at inlet points.

6. Dealing With Existing Effluent and Non-Operational WWTW

6.1 Existing Conditions

The existing Woodlands Wastewater Treatment package plant has been non-operational since approximately 2020. As a result, untreated effluent (without solids removal) currently discharges into the Palmiet watercourse.

During the construction period, untreated effluent will be managed in a controlled, safe, and environmentally responsible manner to prevent further pollution of the receiving environment.

6.2 Temporary Effluent Storage Using Existing Package Plant

Based on available as-built information, the existing package plant has an approximate storage capacity of 1 ML (1 000 kL). The average annual dry weather flow is approximately 250 kL per day.

During construction, the outlet of the existing non-operational package plant will be closed, allowing the structure to function as a temporary conservancy tank. This temporary arrangement provides storage capacity for approximately four (4) days of average dry weather flow.

6.3 Effluent Removal and Off-Site Disposal

The Contractor will be responsible for the regular emptying of the temporary conservancy tank using licensed vacuum tanker services. Effluent will be transported to the nearest operational wastewater treatment works located in Clarkson.

Written confirmation has been obtained from Koukamma Local Municipality allowing for the acceptance of effluent at the Clarkson Wastewater Treatment Works. Records of all effluent removal activities, including volumes and disposal locations, will be maintained and made available on request.

6.4 Construction Sequencing and Use of Lined Stormwater Pond

The construction sequence will ensure that the lined stormwater pond is operational before any modification of the existing package plant. Effluent will be diverted from the existing package plant to the lined stormwater pond with a capacity of approximately 0.7 ML. The Contractor will ensure that the lined stormwater pond is emptied on a regular basis using vacuum tankers while the existing package plant is converted into a balancing tank.

Once the balancing tank is fully constructed and operational, the lined stormwater pond will be completely emptied by means of vacuum tankers. At no stage will untreated effluent be permitted to discharge into the Palmiet watercourse during construction.

7. Pipework And Interconnections

1. Lay pipelines between units on approved bedding material.
2. Ensure correct gradients, alignment, and jointing.
3. Backfill in layers and compact to specified densities.
4. Inspect pipelines prior to commissioning.

8. Treated Effluent Outlet and Erosion Protection

The treated effluent outlet will be constructed to prevent downstream erosion and scouring. A velocity break structure will be constructed at the outlet to dissipate flow energy prior to discharge. Reno mattresses will be installed downstream of the outlet structure in accordance with manufacturer specifications.

The reno mattress will be placed on a prepared and compacted subgrade, including a geotextile filter layer to prevent soil migration. Mattress units will be securely tied and anchored to prevent displacement during high flow events.

The outlet alignment and levels will ensure smooth transition of flow into the receiving river. Disturbed areas will be reinstated and vegetated where applicable to provide long-term erosion protection.

9. Summarised Effluent Management Flow Diagram (Construction Phase)

The following describes the effluent management sequence during construction:

Existing Sewer Inflow

- Existing Non-operational Package Plant (temporarily acting as Conservancy Tank – outlet closed)
- Vacuum Tanker Removal (regular intervals)
- Transport to Clarkson Wastewater Treatment Works (authorised disposal)

During balancing tank construction phase:

Existing Sewer Inflow

- Lined Stormwater Pond (± 0.7 ML temporary storage)
- Vacuum Tanker Removal (regular intervals)
- Transport to Clarkson Wastewater Treatment Works

10. Health, Safety, and Environmental Management

All activities will comply with the approved Health & Safety Plan. Risk assessments and method statements will be communicated to site personnel.

Environmental controls will include dust suppression, noise control, waste management, and protection of watercourses. Emergency procedures will be in place for spills or incidents.

11. Commissioning and Handover

Tanks and pipelines will be cleaned, tested, and inspected prior to commissioning. Mechanical and electrical installations will be tested in accordance with supplier requirements. As-built drawings and operation and maintenance manuals will be provided. Final site reinstatement will be completed prior to handover.

12. Conclusion

This method statement provides a general approach to the construction of the Wastewater Treatment Works and associated outlet protection works, ensuring safe construction, effective treatment performance, and long-term environmental protection. Once the Contractor is appointed, a more detailed method statement will be developed following this method statement as a baseline.

Yours sincerely,


Damian Sharp

Pr Civil Technologist (Pr Tech Eng)

ANNEXURE 3: CV of EAP

Claire De Jongh

Curriculum Vitae

Current	Environmental Assessment Practitioner
Current Location	Port Elizabeth, South Africa
Date of birth	13 July 1983
Year of Birth	1983
Specialisation	Environmental Management and compliance
Nationality	South African
Years of experience	17 years
HDI status and gender	South African Female
Languages	English (Excellent – Reading, Writing, Speaking, Presenting) Afrikaans (Fair – Reading, Writing, Speaking)
Contact Details	+27846074743 / clairejarvis@hotmail.co.za
Career Profile	Claire's career in the environmental field spans 17 years. Her work over the years has included: • Project coordination, authority liaison, specialist team management • Application for Environmental authorisations, Waste management licences, Water use licence, Coastal Water Discharge (as required) and compilation of Basic Assessment Reports and Scoping and environmental impact Reports and Environmental management programmes reports; Rehabilitation strategies and implementation; Environmental training • Compliance audits to conditions of authorisation and ECO related work; Environmental monitoring, Review of management plans, methods statements, procedures • Environmental management systems; Aspect / impact registers and implementation of environmental management systems in line with ISO14001 • Environmental awareness education; Management, coordination and implementation of environmental and social development projects
Career History	• Independent and Freelance Environmental Assessment Practitioner (current) • CEN Integrated Management Unit February 2015 to May 2025 Senior Environmental Consultant (Full time) • Ethical Exchange sustainability Services (Pty) Ltd June 2011 to January 2015 Environmental Consultant • BSc Honours (Environmental Monitoring and Modelling) 2009 to 2011 • WESSA (BushPigs Outdoor Environmental Education Centre) 2007 to 2009 Environmental Education Programme Coordinator • Green Gain Consulting 2005 to 2007 Environmental Consultant: EMS; Training
Education and Courses	BSc (Hons) Environmental Monitoring and Modelling, 2012. BSc Environmental Management: Zoology Stream, 2007. IEMA Accredited Environmental Auditor Training Course: Aspects International, 2011. Environmental Awareness and Legal Liability Course, 2006 (2 days). Field Guiding Association of South Africa (FGASA) Level 1. ICDL, 2004, (Microsoft word, excel, access, PowerPoint, outlook).
Professional Affiliations	EAPASA Registered EAP (Number 2021/3519) SACNASP: Certificated Natural Scientist (Registration 115390). Member of the International Association for Impact Assessment (IAIA). Member of the Field Guiding Association of South Africa (FGASA).
Main Sectors of Expertise	Waste water treatment, Residential, Eco-tourism, Agriculture
Areas Worked	Predominantly Eastern and Western Cape; Throughout South Africa.

Professional Competency Statement:

Claire's career in the environmental consulting field spans 17 years. Claire has been involved in a number of environmental impact assessment projects. Her roles have included being the Environmental Assessment Practitioner (EAP), with responsibilities including compilation of regulated EIA's (i.e. scoping reports, EIA reports, Basic assessments, and Environmental Management Programme reports), undertaking environmental assessments, carrying out the legislated public participation process, compiling fauna screening reports, and incorporating specialists into the EIA team. Claire has been involved in environmental compliance audits and has acted as Environmental control officer and compiled the required audit protocols and audit reports. Claire has compiled environmental management systems compliant with ISO14001.

Claire has worked extensively throughout South Africa, with majority of work being in the Eastern and Western Cape provinces. Claire's strengths lie with understanding and application of environmental legislation, data collection and collation, research, compilation of reports, accuracy, effective communication, and effective time management.

List of Experience:

Environmental Impact Assessments, EMP's, Water Use license applications

- NEMA application: Upgrading of Mbotyi Road on behalf of SANRAL (2025 – current)
- NEMA application: Residential dwelling, Paradys Beach (2025 – current)
- NEMA application: Dwellings and Jetty, St Francis Bay (2025 – 2026)
- NEMA application: Upgrading of Woodlands WWTW on behalf of Koukamma LM (2025 – current)
- NEMA Section 24G EA application: Expansion of citrus, Tregaron Farming, Sundays River Valley (2025 – current)
- NEMA application: Proposed residential development, Albertinia, Western Cape (2025 – current)
- NEMA application: Proposed WWTW, Umzawwethu. Oyster Bay WWTW, KKLM and Zutari, 2025 (2025 – current)
- Screening of Kwanomzamo WWTW, KKLM and Zutari (2025 – current)
- Revision of OEMPr: Addo Lodge, Mantis (2025)
- NEMA Section 24G application: Cape St Francis, Soundprops cc (2025 – current)
- NEMA Section 24G EA application -Zandhoogte light industrial, Western Cape (2024 – current)
- NEMA Section 24G EA application -Outeniqua Game Farm, Western Cape (2024 – current)
- Elliotdale WWTW: Integrated EA and WML and EMP for Elliotdale WWTW and upgrading of sewage infrastructure (2024 - current)
- NEMA Application: Part 2 amendment and EMPR, Kingsway resort (2025 – current)
- EMPR – Fairview, Erf 4256, 2024
- NEMA Section 24G EA application – illegal pumping activities, Sundays River (2023 to current)
- NEMA application: Residential development, erf 2074, Plettenberg Bay (2024 - 2025)
- NEMA application: Residential development, erf 7614, Knysna (2024 - 2025)
- NEMA: Expansion of Residential 1 dwelling, erf 1220, St Francis Bay (2024 - 2025)
- NEMA application – Maintenance Management Plan, Jeffreys Bay coastal area on behalf of Kouga LM (2023 – 2024)
- WULA Process for Addo Eco lodge, Addo, Eastern Cape (2023 – 2024)
- Estuary management plan, review; Seekoei Estuary Management, 2024
- Maintenance management plan and DWS General Authorisation for upgrade of Bay Dunes Sewer Pump Station, Mossel Bay on behalf Of Mossel Bay Municipality, Western Cape (October 2023 – February 2024)
- NEMA: Fuel storage facility in Nelson Mandela Bay Municipality, Eastern Cape (2023) (project halted – S24G for site required)
- NEMA: Expansion of fuel storage facility in NMBM, Eastern Cape (2023 to 2024).
- NEMA: Port Alfred Reverse Osmosis Project: 5MI reverse Osmosis project, Ndlambe Local Municipality, Eastern Cape (2020 - 2022). (project halted)
- NEMA: Addo Lodge Addo, Eastern Cape (2021 - 2022).
- Operational EMP for renewal of air emissions license application, Langkloof Bricks (2021)
- Construction EMP: Somerset East Powerlines: for installation of H frame poles and overhead powerlines between substation and Industrial Park (2021)

- NEMA EA and NEMWA WML: Expansion of Clarkson WWTW and upgrading of sewage infrastructure (2018 – 2022)
- NEMA S24 G assessment report (2018 to 2019); Coega Kamma Citrus Farm 717, Addo:
- NEMA Scoping and Environmental Impact Assessment: 150 ha citrus and irrigation on behalf of Coega Kamma Citrus (2019 – 2023)
- NEMA: Basic Assessment and EMP for housing project on behalf of developer, Erf 168, Walker Driver, Port Elizabeth (2018 – 2020)
- NEMA Section 24G Application Oyster Bay Lodge: on behalf of landowner, Eastern Cape (2018 – 2020)
- NEMA Basic Assessment and EMP for residential development, Erf 3783, Summerstrand; Port Elizabeth (2018 – 2019)
- NEMA Basic assessment, Kwandwe Staff Village: Kwandwe, Makana Municipality, Eastern Cape (2017 - 2018)
- Feasibility study: Screening assessment of properties on behalf of NMBM (2016)
- Wells Estate Conservancy Tanks: Basic Assessment process for Expansion project on behalf of NMBM (2016)
- Driftsands Waste Water Treatment Works: Integrated Environmental and Waste Management License; Coastal Water Discharge Permit; Water Use License Application for Expansion project on behalf of NMBM (2016 - 2017)
- Sundays River Citrus Corporation: Basic Assessment process for Expansion projects at Summerville and Hermitage on behalf of SRCC (2015 – 2017)
- Walmer Cosmo/ Erf 1953: Basic Assessment process for integrated residential development on behalf of Privivox cc, Eastern Cape (2015 - 2016)
- Milkwood Gardens / Erf 1953: Amendment Application for change of ownership; update construction and environmental management programmes on behalf of Own Haven (2015 – 2017)
- Sardinia Bay: Basic Assessment process for public access facilities at Sardinia Bay on behalf of NMBM, Eastern Cape (2015 - 2016)
- Sardinia Bay Public Access Facilities: Amendment Application for change of site (2016 – current)
- Bayethe Luxury tents: Basic Assessment Process on behalf of Bayethe Lodge, Eastern Cape (2015 – 2016)
- Bayethe: NEMA 24G rectification for luxury tents on behalf of Bayethe Lodge, Eastern Cape (2015 - 2017)
- Cascades Iron Ore Mine: EIA process on behalf of Mkhombi Mining, Mpumalanga (2014).
- Zuurberg Road Upgrade: Basic Assessment process on behalf of the Department of Rural Development and Land Reform, Eastern Cape (2014).
- New Largo Colliery: EIA process, state of the environment report, closure and rehabilitation plan and waste management license on behalf of Anglo American Inyosi Coal, Mpumalanga (2011 to 2015).
- Mobile Water Treatment Plant: Waste management license for a mobile water treatment plant to supply water to the Phola-Kusile Coal Conveyor, on behalf of Anglo American Inyosi Coal, Mpumalanga I (2011 to 2015).
- Monitoring Weirs: Basic assessment process and Environmental Management Programme for monitoring weirs as part of reserve determination required by DWA, for Anglo American Inyosi Coal, Mpumalanga (2012 to 2014).
- Phola-Kusile Coal Conveyor: Environmental impact assessment and environmental management programme on behalf of Anglo American Inyosi Coal, Mpumalanga (2011 to 2014).
- St Albans: Public Participation Process carried out on behalf of Department of Public Works, Eastern Cape (2014).
- Grootegeluk Mine Backfill Conveyor System: Environmental impact assessment and EMP amendment, on behalf of Exxaro Coal, Limpopo (2011).

ECO, Monitoring, Auditing Environmental Management Systems

- Compliance Audit: Sardina Bay on behalf of NMBM (2026)
- Addo citrus Eb en Vloed Farm 171, ECO for construction phase (May 2024)
- Kingsway Development, Gamtoos River, Compliance audit to ROD (April 2024)
- Expansion Fuel storage facilities, Motherwell: ECO for construction phase (February 2024 to current)
- ECO and Compliance audit for non-compliant start of business development on erf 4256, Fairview; ongoing ECO for start of construction phase (February 2024 to current)
- Upgrading of Clarkson WWTW: ECO for construction phase (2023 – current)
- Addo Ecolodge: ECO for construction phase (2023 – current)
- Upgrading of Pumpstations, Motherwell and Stanford, NMBM: ECO for construction phase (2022 – 2024)
- St Francis Bay Residential Development, Kouga Local Municipality: ECO for construction phase (2022 – current)
- The Edge Hospital, NMBM: ECO for construction phase (2021 – 2022)
- River Oaks Residential Development, NMBM: ECO for construction phase (2021 – 2023)
- Coegakop Wellfield, NMBM: ECO for construction phase (2021 – current)
- Erf 3783, Summerstrand: ECO for construction phase (2019 – current)
- Sardinia Bay Public Access Facilities: ECO for construction of parking area (2018)

- Sardinia Bay Public Access Facilities: ECO for demolition of structures within 100m of HWM (2016 – 2017)
- Coega Manganese Terminal Air Quality Monitoring: Coordination of PM10, PM2.5 and dustfall baseline monitoring for the proposed Manganese Terminal at Coega, Eastern Cape (2013 - 2015).
- Tharisa Mine: External Compliance audit in terms of WUL and EA, North-West (2013).
- Formalchem: Land Contamination Monitoring and Assessment: Coordination of Land contamination Assessment for mothballed glue manufacturing company in Berlin, Eastern Cape (2012-13).
- Formalchem: Remediation plan and progress report prepared for DEA on behalf of client, Eastern Cape (2012-2014).
- Elitheni Coal Mine: Compilation of legal audit protocol (EMP, Water use license, waste management license, environmental authorisation), Eastern Cape (2013).
- Pikitup Roodepoort Waste Site: Site audit and report compilation, Gauteng (2009).
- Sun International: Compilation of aspects / impacts register and environmental management system for entire Sun International Group, all SA provinces (2006 - 2007).
- Sun International: Environmental management system training for the environmental managers, all SA provinces (2006 - 2007).
- Lonmin Platinum: Compilation of aspect impact register and environmental management system, North West (2006).

Fauna screening assessments

- Ebb en Vloed Farm 717, Addo, Eastern Cape, 2022
- Eco-Lodge and supporting facilities, Addo, Eastern Cape, 2022
- Portion 32 of Farm Goedgeloof No.745 and Erf 1382 in St Francis Bay, 2021
- Africamps, Portion 0 of Farm Hayterdale No. 406, Addo, 2019
- Clarkson Sewage Network and Waste Water Treatment Works, 2018

Guidelines, Environmental Awareness, Education and Training

- Part of team responsible for development of Albany Thicket Ecosystem Guidelines on behalf of SANBI (2017 – 2019)
- Part of team responsible for development of Savanna Ecosystem Guidelines on behalf of SANBI (2017 – 2019)
- Development of sustainable educational programmes (2009 - 2014).
- ZAMA: Coordination of corporate social sponsorships, Eastern Cape (2012 - 2013).
- Environmental Education: Coordination and development of environmental education programmes, Limpopo (2007-09).
- Richards Bay Minerals: Basic environmental awareness training at Richards bay Minerals, kwaZulu Natal (2005).
- Dairybelle: Environmental awareness training for employees of all Dairybells, all SA provinces (2006 - 2007).
- Tiger Brands: Environmental awareness training for employees of all Tiger brands, all SA provinces (2006 - 2007).

Administration and engagement

- Engagement with relevant government authorities, stakeholders and clients
- Management of specialist teams
- Compilation of tenders and proposals for Environmental services
- Report writing, GIS and map compilation, Presentations and Training

Environmental Studies (BSc and BSc Honours)

- Undergraduate - Animal Behaviour: Behaviour of the Marsh Owl. Achieved 100 % (2003).
- Honours - The abundance of the South African Lepidopteran pest organism, *Busseola fusca*, found on genetically modified Bt maize, conventional pesticide- sprayed maize, and polyculture-farmed maize, to determine the best practice farming method with regards to pest control. Achieved 97 % (2011)

ANNEXURE 4: MAP OF PROPOSED WORKS WITH INDICATION OF SENSITIVITIES

