BLUEPEBBLE INDEPENDENT ENVIRONMENTAL AGENCY CC
Joclyn Marshall (Manager)
EAPASA NO: 2022/5006 admin@bluepebble.co.za
MSc Environmental Science www.bluepebble.co.za
joclyn@bluepebble.co.za 067 314 4069
Based in the Garden Route, Western Cape
REGISTRATION NO: 2009/189352/23

Preapplication DRAFT BASIC ASSESSMENT REPORT

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

PREAPPLICATION DRAFT BASIC ASSESSMENT REPORT FOR THE UPGRADE OF A WASTE WATER TREATMENT WORKS AND INSTALLATION OF SMALL-BORE SEWAGE RETICULATION SYSTEM IN WOODLANDS KOUKAMMA LOCAL MUNICIPALITY, SARAH BAARTMAN DISTRICT MUNICIPALITY , EASTERN CAPE

DEDEAT REFERENCE: APPLICATION TO BE SUBMITTED AFTER INITIAL REVIEW OF PREAPPLICATION DRAFT BAR (THIS REPORT)

FOR 30-DAY REVIEW AND COMMENT: 4 SEPTEMBER – 6 OCTOBER 2025 ON PREAPPLICATION DBAR

DWS REFERENCE: WU-42922

FOR 60 DAY REVIEW, COMMENT, OBJECTION ON WULA

PREPARED FOR THE APPLICANT:	Koukamma local Municipality Represented by Mr Mziwamadoda M. Qalaba EMAIL: mzi.qalaba@koukamma.gov.za
PREPARED BY:	CLAIRE DE JONGH (EAPASA REG: 2021/3519)
DATE:	4 September 2025

Table of Abbreviations

BAR	Basic Assessment Report
CBA	Critical Biodiversity Area
CD:NGI	Chief Directorate: National Geo-spatial Information
CRR	Comments and response report
DEDEAT	Eastern Cape Department of Economic Development, Environmental Affairs and Tourism
DFFE	Department of Forestry, Fisheries and the Environmental
DWS	Department of Water and Sanitation
EAP	Environmental Assessment Practitioner
ECBCP	Eastern Cape Biodiversity conservation Plan
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EIS	Ecological Importance and Sensitivity
EMPr	Environmental Management Programme
ESA	Ecological Support Area
GA	General Authorisation issued in terms of the NWA
IAP	Interested and Affected Party/ies
KKLM	Koukamma Local Municipality
MCC	Motor Control Centre
NEMA	National Environmental Management Act (Act 107 of 1998)
NFEPA	National Freshwater Ecosystem Priority Areas
NPAES	National Protected Area Expansion Strategy, 2008
NWA	National water Act (Act 36 of 1998)
NWM5	National Wetland Map 5
PA	Protected Area -
PLCs	Programmable Logic Controllers
PPP	Public Participation Process
SANBI	South African National Biodiversity Institute
SBDM	Sarah Baartman District Municipality
SCADA	Supervisory Control and Data Acquisition System
WUL	Water Use License issued in terms of the NWA

Section contained within Appendix 1 of EIA Regulations	Description	Cross reference in BAR
3a	Details of the EAP and CV	EMPr (Annexure 2)
3b	Location of Activities	Section A
3c	Layout Plan	Section A1; Appendices A - C
3d	Description of the scope of the proposed activity including the triggered and specified activities, associated structures and infrastructure and the way the proposed development relates to the triggered activities	Section A10
3e	Description of the policy and legislative context within which the development is proposed and how is each one applicable to the proposed activity	Section A10
3f	The motivation for the need and desirability (including the development at that specific location)	Section A9
3g	The motivation for the preferred site, activity, and technology alternative	Section A1 - 8
3h (i)	Details of all the alternatives considered	Section A1 - 8
3h (ii)	Details of the Public Participation Process (PPP) undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs Section 5	Section C
3h (iii)	A summary of the issues raised by interested and affected parties, and an indication of the way the issues were incorporated, or the reasons for not including them Section 5	Section C, Appendix E
3h (iv)	The environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects	Section B and Section D2
3h (v)	The impacts and risks identified for each alternative, including the nature, significance, consequence, extent, duration, and probability of the impacts, including the degree to which these impacts- (aa) can be reversed; (bb) may cause irreplaceable loss of resources; and (cc) can be avoided, managed, or mitigated;	Section D

3h (vi)	The methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks associated with the alternatives	Appendix G
3h (vii)	Positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects	Section D2
3h (viii)	Possible mitigation measures that could be applied and the level of residual risk	Section D2; Appendix F
3h (ix)	Outcome of the site selection matrix	Section D2; Appendix F
3h (x)	If no alternatives, including alternative locations for the activity, were investigated, the motivation for not considering such	Section A1 - 8
3h (xi)	Concluding statement indicating the preferred alternatives, including the preferred location of the activity	Sections D4
3i	Full description of the process undertaken to identify, assess and rank the impacts the activity will impose on the preferred location through the life of the activity, including- (i) a description of all environmental issues and risks that were identified during the environmental impact assessment process; and (ii) an assessment of the significance of each issue, risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures	Sections D
3k	Summary of the findings and impact management measures identified in any specialist report complying with Appendix 6 to these Regulations and an indication as to how these findings and recommendations have been included in the final report	Sections D4
3l	Environmental impact statement containing a map and a summary of the positive and negative impacts of the proposed development and alternatives	Sections D4
3m	Based on the assessment, and where applicable, impact management measures from specialist	Section D

	reports, the recording of the proposed impact management objectives, and the impact management outcomes for the development for inclusion in the EMPr	
3n	Any aspects which were conditional to the findings of the assessment either by the EAP or specialist which are to be included as conditions of the authorisation	Section D
3o	Description of any assumptions, uncertainties, and gaps in knowledge which relate to the assessment and mitigation measures proposed	Section A and Section D
3p	Reasoned opinion as to whether the proposed activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation	Section D
3q	Where the proposed activity does not include operational aspects, the period for which the environmental authorisation is required, the date on which the activity will be concluded, and the post-construction monitoring requirements finalised	Section A
3r	Undertaking under oath or affirmation by the EAP	Application for EA (appendix 14)
3s	Details of any financial provisions for the rehabilitation, closure, and ongoing post decommissioning management of adverse environmental impacts	Not applicable

EXECUTIVE SUMMARY

1. INTRODUCTION

Woodlands Settlement is a rural settlement located in the Koukamma Local Municipality (KKLM) and situated on the R102 route in the Eastern Cape. The Woodlands Settlement is located approximately 15km southwest of Kareedouw Town.

The existing small-bore gravity sewer reticulation and digester system servicing Woodland's settlement is in urgent need of upgrade:

- The hydraulic and treatment capacity (ADWF) of the existing treatment plant is 250 kl/d
- The system was designed to take septic tank sludge; not domestic wastewater
- There is no Inlet works, thus no screening, degritting or flow measurement as legislated by DWS
- The system overflows in peak conditions;
- There is no inlet for "honey suckers"
- Limited capacity to clean the digesters has often led to unsanitary conditions.
- There is no chlorine contact tank
- There is no sludge management system
- As the system is not operational, effluent is not compliant with the limits of the general authorisation issued in terms of the National Water Act (Act 36 of 1998).

The Koukamma Local Municipality (LM) has commissioned SMEC South Africa for the design and implementation of the internal sewer reticulation, bulk sewer reticulation, and wastewater treatment works within the Woodlands Settlement.

2. LOCATION

The WWTW is located on Erf RE/1 (SG Code:C03400160000000100000) which is approximately 327 ha in extent.

- The expanded development footprint will be a total of approximately 2.2 ha in extent. Central coordinates: 34° 0'45.35"S; 24° 9'35.41"E)
- The proposed pipeline route alternatives will traverse Farm Palmiet River 2 / 584 (SG Code: C03400000000058400002)

3. PROJECT OVERVIEW

Decommissioning

- Discontinue current digester tank system; replace internal reticulation pipes with 160mm diameter class 34 uPVC pipes.

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. Future development will place dwelling units over the pipe route, which can potentially cause

unsanitary conditions if a pipe bursts, to mitigate, alternatives of Bulk Main sewer will be rerouted to run alongside the new developments and removed where they intersect future developments.

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 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 is deemed an acceptable layout option (Appendix A)

Design Capacity

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

ADWF – 500 kl/d,
PDWF – 800 kl/d,
PWWF – 1000 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 (Concept and Viability report – summary treatment options, May 2025 – Appendix C) 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.

4. ENVIRONMENTAL SENSITIVITIES

A screening tool has been developed by the Department of Forestry, Fisheries and Environmental Affairs (DFFE). The Screening Tool identifies related exclusions and/ or specific requirements including specialist studies applicable to the proposed site and/or development, based on the national sector classification and the environmental sensitivity of the site. A screening report was generated for the proposed project; the sensitivities identified and verified are provided in Table 1.

Specialist Studies

The following specialist studies have been carried out:

- Geological and groundwater assessment (DHS Groundwater) (Appendix D1)
- Aquatic Assessment (Confluent Environmental Pty (Ltd)) (Appendix D2)
- Terrestrial Biodiversity Assessment and Flora Assessment (Jamie Pote) (Appendix D3)
- Fauna Assessment (Jonathan Colville and Callan Cohen) (Appendix D4)
- Agriculture desktop assessment (SoilzSa) (Appendix D5)
- Heritage, archaeology, paleontology screening assessment (CTS Heritage) (Appendix D6)

Table 1: Verification of environmental sensitivity identified in DFFE screening tool report;
***Application Category:** Any activities within or close to a watercourse*

Theme and / or protocol	**Environmental sensitivity as per screening tool report**	**Verification of environmental sensitivity**	**Description**
Landscape/Visual Impact Assessment	NA	NA	WWTW is not located close to visual receptors with exception of bulk line and internal reticulation. Visual impacts are assessed by the EAP – refer to section D.
Agricultural theme	High Sensitivity	Low	The site is used as a WWTW site and size of area is not conducive to large farming. Effluent and / or sludge can be beneficial to surrounding agricultural land users. A compliance statement has been prepared and states that there will be no loss of future agricultural production potential as a result of the development. The site is located in close proximity to the Woodlands residential development, the site is small (2.2 ha) and therefore prevents economies of scale, and there is no existing-agricultural infrastructure on the land. The agricultural potential is considered low.

Theme and / or protocol	Environmental sensitivity as per screening tool report	Verification of environmental sensitivity	Description
Animal Species	High Sensitivity	Low	Site is highly disturbed and not sensitive in terms of habitat provision due to current impacts. Some foraging may occur by raptors in the area, and rodents, amphibian and snakes and other reptiles likely occur due to the adjacent wet areas and landfill.
Aquatic Biodiversity	Very High	Very High	Site is within a strategic water source area, with a high aquifer potential, a fish FEPA and ECBCP aquatic ESA1. The site needs to be correctly managed to prevent impacts associated with WWTW on sensitive aquatic and groundwater systems. The current treatment urgently requires an upgrade to address current pollution and health impacts.
Hydrology Assessment			
Archaeological and Cultural Heritage	Low sensitivity	Low	it is unlikely that the proposed development of the WWTW will negatively impact on the cultural landscape value of the area
Paleontological	Very High	Low / Very high	it is unlikely that the proposed development of the WWTW will negatively impact on significant palaeontological and archaeological resources.
Plant Species Assessment	Medium sensitivity	Low	Secondary vegetation and alien vegetation dominates the site. No SCC present; species listed on PCNO are present and will require permits.
Terrestrial Biodiversity Impact	Very High Sensitivity	Low	The development is not considered to have any significant impact on terrestrial biodiversity sensitivity of the area.
Socio-Economic	NA	NA	Aspects related to socio-economic impacts will be addressed in the basic assessment, however no specific specialist study was deemed to be required.
Civil Aviation Assessment	Medium sensitivity		A civil aviation assessment / compliance statement is excluded as the proposed development will not have an impact on civil aviation aerodrome.
Defence theme	Low sensitivity		A defence them compliance statement is excluded as the proposed development will not have an impact on the defense theme.

5. LEGAL REQUIREMENTS

National Water Act 36 of 1998

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

An integrated Water Use License (WUL) for the proposed WWTW upgrade is required 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.

Note: Section 21 (g) of the Act: Disposing of waste in a manner which may detrimentally impact on a water resource - *confirmed will not be triggered by DWS, preapplication meeting, May 2025*
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 Act (Act 107 of 1998)
The NEMA 2014 Environmental Imapct 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 proposed upgrade and associated development will requiring environmental authorisation for activities listed in GNR 327 and GNR 324.

National Environmental Management: Waste Act (Act 59 of 2008)
A waste management license is not likely to be 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). No disposal of waste is planned to occur on site.

All sludge management guidelines2006 – 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

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.
Existing practices (burying and covering of waste in hole) should have had a waste management license (and by default an environmental authorisation in place) however due to the urgency of the upgrade to address the existing significant environmental and health risks it is requested the proposed upgrade be authorised and the existing pollution be addressed as a part of this planned upgrade.

It is important to note that any WWTW treating only domestic 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.

National Heritage Resources Act (Act 25 of 1999)

As required in terms of the National Heritage Resources Act (Act 25 of 1999), a Notice of Intent to Develop (NID) has been submitted to the Eastern Cape Provincial Heritage Resources Authority (ECPHRA) supported by the screener report prepared by CTS heritage.

6. IMPACT ASSESSMENT SUMMARY

Water quality is currently poor as a result of the non-functioning treatment system; the contamination needs to be urgently addressed. The proposed upgrade and planned placement of facilities and treatment and operational facilities are considered, overall, to be beneficial for the local environment (natural and social). Long term impacts on surface water and groundwater must be prevented through effective planning and design, effective construction and placement of facilities, and effective operations of the plant. The current negative impacts are expected to be adequately addressed through the upgrade and with all recommendations and mitigation measures in place. Effective operational management and supporting facilities, electricity and operators is critical to ensure this proposed treatment process is operationally sound. The significance of the majority of impacts with mitigations in place are rated as low / negligible; the exception is income generation which is considered to be a positive impact; reuse of all sludge is considered positive, an AIS management plan implemented in operations can have a positive impact. Of the feasible and reasonable site layout alternatives, site layout 3 (Appendix A) is deemed an acceptable layout option which includes: bulk pipeline route 3, structures (including section of access road) removed from delineated wetland area, inclusive of a sludge storage area.

Table 2: Summary of impacts associated with planning and design Phase and subsequent construction and operation

Impact 1:	**Placement of WWTW and supporting infrastructure on sensitive areas**							
Nature	Direct (site) / Indirect (surrounding environment) / cumulative (downstream in combination with existing impacts)							
Description	Incorrect placement of structures in sensitive areas can result in direct, indirect and cumulative impacts on the environment. Site layout 3 is deemed an acceptable site layout option for the upgrade; road and structures placed outside delineated wetland.							
Impact Rating	Impact Status	Negative Impact			Negligible to negative low impact			
	Impact Criteria	Without mitigation (baseline / no go alternative)			With mitigation (upgraded process - site layout 3)			
	Impact Significance	Negative high (considerably harmful)	22		Negative Low	10		
Impact 2:	**Placement of bulk pipeline on sensitive areas**							
Nature	Direct (immediate environment) / Indirect (surrounding people and environment) / cumulative (downstream)							
Description	Route 1 is not feasible due to placement in future housing area and traversing delineated floodline, wetland. Route 2 crosses the wetland over a longer distance. Route 3 is environmentally preferred; distance over the wetland is shorter, gradient best suited to the gravity requirements.							
Impact Rating	Impact Status	Negative Impact		Negative Impact		Negative Impact		Negative Impact	
	Impact Criteria	No go alternative		Pipeline 1		Pipeline 2		Pipeline 3	
	Impact Significance	Negative high	22	Negative Medium High	16	Negative Medium	11	Negative Low	10
Impact 3:	**Treatment of effluent**							
Nature	Direct / Indirect / cumulative as applicable							
Description	Treatment of sewage from woodlands settlement via the proposed BNR and chlorine contact tanks, sw pond							
Impact Rating	Impact Status	Negative			Negligible			
	Impact Criteria	No go alternative			Treatment of effluent			
	Impact Significance	Negative medium high	19		Positive Low / Negligible	10		
Impact 4:	**Flooding, Erosion and sedimentation**							
Nature	Direct at discharge site / Indirect from sedimentation in streams / cumulative on streams							
Description	Potential sewage overflow events; Discharge of effluent per day, emergency discharge of SW							

Impact Rating	Impact Status	Negative Impact		Negative Impact		Negative Impact		
	Impact Criteria	No go alternative (current discharge)		discharge no mitigation		discharge with mitigation		
	Impact Significance	Negative Medium	15	Negative Medium	15	Negative Low	10	
Impact 5:	**Loss of treated effluent that can be reused**							
Nature	Direct at discharge site / reuse							
Description	Reuse of treated effluent (5Kl per day) is encouraged by the KKLM to be incorporated into future planning of the area. A Section 21e water use license / general authorisation as applicable would need to be applied for in order to authorised irrigation with water containing waste;							
Impact Rating	Impact Status	Negative Impact		Negative Impact		Positive Impact		
	Impact Criteria	No go alternative (current discharge – no reuse)		Effluent discharge (planned discharge - no reuse)		Reuse effluent		
	Impact Significance	Negative Low	10	Negative Low	10	Positive medium	13	
Impact 6:	**Incorrect management of sludge leading to soil, surface and groundwater contamination**							
Nature	Direct (immediate environment) / Indirect (downstream environment) / cumulative (in combination with downstream impacts)							
Description	Mismanagement of sludge due to failed operations, flooding of site or spillage onto ground can result in site contamination.							
Impact Rating	Impact Status	Negative Impact		Negative Impact		Negative / Negligible impact		
	Impact Criteria	No go alternative (current)		drying beds, storage area (no mitigation)		drying beds and storage area (with mitigation)		
	Impact Significance	Negative Medium high	17	Negative medium	11	Negative low / negligible	7	
Impact 7:	**Incorrect treated sludge management leading to site contamination**							
Nature	Direct (immediate environment) / Indirect (downstream environment) / cumulative (in combination with downstream impacts)							
Description	Mismanagement of dried sludge can result in insufficient space in management facilities, operational difficulties, overdried sludge no longer useable, incorrect management (e.g burying of waste). Sludge operational procedure, skilled operators, reuse / disposal plan required.							
Impact Rating	Impact Status	Negative Impact		Negative Impact		Negligible / Positive Impact		
	Impact Criteria	No go alternative (current)		Operational sludge management (no mitigation)		Operational sludge management (with mitigation; reuse & / or disposal offsite)		
	Impact Significance	Negative Medium high	17	Negative Medium	13	Positive Low / negligible	7	
Impact 8:	**Reuse versus off-site disposal of sludge**							
Nature	Indirect (beneficial offsite use) / cumulative (increasing disposal at landfills)							
Description	Reuse of sludge is preferred to offsite disposal. Reuse options of dried sludge include agricultural use, reuse for brick making operations. Composting of sludge is encouraged and can prevent overdying of sludge and result in saleable product for reuse.							
Impact Rating	Impact Status	Negative Impact		Negative Impact		Positive Impact		Negative Impact	
	Impact Criteria	No go alternative (current)		Operational sludge management (no mitigation)		Operational sludge management (reuse only)		Drying beds and offsite disposal (reuse and disposal)	
	Impact Significance	Negative Medium high	17	Negative Medium	12	Positive Low	10	Negative Low	9
Impact 9:	**Groundwater contamination**								
Nature	Direct / Indirect / cumulative as applicable								

Description	i)Leakage from pipework associated with the WWTW ii) Leakage from sewage holding tank. iii) Leaks, leachate from the WWTW. iii) Discharge of improperly treated effluent. iv) WWTW failure. v) Flooding of WWTW during storms. vi) Leachate from the sludge storage facilities.							
Impact Rating	Impact Status	Negative Impact		Negative Impact		Negligible / negative Impact		
	Impact Criteria	No go (current)		Without mitigation		With mitigation		
	Impact Significance	Negative Medium high	19	Negative Medium high	16	Negligible / low negative	9	

Table 3: Summary of impacts associated with construction phase and decommissioning as applicable and maintenance during operations as required

Alternative:	**All - Site 1; pipeline (preferred 3); BNR design; sludge drying beds; effluent discharge; internal reticulation and small-bore installation, roads**							
Impact 1:	**Inadequate planning and *Non-compliance with Conditions of the Environmental Authorisations***							
Nature	Direct / Indirect / cumulative. Poor planning and / or lack of budget for environmental management will result in unmitigated impacts.							
Description	Without correct planning negative impacts can be expected during construction phase and operations							
Impact Rating	As per impacts identified for planning, construction / operational phase as applicable without / with mitigation implemented							
Impact 2:	**Loss of heritage, archaeological, palaeontological resources.**							
Nature	Direct (loss of resource / damage to resource / collection of resource)							
Description	Excavation activities can unearth archaeological / palaeontological resources and result in unnecessary disturbance if measures are not in place.;							
Impact Rating	Impact Status			Negative Impact		Positive Impact		
	Impact Criteria	No go alternative		Without mitigation		With mitigation		
	Impact Significance	Negligible		Low	7	Low	7	
Impact 3:	**Unnecessary loss of vegetation, disturbance to watercourses and disturbance to fauna**							
Nature	Direct (loss of vegetation, disturbance to watercourses, disturbance to fauna)							
Description	By their nature, construction projects involving large numbers of workers using heavy machinery, with movement of materials over a large area are likely to create more disturbance to the natural environment (and watercourses) than necessary.							
Impact Rating	Impact Status	Negligible		Negative Impact		Negative Impact		
	Impact Criteria	No go alternative (baseline)		No go alternative		With mitigation		
	Impact Significance	Negligible	Negligible	Medium	7	Low	7	
Impact 4:	**Stormwater Runoff Causing Erosion, Sedimentation and Pollution During Construction**							
Nature	Direct (loss of vegetation and soil, erosion) and indirect and cumulative (sedimentation in watercourses, disturbance to aquatic ecosystems)							
Description	Large areas of exposed soil, stockpiled mobile materials, and compacted soil without vegetation are susceptible to erosion							
Impact Rating	Impact Status	Negligible		Negative Impact		Negative Impact		
	Impact Criteria	No go alternative (baseline)		Without mitigation		With mitigation		
	Impact Significance	Low	10	Medium	13	Low	7	
Impact 5:	**Soil disturbance**							
Nature	Direct (soil erosion, soil loss, damage to soil structure); Indirect (sedimentation, impact on surrounding vegetation, aquatic systems)							
Description	Mismanagement of soil leads to damage of soil structure and loss of soil							
Impact Rating	Impact Status	Negligible		Negative Impact		Negative Impact		

	Impact Criteria	Baseline / no go		Without mitigation		With mitigation		
	Impact Significance	Negligible	5	Medium	12	Low	10	
Impact 6:	**Working in and Adjacent to the Drainage Line for Construction of the WWTW and Associated Outlets**							
Nature	Direct (erosion and sedimentation) and indirect and cumulative (disturbance to watercourses)							
Description	Construction within wet areas can cause soil disturbance and impact on wetland functioning							
Impact Rating	Impact Status	Negligible		Negative Impact		Negative Impact		
	Impact Criteria	Baseline / no go		Without mitigation		With mitigation		
	Impact Significance	Negligible	5	Medium	12	Low	10	
Impact 7:	***AIS Displacing indigenous flora and fauna; decrease of natural runoff in catchment area***							
Nature	Direct and indirect and cumulative (Sensitive Aquatic Habitat, water, disturbance to flora and fauna; health impacts)							
Description	Disturbed construction areas are often impacted with AIS seedlings. Ongoing removal during construction required.							
Impact Rating	Impact Status	Negative Impact		Negative Impact		Positive / negligible Impact		
	Impact Criteria	No go / current		Without mitigation (current)		With mitigation		
	Impact Significance	Medium High	18	Medium High	18	Low to negligible	6/7	
Impact 8:	***General Waste pollution***							
Nature	Direct and indirect and cumulative (Aquatic Habitat, groundwater, surface water, disturbance to flora and fauna; health impacts, visual impacts)							
Description	This impact mainly concerns the proper management of construction related waste materials.							
Impact Rating	Impact Status	Negligible		Negative Impact		Negative Impact		
	Impact Criteria	No go / baseline		Without mitigation		With mitigation		
	Impact Significance			Medium	14	Low	9	
Impact 9:	***Hazardous Waste pollution***							
Nature	Direct and indirect and cumulative (Aquatic Habitat, groundwater, surface water, disturbance to flora and fauna; health impacts, visual impacts).							
Description	Spillages of diesel, petrol, oil, paints, other harmful chemicals. Potentially percolate into groundwater and enter surrounding environment.							
Impact Rating	Impact Status	Negligible		Negative Impact		Negative Impact		
	Impact Criteria	No go / baseline		Without mitigation		With mitigation		
	Impact Significance			Medium	15	Low	10	
Impact 10:	***Unintentional and uncontrolled fires can have high significant impacts on the social and natural environment***							
Nature	Direct (fire) and indirect (visual, smoke, smog)							
Description	Unintentional and uncontrolled fires can have high significant impacts on the social and natural environment.							
Impact Rating	Impact Status	Negative		Negative Impact		Negative Impact		
	Impact Criteria	No go / baseline		Without mitigation		With mitigation		
	Impact Significance	Medium	12	Medium	12	Low	10	
Impact 11:	***Noise impacts***							
Nature	Noise impacts disturbing residents and associated activities in the settlement							
Description	With mitigation measures in place, the noise impacts will be short-lived and considered to be negative and of low significance.							

Impact Rating	Impact Status	Negative		Negative Impact		Negative / Negligible	
	Impact Criteria	No go / baseline – not applicable		Without mitigation		With mitigation	
	Impact Significance			Low	9	Negligible	5
Impact 12:	***Visual impacts***						
Nature	Visual impacts from construction activities in close proximity to residents						
Description	Poor housekeeping and waste management. Receptors of visual impacts during construction includes the neighbouring residents in the area.						
Impact Rating	Impact Status	Negative		Negative Impact		Negative / Negligible	
	Impact Criteria	No go / baseline – not applicable		Without mitigation		With mitigation	
	Impact Significance			Low	9	Negligible	5
Impact 13:	**Income generation**						
Nature	Direct (employment, sourcing of materials and associated services) and indirect (skills development and transfer of skills)						
Description	Direct employment, sourcing of materials and services Skills development An estimated 40 - 70 employment opportunities. The expected value of the project is estimated at 61 million.						
Impact Rating	Impact Status	Negative		Negative Impact		Positive Impact	
	Impact Criteria	No go / baseline – no employment opportunities form construction		Without mitigation		With mitigation	
	Impact Significance			Low	10	Medium	11

Table 4: Summary of impacts associated with operational phase

Alternative:	**All - Site layout 3; pipeline (preferred 3); BNR design; sludge drying beds; effluent discharge; internal reticulation and small-bore installation, roads**						
Impact 1:	***AIS Displacing indigenous flora and fauna; decrease of natural runoff in catchment area***						
Nature	Direct and indirect and cumulative (Aquatic Habitat, terrestrial)						
Description	Ongoing removal during operations during operations on site and in surrounding area can result in a positive impact if implemented and lead to natural rejuvenation of indigenous vegetation, if implemented.						
Impact Rating	Impact Status	Negative Impact		Negative Impact		Positive Impact	
	Impact Criteria	No go / current		Without mitigation (current)		With mitigation	
	Impact Significance	Medium High	18	Medium High	18	Low	9
Impact 2:	***Unintentional and uncontrolled fires can have high significant impacts on the social and natural environment***						
Nature	Direct (fire) and indirect (visual, smoke, smog)						
Description	Unintentional and uncontrolled fires can have high significant impacts on the social and natural environment.						
Impact Rating	Impact Status	Negative		Negative Impact		Negative Impact	
	Impact Criteria	No go / baseline		Without mitigation		With mitigation	
	Impact Significance	Medium	12	Medium	12	Low	10
Impact 3:	**Income generation**						
Nature	Direct (employment, sourcing of materials and associated services) and indirect (skills development and transfer of skills)						
Description	Direct employment (operations on site) and associated services required. Skills development is expected to result. An estimated 10 - 20 income opportunities will be created during the operational phase. Operational management costs estimated at R6 million over 5 years.						

Impact Rating	Impact Status	Positive		Positive		Positive Impact		
	Impact Criteria	No go / baseline		Without mitigation		With mitigation		
	Impact Significance	Low	9	Low	9	Medium	10	
Impact 4:	**Pipeline Blockages, Sewage Spills, and Operational Issues**							
Nature	Direct / Indirect / cumulative as applicable							
Description	Short-term spills are likely on an occasional basis; chronic leakage or discharge of poorly treated or untreated sewage causes long-term damage Mitigation to prevent leakage, and the appropriate response are essential.							
Impact Rating	Impact Status	Negative Impact		Negative Impact		Negative Impact		
	Impact Criteria	No-go / baseline		Without mitigation		With mitigation		
	Impact Significance	Medium	16	Medium	11	Low	6	
	Mitigation	Possible						
	Confidence	High						
Impact 5:	**Groundwater contamination, aquatic impact, flora and fauna, health impacts**							
Nature	Direct / Indirect / cumulative as applicable Since the impact is negligible negative with mitigation, cumulative impacts to groundwater with other projects are not anticipated.							
Description	Ineffective SW management resulting in contaminated runoff							
Impact Rating	Impact Status	Negative Impact		Negative Impact		Negative Impact		
	Impact Criteria	No-go / baseline		Without mitigation		With mitigation		
	Impact Significance	Medium	16	Medium	11	Low	6	
Impact 6:	**Risk of Increased Access to Aquatic Habitats for Dumping**							
Nature	Direct / Indirect / cumulative as applicable							
Description	The creation of a new servitude for the pipeline will result in easier access and may lead to increased dumping incidences							
Impact Rating	Impact Status	Negative Impact		Negative Impact		Negative Impact		
	Impact Criteria	No-go / baseline		Without mitigation		With mitigation		
	Impact Significance	Medium	16	Medium	11	Low	6	
Impact 7:	***General Waste pollution***							
Nature	Direct and indirect and cumulative (Aquatic Habitat, groundwater, surface water, disturbance to flora and fauna; health impacts, visual impacts)							
Description	This impact mainly concerns the proper management of operational related waste materials							
Impact Rating	Impact Status	Negligible		Negative Impact		Negative Impact		
	Impact Criteria	No go / baseline		Without mitigation		With mitigation		
	Impact Significance	Medium	14	Medium	14	Low	**9**	
Impact 8:	***Hazardous substance management***							
Nature	Direct and indirect and cumulative (Aquatic Habitat, groundwater, surface water, disturbance to flora and fauna; health impacts, visual impacts).							
Description	Spillages of diesel, petrol, oil, paints, clears and other harmful chemicals. These substances may potentially percolate into the groundwater and enter the surrounding environment. Ablutions facilities will be equipped with 8000-liter conservancy tank.							
Impact Rating	Impact Status	Negligible		Negative Impact		Negative Impact		
	Impact Criteria	No go / baseline		Without mitigation		With mitigation		
	Impact Significance			Medium	15	Low	**10**	
Impact 9:	***Health impacts from pollution in the area***							
Nature	Direct (Pollution from current sewage and waste water management); indirect, cumulative (users downstream)							

<table>
<tr><td>Description</td><td colspan="8">Current sewage management is resulting in pollution impacting on the natural and social environment. Inadequate management and operation of upgraded system can result in negative impact and associated health and pollution risks on the site and in the surrounding area. The upgrade is expected to address the current impacts. Effective operational management and supporting facilities, electricity and operators is critical to ensure this treatment process is operationally sound.</td></tr>
<tr><td rowspan="3">Impact Rating</td><td>Impact Status</td><td colspan="2">Negative</td><td colspan="2">Negative Impact</td><td colspan="2">Negligible Impact</td></tr>
<tr><td>Impact Criteria</td><td colspan="2">No go / baseline</td><td colspan="2">Without mitigation</td><td colspan="2">With mitigation</td></tr>
<tr><td>Impact Significance</td><td>Medium high</td><td>17</td><td>Low</td><td>10</td><td>Negligible</td><td>5</td></tr>
</table>

7. SUMMARY OF PUBLIC PARTICIPATION

The following public participation activities have been carried out:

- Initial IAP register – applicant, landowner, adjacent landowners, organs of state, identified stakeholders and any NGOs
- The notice of intention to submit a Water use license application and environmental authorisation application and call for registration of interested and affected parties was distributed as follows:
    - Placing two posters close to the site to inform the public of the process, dated 27 March 2025
    - Emailing notice and BID to organs of state, landowners, adjacent landowners and potential IAPs on 27 March 2025
    - Placing an advertisement in the KOUGA EXPRESS on 27 March 2025
- Registration period: 27 March to 2 May 2025 (NEMA and WUL) (30 days registration and initial comments)
- Update IAP register with additional registrations / identified parties (e.g. WUL officials, interested farmers, local brick making facilities)

The following public participation will take place:

- Advert, site notice and notices including the following:
    - The pre-application draft basic assessment report (this report) will be distributed to all registered interested and affected parties for a 30-day review and comment period to registered interested and affected parties prior to submission of the NEMA EA application to the competent authority.
    - The relevant water use license information (this report and appendix G)will be made available for a 60-day comment and objection periods (Note: The pre-application meeting with DWS has taken place and the online ewula process has commenced; Reference: WU-42922).
    - Link to reports will be provided in notices and adverts.
- The pre-application DBAR and accompanying PP and CRR (this report) will be updated accordingly
- The NEMA EA application will be submitted to the competent authority
- Upon receipt of the reference number the draft report will be distributed for a further 30-day review and comments period
- The post-application report and accompanying PP and CRR (this report) will be updated accordingly
- The final report submitted to the competent authority for consideration within 90 days of submission of the application (BAR process).

- The NEMA decision-making time frame is 107 days. Once a decision is reached the decision will be distributed to all registered interested and affected parties and provided with a 20-day timeframe to submit an appeal against the decision.
- Once all information has been accepted by the DWS, the decision-making process on the WULA is 90 days.

8. CONCLUSION

The pre-application draft basic assessment report (this report) will be distributed to all registered interested and affected parties for a 30-day review and comment period. The relevant water use license information (this report and appendix G) will be made available for a 60-day comment and objection periods Participation is encouraged by all registered interested and affected parties. Once the NEMA 30-day review and comment period has ended, the report will be updated accordingly and the NEMA application for EA submitted.

.

CONTENTS

Appendix A: Site plan(s)

Appendix B: Photographs

Appendix C: Facility illustration(s)

Appendix D: Specialist reports

Appendix E: Comments and responses report

Appendix F: Environmental Management Programme (EMPr)

Appendix G: Other information

List of Figures

List of Tables

Province of the
EASTERN CAPE
ECONOMIC DEVELOPMENT,
ENVIRONMENTAL AFFAIRS & TOURISM

BASIC ASSESSMENT REPORT

(For official use only)

File Reference Number:	
NEAS Number:	
Date Received:	

Basic assessment report in terms of the Environmental Impact Assessment Regulations, 2014 as amended, promulgated in terms of the National Environmental Management Act, 1998(Act No. 107 of 1998), as amended.

Kindly note that:

1. This **basic assessment report** is a standard report that may be required by a competent authority in terms of the EIA Regulations, 2014 as amended and is meant to streamline applications. Please make sure that it is the report used by the particular competent authority for the activity that is being applied for. This report is current as of 1 OCTOBER 2022. It is the responsibility of the applicant to ascertain whether subsequent versions of the form have been published or produced by the competent authority
2. The report must be typed within the spaces provided in the form. The size of the spaces provided is not necessarily indicative of the amount of information to be provided. The report is in the form of a table that can extend itself as each space is filled with typing.
3. Where applicable **tick** the boxes that are applicable or **black out** the boxes that are not applicable in the report.
4. An incomplete report may be returned to the applicant for revision.
5. The use of "not applicable" in the report must be done with circumspection because if it is used in respect of material information that is required by the competent authority for assessing the application, it may result in the rejection of the application as provided for in the regulations.
6. This report must be handed in at offices of the relevant competent authority as determined by each authority **unless indicated otherwise by the Department**.
7. No faxed or e-mailed reports will be accepted **unless indicated otherwise by the Department**.

8. The report must be compiled by an independent environmental assessment practitioner (EAP). The EAP must satisfy conditions 11 below.

9. Unless protected by law, all information in the report will become public information on receipt by the competent authority. Any interested and affected party should be provided with the information contained in this report on request, during any stage of the application process.

10. A competent authority may require that for specified types of activities in defined situations only parts of this report need to be completed.

11.1 The Environmental Assessment Practitioner (EAP) must be registered in terms of S24H Regulations with the Registration Authority EAPASA as from 8 August 2022.

11.2. S24H (14) states that "only a person registered as an Environmental Assessment practitioner may perform tasks in connection with an application for an environmental authorisation contemplated in

(a)Chapter 5 of the Act read with the Environmental impact Assessment Regulations.

(b)Section 24G of the Act

(c) Chapter 5 of the National Environmental Management Waste Act 2008 (Act No 59 of 2008) read with the Environmental Impact Assessment Regulations

11.3. Tasks in regulation 14 may only be conducted by an EAP that is registered

11.4. Regulations 20 of S24H indicates the offences and penalties as indicated below:

"*20. Offences and penalties*

(1) A person is guilty of an offence if that person-

(a) contravenes regulation 14 of the Regulations; or

(b) pretends to be a registered environmental assessment practitioner or registered candidate environmental assessment practitioner.

(2) A person convicted of an offence in terms of subregulation (1) is liable to the penalties contemplated in section 49B(3) of the Act.".

Section 49B(3) of the Act states:

"A person convicted of an offence in terms of section 49A(1)(h), (l), (m), (n), (o) or (p) is liable to a fine or to imprisonment for a period not exceeding one year, or to both a fine and such imprisonment.".

SECTION A: ACTIVITY INFORMATION

Has a specialist been consulted to assist with the completion of this section?	YES	NO

If YES, please complete form XX for each specialist thus appointed:

Any specialist reports must be contained in Appendix D.

A1 ACTIVITY DESCRIPTION

Describe the activity, which is being applied for, in detail

Introduction

Woodlands Settlement is a rural settlement located in the Koukamma Local Municipality (KKLM) and situated on the R102 route in the Eastern Cape. The Woodlands Settlement is located approximately 15km southwest of Kareedouw Town. The existing small-bore gravity sewer reticulation and digester system has proven problematic, particularly during peak conditions such as the festive season, resulting in overflows. Additionally, the municipality's limited capacity to clean the digesters has often led to unsanitary conditions within the Woodlands Settlement. The existing small-bore gravity sewer reticulation and digester system servicing Woodland's settlement is in urgent need of upgrade:

Overview of existing sewage treatment

The existing bulk sewer lines have a diameter of 160 mm and extend to an approximate length of 3.9 km. The bulk main collects effluent from multiple small holdings situated between the R102 and the N2. The bulk main runs along the western boundary of the Woodlands Settlement, efficiently transporting the collected sewage to the existing WWTW located within the Woodlands Settlement for treatment and disposal.

The current sanitation services at Woodlands Settlement consist of digester tanks and a 110 mm diameter small-bore gravity sewer reticulation system. Effluent from the digesters is regularly removed by vacuum tankers and transported to the WWTW at Woodlands Settlement, located approximately 0.5 km south of the southwestern boundary of the Woodlands Settlement.

The effluent undergoes an activated sludge treatment process via a package plant followed by clarification, where the solids and liquids are separated before the final effluent is discharged into a surface watercourse. Sludge is conveyed to a pit near the treatment works for disposal. Once the pit reaches 80% capacity, it is backfilled, and a new pit is created.

Summary of reasons for upgrade:

- The hydraulic and treatment capacity (ADWF) of the existing treatment plant is 250 kl/d
- The system was designed to take septic tank sludge and not domestic wastewater
- There is no Inlet works, thus no screening, degritting or flow measurement as legislated by DWS
- The system overflows in peak conditions;

- There is no inlet for “honey suckers”
- Limited capacity to clean the digesters has often led to unsanitary conditions.
- There is no chlorine contact tank
- There is no sludge management system
- As the system is not operational, effluent is not compliant with the limits of the general authorisation issued in terms of the National Water Act (Act 36 of 1998).
- There are no facilities on site for operators
- Plant has not functioned in the last 5 years.
- Aerator motors are removed.
- Method of dosing chlorine is by HTH chips/tablets in the outlet sump.
- Sludge dams are full.
- No place to remove and dry sludge. It is reported that sludge is disposed of in a pit nearby and covered once full. Future designs to look at improved sludge management practices.
- No chlorine contacts tank/designated tank filed with sludge.
- Solid waste (glass, plastic) overflows the existing solid waste management site on the approach road and the plant itself.
- Stormwater run-off from the solid waste site collects and discharges into the wastewater plant and into the process units.
- No controlled access or security fencing on the wastewater plant.
- Small chemical store building dilapidated, and roof and windows vandalised and stolen.
- Electrical panel and cabling to the plant vandalised and stolen.
- Plant is not operational for the past 5 years.
- No operators’ facilities (ablution, locker room, lab, storeroom, breakroom)
- Limited space on the site resulted in the use of a packaged plant as opposed to a simple pond system.

The Koukamma Local Municipality (LM) has commissioned SMEC South Africa for the design and implementation of the internal sewer reticulation, bulk sewer reticulation, and wastewater treatment works within the Woodlands Settlement.

Location

The WWTW is located on Erf RE/1 (SG Code:C03400160000000100000) which is approximately 327 ha in extent. The expanded development footprint will be a total of approximately 2.2 ha in extent. Central coordinates: 34° 0'45.35"S; 24° 9'35.41"E). The proposed pipeline route alternatives will traverse Farm Palmiet River 2 / 584 (SG Code: C03400000000058400002). Title deeds and consent provided in Appendix G.

Figure 1: Woodland's settlement located on R102 between Clarkson and Witelsbos in the Koukamma Local Municipality

Figure 2: Woodlands WWTW and majority of reticulation situated on Erf RE/1 (adapted from Cape Farm Mapper); bulk pipeline will traverse Palmiet River 584

Decommissioning

- The existing bulk sewer lines have a diameter of 160 mm and extend to an approximate length of 3.9 km.
- Discontinue current digester tank system; replace all internal reticulation pipes with 160mm diameter class 34 uPVC pipes.
- The existing sewer digester tanks will be decommissioned and will not form part of the proposed system.

It is proposed that the WWTW be constructed in 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 possibly de-sludging activities from the current septic tank system.

Reticulation

- The new system will operate as a gravity sewer, directing all pipes towards the settlements lower points.
- Bulk Sewer Main (Alternative 1) runs adjacent to the boundary of the Woodlands Development. Future development will place dwelling units over this route which can potentially cause unsanitary conditions if a pipe bursts, to mitigate, alternative route options have been considered.
- 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 all pipe connections.
- Each erf will be connected to the new internal reticulation network via 110 mm diameter uPVC pipes.
- The use of uPVC is specified due to its favourable properties, including ease of installation, corrosion resistance, low maintenance requirements, and a long operational lifespan, making it well-suited for municipal sewer infrastructure

Figure 3: Existing Sewer Reticulation, Woodlands Settlement (SMEC, July 2025)

Design Capacity

The influent wastewater from households is expected to primarily consist of domestic sewage, containing a mixture of water, organic, and inorganic substances, both dissolved and suspended. Organic substances will

include carbohydrates, proteins, fats, soap, detergents, and their decomposition products. The strength of sewage, whether high or low, can indicate patterns of water consumption: high strength may suggest low water usage for consumption, while low strength may indicate higher water consumption and potential dilution from stormwater infiltration. High sewage strength is often associated with low-income groups, whereas low sewage strength is characteristic of high-income groups. Compared to the typical sewage strength, the sewage entering Woodlands WWTW is expected to be medium sewage strength.

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

ADWF – 500 kl/d,
PDWF – 800 kl/d,
PWWF – 1000 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 (concept and Viability report – summary treatment options, May 2025; Detail Design, July 2025 – Appendix C) are as follows:

ADWF – 462.37 kl/d,
PDWF – 869.45 kl/d,
PWWF – 1041.122 kl/d.

Figure 4: Sewer drainage zone post development of future housing, Woodlands Settlement

Head of Works

- The head of works will consist of:

- A tanker dumping area
- 1x 10mm coarse mechanical screen
- 2x degritting channels.

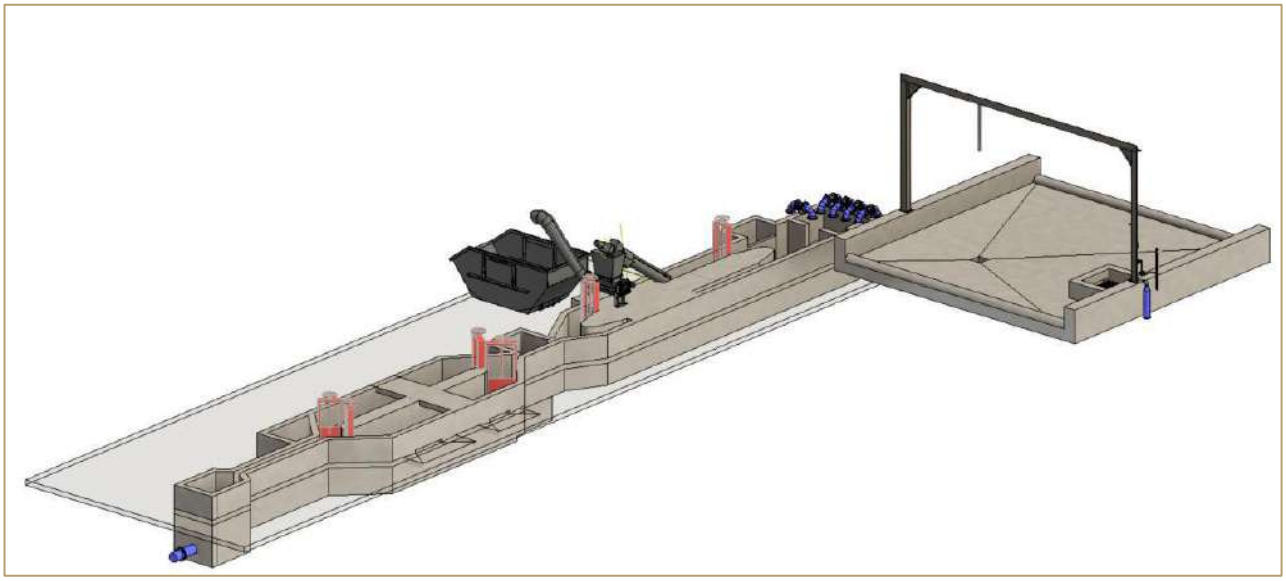

Figure 5: Head of works schematic diagram (adapted from SMEC, May 2025)

Sewage treatment process

Various wastewater treatment processes were investigated, and the preferred option is the extended aeration activated sludge process with integrated biological nutrient removal (BNR). Further details on the alternative treatment technologies considered are provided in the subsequent section of this draft BAR. The preferred treatment process will include a balancing tank and a biological reactor unit, surface aeration and clarification.

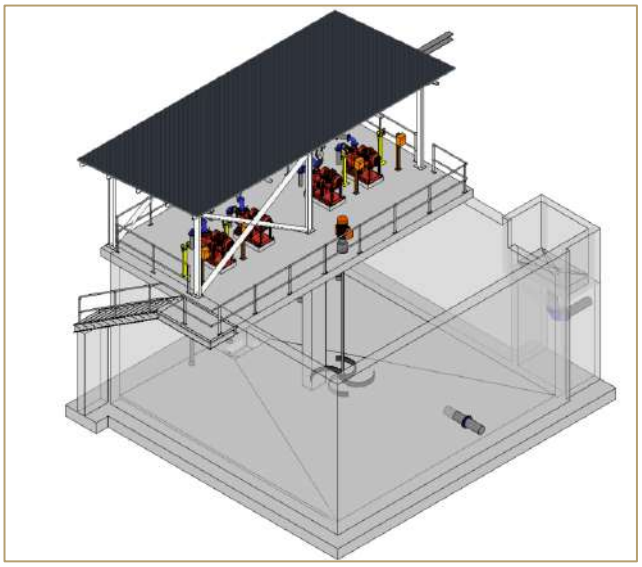

Figure 6: Balancing tank (adapted from SMEC, May 2025)

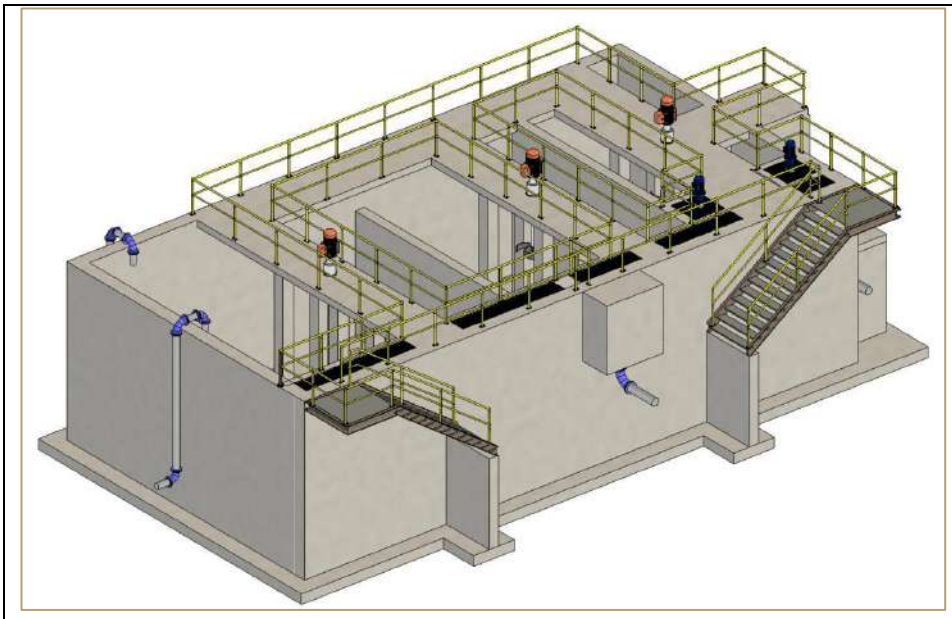

Figure 7: Biological Nutrient Removal (Adapted from SMEC, May, 2025)

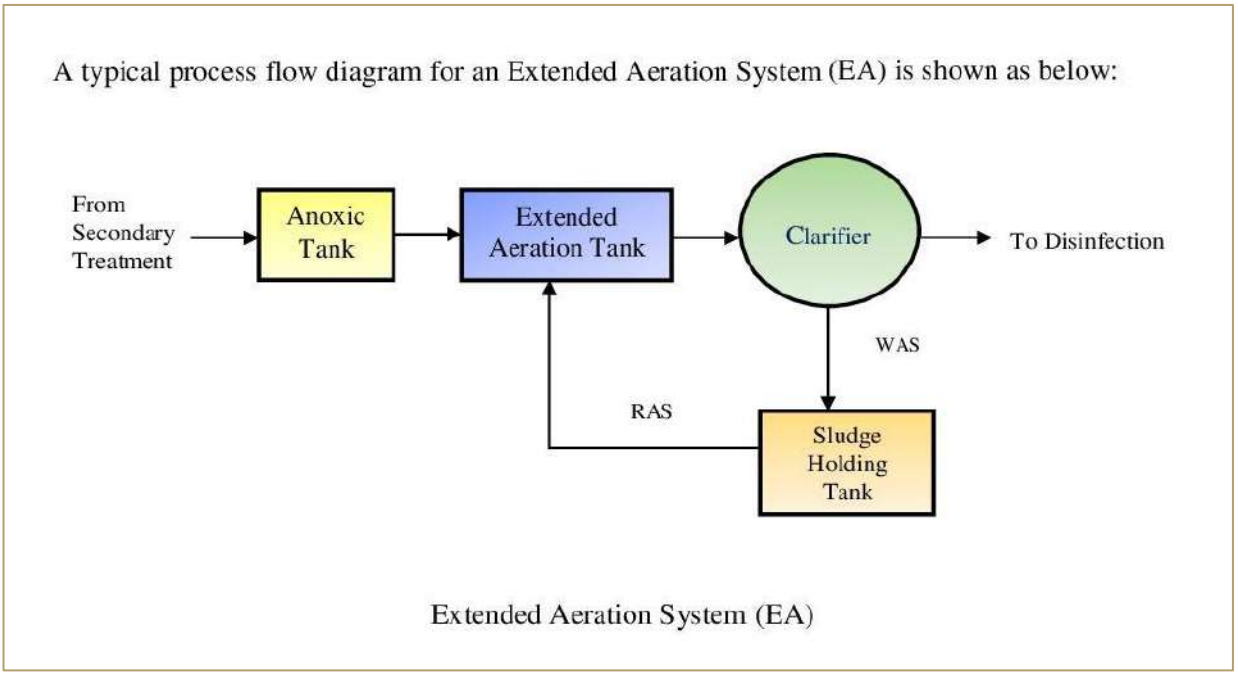

Figure 8: Typical extended aeration process configuration (Onevproject.com, 2016) (adapted from SMEC, May 2025)

Effluent Treatment

It is proposed for treated effluent to gravitate to 2x chlorine contact tanks and then be discharged into the natural environment.The effluent from the clarifiers is collected in a common sump and then distributed into a 15m³ chlorine contact tank. Chlorine will be dosed at the inlet weir or in the pipe upstream of the inlet to the chlorine contact tanks. The chlorine contact tank provides 20-30 minutes of contact time at PWWF. An auto-flow metering system will be installed to ensure that a chlorine dosing rate of 5mg/l is maintained.

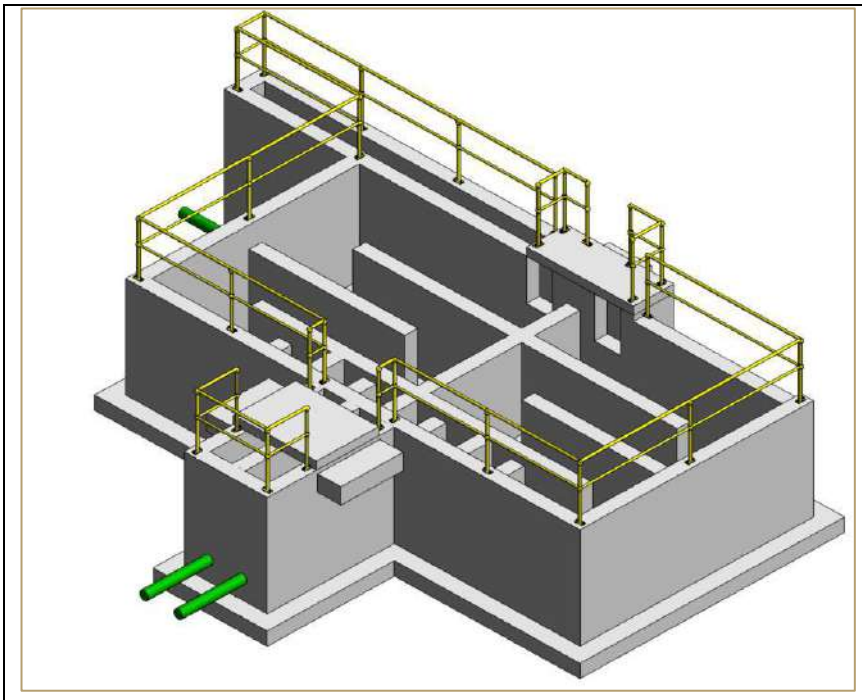

Figure 9: Chlorine contact tank (adapted from SMEC, May 2025)

Sludge Management

The goal of sludge management is to manage the sludge in a contained way so as to prevent local contamination and achieve an end product that can be re-used. The site is located in an area dominated by agricultural activities and sludge management should aim to achieve A1a as per the Sludge management Guidelines, 2006, in order for it to be safely applied to agricultural areas.

Sludge management options are being investigated and a sludge drying bed is indicated on the process flow diagram. The leachate from drying beds is proposed to be captured and returned to the head of works. A dried sludge storage facility has been included in the design of the WWTW layout.

The engineer report, Concept and Viability Report – Summary Treatment options, SMEC, May 2025 (Appendix C) states that following:

It expected that around 24.4m3/d of sludge will be wasted. Drying of sludge has been proposed using drying beds. To size sludge drying beds for a 25 m³/day sludge generation rate factors like sludge type, drying depth, and desired drying time need to be considered. A typical conventional sand drying bed (SDB) is about 6-8 meters wide and 30 meters long. The sand layer should be 230-300 mm deep.

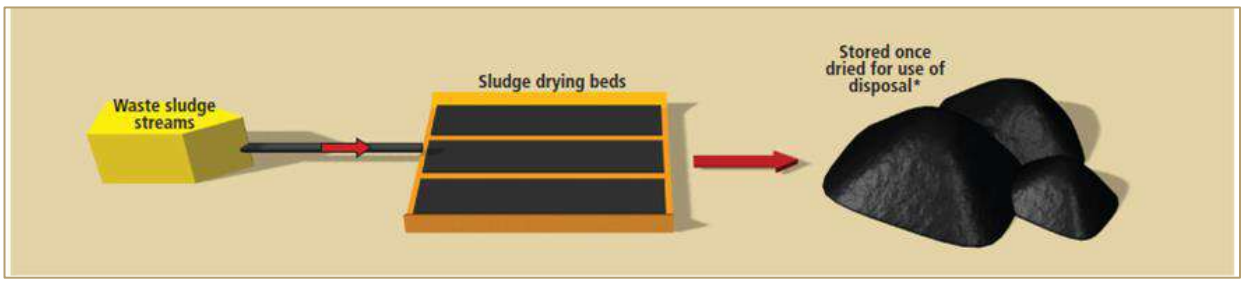

Figure 10: Sludge drying beds and storage (adapted from SMEC, May 2025 and July 2025)

Flow of 24.43 m3/d from WAS Pump

Variable	Concentration mg/L	Mass rate kg/d
COD - Total	4855.53	118.63
BOD - Total Carbonaceous	882.76	21.57
N - Total Kjeldahl Nitrogen	269.59	6.59
P - Total P	95.38	2.33
Volatile suspended solids	3317.83	81.06
Total suspended solids	4395.17	107.38

Figure 11: Variables of Waste activated sludge provided by SMEC, April 2025

The following dimensions are presented in the drawing (no drawing number; 22 July 2025 – Appendix A) for the sludge drying beds: 18.5 × 12.8 m which equates to 236.8m2; provision of two drying beds with the dimensions is indicated.

The engineer report, Detail design report, SMEC, July 2025 (Appendix C) states that following:
There are two drying beds designed to receive Waste activated sludge (WAS) for the dewatering process. The discharge of WAS from the biological reactor will be initiated manually by the process controller. The volume wasted will be recorded by means of an inline flow measuring device. An actuated knife gate valve will be controlled by the means of the measuring device, by closing the valve once the pre-set discharge volume has been reached.
The selection of a drying bed will be at the discretion of the operator and/or process controller as instructed. The inlet valve to the selected will be manually opened and only closed once the WAS discharge flow has stopped.
Manually operated type stop log will allow after the initial sludge settling, the decanting of the residual supernatant water from the drying beds. The underflow and supernatant from the drying beds will be collected in a channel connected to the drying beds and will be pumped back to the head of works.
Once the sludge has dried, it will be manually removed. It is proposed that a skip bin be provided onsite for temporary storage of the dried sludge prior to disposal at a registered landfill site. The sludge is designed to produce waste sludge suitable for general landfill disposal or an A1a sludge that can be used for beneficiation purposes.

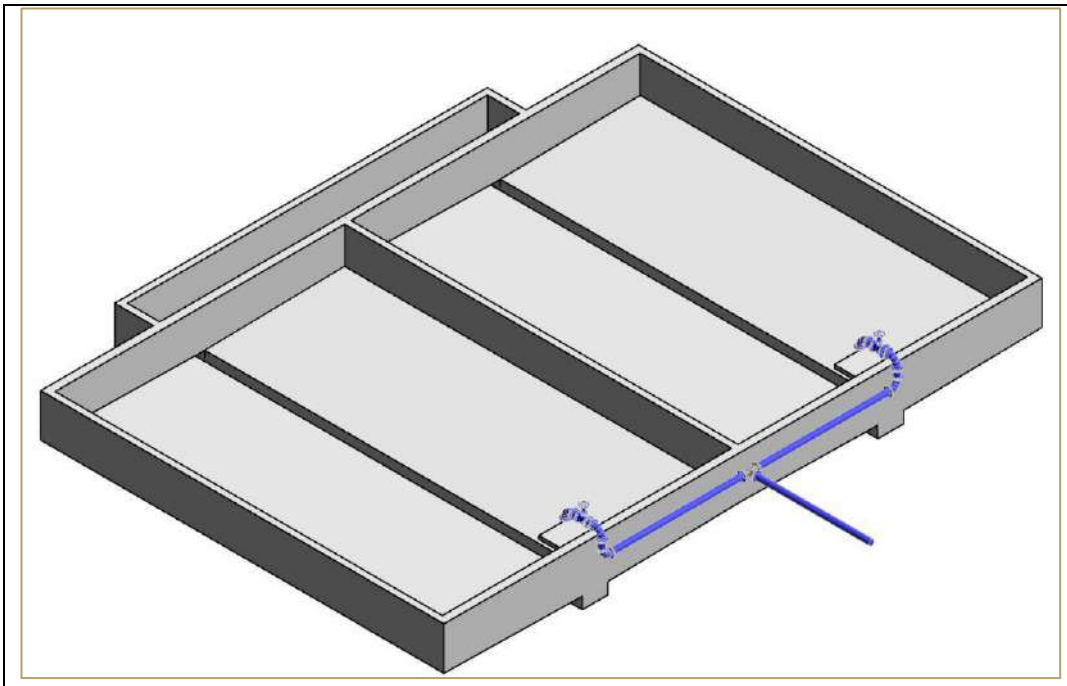

Figure 12: Sludge drying beds (adapted from SMEC, July 2025)

The sludge from the drying beds is recommended to be beneficiated to the surrounding community; local farmers have been included as interested and affected parties for this process and communication has been initiated between the project planning team and the interested farmers.
The Detail design report states that the facility is envisioned to be operated by eight to ten persons during the day. Remote access should be enabled for after hours to allow secure entry / exit at the WWTW at all times.

Sludge management guidelines (Relevant tables and guidelines are included as appendix G):
Microbiological class A – management options include agricultural use with no restrictions
Stability class 1 - management options include agricultural use with no restrictions
Pollutant class a - management options include agricultural use with no restrictions, other than sludge application rates to not exceed agronomic rates.

Dried sludge is not to be stored more than 90 days (temporary storage). Assuming sludge is dried to 90% solids, approximately 0.119 m3 / day of dried sludge will be generated; 90 days storage will result in an estimated 10.7m3 total dried sludge cake.

Composting and / or reuse of sludge is preferred. Any offsite disposal of sludge will entail ensuring that receiving landfill is suitably licensed and confirm capacity to receive the dried sludge quantity and quality from Woodlands WWTP.

A composting facility is recommended to be included in the design (either in the current application or in the future). The composting norms and standards require the addition of carbon (e.g landscape / vegetation / suitable AIS material) to be added to the sludge (estimated to be dried to 50 - 60%); this is deemed feasible

for this site as the existing landfill is adjacent, from where landscaping waste can be possibly diverted to the WWTW for composting.

Buildings and supporting structures

Supporting structures to be developed include:

- Administration building - receiving point for visitors and service providers to the new Woodlands WWTW. The building will have, offices, kitchen facilities, boardroom, laboratory, storeroom, and ablution facilities.

Electrical and Instrumentation

Supporting electrical infrastructures and structures will include:

- Site lighting
- Electrical installations in buildings
- Lightning protection
- Motor control centre
- Supervisory Control and Data Acquisition System
- Programmable Logic Controllers (PLC's) shall be distributed on the site and shall be linked by means of fibre optic cables between PLC's and the SCADA system.
- Instrumentation, including, inter alia, flow meters, level meters, pH meters, MLSS meters, DO meters, motorised valves, etc) shall be monitored and displayed on the SCADA system.
-

The capacity of the existing main electrical supply point and the capacity required at the new extension are still to be verified. The existing main electrical supply point shall be upgraded should the need arise

Construction Timeframes

Estimated: construction programme and estimated construction budget still to be developed

It is proposed that the WWTW be constructed in 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 possibly de-sludging activities from the current septic tank system.

- Construction and installation of inlet works, balancing, BNR, chlorine tank, sludge drying facility: 24 – 48 months
- Decommissioning and installation of small-bore connections within the settlement: 4 – 12 months
- Construction of the pipeline route: 4 months – 12 months

Estimated time to completion: 5 years / 60 months

Operational Requirements

- Monthly surface water quality testing and quantity (SCADA)
- Monthly groundwater testing via monitoring borehole
- Sludge testing prior to reuse / disposal as per sludge management guidelines
- Compliance with conditions of EA and WUL (if attained)

A2 FEASIBLE AND REASONABLE ALTERNATIVES

"alternatives", in relation to a proposed activity, means different means of meeting the general purpose and requirements of the activity, which may include alternatives to—

(a) the property on which or location where it is proposed to undertake the activity;
(b) the type of activity to be undertaken;
(c) the design or layout of the activity;
(d) the technology to be used in the activity;
(e) the operational aspects of the activity; and
(f) the option of not implementing the activity.

Describe alternatives that are considered in this application. Alternatives should include a consideration of all possible means by which the purpose and need of the proposed activity could be accomplished in the specific instance taking account of the interest of the applicant in the activity. The no-go alternative must in all cases be included in the assessment phase as the baseline against which the impacts of the other alternatives are assessed. The determination of whether site or activity (including different processes etc.) or both is appropriate needs to be informed by the specific circumstances of the activity and its environment. After receipt of this report the competent authority may also request the applicant to assess additional alternatives that could possibly accomplish the purpose and need of the proposed activity if it is clear that realistic alternatives have not been considered to a reasonable extent.

A.2.1 Site selection (alternatives and preferred)

Waste water treatment works site

The only suitably feasible site for the proposed WWTW is situated at the current WWTW adjacent to the landfill site situated in the southern outskirts of the Woodlands settlement.

This is the only alternative WWTW site considered; it is the preferred site due to:

- Situated more than 200 meters form nearest residential dwelling
- Existing disturbed site and adjacent to the landfill site
- existing access road in place
- outside aquatic sensitivities
- no identified terrestrial biodiversity sensitivities

Pump station sites

No pump stations have been proposed to date (May 2025) for the bulk pipeline; there will be pumps on the WWTW for operations.

Pipeline Routes

Three pipeline routes have been proposed to date (May 2025)

The environmentally preferred route is route 3 (adapted to reduce impact on aquatic sensitivities)

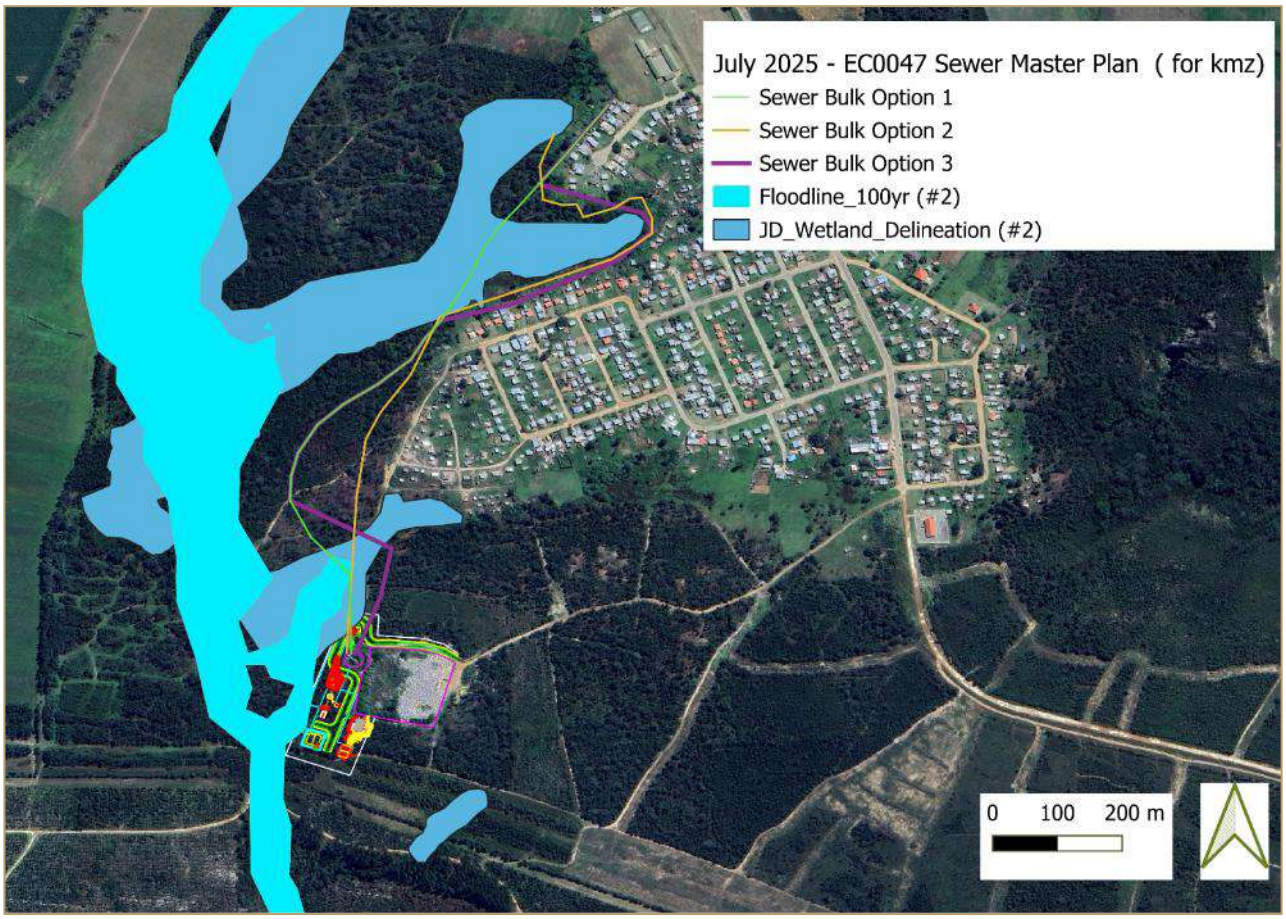

Figure 13: Aquatic sensitivities and alternative pipeline routes (Site layout 1)

A.2.2 Activity

The aim of the project is to provide Woodland's settlement with a small-bore sewage reticulation and adequate WWTW facility to ensure sewer inflows are treated to acceptable quality standards in an operationally efficient manner.

The no-go alternative would mean the small-bore sanitation system is not installed, no upgrades take place baseline conditions (inadequate sewage systems creating cumulative impacts on soil, ground and surface water flows) would remain.

A.2.3 The design and layout of the activity

Three treatment options have been described by SMEC in the following reports:

Concept and viability report, November 2024 (Appendix C1)

Concept and viability report – summary treatment options, May 2025 (Appendix C2)

Detail Design Report, July 2025 (Appendix C3)

The treatment options include:

- Option 1 – Oxidation Ponds
- Option 2 – Rotating biological contractors
- Option 3 – Extended aeration activated sludge with Biological nutrient removal

Option 1 – Oxidation Ponds

These can be very low-maintenance and self-sustaining if sufficient land is available. For purposes of the Woodlands WWTW, the utilization of ponds to treat sewerage can be considered if more land can be made available

Option 2 – Rotating biological contractors

Large plastic disks mounted on a horizontal shaft are partially submerged in primary effluent. As the shaft rotates, the disks are exposed alternately to air and wastewater, allowing a layer of bacteria to grow on the disks and to metabolize the organics in the wastewater.

Capital Cost estimate: R16.2 million

Operational and maintenance cost estimate: R3.3 million

Option 3 - Extended aeration activated sludge with Biological nutrient removal (preferred)

Extended aeration with BNR is expected to achieves higher treatment and nutrient removal *within the process* and therefore additional tertiary treatment via reed beds will not be required. This option fits in with the space available for effective treatment.

Capital cost estimate: R12.9 million

Operational and maintenance cost estimate: R2.6 million

The applicant's preferred option is option 3; option 3 is assessed.

A.2.4 - Technologies

Different technologies and costs related to the most suitable technology solution was evaluated in the feasibility report.

Option 1 – Oxidation Ponds

These can be very low-maintenance and self-sustaining if sufficient land is available

For purposes of the Woodlands WWTW, the utilization of ponds to treat sewerage can be considered if more land can be made available

Option 2 – Rotating biological contractors

Large plastic disks mounted on a horizontal shaft are partially submerged in primary effluent. As the shaft rotates, the disks are exposed alternately to air and wastewater, allowing a layer of bacteria to grow on the disks and to metabolize the organics in the wastewater.

Capital Cost estimate: R16.2 million

Operational and maintenance cost estimate: R3.3 million

Option 3 - Extended aeration activated sludge with Biological nutrient removal (preferred)

Extended aeration with BNR is expected to achieves higher treatment and nutrient removal *within the process* and therefore additional tertiary treatment via reed beds will not be required. This option fits in with the space available for effective treatment.

Capital cost estimate: R12.9 million
Operational and maintenance cost estimate: R2.6 million

The applicant's preferred option is option 3; option 3 is assessed.

Supporting infrastructure includes:

- Access road and internal roads
- A wall slab fence to be 3.0m high (2.4m above ground concrete wall with 0.6m anti-burrow) (phase 1 and 2 boundary fence)
- Roofs to be concrete
- Guard house
- Ablution facilities yes
- Process controller office yes
- Storeroom yes
- MCC in one room for security
- 10-meter buffer from road reserve

Site layouts (Refer to Appendix A)
Site layout 1 was found to have some infrastructures within the delineated wetland.

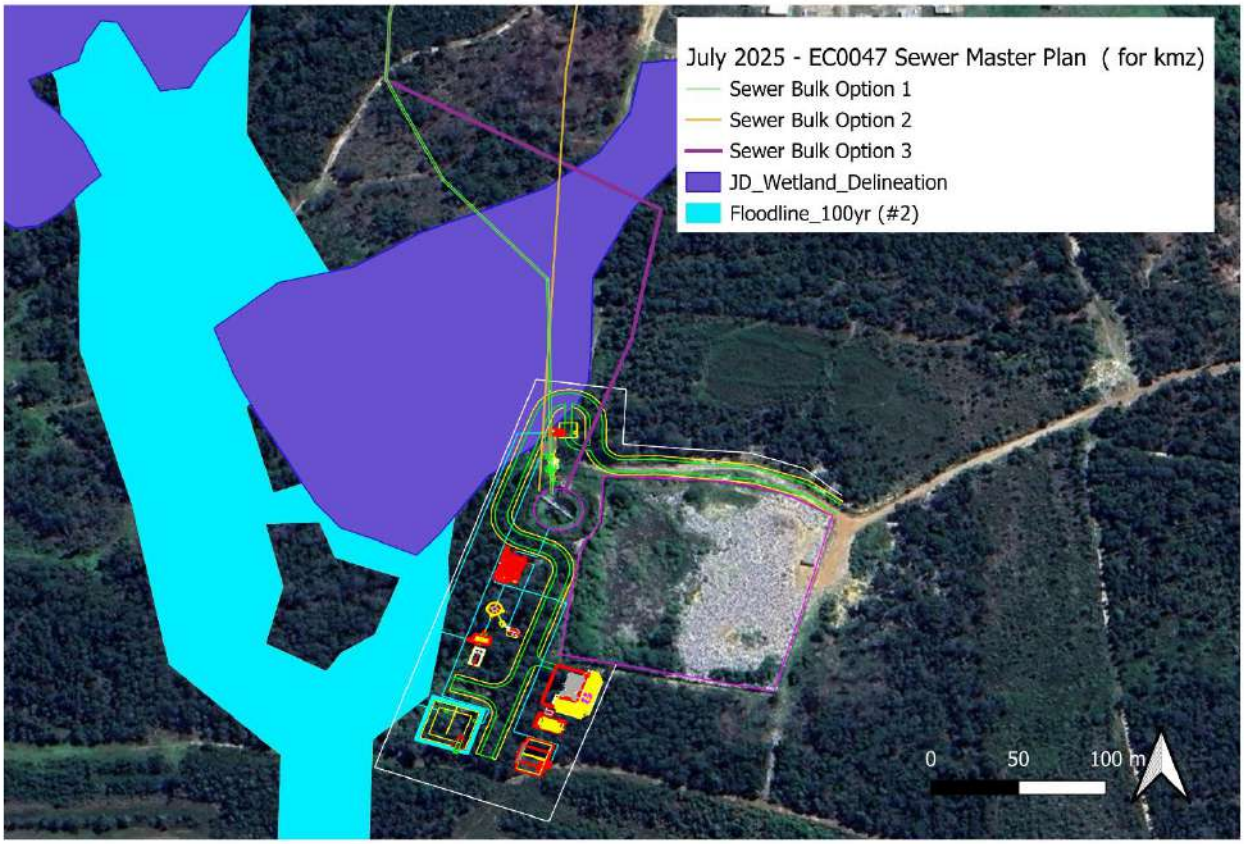

Figure 14: Site layout 1 – structures within wetland

Site layout 2 removes structures from delineated wetland area (including section of access road)

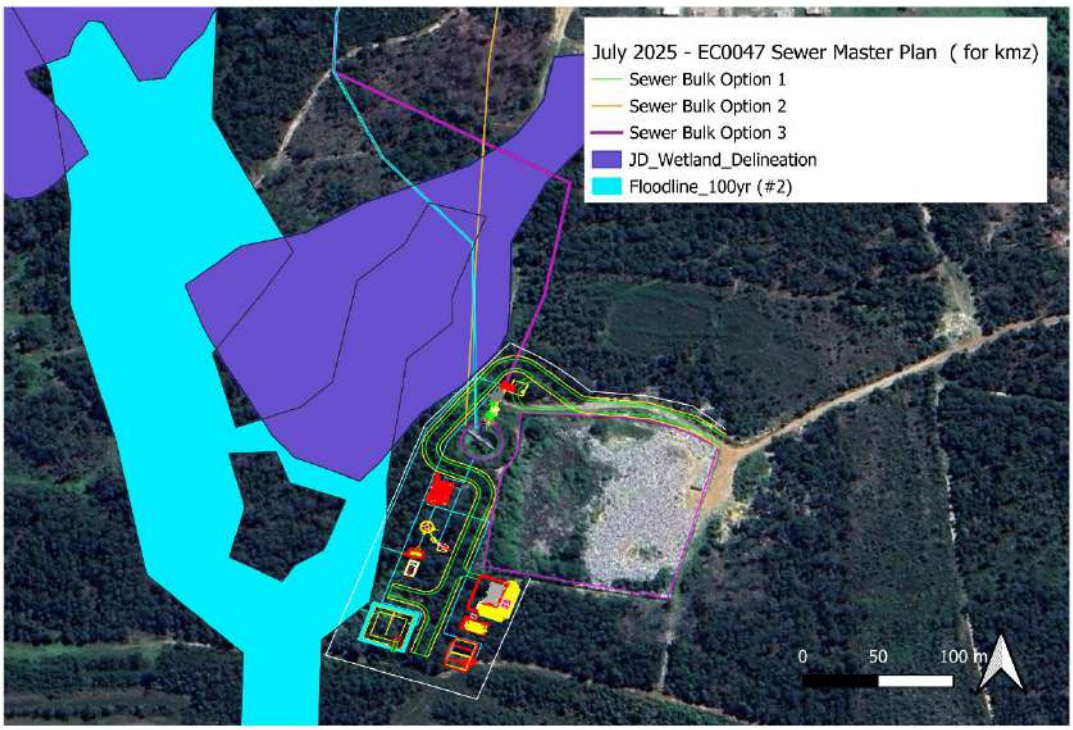

Figure 15: Site layout 2 – structures outside wetland

Site layout 3 includes the sludge storage area and preferred bulk pipeline route 3 crossing at the shortest distance over delineated wetland***. Site layout 3 is deemed an acceptable site layout option.***

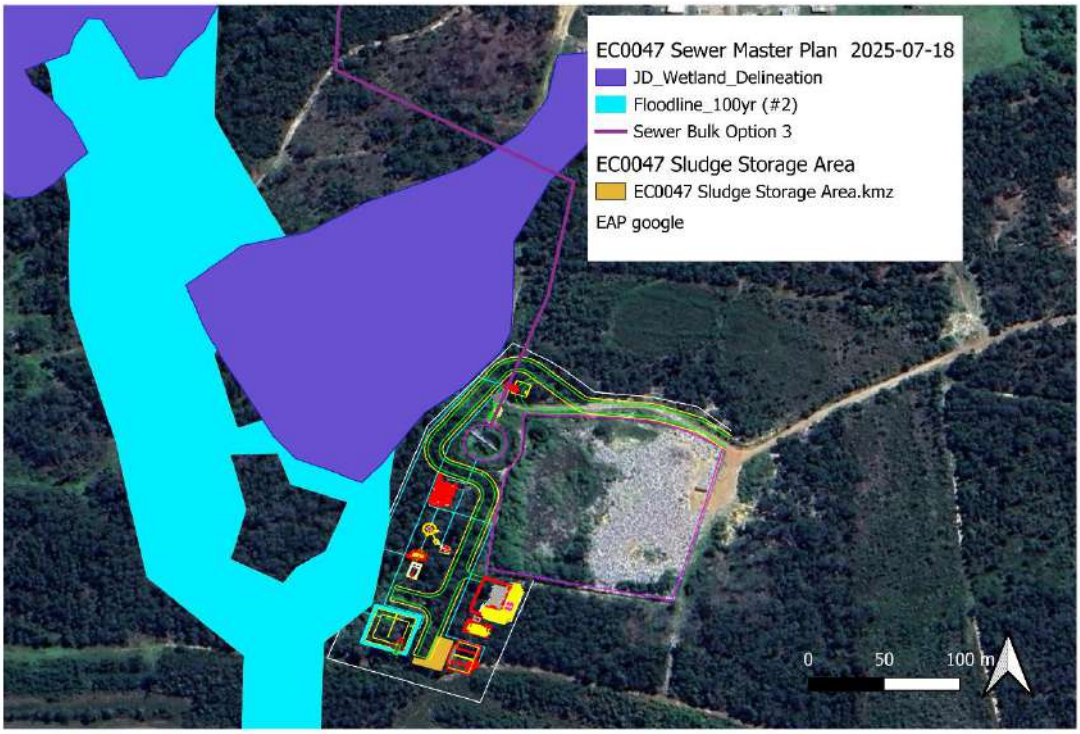

Figure 16: Site layout 3 – structures outside wetland, bulk pipeline 3, sludge storage area

A.2.5 - Operational aspects

Effluent discharge

Effluent from the wwtw will be treated with chlorine and then discharged to the environment which will eventually reach the Groot Rivier. DWS general limits will need to be complied with; the proposed treatment system (BNR) is anticipated to be within these limits.

Reuse of effluent is assessed as a reasonable and feasible alternative for consideration by KKLM in future planning and no specific effluent reuse infrastructure is included in this EA and WUL application process.

Outlets

Two outlets from the WWTW to the stream along the western boundary are necessary. The first is the discharge of treated wastewater from the chlorine contact tank around mid-way along the western extent of the WWTW. The second overflow structure will be constructed to discharge any overflowing stormwater from the stormwater pond to the drainage line (southwest corner of the WWTW). This would only be necessary during flooding conditions because under ordinary circumstances the stormwater overflow captured in the stormwater pond would be recirculated back to the WWTW head of works.

Sludge management

It expected that around 24.4m3/d of sludge will be wasted. There are two drying beds designed to receive Waste activated sludge (WAS) for the dewatering process. A process control will discharge WAS form the biological reactor, and the volume recorded by a flow measuring device. An actuated knife gate valve will be controlled by the means of the measuring device, by closing the valve once the pre-set discharge volume has been reached. The underflow and supernatant from the drying beds will be collected in a channel connected to the drying beds and will be pumped back to the head of works. Once the sludge has dried, it will be manually removed. A dried sludge storage facility has been included in the design.

Preliminary calculations have been made for the estimated amount of sludge expected to be generated:

Flow Ml/day	ADWF – 462.37 kl/d, PDWF – 869.45 kl/d, PWWF – 1041.122 kl/d. Average 0.5 ML / day
Wasted sludge per day	*24.4m3*

Flow of 24.43 m3/d from WAS Pump

Variable	Concentration mg/L	Mass rate kg/d
COD - Total	4855.53	118.63
BOD - Total Carbonaceous	882.76	21.57
N - Total Kjeldahl Nitrogen	269.59	6.59
P - Total P	95.38	2.33
Volatile suspended solids	3317.83	81.06
Total suspended solids	4395.17	107.38

sludge Drying Beds Dimensions	= 18.5m x 12.8m = 236.8m2 Total Depth = 2 m Depth Below NGL = 0.7 m
Dried sludge storage area	270 m2
Anticipated sludge classification	a1A

The sludge will be stable with low odor and fly nuisance potential together with a reduced content of pathogenic organisms. This sludge will be treated to a class A sludge.

Alternatives for Dried sludge

- Composted on site for reuse
- Reused for agricultural purposes
- Reused in brick making operations
- Disposed at approved land disposal site. Disposal of sludge is only permitted at a suitably licensed site.

The sludge management guidelines will be applicable (Appendix G1)
Any further composting on site will need to comply with the Composting National Norms and Standards (Appendix G2)

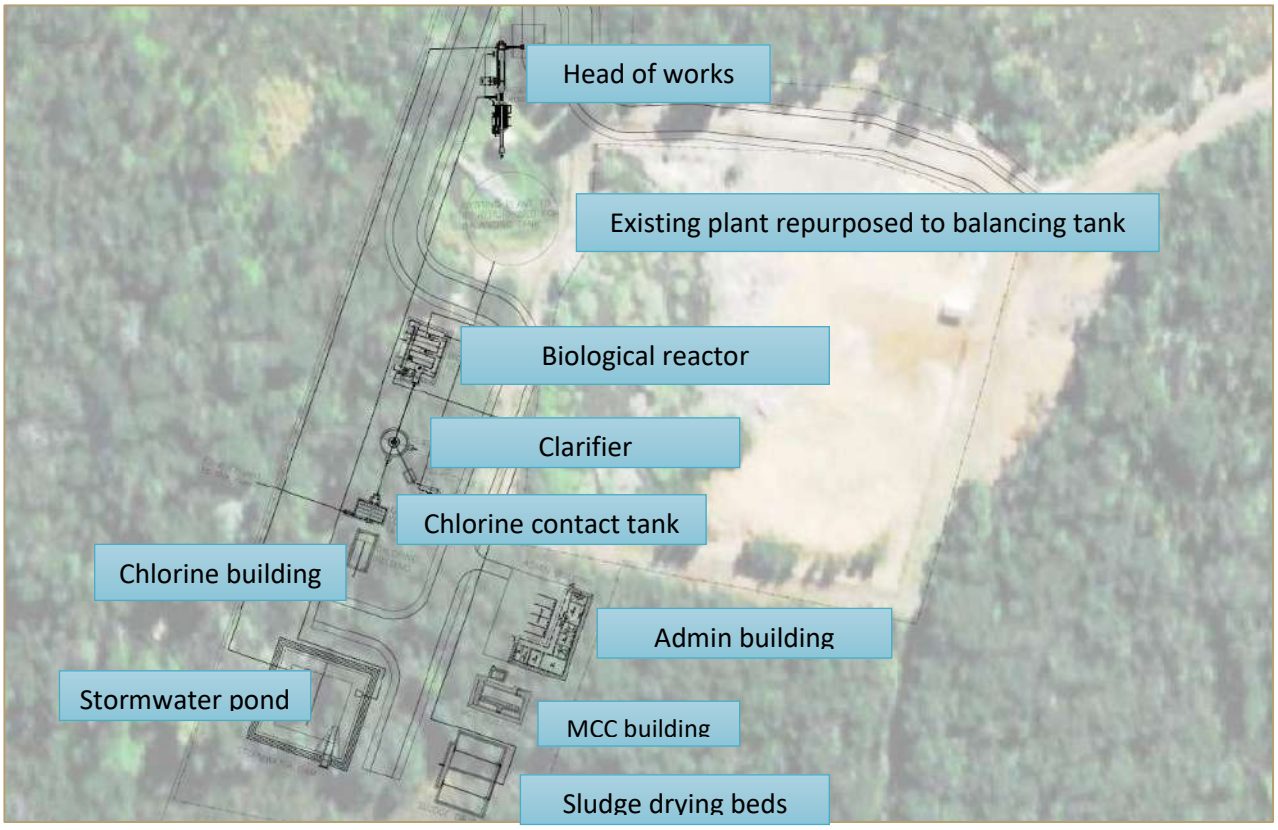

Figure 17: Layout of wastewater treatment components and management facilities (adapted from SMEC, EC0047-WWTW-00-001, REV 0 – Appendix C)

A.2.6 The option of not implementing the activity.

The status quo will remain i.e. no provision of a non-operational waste water treatment works. Existing health and environmental pollution risks from the existing system will remain.

Paragraphs 3 – 13 below should be completed for each alternative.

A3 ACTIVITY POSITION

Indicate the position of the activity using the latitude and longitude of the centre point of the site for each alternative site. The co-ordinates should be in degrees and decimal minutes. The minutes should have at least three decimals to ensure adequate accuracy. The projection that must be used in all cases is the WGS84 spheroid in a national or local projection.
List alternative sites if applicable.

Alternative:	**Latitude (S):**	**Longitude (E):**
Alternative S1 (preferred / only site alternative)	34° 0.673'S	24° 9.575'E
~~Alternative S2 (if any)~~		
~~Alternative S3 (if any)~~		

Site layout 3 is deemed an acceptable site layout option (Appendix A)

In the case of linear activities:

Bulk pipeline alternative route 1 (1025 meters)

Latitude (S):	**Longitude (E):**
34° 0.214'S	24° 9.792'E
34° 0.304'S	24° 9.706'E
34° 0.422'S	24° 9.622'E
34° 0.503'S	24° 9.528'E
34° 0.603'S	24° 9.570'E
24° 9.584'E	24° 9.584'E

- Starting point of the activity – a
- Middle point of the activity – b
- Middle point of the activity – c
- Middle point of the activity – d
- Middle point of the activity – e
- End point of the activity – f

[1] "Alternative S.." refer to site alternatives.

Figure 18: Pipeline route alternative 1

- **Bulk pipeline alternative route 2 (1010 meters)**
- Starting point of the activity – 2a
- Middle point of the activity – 2b
- Middle point of the activity – 2c
- Middle point of the activity – 2d
- Middle point of the activity – 2e
- Middle point of the activity – 2f
- Middle point of the activity – 2g
- End point of the activity – 2h

Latitude (S):	Longitude (E):
34° 0.241'S	24° 9.741'E
34° 0.293'S	24° 9.730'E
34° 0.306'S	24° 9.765'E
34° 0.293'S	24° 9.817'E
34° 0.320'S	24° 9.824'E
34° 0.389'S	24° 9.647'E
34° 0.491'S	24° 9.584'E
24° 9.584'E	24° 9.584'E

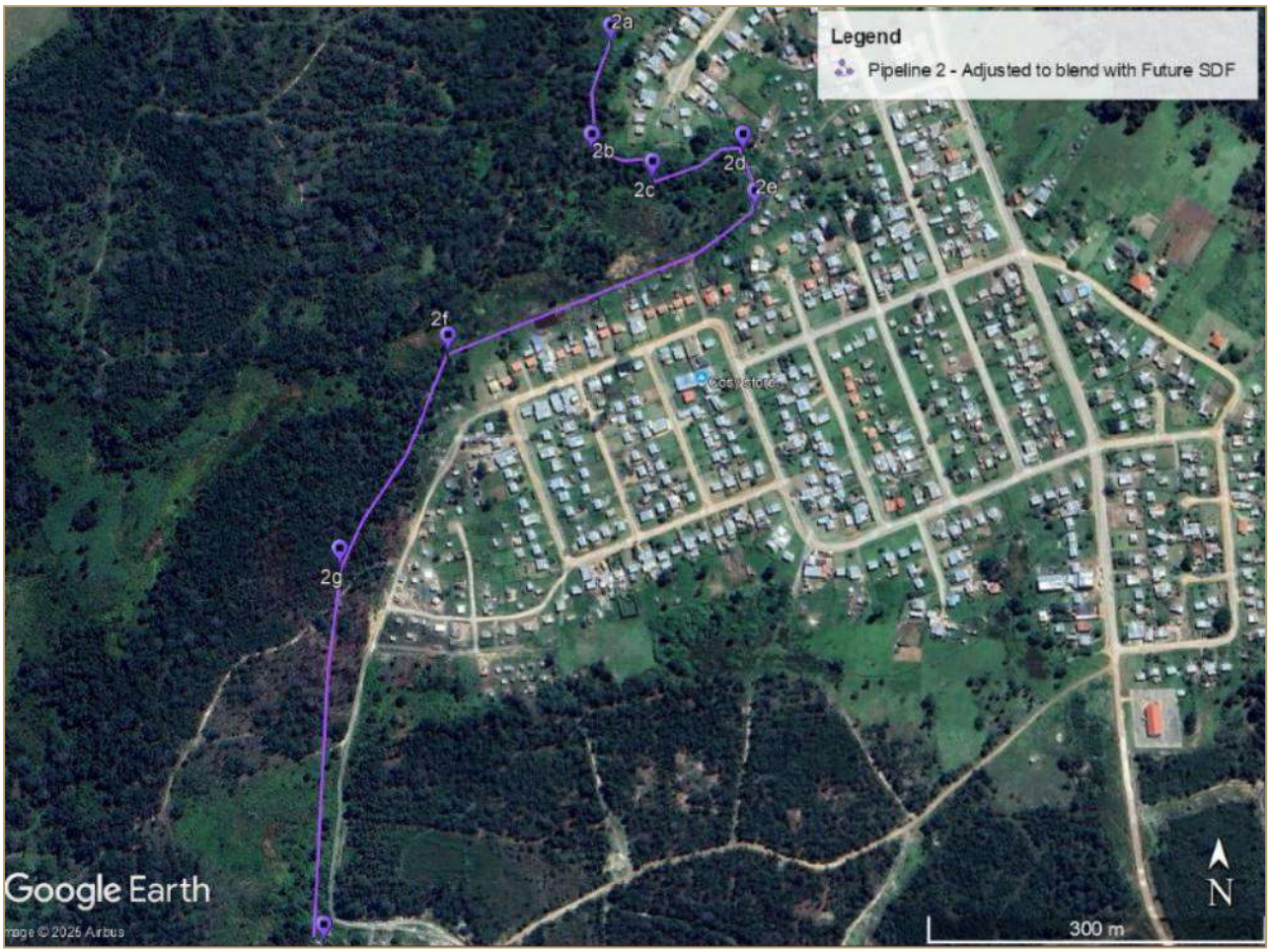

Figure 19: Bulk pipeline route alternative 2

- **Bulk pipeline alternative route 3 (1250meters)**
- Starting point of the activity – a
- Middle point of the activity – b
- Middle point of the activity – c
- Middle point of the activity – d
- Middle point of the activity – e
- Middle point of the activity – f
- Middle point of the activity – g
- Middle point of the activity – h
- Middle point of the activity – i
- End point of the activity – h

Latitude (S):	Longitude (E):
34° 0'12.83"S	24° 9'47.14"E
34° 0'16.72"S	24° 9'43.77"E
34° 0'18.14"S	24° 9'48.92"E
34° 0'19.08"S	24° 9'49.45"E
34° 0'20.44"S	24° 9'47.69"E
34° 0'22.65"S	24° 9'42.30"E
34° 0'23.51"S	24° 9'38.89"E
34° 0'32.55"S	24° 9'31.29"E
34° 0'34.92"S	24° 9'36.41"E
34° 0'39.23"S	24° 9'35.02"E

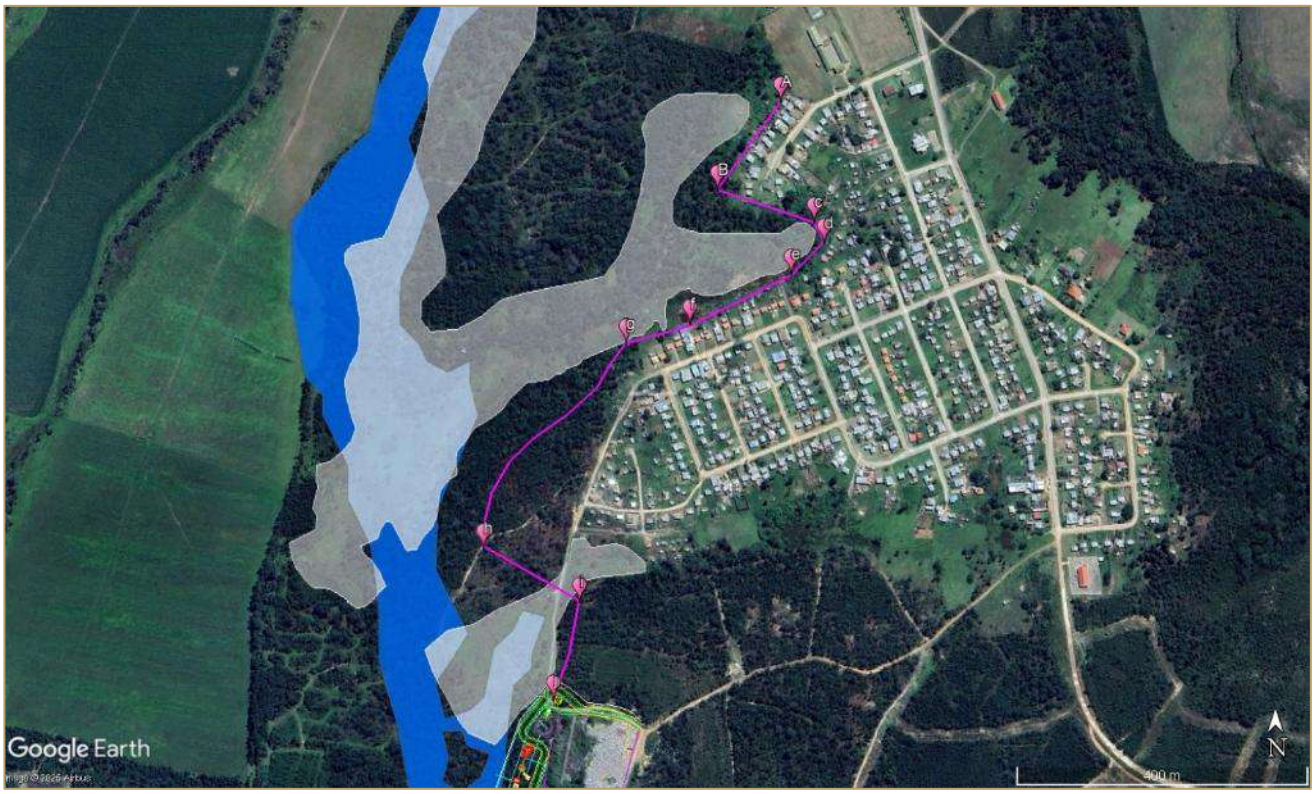

Figure 20: Bulk pipeline route alternative 3

For route alternatives that are longer than 500m, please provide an addendum with co-ordinates taken every 250 meters along the route for each alternative alignment.

A4 PHYSICAL SIZE OF THE ACTIVITY

Indicate the physical size of the preferred activity/technology as well as alternative activities/technologies (footprints):

Alternative:	**Size of the activity:**
Alternative A1[2] (preferred activity alternative)	2.5 ha /
Alternative A2 (if any)	m^2
Alternative A3 (if any)	m^2

or, for linear activities:

Alternative:	Length of the activity:
Pipeline Route 1	1025 m
Pipeline Route 2	1010 m
Pipeline Route 3	1250 m

Indicate the size of the alternative sites or servitudes (within which the above footprints will occur):

Alternative:	**Size of the site/servitude:**
Alternative A1 (preferred activity alternative)	327 ha
Alternative A2 (if any)	m^2

[2] "Alternative A.." refer to activity, process, technology or other alternatives.

Alternative A3 (if any)	m^2

A5 SITE ACCESS

Does ready access to the site exist?	**YES** ■
If NO, what is the distance over which a new access road will be built	m

Describe the type of access road planned:

Site access is in place however the site does require upgrading to allow ease of access during construction and operational phases. The eastern road will be used as the main access road to the site. The western access road is noted to be within 32 meters of the delineated wetland area, and this road will likely to be used for installation of the pipeline. The proposed access road has a 10-meter-wide road reserve, which includes a 2-meter-wide service corridor on either side to accommodate underground utilities. The road has been designed to accommodate a SANRAL single-unit design vehicle, which requires a minimum turning radius of 10 meters. A two-way traffic is incorporated and an access control point at the entrance to regulate vehicular movement. The revised layout places this infrastructure outside the delineated wetland area (Refer to appendix A - site layout 2 and 3).

Include the position of the access road on the site plan and required map, as well as an indication of the road in relation to the site.

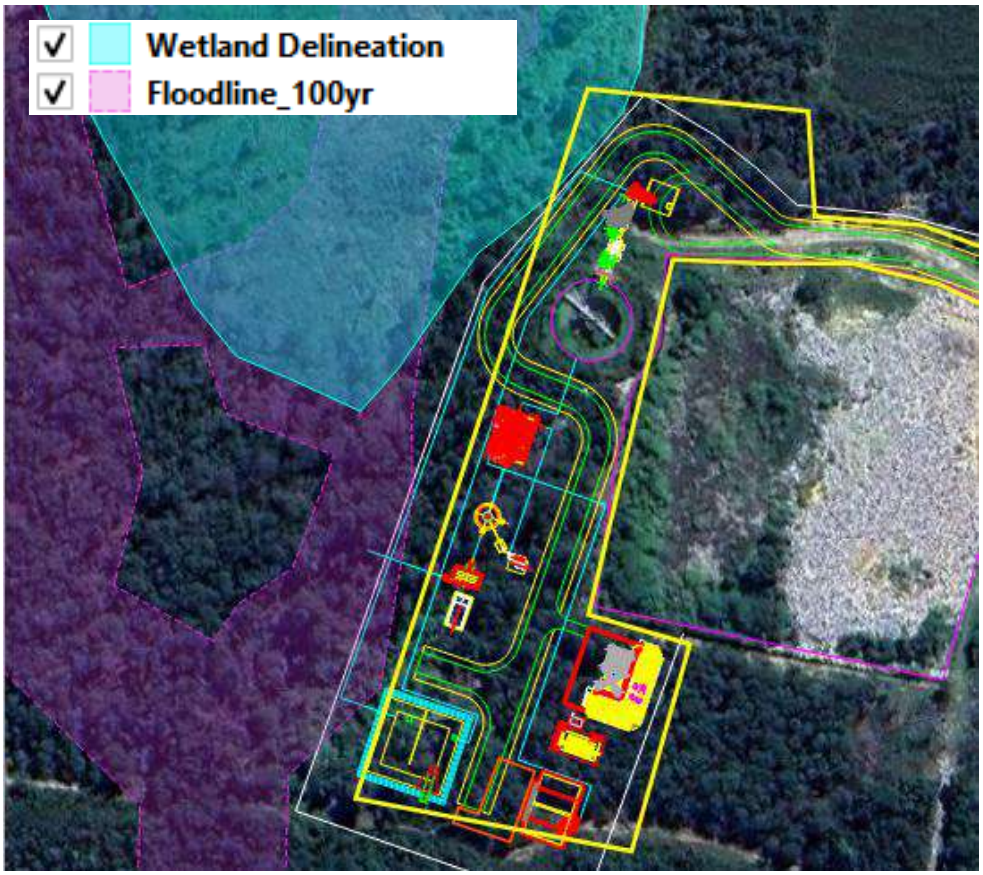

Figure 21: Road access upgrades shown north of the site with sections within 32 meters of wetland delineation (adapted from Confluent, August 2025)

A6 SITE OR ROUTE PLAN

A detailed site or route plan(s) must be prepared for each alternative site or alternative activity. It must be attached as Appendix A to this document.

The site or route plans must indicate the following:

6.1 the scale of the plan which must be at least a scale of 1:500;

6.2 the property boundaries and numbers of all the properties within 50 metres of the site;

6.3 the current land use as well as the land use zoning of each of the properties adjoining the site or sites;

6.4 the exact position of each element of the application as well as any other structures on the site;

6.5 the position of services, including electricity supply cables (indicate above or underground), water supply pipelines, boreholes, street lights, sewage pipelines, storm water infrastructure and telecommunication infrastructure;

6.6 all trees and shrubs taller than 1.8 metres;

6.7 walls and fencing including details of the height and construction material;

6.8 servitudes indicating the purpose of the servitude;

6.9 sensitive environmental elements within 100 metres of the site or sites including (but not limited thereto):

- rivers;
- the 1:100 year flood line (where available or where it is required by DWA);
- ridges;
- cultural and historical features;
- areas with indigenous vegetation (even if it is degraded or infested with alien species);

6.9 for gentle slopes the 1 metre contour intervals must be indicated on the plan and whenever the slope of the site exceeds 1:10, the 500mm contours must be indicated on the plan; and

6.10 the positions from where photographs of the site were taken.

Refer to Appendix A

A7 SITE PHOTOGRAPHS

Colour photographs from the centre of the site must be taken in at least the eight major compass directions with a description of each photograph. Photographs must be attached under Appendix B to this form**.** It must be supplemented with additional photographs of relevant features on the site, if applicable.

Refer to Appendix B

A8 FACILITY ILLUSTRATION

A detailed illustration of the activity must be provided at a scale of 1:200 as Appendix C for activities that include structures. The illustrations must be to scale and must represent a realistic image of the planned activity. The illustration must give a representative view of the activity.

Detailed designs are provided. Refer to Appendix C

A9 ACTIVITY MOTIVATION

9(a) Socio-economic value of the activity

What is the expected capital value of the activity on completion?	R62 million	
What is the expected yearly income that will be generated by or as a result of the activity?	Unknown	
Will the activity contribute to service infrastructure?	**YES**	
Is the activity a public amenity?		**NO**
How many new employment opportunities will be created in the development phase of the activity?	Development costs calculated at R62 million. Unknown – estimated 40 - 70	
What is the expected value of the employment opportunities during the development phase?	Development costs calculated at R62 million.	
What percentage of this will accrue to previously disadvantaged individuals?	Unknown – estimated 80%	
How many permanent new employment opportunities will be created during the operational phase of the activity?	Unknown – estimated 10 to 15	
What is the expected current value of the employment opportunities during the first 10 years?	O&M costs over 5 years estimated R6 128 090	
What percentage of this will accrue to previously disadvantaged individuals?	Unknown – estimated 80%	

9(b) Need and desirability of the activity

Motivate and explain the need and desirability of the activity (including demand for the activity):

The current sewage system is not functioning. The system requires upgrading to a treatment capacity in line with current and planned population growth in the area and to accommodate the planned SDP housing in the area.

Indicate any benefits that the activity will have for society in general:

Address existing pollution and health risk on and downstream of the settlement and WWTW. The proposed small-bore sanitation system aims to address the current problem.

Indicate any benefits that the activity will have for the local communities where the activity will be located:

Address existing pollution and health risk on and downstream of the settlement and WWTW. The proposed small-bore sanitation system aims to address the current problem.

A10 APPLICABLE LEGISLATION, POLICIES AND/OR GUIDELINES

Province of the EASTERN CAPE
ECONOMIC DEVELOPMENT, ENVIRONMENTAL AFFAIRS & TOURISM

List all legislation, policies and/or guidelines of any sphere of government that are applicable to the application as contemplated in the EIA regulations, if applicable:

Title of legislation, policy or guideline:	Administering authority:	Date:
Environmental Conservation Act (Act 73 of 1989)	**DFFE**	**1989**
Constitution of the Republic of South Africa		**1997**
National Environmental Management Act	**DEDEAT / DFFE**	**1998**
Environmental Impact Assessment Regulations	**DEDEAT / DFFE**	**2014**

Identified NEMA EIA Related Listed activity	**Relevance to project**
Listing Notice 1	
GNR. 327 - Activity 10 The development and related operation of infrastructure exceeding 1 000 metres in length for the bulk transportation of sewage, effluent, process water, waste water, return water, industrial discharge or slimes… – excluding where— (a) such infrastructure is for the bulk transportation of sewage, effluent, process water, waste water, return water, industrial discharge or slimes inside a road reserve or railway line reserve; or (b) where such development will occur within an urban area.	Pipeline is estimate at 1250 meters, outside urban area.
GNR. 327 - Activity 12 The development of— (ii)infrastructure or structures with a physical footprint of 100 square metres or more; where such development occurs— (a) within a watercourse; (b) in front of a development setback; or (c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse; — excluding— (cc) activities listed in activity 14 in Listing Notice 2 of 2014 or activity 14 in Listing Notice 3 of 2014, in which case that activity applies; (dd) where such development occurs within an urban area**;**	Definition of development: "development" means the building, erection, construction or establishment of a facility, structure or infrastructure, including associated earthworks or borrow pits, that is necessary for the undertaking of a listed or specified activity, but excludes any modification, alteration or expansion of such a facility, structure or infrastructure, including associated earthworks or borrow pits, and ***excluding the redevelopment of the same facility in the same location, with the same capacity and footprint;*** Site zoned agricultural1; delineated wetland occurs within 32 meters of some components, and crossing of pipeline over wetland over estimated 40 meter

	distance. Site is within a strategic water source area, with a high aquifer potential, a fish FEPA and ECBCP aquatic ESA1 ECBCP Terrestrial CBA 1; Tsitsikamma sandstone fynbos (2022 list ecosystems – least concern); Pipeline over Coastal Shale Band Vegetation (FFb6) (Ecosystem Status, 2022: endangered) Previous footprint is 980m2 (in least threatened vegetation; Koukamma LM). Future maintenance activities and ongoing upgrades and improvements likely required. Activity 14 in Listing Notice 3 of 2014 applies
GNR. 327 - Activity 19 The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse; but excluding where such infilling, depositing, dredging, excavation, removal or moving— (a) will occur behind a development setback; (b) is for maintenance purposes undertaken in accordance with a maintenance management plan;	NEMA definition "watercourse" means – (a) a river or spring; (b) a natural channel in which water flows regularly or intermittently; (c) a wetland, pan, lake or dam into which, or from which, water flows; and any collection of water which the Minister may, by notice in the Gazette, declare to be a watercourse as defined in the National Water Act, 1998 (Act No. 36 of 1998); and a reference to a watercourse includes, where relevant, its bed and banks; and **"wetland"** means land which is transitional between terrestrial and aquatic systems where the water table is usually at or near the surface, or the land is periodically covered with shallow water, and which land in normal circumstances supports or would support vegetation typically adapted to life in saturated soil. Delineated wetland occurs within 32 meters of some and crossing of pipeline over wetland over estimated 40-meter distance. Future maintenance activities and ongoing upgrades and improvements likely required.
GNR. 327 -Activity 25 ***The development*** and ***related operation of facilities or infrastructure*** for the treatment of effluent, wastewater or sewage with a daily throughput capacity of more than 2 000 cubic metres but less than 15 000 cubic metres.	Not triggered ADWF – 462.37 kl/d, PDWF – 869.45 kl/d, PWWF – 1041.122 kl/d -). GA in place for discharge of effluent. WUL is being applied for c, I and f DWS water uses
GNR. 327 - Activity 27 The clearance of an area of 1 hectare or more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for— (i) the undertaking of a linear activity; or (ii) maintenance purposes undertaken in accordance with a maintenance management plan.	Development footprint off wwtw is approximately 2.2 ha; the pipeline is 1250 meters requiring about 3 meters of disturbance and therefore approximately 3000m2 disturbance footprint. A return effluent pipeline, back to the town, if incorporated into future planning, will be a similar footprint. Previous footprint is 980m2
GNR. 327 - Activity 28 Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture, game farming, equestrian purposes or afforestation on or after 01 April 1998 and where such development:	Not triggered. The site has not been used for agricultural purposes and should be zoned accordingly. Site already developed for WWTW use.

(i) will occur inside an urban area, where the total land to be developed is bigger than 5 hectares; or **(ii)** will occur outside an urban area, where the total land to be developed is bigger than 1 hectare; excluding where such land has already been developed for residential, mixed, retail, commercial, industrial or institutional purposes.	An agricultural compliance statement has been prepared as part of this application process. .
GNR. 327 - Activity 31 The decommissioning of existing facilities, structures or infrastructure for— (i) any development and related operation activity or activities listed in this Notice, Listing Notice 2 of 2014 or Listing Notice 3 of 2014; (ii) any expansion and related operation activity or activities listed in this Notice, Listing Notice 2 of 2014 or Listing Notice 3 of 2014; (iv) any phased activity or activities for development and related operation activity or expansion or related operation activities listed in this Notice or Listing Notice 3 of 2014; or (v) any activity regardless the time the activity was commenced with, where such activity: (a) is similarly listed to an activity in (i) above; and (b) is still in operation or development is still in progress; **excluding where—** ~~***(aa) activity 22 of this notice applies; or***~~ ***(bb) the decommissioning is covered by part 8 of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) in which case the National Environmental Management: Waste Act, 2008 applies.***	Dismantling and removal of disused equipment Disposal or transfer off site of disused equipment to a suitable location identified Emptying and cleaning of structures Replacement and refurbishment the planned upgrade to be achieved to treat current waste stream and future planned waste streams (additional housing and relocation planned in the treatment catchment area) Part 8 of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) applies to contaminated land, regardless of when or how the contamination occurred. To be confirmed by engineer and KKLM. Burying and covering waste?
GNR. 327 – Activity 34 The expansion of existing facilities or infrastructure for any process or activity where such expansion will result in the need for a permit or licence or an amended permit or licence in terms of national or provincial legislation governing the release of emissions, effluent or pollution, excluding— (i) where the facility, infrastructure, process or activity is included in the list of waste management activities published in terms of section 19 of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) in which case the National Environmental Management: Waste Act, 2008 applies; [or] ***(ii) the expansion of existing facilities or infrastructure for the treatment of effluent, wastewater, polluted water or sewage where the capacity will be increased by less than 15 000 cubic metres per day; or*** ~~(iii) the expansion is directly related to aquaculture facilities or infrastructure where the wastewater discharge capacity will be increased by 50 cubic meters or less per day.~~	**"expansion"** means the modification, extension, alteration or upgrading of a facility, structure or infrastructure at which an activity takes place in such a manner that the capacity of the facility or the footprint of the activity is increased; **Will be increased by less than 15000 cubic meters / day** **Exclusion applies**
GNR. 327 - Activity 48 The expansion of (i) infrastructure or structures with a physical footprint of 100 square metres or more;	**"expansion"** means the modification, extension, alteration or upgrading of a facility, structure or infrastructure at which an activity takes place in such a manner that the capacity of the facility or the footprint of the activity is increased;

where such development occurs— (a) within a watercourse; (c) if no development setback has been adopted, within 32 m of a watercourse measured form the edge of the watercourse **excluding—** (cc) activities listed in activity 14 in Listing Notice 2 of 2014 or **activity 14 in Listing Notice 3 of 2014,** in which case that activity applies; (dd) where such expansion occurs within an urban area; or (ee) where such expansion occurs within existing roads, road reserves or railway line reserves.	Activity 14 in Listing Notice 3 of 2014 is triggered
GNR. 327 - Activity 57 The expansion and related operation of facilities or infrastructure for the treatment of effluent, wastewater or sewage where the capacity will be increased by 15 000 cubic metres or more per day and the development footprint will increase by 1 000 square meters or more.	Not Triggered Site is 2.4 ha, Current footprint is 974m2. Site will be expanded by more than 1000 square meters. Treatment capacity is (average) 0.5Ml / day or 500 cubic meters / day. -
Listing Notice 2	
GNR. 325 - Activity 6 The development of facilities or infrastructure for any process or activity which requires a permit or licence or an amended permit or licence in terms of national or provincial legislation governing the generation or release of emissions, pollution or effluent, excluding– (i) activities which are identified and included in Listing Notice 1 of 2014; (ii) activities which are included in the list of waste management activities published in terms of section 19 of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) in which case the National Environmental Management: Waste Act, 2008 applies; (iii) the development of facilities or infrastructure for the treatment of effluent, polluted water, wastewater or sewage where such facilities have a daily **throughput capacity of 2 000 cubic metres** or less; or (iv) where the development is directly related to aquaculture facilities or infrastructure where the wastewater discharge capacity will not exceed 50 cubic metres per day.	Not triggered Upgrade to Treatment capacity is (average) 0.5Ml / day or 500 cubic meters / day. New BNR treatment facilities, chlorine contact tank, sludge drying and storage areas developed.
GNR. 325 -Activity 25 The development and related operation of facilities or infrastructure for the treatment of effluent, wastewater or sewage with a daily throughput capacity of 15 000 cubic metres or more.	500 cubic meters daily throughput treatment capacity. Not triggered
Listing Notice 3	
GNR. 324 – Activity 4 The development of a road wider than 4 metres with a reserve less than 13.2 meters. a. Eastern Cape i. Outside urban areas: (bb) National Protected Area Expansion Strategy Focus areas; (cc) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority; (dd) Sites or areas identified in terms of an international convention; (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;	Terrestrial CBA 1 in terms of ECBCP The site is situated within 5 km and 10 km of portions of the Garden Route National Park (1.3 km to the north, 1.2 km to the south-west and 6.6 km to the west) and falls within a proposed SANParks Garden Route NP expansion area. The site falls within the designated Garden Route Biosphere Reserve. The proposed access road has a 10-meter-wide road reserve, which includes a 2-meter-wide service corridor on either side to accommodate underground utilities. The road has been designed to accommodate a SANRAL single-unit design vehicle, which requires a minimum turning radius of 10 meters.

(gg) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core areas of a biosphere reserve, excluding disturbed areas;	The layout allows for two-way traffic and incorporates an access control point at the entrance to regulate vehicular movement. Some sections of the road will be new.
GNR. 324 -Activity 12 The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan. Eastern Cape i. Within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA or prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial Biodiversity Assessment 2004; ii. Within critical biodiversity areas identified in bioregional plans;	Triggered Terrestrial CBA 1; aquatic ESA in terms of ECBCP Tsitsikamma sandstone fynbos (2022 list ecosystems – least concern) Coastal Shale Band Vegetation (FFb6) (Ecosystem Status, 2022: endangered) The site is situated within 5 km and 10 km of portions of the Garden Route National Park (1.3 km to the north, 1.2 km to the south-west and 6.6 km to the west) and falls within a proposed SANParks Garden Route NP expansion area. The site falls within the designated Garden Route Biosphere Reserve.
GNR. 324 - Activity 14 The development of (ii) infrastructure or structures with a physical footprint of 10 square metres or more; where such development occurs— (a) within a watercourse; (c) if no development setback has been adopted, within 32 m of a watercourse measured form the edge of the watercourse Eastern Cape i. Outside urban areas: (bb) National Protected Area Expansion Strategy Focus areas; (dd) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority; (ee) Sites or areas identified in terms of an international convention; (ff) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; (hh) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core area of a biosphere reserve; ii. Inside urban areas:	Triggered Terrestrial CBA 1; aquatic ESA in terms of ECBCP Tsitsikamma sandstone fynbos (2022 list ecosystems – least concern) Coastal Shale Band Vegetation (FFb6) (Ecosystem Status, 2022: endangered) Delineated wetland occurs within 32 meters of some components and crossing of pipeline over wetland over estimated 40-meter distance. The site is situated within 5 km and 10 km of portions of the Garden Route National Park (1.3 km to the north, 1.2 km to the south-west and 6.6 km to the west) and falls within a proposed SANParks Garden Route NP expansion area. The site falls within the designated Garden Route Biosphere Reserve (UNESCO, 2017) Future maintenance activities and ongoing upgrades and improvements likely required.
GNR. 324 – Activity 18	Triggered

<u>The widening of a road by more than 4 metres,</u> or the lengthening of a road by more than 1 kilometre. **a. Eastern Cape** i. Outside urban areas: (bb) National Protected Area Expansion Strategy Focus areas; (cc) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority; (dd) Sites or areas identified in terms of an international convention; (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; (gg) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core area of a biosphere reserve; (kk) A watercourse; or	Terrestrial CBA 1 in terms of ECBCP The proposed access road has a 10-meter-wide road reserve, which includes a 2-meter-wide service corridor on either side to accommodate underground utilities. The road has been designed to accommodate a SANRAL single-unit design vehicle, which requires a minimum turning radius of 10 meters. The layout allows for two-way traffic and incorporates an access control point at the entrance to regulate vehicular movement.	
GNR. 324 - Activity 23 The expansion of (ii) infrastructure or structures with a physical footprint of 10 square metres or more; where such development occurs— (a) within a watercourse; (c) if no development setback has been adopted, within 32 m of a watercourse measured form the edge of the watercourse Eastern Cape i. Outside urban areas: (aa) A protected area identified in terms of NEMPAA, excluding conservancies; (bb) National Protected Area Expansion Strategy Focus areas; (cc) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority; (dd) Sites or areas identified in terms of an international convention; (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; (gg) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core area of a biosphere reserve; ii. Inside urban areas: ~~(aa) Areas zoned for use as public open space; or~~ ~~(bb) Areas designated for conservation use in Spatial Development Frameworks adopted by the competent authority or zoned for a conservation purpose.~~	Triggered Some road upgrades and maintenance required on existing roads. Falling within 32 meters / within delineated wetland. Future maintenance activities and ongoing upgrades and improvements likely required. The site is situated within 5 km and 10 km of portions of the Garden Route National Park (1.3 km to the north, 1.2 km to the south-west and 6.6 km to the west) and falls within a proposed SANParks Garden Route NP expansion area. The site falls within the designated Garden Route Biosphere Reserve.	
Provincial Nature and Environmental Conservation Ordinance No 19 of 1974	**DEDEAT**	**1974**

National Environmental Management: Biodiversity Act, 2004 (Act No.10 Of 2004)	**DFFE / DEDEAT**	**2004**
National Forest Act (Act 84 of 1998)	**DFFE: forestry**	**1998**
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. Disturbance / removal of trees protected in terms of the National forest Act will also require a permit. 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 AIS list supersedes CARA);		
National Environmental Management: Waste Act 59 Of 2008 *Any waste or portion of waste referred to in paragraphs (a) and (b) ceases to be considered waste:* ***i*** *i. Once an application for its re-use, recycling or recovery has been approved or, after such approval, once it is, or has been re-used, recycled or recovered;*	**DFFE**	**2008**
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	**DFFE**	**2017**

Waste management activities, GN 921, 2013 (as amended)	**Comment**
Category A	
Storage of waste	
(1)The storage of general waste in lagoons.	Not lagoon; not general waste. Sludge drying beds and dried sludge storage area. Sludge management guidelines Composting norms and standards if applicable Storage of waste norms and standards
Recycling or recovery of waste	
(3) The recycling of general waste at a facility that has an operational area in excess of 500 m2, excluding recycling that takes place as an integral part of an internal manufacturing process within the same premises.	No
(4) The recycling of hazardous waste in excess of 500 kg but less than 1 ton per day calculated as a monthly average, excluding recycling that takes place as an integral part of an internal manufacturing process within the same premises.	No
(5) The recovery of waste including the refining, utilisation, or co-processing of waste in excess of 10 tons but less than 100 tons of general waste per day or in excess of 500 kg but less than 1 ton of hazardous waste per day, excluding recovery that takes place as an integral part of an internal manufacturing process within the same premises.	No
Treatment of waste	
(6) The treatment of general waste using any form of treatment at a facility that has the capacity to process in excess of 10 tons but less than 100 tons per day calculated as a monthly average, excluding the treatment of organic waste using composting and any other organic waste treatment.	No.

(7) The treatment of hazardous waste using any form of treatment at a facility that has the capacity to process in excess of 500 kg but less than 1 ton per day calculated as a monthly average, excluding the treatment of effluent, wastewater, sewage or organic waste using composting or any other organic waste treatment.	No Exclusion applies WWTW excluded Sludge management guidelines
Disposal of Waste	
(9) The disposal of inert waste to land in excess of 25 tons but not exceeding 25 000 tons, excluding the disposal of such waste for the purposes of levelling and building which has been authorised by or under other legislation.	No on-site disposal
(10) The disposal of general waste to land covering an area of more than 50 m but less than 200 m and with a total capacity not exceeding 25 000 tons.	No on-site disposal
(11) The disposal of domestic waste generated on premises in areas not serviced by the municipal service where the waste disposed exceeds 500 kg per month.	No on-site disposal
Construction, expansion or decommissioning of facilities and associated structures and infrastructure	
(12) The construction of a facility for a waste management activity listed in Category A of this Schedule (not in isolation to associated waste management activity).	Facilities will be BNR components, sludge drying beds, dried sludge storage / potential compost area, contact tanks, outlets, pipeline. Sludge management guidelines Composting norms and standards if applicable Storage of waste norms and standards
(13) The expansion of a waste management activity listed in Category A or B of this Schedule which does not trigger an additional waste management activity in terms of this Schedule.	No
(14) The decommissioning of a facility for a waste management activity listed in Category A or B of this Schedule.	Existing structures will be decommissioned; not listed in A or B
Category B	
Storage of hazardous waste	
(1) The storage of hazardous waste in lagoons excluding storage of effluent, wastewater or sewage.	No – exclusion applies Sludge management guidelines Composting norms and standards if applicable Storage of waste norms and standards
Reuse, recycling or recovery of waste	
(2) The reuse or recycling of hazardous waste in excess of 1 ton per day, excluding reuse or recycling that takes place as an integral part of an internal manufacturing process within the same premises.	No – takes place within same premises – sewage influent to treated effluent and dried sludge
(3) The recovery of waste including the refining, utilisation, or co-processing of the waste at a facility that processes in excess of 100 tons of general waste per day or in excess of 1 ton of hazardous waste per day, excluding recovery that takes place as an integral part of an internal manufacturing process within the same premises.	No
Treatment of waste	
(4) The treatment of hazardous waste using any form of treatment at a facility that processes in excess of 1 ton per day calculated as a monthly average, excluding the treatment of effluent, wastewater, sewage or organic waste using composting or any other organic waste treatment.	No - exclusion applies Sludge management guidelines National Norms and Standards for organic waste composting if applicable
(5) The treatment of hazardous waste in lagoons, excluding the treatment of effluent, wastewater or sewage.	No - exclusion applies Sludge management guidelines National Norms and Standards for organic waste composting if applicable

(6) The treatment of general waste using any form of treatment at a facility that has a capacity to process in excess of 100 tons per day calculated as a monthly average, excluding the treatment of organic waste using composting or any other organic waste treatment.	No – sewage influent to treated effluent and dried sludge
Disposal of waste on land	
(7) The disposal of any quantity of hazardous waste to land.	No – there will be no onsite disposal No – sewage influent to treated effluent and dried sludge Sludge management guidelines Composting norms and standards if applicable Storage of waste norms and standards "disposal" means the burial, deposit, discharge, abandoning, dumping, placing or release of any waste into, or onto, any land; According to Schedule 3 of NEMWAA, wastewater sludge is Category A: Hazardous waste (#17 Wastes from waste management facilities (c) hazardous portion of stabilized wastes, (d) hazardous portion of wastes from aerobic treatment of solid wastes, (e) hazardous portion of wastes from anaerobic treatment of waste
(8) The disposal of general waste to land covering an area in excess of 200 m2 and with a total capacity exceeding 25 000 tons.	No
(9) The disposal of inert waste to land in excess of 25 000 tons, excluding the disposal of such waste for the purposes of levelling and building which has been authorised by or under other legislation.	There will be no disposal on site – No – sewage influent to treated effluent and dried sludge
Construction, expansion or decommissioning of facilities and associated structures and infrastructure	
(10) The construction of a facility for a waste management activity listed in Category B of this Schedule (not in isolation to associated waste management activity).	No
Residue stockpiles or residue deposits	
(11) The establishment or reclamation of a residue stockpile or residue deposit resulting from activities which require a mining right, exploration right or production right in terms of the Mineral and Petroleum Resources Development Act, 2002 (Act 28 of 2002).	No
Category C	
Norms and Standards	
Storage of Waste	
(1) The storage of general waste at a facility that has the capacity to store in excess of 100 m3 of general waste at any one time, excluding the storage of waste in lagoons or temporary storage of such waste.	No
(2) The storage of hazardous waste at a facility that has the capacity to store in excess of 80 m3 of hazardous waste at any one time, excluding the storage of hazardous waste in lagoons or temporary storage of such waste.	No Temporary storage of grit. Treatment to result in dried sludge with Ala classification.
(3) The storage of waste tyres in a storage area exceeding 500 m .	No

Recycling or recovery of waste	
(4) The scrapping or recovery of motor vehicles at a facility that has an operational area in excess of 500 m	No Standards for Scrapping or Recovery of Motor Vehicles, 2013
(5) The extraction, recovery or flaring of landfill gas.	No Standards for Extraction, Flaring or Recovery of Landfill Gas, 2013; or
(6) The sorting, shredding, grinding, crushing, screening or baling of general waste at a waste facility that has an operational area that is 1 000 m and more.	No National Norms and Standards for the Sorting, Shredding, Grinding, Crushing, Screening or Baling of General Waste, 2017.
(7) The treatment of organic waste using composting and any other organic waste treatment.	Recommended to be considered in future planning and operations of the site. National Norms and Standards for organic waste composting published under Government Notice 561 in Government Gazette 44762 of 25 June 2021. Provided in Appendix G.

Guidelines for the Utilisation and Disposal of Wastewater Sludge Volumes 1 to 6 (Herselmann & Snyman, 2006). Volume 1: Selection of management options (Snyman and Herselman, 2006b; 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)	**DWS / DFFE**	**2006**
WRC Sludge Management Guidelines of 2006 and 2009 and THE DEVELOPMENT OF A FRAMEWORK FOR THE REVIEW OF THE SLUDGE MANAGEMENT GUIDELINES, August 2024	**DWS / DFFE**	**2024**

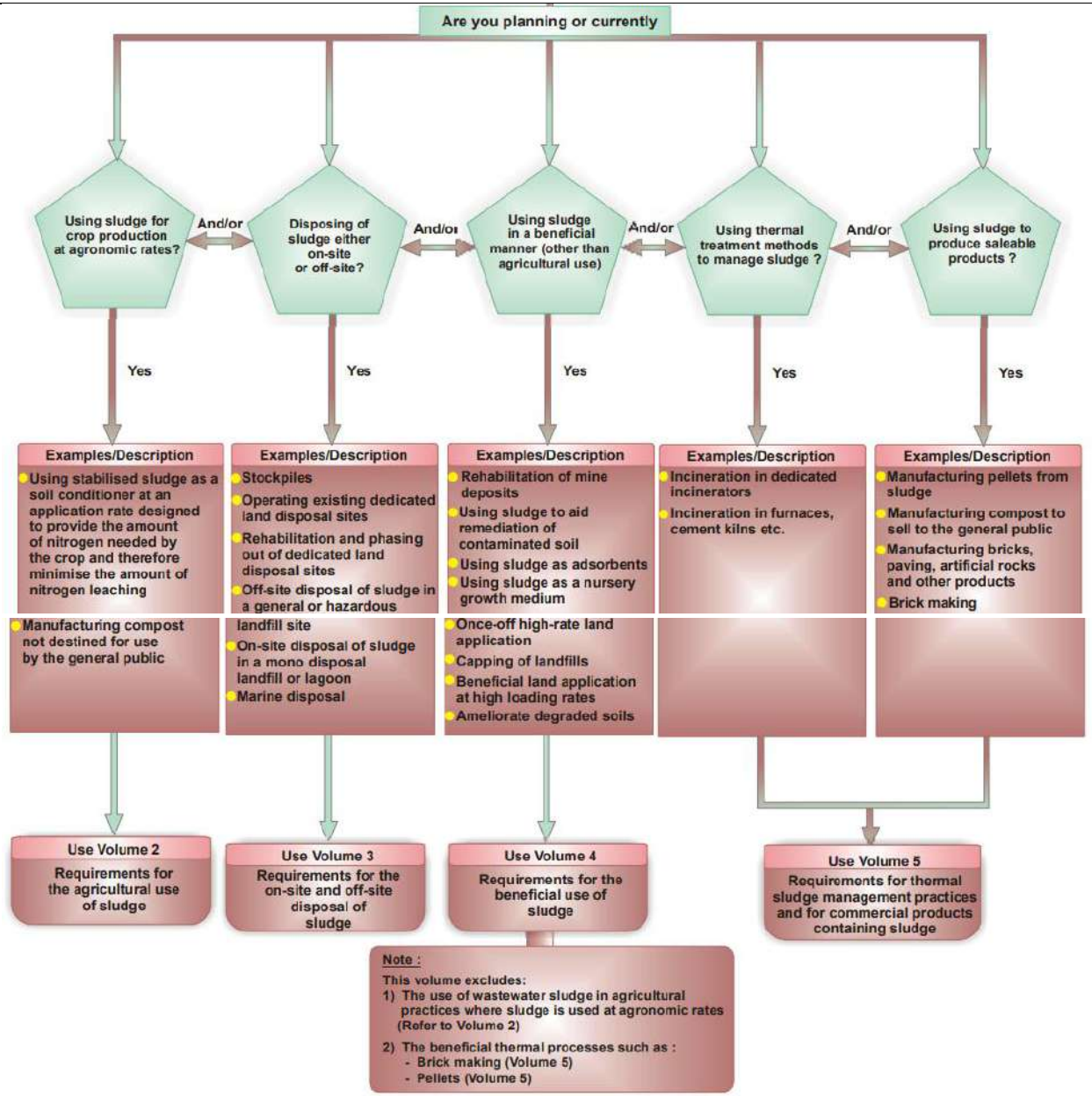

Figure 22: Sludge management decision making process, extracted from Volume 1, sludge management guidelines

All five volumes are applicable to sludge management at the upgraded Woodlands WWTW site. Various options will be applied – reuse for agricultural application, brick making operations, beneficial use, offsite disposal will be the last option considered and only done if no local demand for the sludge		
NOTE: EIA regulations and NEMWA activities - WWTW excluded in *treatment, reuse, and storage* – **not excluded for disposal**. **Temporary Storage is 90 days.** No disposal of hazardous waste. No WML required. Classification of sludge for reuse from drying beds – A1A (reuse recommended)		
Waste classification and management regulations (GNR 634 of 2013)	**DWS / DFFE**	**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). 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. 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)	**DFFE**	**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.***		
National norms and standards for the remediation of contaminated land and soil quality (GNR 331 of 2014)	**DFFE**	**2014**
National Environmental Management: Waste Act (59/2008): National Waste Management Strategy, 2020 (GN 56 of 2021) (NWMS)	**DFFE**	**2020**
GNR 982 NATIONAL NORMS AND STANDARDS FOR DOMESTIC WATER AND SANITATION SERVICES, 08 SEPTEMBER 2017 (DWS)	**DWS**	**2017**
The Fertilisers, Farm Feeds, Agricultural Remedies and Stock Remedies Act (Act 36 of 1947)	**DALDRR / EC Agriculture**	**1947**

Sludge, or products derived from sludge, may be used as a fertilizer or soil amendment. If these are intended for agricultural use, they will require registration in terms of this act.		
National Water Act (Act 36 of 1998)	**DWS**	**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 following water uses have been applied for as part of the integrated Water Use License (WUL) for the WWTW upgrade: • 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. Section 21 (g) of the Act: Disposing of waste in a manner which may detrimentally impact on a water resource - this will not be applied for as confirmed in meeting with DWS. There will be no disposal of waste on site. Section 21 (i) of the Act: Engaging in a controlled activity identified as such in section 37(1) or declared under section 28(1) of the NWA. A Section 21e water use license / general authorisation as applicable would need to be applied for in order to authorised irrigation with water containing waste. Note: A GA for irrigation is applicable when: • No more than 2 000 m3 of domestic wastewater is irrigated on any given day; and (plant is maximum 1000m3) • Water quality complies with wastewater limits (will be treated to general limits – ammonia as N will need to be 2mg/l (not 6mg/l) to irrigate) This GA is only permitted when irrigation takes place: • More than 50m above the 1 in 100-year flood line or riparian habitat whichever is the greatest; (floodline delineated – cannot irrigate within 50 m of floodline in terms of GA) • At least 100m from a water course; (watercourses delineated – cannot irrigate within 100m of watercourses in terms of GA) • At least 500m from a borehole that is utilised for drinking water or stock watering; (not likely – no registered users within 500 meters in terms of GA) • At least 500m from a wetland; and (wetland delineated – cannot irrigate within 500 meters of wetland in terms of GA)		

• On land that is not, or does not, overlie a major aquifer. (the aquifer is considered moderate and further assessment will be carried out once monitoring boreholes are drilled; cannot irrigate on major aquifer in terms of GA)		
NATIONAL HEALTH ACT, 2003 (ACT NO 61 OF 2003)	**DEPARTMENT OF HEALTH**	**2003**
National Environmental Health Policy	DEPARTMENT OF HEALTH	**2013**
NATIONAL NORMS AND STANDARDS RELATING TO ENVIRONMENTAL HEALTH IN TERMS OF NATIONAL HEALTH ACT, 2003 (ACT NO 61 OF 2003)	DEPARTMENT OF HEALTH	**2013**
The NATIONAL NORMS AND STANDARDS RELATING TO ENVIRONMENTAL HEALTH IN TERMS OF NATIONAL HEALTH ACT, 2003 (ACT NO 61 OF 2003) are applicable to construction sites and vacant land is applicable to the baseline conditions and upgrade. *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.*		
National Heritage Resources Act (Act 25 of 1999)	**SAHRA / ECPRHA**	**1999**
As required in terms of the National Heritage Resources Act (Act 25 of 1999), a Notice of Intent to Develop (NID) has been submitted to the Eastern Cape Provincial Heritage Resources Authority (ECPHRA) supported by the screener report prepared by CTS heritage.		
Eastern Cape Biodiversity Conservation Plan, 2019		
KKLM IDP and SDF		
Fynbos Forum Ecosystem Guidelines for Environmental Assessment in the Western Cape Ecosystem Guidelines, Albany Thicket, 2021		
National Development Plan 2030 (NDP) (2012)		
STR Protocol guidelines, 2020		
National Protected Area Expansion Strategy (NPAES), 2008		

A11 WASTE, EFFLUENT, EMISSION AND NOISE MANAGEMENT

11(a) Solid waste management

Will the activity produce solid construction waste during the construction/initiation phase?	**YES**	NO
If yes, what estimated quantity will be produced per month?	Not provided – estimated 20m^3	

How will the construction solid waste be disposed of (describe)?

The current digester tank system will be discontinued, and some internal reticulation pipes require replacement with 160mm diameter class 34 uPVC pipes.
An estimated 20m3 is estimated to be produced per month – however there will be some months (during early decommissioning stages) where waste quantity could reach 100m3.
Recycling dismantled components must be included in the tender phase and costed by the contractor. Plastic and metals are recommended to be cleaned and sent to recycling facilities.
Disposal at a licensed waste site as appropriate must be included in the tender phase and costed by the contractor; the adjacent landfill is recommended NOT be used as this does not seem to have any operational management. The provision of waste sorting facilities (adequate skips and bins for separation and storage) on site must also be included in the tender by the bidding contractors. If this is not done, then no budget is available for waste management and contractors' resort to burning / burying of waste, illegal dumping and no waste sorting or recycling measures.
Any existing sewage waste on site due to failure of current WWTW will need to be stored safely until the WWTW is operating and then it can be placed at the head of works for effective treatment. Alternatively it will need to be sent to a nearby operational and licensed WWTW for treatment.
Waste may not be buried on site.
Only excavated soils and rocks may be stockpiled correctly on site for use as fill during levelling.

Where will the construction solid waste be disposed of (describe)?

Closest registered transfer site and or WWTW as appropriate to waste stream

Will the activity produce solid waste during its operational phase?	**YES**	NO
If yes, what estimated quantity will be produced per month?	Not provided – estimated 5m^3	

How will the solid waste be disposed of (describe)?

Screening and grit material will be generated on an ongoing basis. Screenings and grit left lying around will cause nuisance conditions such as odours and will encourage fly breeding. A suitable designed waste storage facility must be provided for temporary storage of this material and it is recommended to be removed offsite and disposed of at a suitably licensed landfill site. Waste disposal records must be kept for screenings and grit material. General waste will also be generated by maintenance activities on site (building, painting, AIS clearing, packaging etc.). from operators. Suitable waste facilities will be required for general waste generated. The remaining sewage and wastewater stream will be treated on site and result in a sludge product aimed at reaching an A1a sludge classification, and an effluent stream aimed at reaching the general DWS limits.

Where will the solid waste be disposed if it does not feed into a municipal waste stream (describe)?

Screenings and grit - Suitably licensed site
General waste – nearest registered general waste site

If the solid waste (construction or operational phases) will not be disposed of in a registered landfill site or be taken up in a municipal waste stream, then the applicant should consult with the competent authority to determine whether it is necessary to change to an application for scoping and EIA.

Can any part of the solid waste be classified as hazardous in terms of the relevant legislation?	**YES**	NO

If yes, inform the competent authority and request a change to an application for scoping and EIA.

Is the activity that is being applied for a solid waste handling or treatment facility?	**YES**	NO

If yes, then the applicant should consult with the competent authority to determine whether it is necessary to change to an application for scoping and EIA.

No disposal of hazardous waste will occur on site.
The WWTW will temporarily store and treat the hazardous sewage wastewater into sludge and effluent streams. The sludge will be treated to a sludge classification that will render it safe for reuse on agricultural land and / or safe offsite disposal at a registered general waste site and / or safe for reuse in brick making operations. Effluent released will be treated to be within general limits of DWS.
Classification of sludge will be required and records of quantities of sludge reused / disposed will need to be taken, kept and shared with authorities. Sludge management will need to comply with the relevant sludge management guidelines as applicable to reuse / offsite disposal option.
Monthly records of water quality and quantity of effluent will need to be taken, kept and shared with authorities. Effluent management will need to comply with conditions of the water use license.

11(b) Liquid effluent

Will the activity produce effluent, other than normal sewage, that will be disposed of in a municipal sewage system?	YES	**NO**
If yes, what estimated quantity will be produced per month?	m^3	
Will the activity produce any effluent that will be treated and/or disposed of on site?	**Yes**	NO

If yes, the applicant should consult with the competent authority to determine whether it is necessary to change to an application for scoping and EIA.

Will the activity produce effluent that will be treated and/or disposed of at another facility?	YES	**NO**

If yes, provide the particulars of the facility:

Facility name:			
Contact person:			
Postal address:			
Postal code:			
Telephone:		Cell:	
E-mail:		Fax:	

Describe the measures that will be taken to ensure the optimal reuse or recycling of waste water, if any:

Reuse of the effluent has not been applied as part of this WUL application, but it is recommended to be considered in future planning by KKLM and is assessed as a *with-mitigation measure* in place. The effluent will be discharged. The upgrade will require a water use license for section 21 c, I and f water uses.

11(c) Emissions into the atmosphere

Will the activity release emissions into the atmosphere?	**YES**	NO
If yes, is it controlled by any legislation of any sphere of government?	**YES**	NO

If yes, the applicant should consult with the competent authority to determine whether it is necessary to change to an application for scoping and EIA.

If no, describe the emissions in terms of type and concentration:

During construction, vegetation will be cleared. The clearing of vegetation will give rise to windblown dust and dust via vehicle entrainment and construction works. Fumes will be emitted from construction vehicles. The Particulate Matter concentration in the atmosphere will slightly increase due to the construction activities and this slight increase will be of short duration. The amount of emissions expected will be very small and will not trigger any of the listed activities promulgated 1 November 2013 (GN R. 893) in terms of Section 21(1) b of the National Environmental Management: Air Quality Act (No of 2004) as amended.
Furthermore, the emissions will be within the acceptable dust fall rate (D < 600 mg/m2/day, 30-days average) according to the Dust Control Regulations promulgated 1 November 2013 (GN R. 827) in terms of the National Environmental Management: Air Quality Act (No of 2004) as amended. The activity is not listed as a category requiring an air emissions license in terms of the NEMAQA.

The WWTW will be designed and operated per the sludge management guidelines so that odours are minimal during operational phase. Strong odours would be indication of operational problems that need to be immediately addressed. The relevant sludge management guidelines need to be complied with and these specifically address the prevention of odours. The WWTW design allows for treatment to a stability class of 1.
Sludge drying beds (which will be lined and equipped to return drainage to head of the WWTW) will be on site and these must be managed accordingly. Dried sludge suitable for reuse and / or offsite disposal is recommended to not be stored on site for more than 90 days. (If it is then it will be disposal and no longer storage on site, and a waste management license will be required)
Emergency stormwater ponds will be lined with sand and equipped for contents to be returned to head of work and thus remaining part of the treatment process and not on-site disposal.

Extracted from sludge management guideline: GUIDELINES FOR THE UTILISATION AND DISPOSAL OF WASTEWATER SLUDGE - Volume 3 of 5 -Requirements for the on-site and off-site disposal of sludge:
Odours – odours and vector attraction affect the public negatively (and could affect public health), therefore the stability of sludge, the reduction of odours and vector attraction potential received attention in these Guidelines.
One of the vector attraction reduction options (Table 3) must be applied to minimise the production of odours.
The Stability class can be determined analytically and/or by complying with a vector attraction reduction requirement. A sludge producer is required to prove compliance to at least one of the vector attraction reduction options at any stage during operation. The different vector attraction reduction options are listed in Table 3 and described in detail in Appendix 2.
Note: The Stability class indicates the stability of the sludge and not the stability of the disposal site.
The achievement of a Stability class is especially important during the operational stages of a wastewater treatment plant. It is more important to consistently comply with a vector attraction reduction option, than the actual initial Stability classification. Confirm the Stability class of the sludge by selecting at least one of the vector attraction reduction options in Table 3.

TABLE 3: DETERMINING THE STABILITY CLASS

Stability class	1	2	3
	Comply with one of the options listed below on a 90 percentile basis.	Compy with one of the options listed below on a 75 percentile basis.	No stabilisation or vector attraction reduction options
Vector attraction reduction options (Applicable to Stability Class 1 and 2 only)			
Option 1	Reduce the mass of volatile solids by a minimum of 38 percent		
Option 2	Demonstrate vector attraction reduction with additional anaerobic digestion in a bench-scale unit		
Option 3	Demonstrate vector attraction reduction with additional aerobic digestion in a bench-scale unit		
Option 4	Meet a specific oxygen uptake rate for aerobically treated sludge		
Option 5	Use aerobic processes at a temperature greater than 40˚C (average temperatures 45˚C) for 14 days or longer (eg during sludge composting)		
Option 6	Add alkaline material to raise the pH under specific conditions		
Option 7	Reduce moisture content of sludge that do not contain unstabilised solids (from treatment processes other than primary treatment) to at least 75 percent solids		
Option 8	Reduce moisture content of sludge with unstabilised solids to at least 90 percent solids (like primary treatment)		
Option 9	Applicable to Dedicated disposal and other land disposal options. Inject sludge beneath the soil surface within a specified time, depending on the level of pathogen treatment		
Option 10	Applicable to Dedicated disposal and other land disposal options. Incorporate sludge disposed on the land surface within a specified time after disposal.		
Option 11	Applicable to landfill option only. The sludge should be covered on a daily basis.		
Note:	Vector attraction reduction options 1-8 are applicable to all on-site and off-site disposal options, options 9 and 10 are applicable to all land disposal options and option 11 is applicable to co-disposal on landfill only.		

Figure 23: Stability class (sludge management guidelines) - the WWTW has been designed to reach stability class 1

11(d) Generation of noise

Will the activity generate noise?	**YES**	NO
If yes, is it controlled by any legislation of any sphere of government?	YES	**NO**

If yes, the applicant should consult with the competent authority to determine whether it is necessary to change to an application for scoping and EIA.

If no, describe the noise in terms of type and level:

Noise generated will mostly be from construction activities. All machinery will be within sound working order and will meet the necessary noise level requirements. Construction activities will be limited to daylight hours. No blasting activities will be required.

A12 WATER USE

Please indicate the source(s) of water that will be used for the activity by ticking the appropriate box(es)

municipal	water board	groundwater	river, stream, dam or lake	**other**	the activity will not use water

If water is to be extracted from groundwater, river, stream, dam, lake or any other natural feature, please indicate the volume that will be extracted per month:

litres	
YES	NO

Does the activity require a water use permit from the Department of Water Affairs?

If yes, please submit the necessary application to the Department of Water Affairs and attach proof thereof to this application if it has been submitted.

A water use license is required for the following:

The Woodlands WWTW currently has a valid General Authorization in place dated 28 September 2017. The GA (Ref 27/2/2/K480/7/8) allows a volume of **1772.8 m3/annum** into the Groot River. (S21f)
An integrated Water Use License (WUL) for the proposed WWTW upgrade is required 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.

Note: Section 21 (g) of the Act: Disposing of waste in a manner which may detrimentally impact on a water resource - *confirmed will not be triggered by DWS, preapplication meeting, May 2025*
Correspondence is included in PP and CRR in appendix E.

Note – there will be no disposal of waste on site. Screeners and grit will be suitably stored on site and removed to a suitably licensed disposal site. Sludge drying beds and a dried sludge storage area are included in the design. Dried sludge will be reused and / or disposed of off-site at a suitable licensed site. The WWTW process will treat sludge to a1A classification and sludge management will comply to sludge management guidelines. Any composting on site will need to comply with the National Norms and Standards for composting.

A13 ENERGY EFFICIENCY

Describe the design measures, if any, that have been taken to ensure that the activity is energy efficient:

Mitigation measures:

- Construction is to be carried out during regular working hours to reduce the use of artificial lighting.
- Contractor will be advised to transport all construction materials on-site at the same time wherever possible; the collection of waste material must be conducted simultaneously with other collection / deliveries to reduce the amount of fuel usage

Describe how alternative energy sources have been taken into account or been built into the design of the activity, if any:

Pump stations and process requirements

Sludge drying beds use less energy than a belt press.

No pump station is required for bulk pipeline – it will be gravity fed pipeline. A stormwater management pond is proposed and contents pumped back to the inlet works.

Pumps are included in the design at various stages and energy inputs will be required at various stages of the process.

Primary phase separation will entail rotating discs with a 2.25 kW energy requirement per rotor.

Two balancing tanks are included with a 125m3 volume and equipped with one 4Kw platform mounted mixer.

The anoxic zone received flow from balancing tank and recycled flow from the aerobic zone and is the main dentification reactor in the treatment process. Three axial flow operational pumps (3 duty and 1 standby) will be provided. Return activated sludge will be received here from the clarifier. The anoxic zone will be fitted with 1x4kw vertical shaft mixers.

The aerobic zone received flow from anoxic zone and has a volume capacity of 270m3. Wasted activated sludge will be wasted form the end of the aerobic zone of the biological nutrient reactor and form the sludge return flow stream. Air will be introduced using two surface aerators with an energy input of approximately 22 kw each. The aeration equipment is sized to maintain a dissolved oxygen concentration of 21mg / liter to ensure sufficient treatment. The surface aerator will be equipped with timers that will switch the units on and off based on the DO levels in the reactor. In addition, an adjustable tilting weir will be provided at the outlet to control the immersion and therefore the power drawn by the aerators. The weir will be equipped with an actuator that receives a signal from one or more Dissolved Oxygen (DO) meters indicating the required oxygen demand.

One 7 m clarifier (3 m depth) will be provided to separate return activated sludge form the effluent. An upward velocity of 0.7 m/h will be maintained peaking at 0.8 m/h. Sludge will be withdrawn to the sludge pump station, either by telescopic bellmouth discharging into a sump or alternatively the sludge lines will be directly coupled to the pumps.

The treated effluent will flow over V-notch weirs into a peripheral launder. It will then be collected in a common effluent channel which gravitates to the chlorine contact tank. At the end of the channel, the flow is measured in a venturi flume. There will be two chlorine contact tanks (15m^3).

Chlorine will be dosed at the inlet weir or in the pipe upstream of the inlet to the chlorine contact tanks. The chlorine contact tank provides 20-30 minutes of contact time at PWWF. An auto-flow metering system will be installed to ensure that a chlorine dosing rate of 5mg/l is maintained.

Electrical supply point

The capacity of the existing main electrical supply point and the capacity required at the new extension are still to be verified. The existing main electrical supply point shall be upgraded should the need arise.

The design shall be such that to ensure continuous operation even with the failure of the main supply. In this regard, it is proposed to make provision for standby generator set/s with an automatic changeover system to continue with the operation of critical processes during main supply outages.

Lighting

Scissor masts shall be installed to provide proper levels of site illumination for the safe and correct operation of the plant. The scissor masts shall ensure easy maintenance of the site lighting structure.

Electrical Installations in Buildings Electrical Installations in Buildings

The electrical installations in buildings shall include all small power and lighting requirements as well as emergency lighting if required.

Lightning Protection

All structures, hand-railing and open conductive parts on site shall be earthed in terms of the relevant statutory requirements. Surge protection devices complete with the required earth continuity paths shall be provided on all equipment where necessary.

Motor Control Centre (MCC)

Equipment for each load centre shall be powered and controlled from an MCC. The MCC shall incorporate power factor correction to reduce the effects of harmonics on the distribution system, to improve energy efficiency and hence to save on energy consumption costs.

SCADA System

The type or make of the Supervisory Control and Data Acquisition System on the existing plant needs to be verified. A new SCADA system shall be installed for the new extension. Remote control of the plant shall allow operating staff to control plant functions or processes.

Programmable Logic Controllers

Programmable Logic Controllers (PLC's) shall be distributed on the site and shall be linked by means of fibre optic cables between PLC's and the SCADA system. The existing communication systems between the SCADA system and plant processes is to be verified. All major plant processes shall be monitored and controlled by local PLC equipment that shall provide a fully automated system for some of the processes. The PLC shall also serve as an interface between the SCADA System and the plant equipment.

Uninterruptable power supply units shall be supplied at all PLC installations to provide backup power required during shut shutdown of plant processes in the event of power failures.

Instrumentation

All instrumentation (flow meters, level meters, pH meters, MLSS meters, DO meters, motorised valves, etc) shall be monitored and displayed on the SCADA system. Where control functions require the measured parameters in any section of the plant, this information shall be made available in the PLC / SCADA automation platform.

SECTION B: SITE/AREA/PROPERTY DESCRIPTION

Important notes:

1. For linear activities (pipelines, etc) as well as activities that cover very large sites, it may be necessary to complete this section for each part of the site that has a significantly different environment. In such cases please complete copies of Section C and indicate the area, which is covered by each copy No. on the Site Plan.

Section C Copy No. (e.g. A):

2. Paragraphs 1 - 6 below must be completed for each alternative.

3. Has a specialist been consulted to assist with the completion of this section?

YES	NO

If YES, please complete form XX for each specialist thus appointed:

All specialist reports must be contained in Appendix D.

Refer to Appendix D

B1 GRADIENT OF THE SITE

Indicate the general gradient of the site.

Alternative S1:

Flat	1:50 – 1:20	1:20 – 1:15	1:15 – 1:10	1:10 – 1:7,5	1:7,5 – 1:5	Steeper than 1:5

Alternative S2 (if any):

Flat	1:50 – 1:20	1:20 – 1:15	1:15 – 1:10	1:10 – 1:7,5	1:7,5 – 1:5	Steeper than 1:5

Alternative S3 (if any):

Flat	1:50 – 1:20	1:20 – 1:15	1:15 – 1:10	1:10 – 1:7,5	1:7,5 – 1:5	Steeper than 1:5

The highest elevation—approximately 229 meters above mean sea level (mamsl)—is located at the northernmost point, while the lowest point, around 202 mamsl, lies along the southern boundary. Surface water drainage follows the natural topographical gradients, generally flowing from northeast to southwest toward a non-perennial stream, which ultimately discharges into the Groot River to the southeast.

The bulk pipeline will be installed on the western section of the town ship and extend from north (estimated) to the WWTW. The pipeline is in close proximity to the delineated floodline and wetland areas; strict measures will need to be in place for the construction phase. The pipeline will be raised in the sections where the

watercourse is crossed. Option 3 presents the shortest distance over the wetland and the most suitable gradient. General gradients of the pipeline routes (alternative 1 – 3) is shown in the figures below.

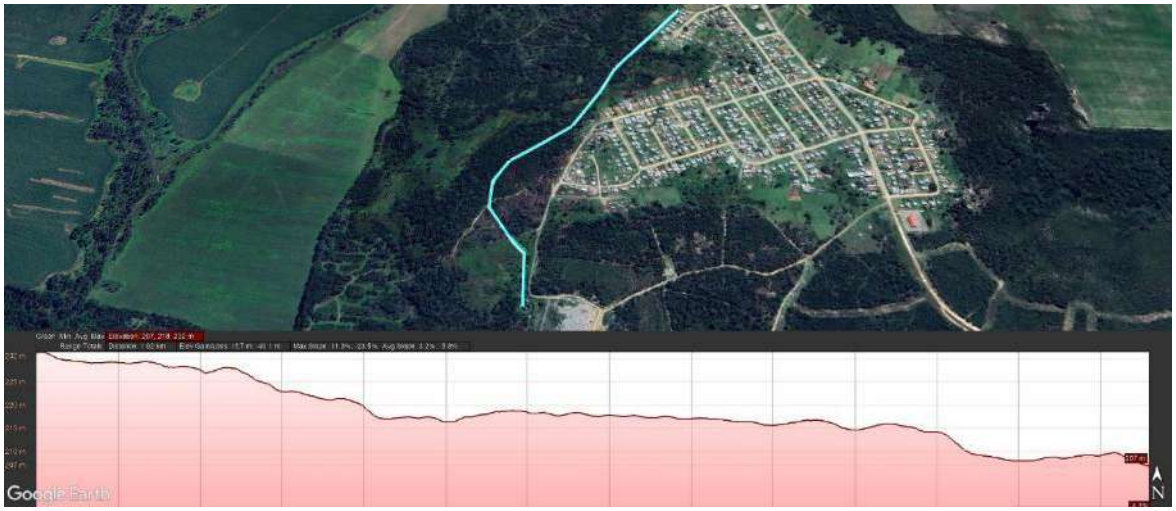

Figure 24: General gradient of Pipeline – alternative 1

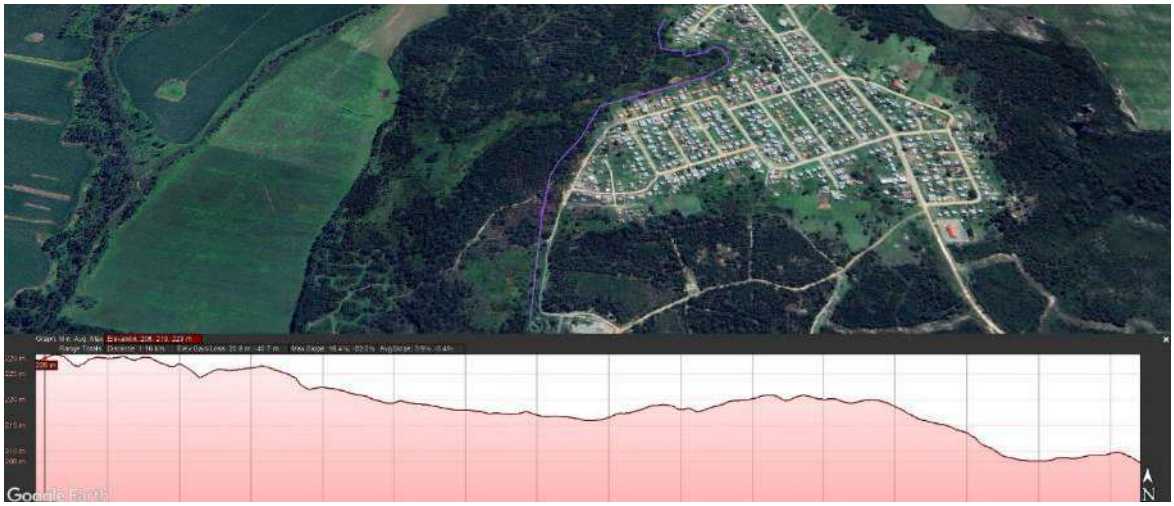

Figure 25: General gradient of Pipeline – alternative 2

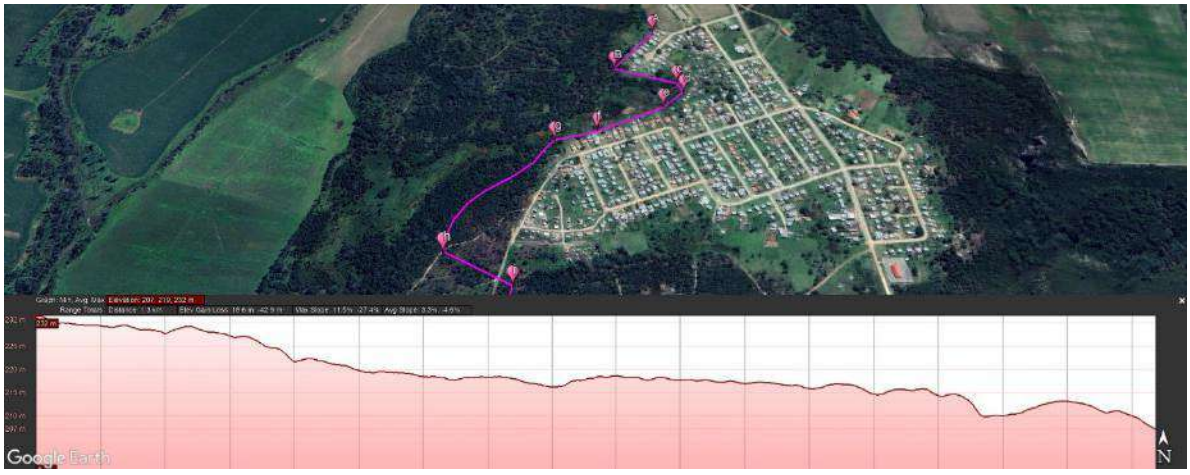

Figure 26: General gradient of Pipeline – alternative 3

B2 LOCATION IN LANDSCAPE

Indicate the landform(s) that best describes the site:

2.1 Ridgeline
2.2 Plateau
2.3 Side slope of hill/mountain
2.4 Closed valley
2.5 Open valley
2.6 Plain
2.7 Undulating plain / low hills
2.8 Dune
2.9 Seafront

B3 GROUNDWATER, SOIL AND GEOLOGICAL STABILITY OF THE SITE

Is the site(s) located on any of the following (tick the appropriate boxes)?

	Alternative S1 (WWTW):		**Alternatives (all pipeline routes):**	
Shallow water table (less than 1.5m deep)	YES	**NO**	YES	**NO**
Dolomite, sinkhole or doline areas	YES	**NO**	YES	**NO**
Seasonally wet soils (often close to water bodies)	YES	**NO**	**YES**	NO
Unstable rocky slopes or steep slopes with loose soil	YES	**NO**	YES	**NO**
Dispersive soils (soils that dissolve in water)	YES	**NO**	YES	**NO**
Soils with high clay content (clay fraction more than 40%)	YES	**NO**	YES	**NO**
Any other unstable soil or geological feature	YES	**NO**	YES	**NO**
An area sensitive to erosion	**YES**	NO	**YES**	NO

If you are unsure about any of the above or if you are concerned that any of the above aspects may be an issue of concern in the application, an appropriate specialist should be appointed to assist in the completion of this section. (Information in respect of the above will often be available as part of the project information or at the planning sections of local authorities. Where it exists, the 1:50 000 scale Regional Geotechnical Maps prepared by the Council for Geo Science may also be consulted).

According to the Department of Forestry, Fisheries and Environment (DFFE) Screening Tool, the area in which the WWTW upgrade is proposed has a 'Very High' aquatic biodiversity sensitivity. The sensitivity features that triggered this classification are:

- Ecological Support Area 1 (ESA 1)
- Strategic Water Source Area (SWSA) for surface water in the Tsitsikamma

B.3.1 - Geology, lithology and groundwater

Geology of the area is the Table Mountain Group of Cape Supergroup and characterized by resistant quartzitic sandstones interbedded with **minor shale and siltstone layers**. The basal Peninsula Formation is present in the northern part of the site, followed by a sequence of the Cederberg, Goudini, and Skurweberg Formations extending southwards across the central portion of the site.

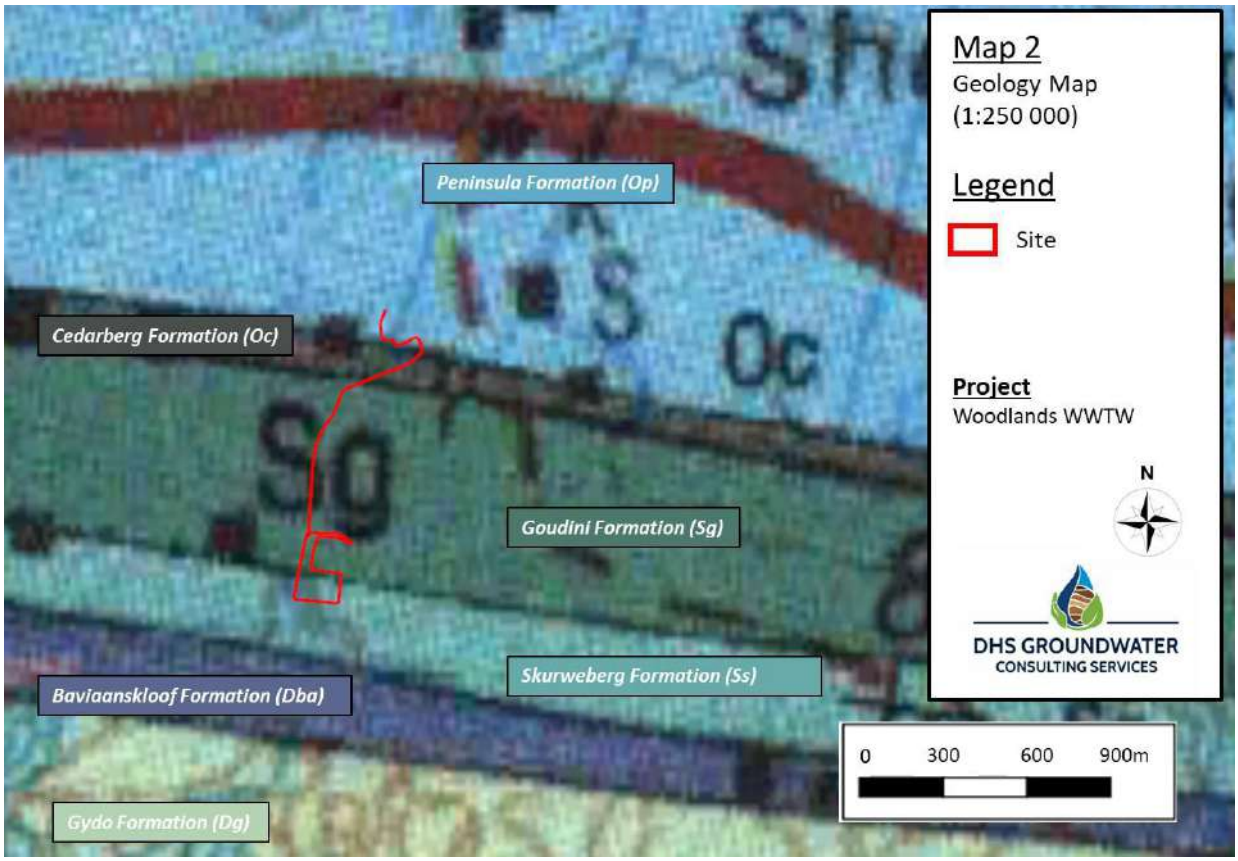

Figure 27: Geology of area (adapted from DHS Groundwater, 2025)

Table 5: Lithostratigraphy of underlying geology (adapted from Woodlands WWTW, DHS Groundwater, 2025).

Supergroup	Group	Subgroup	Formation	Lithology	Relevance to site
Cape Supergroup	Table Mountain	Nardouw	Peninsula (Op)	Quartzitic Sandstone	North – bulk pipeline
			Cedarberg (Oc)	Shale, Siltstone, Subordinate sandstone	North – bulk pipeline – corresponds to endangered *Eastern Coastal Shale Band*

Supergroup	Group	Subgroup	Formation	Lithology	Relevance to site
					Vegetation (FFb 6) mapped here.
			Goudini (Sg)	Quartzitic Sandstone, Shale, Siltstone	Central - – bulk pipeline North - WWTW
			Skurweberg (Ss)	Quartzitic Sandstone	South - WWTW
			Baviaanskloof (Dba)	Feldspathic Sandstone and Shale	South of WWTW (drainage area of discharged effluent)

The study area falls within quaternary catchment K80D. The mean annual precipitation in the area is high and reported (ranging from 745 mm to 1067 mm / annum); the annual recharge and baseflow figures for the study area is presented in Table 6.

Table 6: Regional Rainfall, Recharge and Baseflow based on Vegter's (1995) recharge and baseflow maps(DHS consulting, 2025)

Mean Annual Precipitation (mm):	745
Annual Recharge (mm):	50 - 75
Percentage Recharge of MAP:	6.71% - 10.06%
Annual Baseflow (mm):	50 - 100
Percentage Baseflow of MAP:	6.71% - 13.42%

Given this topographical gradient, groundwater is expected to flow in a south westerly direction, ultimately draining toward the adjacent valley.

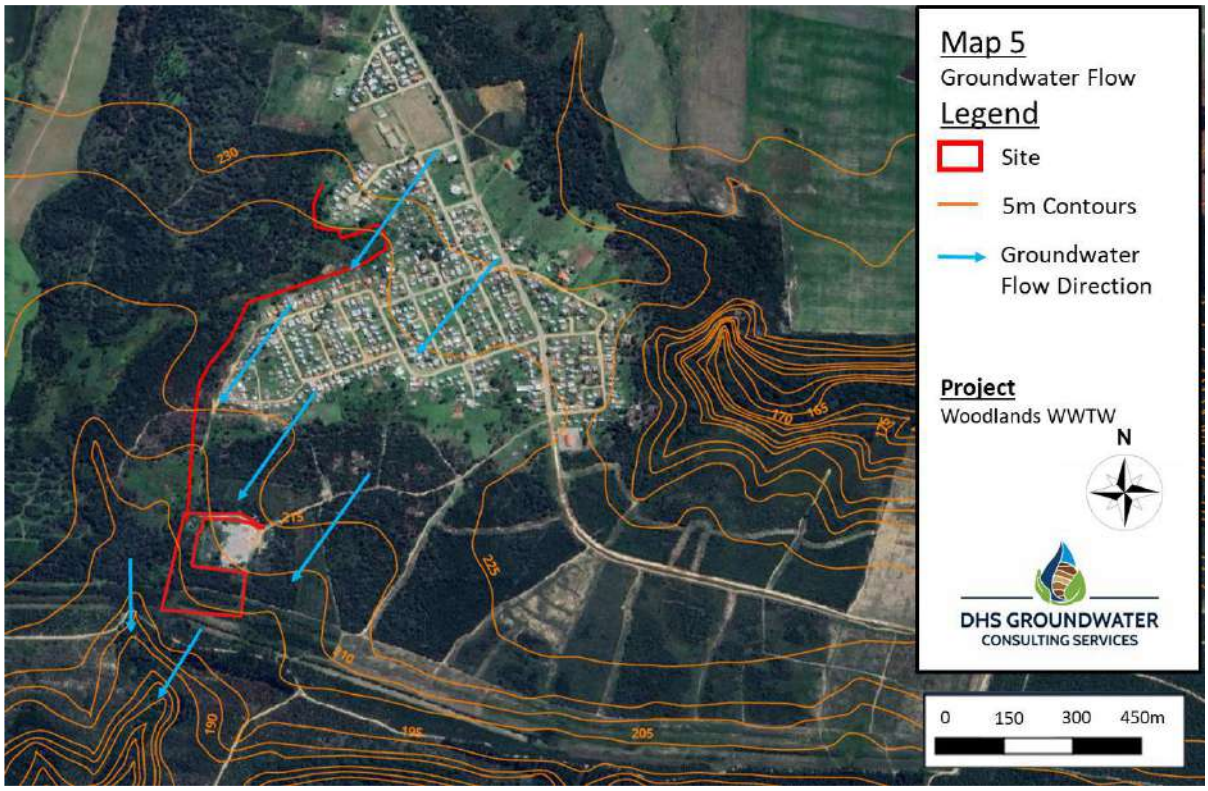

Figure 28: Inferred groundwater flow direction

The static groundwater level generally occurs at approximately 20.16 metres below surface. It must be stated that this is low resolution interpolation and is an average. It is not intended to define water level depths on small scale.

Groundwater within the project area occurs predominantly within fractured aquifers with reported yields of 0.5 – 2.0 L/s. Electrical Conductivity (EC) of groundwater in the area is generally between 0 and 70 mS/m. This is considered as an "ideal" water quality with respect to drinking water standards.

Aquifer Vulnerability can be defined as *"the likelihood for contamination to reach a specified position in the groundwater system after introduction at some location above the uppermost aquifer"*. Based on the DRASTIC method, the vulnerability of the aquifers within the project area is rated as "moderate" vulnerable to pollutants. The aquifer system in the study area can be classified as a "Minor to Major Aquifer System." These aquifers primarily play an ecological role by sustaining baseflow to surface water bodies and supporting local ecosystems. While they typically yield only modest quantities of groundwater, pockets of highly productive aquifers do exist within the region, capable of supporting more substantial groundwater abstraction where geological conditions are favourable. The ratings for the Aquifer System Management Classification and Second Variable Classification (Fracturing) yield an Aquifer System Management Index of 9 for the study area, indicating that a "high" level of groundwater protection is required in terms of prevailing groundwater flow regime management.

The ratings for the Aquifer System Management Classification and Aquifer Vulnerability Classification yield a Groundwater Quality Management Index of 6 for the study area, indicating that a "high" level of groundwater protection is required in terms of groundwater quality management.

In terms of DWS's overarching water quality management objectives which is (1) protection of human health and (2) the protection of the environment, the significance of this aquifer classification is that if any potential risk exists, measures must be triggered to limit the risk to the environment. In this instance it would be the (1)

protection of the “Minor and Major Aquifer”, (2) the external groundwater users in the area, and (3) maintain baseflow to the surrounding ecosystems dependent on groundwater.

No boreholes have been identified within a 1km radius of the WWTW site; three boreholes (depths of 90m, 121 m and 10 m) were identified within 5 km radius of the site (National Groundwater Archive)
No boreholes have been identified within a 1km radius of the WWTW site; two boreholes (depths of 90m, 121 m and 10 m) were identified within 5 km radius of the site (Water Use Authorization & Registration Management System)
No groundwater users were identified within 1 km of the site during the hydrocensus carried out.

“Geohydrological Response Unit” (GRU) is a delineation which defines a localised area which groundwater and groundwater users may be affected by potential pollutants
The “Geohydrological Response Unit” (GRU) of the study area covers a total area of 826 ha and is defined as:

- The northern boundary was defined by a topographic high;
- The western, eastern and southern boundary was defined by the topographic lows/valleys

No groundwater users were identified within the GRU from both the DWS databases and from hydrocensus.

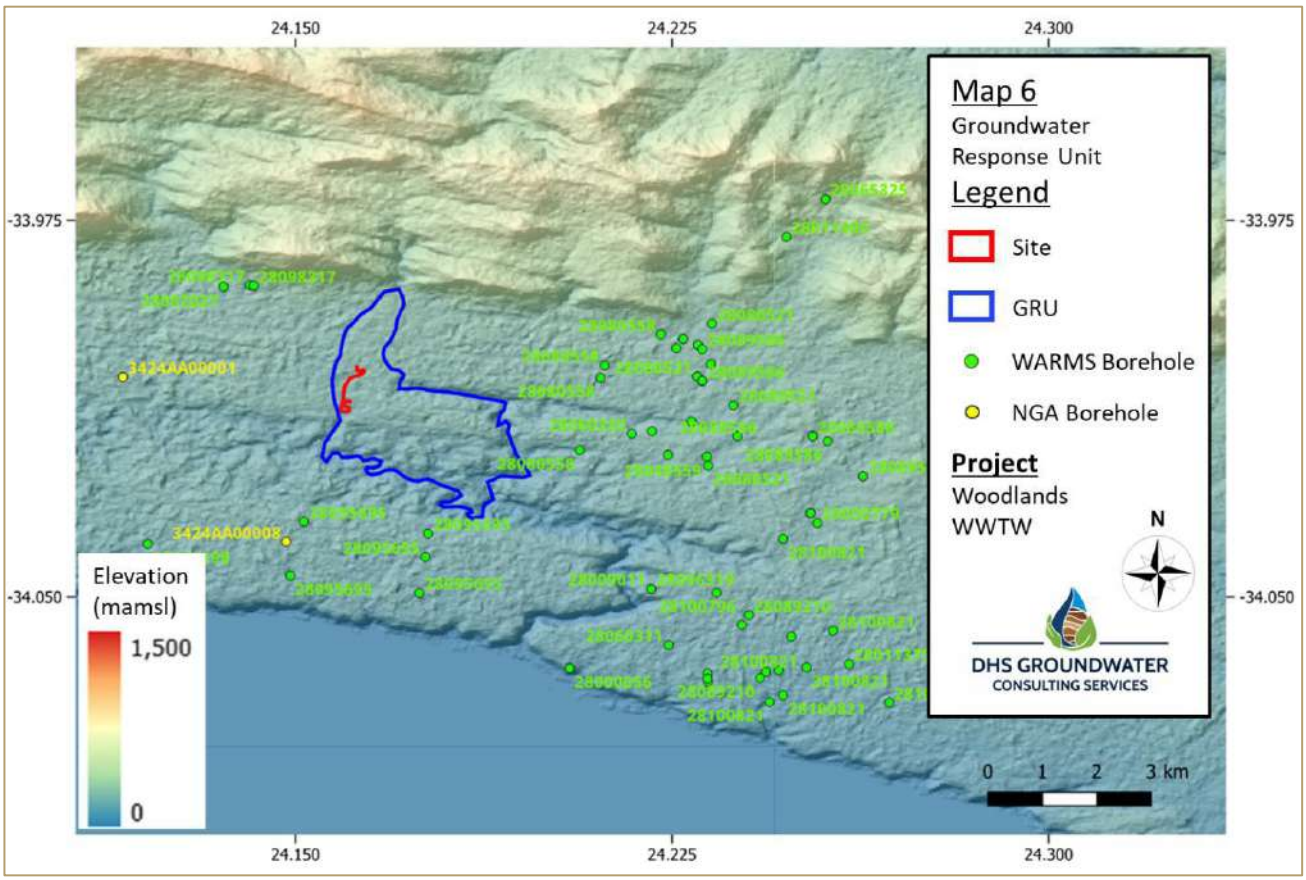

Figure 29: Mapped GRU - no groundwater users identified within area

Refer to Appendix D1 for the full Groundwater Impact Assessment for the Upgrade of Wastewater Treatment Works and Sewer Reticulation, Woodlands, Eastern Cape, DHS GROUNDWATER CONSULTING SERVICES, May 2025

The impact assessment and accompanying mitigation measures, is provided in Section D of the draft Basic Assessment Report.

B.3.2 - Surface water

Rainfall occurs all year with peaks in spring and autumn. The mean annual precipitation in the area is high and reported as 745 mm / annum (DHS groundwater, 2025) and 1067 mm / annum (Confluent, 2025) and the mean annual runoff is also high at 414 mm / annum(confluent, 2025). The nearest perennial river is the Groot River, approximately 900 m south of the WWTW. Five non-perennial rivers are mapped within 50 to 300 m around the proposed upgrade area, 2 flowing in a southern direction and 3 in an eastern direction. No wetlands are mapped to occur in the immediate vicinity of the WWTW and associated infrastructure however wetlands (unchanneled valley bottom) are present west of the site, which the pipeline will cross and access road in located in, and seep wetland south of the site, and these have been delineated. The Present ecological state of the wetland is: Category C, Moderately Modified condition and the wetland vegetation in a near-natural state (category B). The lower section of the watercourse into which the treated wastewater will be discharged is classified as a drainage line with perennial flowing water and a well-developed riparian zone. The instream The Present ecological state of the wetland is: Category C, Moderately Modified and the Present ecological state of the riparian area is: Category B: Largely natural impacts by some minor alien vegetation.

Figure 30: Indication of drainage lines and wetlands (NWM5) within and surrounding the study area; the nearest perennial stream is located 900 meters south of the site

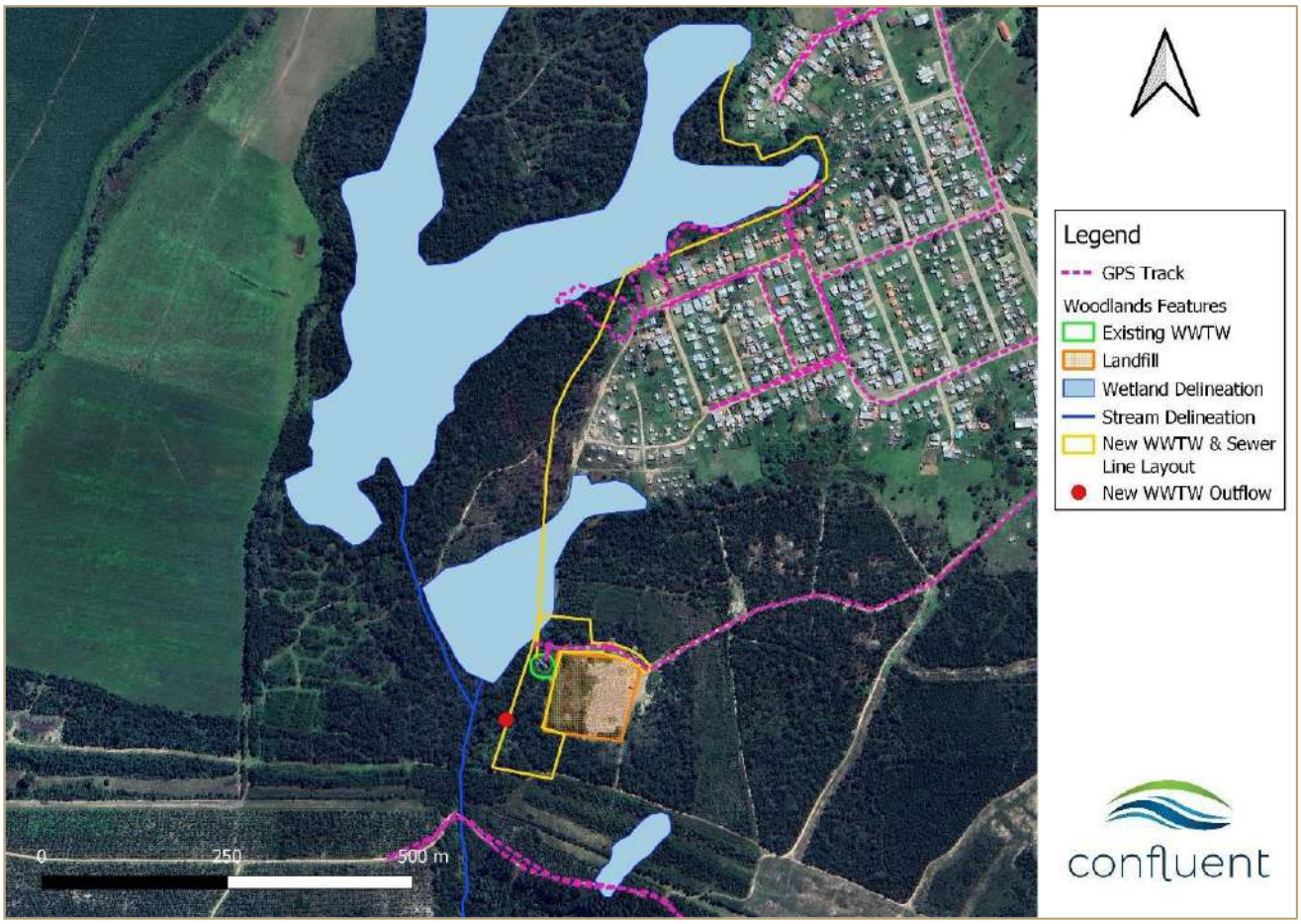

Figure 31: Wetland delineation provided by confluent (Confluent, 2025)

The site is located in Sub-quaternary reaches 9124 and 9138, of a Fish FEPA. Important fish species potentially present within these systems include *Pseudobarbus afer (*Eastern Cape redfin*), Pseudobarbus tenuis* (slender redfin), and *Galaxias zebratus* (Cape galaxias), all of which are endemic to the Cape Floristic Region with the Eastern cape redfin recorded in the Groot River (2017). The management objective for fish support areas is as follows:

"Sub-quaternary catchments that are required to meet biodiversity targets for threatened and near threatened fish species indigenous to South Africa. Fish support areas also include SQRs that are important for the migration of threatened and near-threatened fish species. River reaches in Fish Support Areas need to be maintained in a condition that supports the associated populations of threatened fish species."

the discharge of treated wastewater into or near these systems could pose a risk to downstream aquatic biodiversity, particularly if water quality, flow regime, or habitat structure is altered. Strict water quality management and careful ecological consideration during the planning and operation of wastewater infrastructure is required.

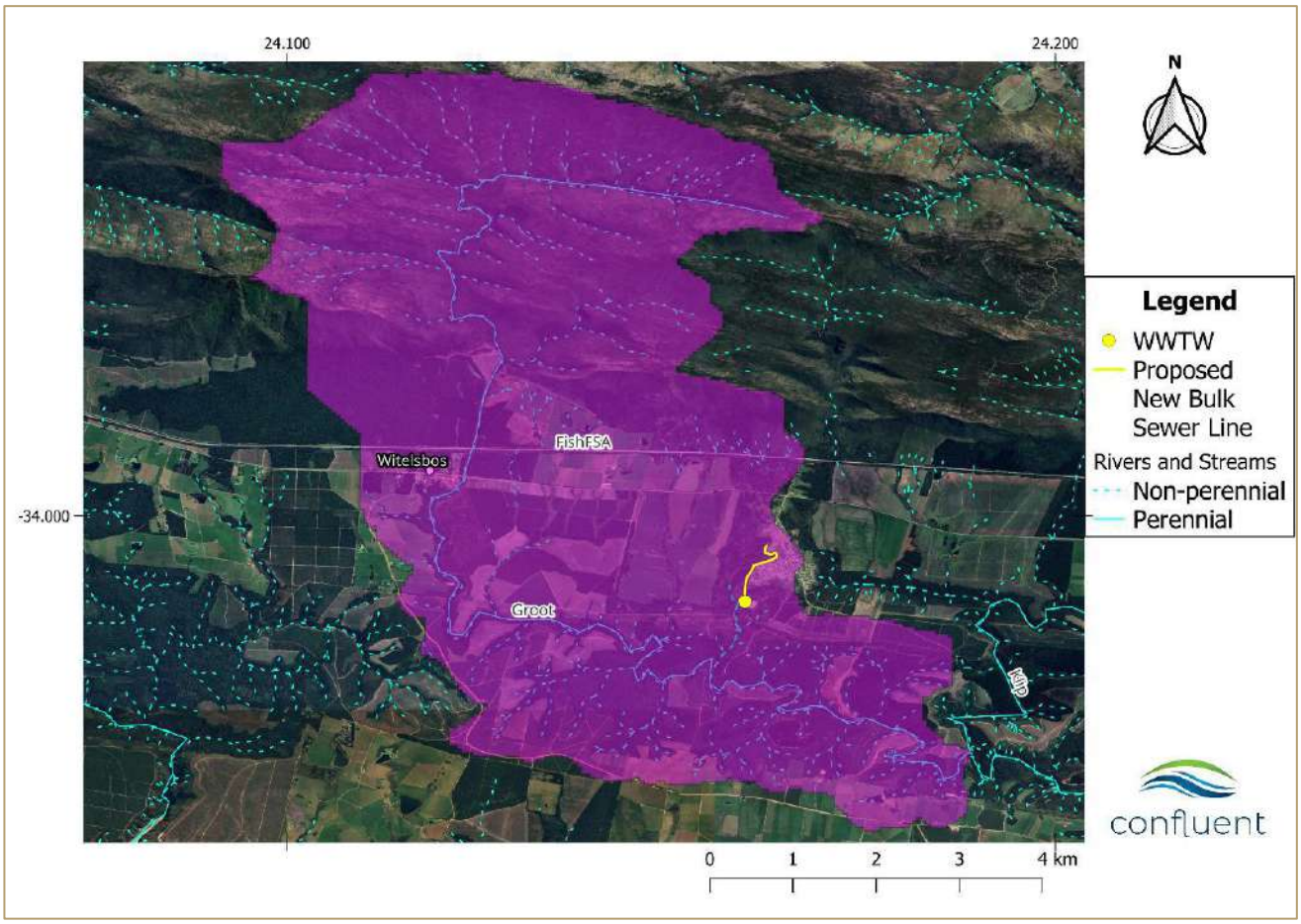

Figure 32: Map indicating the Proposed New Bulk Sewer Line and WWTW location in relation to mapped Freshwater Ecosystem Priority Areas (Confluent, 2025)

In terms of the Eastern Cape Biodiversity Conversation Plan, 2019 (ECBCP) the site falls within an Aquatic Ecological Support Area (ESA) 1; these areas play an important role in supporting the functioning of ecosystem services and the management objective includes: *Maintain in a functional, near-natural state. Some habitat loss is acceptable, provided the underlying biodiversity objectives and ecological functioning are not compromised.*

Testing of the water was carried out and shows very high levels of chlorine and E.coli, both exceeding the DWS GA limits. This is likely a result of the non-functional WWTW and poor sanitation conditions of the settlement area.

Table 7: Water Quality Results (Confluent, 2025)

Parameter	Sample Points	
	Upstream WTWW	Downstream WTWW
Conductivity (mS/m) (at 25 °C)	24.9	68.6
Total Dissolved Solids (mg/l)	166	448
pH (at 25 °C)	4.08	6.50
Nitrate Nitrogen. (mg/l as N)	<0.20	3.3
Nitrite Nitrogen (mg/l as N)	<0.20	1.2
Nitrite/Nitrate Nitrogen	0.40	4.5
Sulphate (mg/l as SO4)	<2.0	17.1
Fluoride (mg/l as F)	<0.50	0.92
Ammonia Nitrogen (mg/l as N)	0.13	16.4
Chloride (mg/l as Cl)	62.6	125
Sodium (mg/l as Na)	31.5	71.2
Zinc (mg/l as Zn)	0.01	0.02
Total Alkalinity (mg/l as CaCO3)	<11.0	73.7
Total Hardness (mg/l as CaCO3)	18.3	55.4
Magnesium Hardness (mg/l as CaCO3)	15.6	35.7
Calcium Hardness (mg/l as CaCO3)	2.8	19.8
Total Kjeldahl Nitrogen (mg/l as N)	0.78	16.9
Total Phosphate (mg/l as P)	<0.20	2.9
Ortho Phosphate (mg/l as P)	<0.20	1.8
Calcium (mg/l as Ca)	1.1	7.9
Magnesium (mg/l as Mg)	3.8	8.7
E. coli (count per 100ml)	56	> 2 419

Table 8: General and Special Wastewater limit values applicable to discharge of wastewater into a water resource (extracted from revision of GA, 2013

SUBSTANCE/PARAMETER	GENERAL LIMIT	SPECIAL LIMIT
Faecal Coliforms (per 100 ml)	1000	0
Chemical Oxygen Demand (mg/l)	75 (i)	30(i)
pH	5.5-9.5	5.5-7.5
Ammonia (ionised and un-ionised) as Nitrogen (mg/l)	6	2
Nitrate/Nitrite as Nitrogen (mg/l)	15	1,5
Chlorine as Free Chlorine (mg/l)	0,25	0
Suspended Solids (mg/l)	25	10
Electrical Conductivity (mS/m)	70 mS/m above intake to a maximum of 150 mS/m	50 mS/m above background receiving water, to a maximum of 100 mS/m
Ortho-Phosphate as phosphorous (mg/l)	10	1 (median) and 2,5 (maximum)
Fluoride (mg/l)	1	1
Soap, oil or grease (mg/l)	2,5	0
Dissolved Arsenic (mg/l)	0,02	0,01
Dissolved Cadm ium (mg/l)	0,005	0,001

The upgrading of the WWTW as proposed in the design is considered compatible with this objective as current pollution in the area will be addressed and future sewage generation suitably treated and managed on the site. If operational management fails due to, for example power failure of equipment malfunction, then current impacts experienced, will occur again. It is important to take monthly monitoring of effluent and groundwater and sludge testing as required and address any problems detected immediately using suitable practical and effective emergency response protocols. The primary impact affecting the instream PES is the serious impact of sewage on water quality; were it not for the impacted water quality, the instream PES would have been rated A/B. The aim of the management of the WWTW should be to ensure that this PES is achieved in the future with suitable implementation and operation of the works.

Refer to Appendix D2 for the full Aquatic Impact Assessment for the Upgrade of Wastewater Treatment Works and Sewer Reticulation, Woodlands, Eastern Cape, Confluent Environmental Pty (Ltd), July 2025
The impact assessment and accompanying mitigation measures, is provided in Section D of the draft Basic Assessment Report.

B4 GROUNDCOVER

Indicate the types of groundcover present on the site:

4.1 Natural veld – good condition [E]
4.2 Natural veld – scattered aliens [E]
4.3 Natural veld with heavy alien infestation [E]
4.4 Veld dominated by alien species [E]
4.5 Gardens
4.6 Sport field
4.7 Cultivated land
4.8 Paved surface
4.9 Building or other structure
4.10 Bare soil

The location of all identified rare or endangered species or other elements should be accurately indicated on the site plan(s).

Natural veld - good condition[E]	Natural veld with scattered aliens[E]	**Natural veld with heavy alien infestation[E]**	**Veld dominated by alien speciesE**	Gardens
Sport field	Cultivated land	Paved surface	**Building or other structure**	Bare soil

If any of the boxes marked with an "[E] "is ticked, please consult an appropriate specialist to assist in the completion of this section if the environmental assessment practitioner doesn't have the necessary expertise.

B.4.1 Terrestrial Biodiversity

In terms of the National vegetation Map, 2024, the main vegetation types within the study area include Tsitsikamma Sandstone Fynbos (WWTW and pipeline) and Eastern Coastal Shale Band Vegetation (Pipeline route). In terms of section 52 of NEMBA, Tsitsikamma Sandstone Fynbos has a conservation status of least concern(~69% of natural area remaining), as per National Biodiversity Assessment (NBA) / Red List Ecosystem status (2022).

In terms of section 52 of NEMBA, Eastern Coastal Shale Band Vegetation has a conservation status of ***Endangered*** (~39% of natural area remaining); Approximately 200 meters of the bulk pipeline route is mapped within this vegetation type.

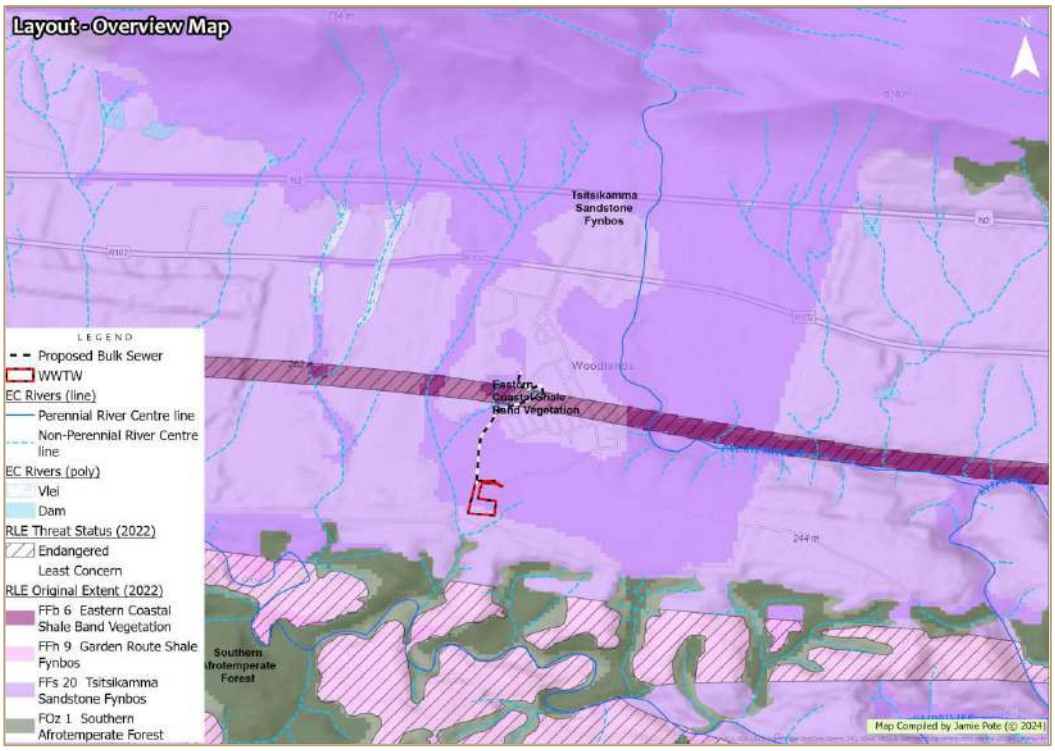

Figure 33: Vegetation mapped on site (NatVeg Map, 2024) (adapted from Jamie Pote, 2025)

The proposed sewer pipeline and WWTW does not overlap with any designated Protected Area or Important Bird Area (IBA); a section of the WWTW access road overlaps with designated NPAES. The site is situated within 5 km and 10 km of portions of the Garden Route National Park (1.3 km to the north, 1.2 km to the south-west and 6.6 km to the west) and falls within a proposed SANParks Garden Route NP expansion area. The site falls within the designated Garden Route Biosphere Reserve.

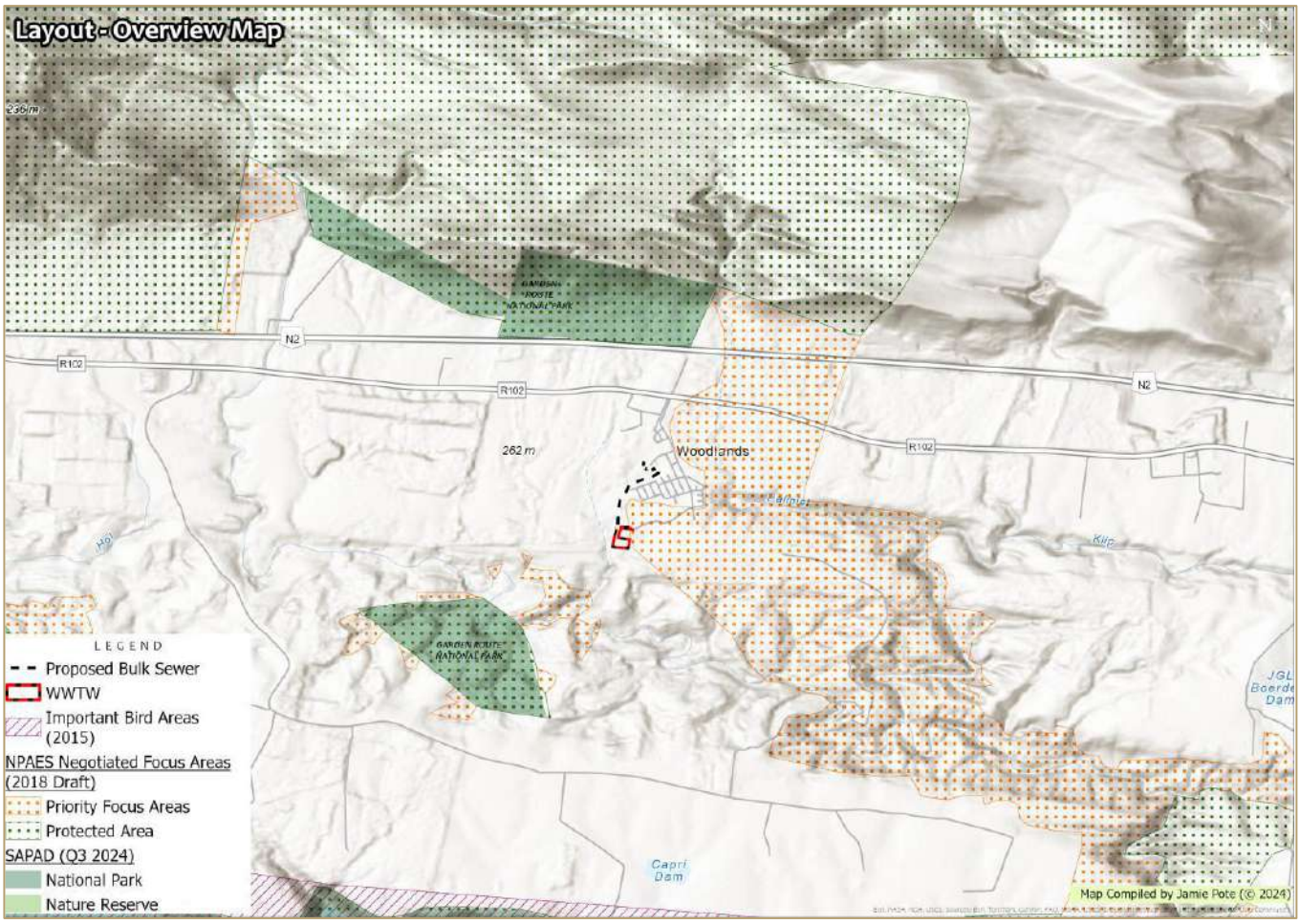

Figure 34: NEMPAA areas in relation to the site (adapted from Jamie Pote, 2025)

In terms of the Eastern Cape biodiversity conservation plan, 2019, the bulk pipeline route and wwtw site falls within a terrestrial critical biodiversity area (CBA) 1; some sections of the bulk pipeline route fall within an area mapped as no natural area remaining (NNR). Land cover and remnant vegetation data reflects the site is comprised of natural vegetation remnants and plantation/dense invasion.

Approximately 200 meters of the pipeline will traverse the endangered vegetation unit, however it has been placed adjacent to the settlement and outside the delineated wetland and therefore is not likely to impact or fragment terrestrial biodiversity functioning in any significant manner above the current baseline conditions. The reminder of the pipeline and WWTW was found to fall within significantly degraded and/or invaded vegetation.

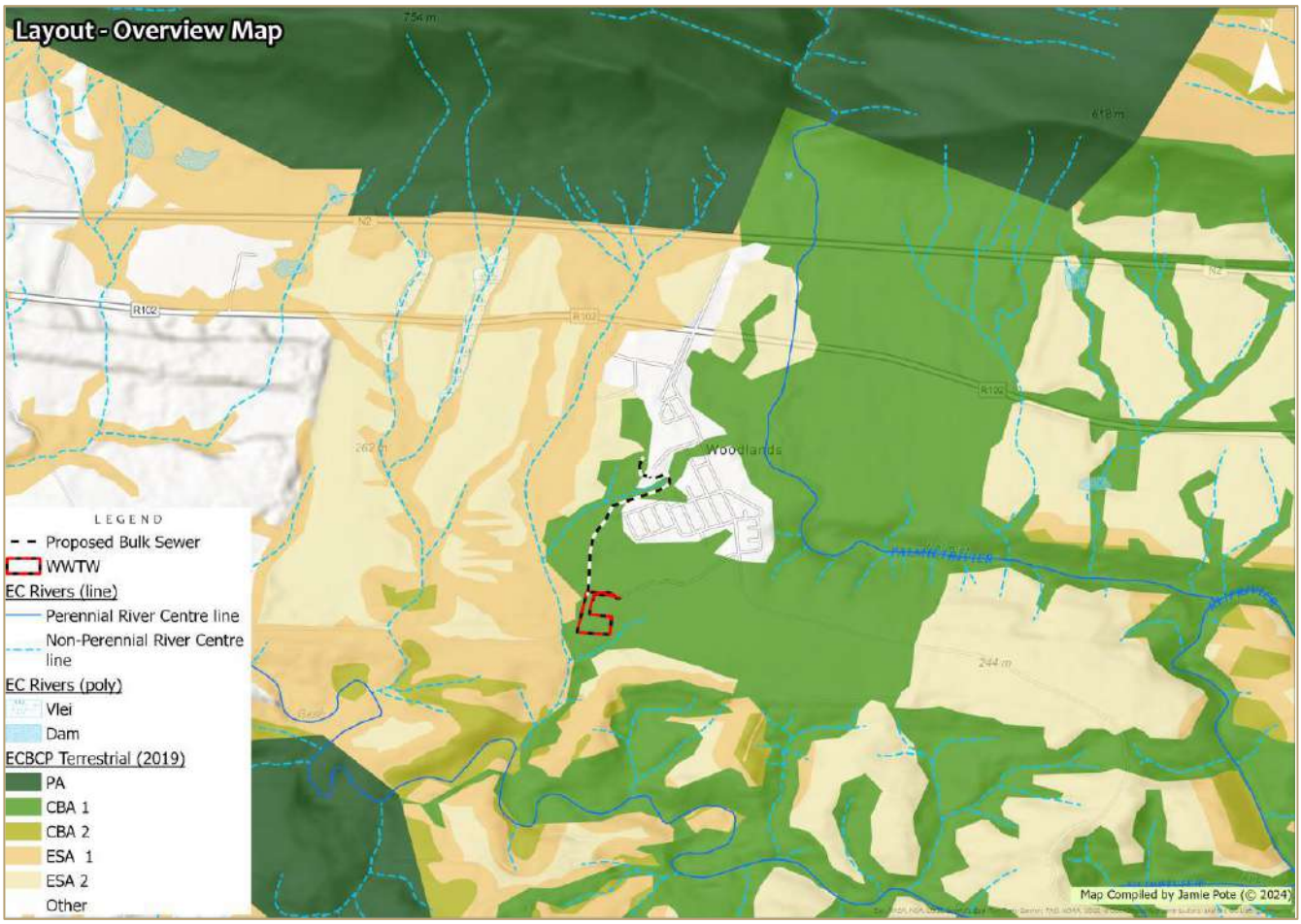

Figure 35: Terrestrial CBA1 and NNR mapped on site (ECBCP, 2019) (adapted from Jamie Pote, 2025)

The minimal activity associated with the sewer installation primarily within transformed areas is not anticipated to have any direct or indirect impact. The proposed activity is also not anticipated to have any direct or indirect impact on any of the protected areas. Furthermore, the activity can be deemed critical infrastructure to support the Woodlands village, as sewage treatment is currently below acceptable standards, where untreated effluent is discharged. The pipeline will be located adjacent to the settlement and the majority of the represented vegetation units are not under threat. No terrestrial CBAs or ESAs are thus likely to be affected by proposed the activity in any significant manner.

B.4.2 Indigenous Flora

Tsitsikamma Sandstone Fynbos (FFs 20) occurs in the Western and Eastern Cape Provinces and is represented by medium dense, tall proteoid shrubland over a dense moderately tall, ericoid-leaved shrubland; it is mainly comprised of proteoid, restioid and ericoid fynbos, with fynbos thicket in wetter areas. It occurs on sandstones of the table mountain group (consistent with geology of the area).

Eastern Coastal Shale Band Vegetation (FFb 6) occurs on shale bands in the Western and Eastern Cape Provinces and is represented by shrublands, ranging from thicket to renosterveld and fynbos at higher altitudes; fynbos includes all structural types and is quite often grassy in character.

The site and surrounding area was found to be comprised of densely invaded areas including black wattle, Bugweed, pines, and several others interspersed with remnant and secondary remnant patches of sand-fynbos vegetation.
Common species of the Sand Fynbos unit found within the study area includes *Passerina corymbosa, Erica discolor, Erica sparsa, Helichrysum teretifolium, Metalasia pulcherrima, Cliffortia serpyllifolia, Phylica axillaris, Commelina africana, Gazania krebsiana, Geissorhiza fourcadei, Restio triticeus, Elegia juncea, Themeda triandra, and Tristachya leucothrix.*

Remnant vegetation has a low species diversity and absence of key indicator species such as Proteaceae and several Ericaceae species and is representative of secondary and degraded nature of the habitat. No species indicative or typical of Coastal Shale Band Vegetation were recorded.
Endemic species (*Erica sparsa* and *Erica glandulosa subsp.)* was recorded on site; Other sensitive species recorded on site includes *Erica discolor* and *Watsonia pillansii*. These plants are all listed on the Provincial conservation ordinance, 1974, and require permits for removal from DEDEAT.
No Endangered or Critically Endangered flora species were confirmed to be present nor known to be present in the affected area. The site is within the range of yellowwood species, no large yellowwood trees were recorded during the site visit, however the timeframe to construction is not known and it's possible that seedlings could propagate before construction; a final walkdown would be recommended as a precautionary measure before construction.

B.4.3 Alien Invasive Flora

Several exotic invasive and other weed species were noted within the site and surrounding area. Proliferation of weedy and exotic species often indicate disturbance especially during or after construction. A list of species is included in Table 9. During construction it is highly likely that species currently not on site could be introduced through the construction process. A weed management programme is recommended after construction to counter the weed proliferation that would be expected after construction.

Table 9: Alien (exotic) invasive and other weed species detected on site (adapted from Jamie Pote, 2025)

SCIENTIFIC NAME	COMMON NAME	FAMILY	PRESENCE
Acacia mearnsii	Black Wattle	Fabaceae	Present, common
Acacia melanoxylon	Blackwood	Fabaceae	Present, common
Bidens pilosa	Blackjack	Asteraceae	Present, uncommon
Cortaderia selloana	Pampas Grass	Poaceae	Present, uncommon
Eucalyptus spp.	Eucalyptus tree	Myrtaceae	Present, uncommon
Hakea sericea	Hakea	Proteaceae	Present, uncommon
Lantana camara	Lantana	Verbenaceae	Present, common
Pennisetum clandestinum	Kikuyu	Poaceae	Present, common
Pinus spp.	Pine Tree	Pinaceae	Present, common
Ricinus communis	Castor Oil Plant	Rosaceae	Present, uncommon
Rubus affinis	Bramble	Rosaceae	Present, common
Solanum mauritianum	Bugweed	Solanaceae	Present, uncommon
Tagetes minuta	Khakibos	Asteraceae	Present, uncommon

Intactness for the site is rated as very low (> 75 % of original vegetation has been removed or lost); degradation of the site is rated as High (Moderately / severely Degraded) with an overall sensitivity score of low for both the pipeline route and the WWTW.

Refer to Appendix D3 for the full terrestrial and flora Impact Assessment for the Upgrade of Wastewater Treatment Works and Sewer Reticulation, Woodlands, Eastern Cape, Jamie Pote, 2025
The impact assessment and accompanying mitigation measures, is provided in Section D of the draft Basic Assessment Report.

B.4.4 Terrestrial Fauna

The Screening Tool indicates an overall High sensitivity for the animal species sensitivity theme for six bird, three insect, and two mammal SCC, with possible suitable habitat for:

Birds:

- Denham's Bustard (*Neotis denhami*): High sensitivity
- Black Harrier (*Circus maurus*): Medium sensitivity.
- African Marsh Harrier (*Circus ranivorus):* Medium sensitivity. (may occur in area for foraging due to wet area)
- Crowned eagle (*Stephanoaetus coronatus):* Medium sensitivity
- Knysna Warbler (*Bradypterus sylvaticus):* Medium sensitivity (may occur in area)
- White-bellied bustard (*Eupodotis senegalensis*): Medium Sensitivity

Insects:

- Tsitsikamma Giant Copper (*Aloeides pallida juno*): Medium Sensitivity
- Dickson's Sylph butterfly (*Tsitana dicksoni*): Medium Sensitivity (recorded within 14km of site)
- Yellow-winged Agile Grasshopper (*Aneuryphymus montanus*): Medium Sensitivity (recorded within 16km of site)

Mammals:

- Duthie's golden mole (*Chlorotalpa duthieae):* Medium sensitivity. (may occur on site and in area)
- Sensitive species 8: Medium sensitivity.

Ground-truthing during the site visit found that the project site is heavily disturbed and transformed and only retains limited elements of natural vegetation and faunal habitat. Suitable habitat for the animal SCC indicated in the Screening tool report was not found across the project area, and the importance of the project site for the SCC is considered as low to very low due to the high disturbance and habitat transformation.
Refer to Appendix D4 for the fauna compliance statement for the Upgrade of Wastewater Treatment Works and Sewer Reticulation, Woodlands, Eastern Cape, Jonathan Colville and Callan Cohen, 2025
The impact assessment and accompanying mitigation measures is provided in Section D of this preapplication draft Basic Assessment Report.

B.4.5 Agricultural potential

The Screening Tool indicates a Very high sensitivity for the agricultural theme. The site is used as a WWTW site and is located in close proximity to the Woodlands residential development and immediately adjacent to a small landfill site. The small size of area is not conducive to large farming; The site is small (2.2 ha) and therefore prevents economies of scale, and there is no existing-agricultural infrastructure on the land.
Rezoning from agricultural to appropriate land use (i.e. light industrial) is recommended for the WWTW and adjacent landfill site as part of future planning and zoning. The site has not been used for agricultural purposes and should be zoned accordingly. A compliance statement has been prepared and states that there will be no loss of future agricultural production potential as a result of the development.

The agricultural potential is considered low. Effluent and / or sludge can be beneficial to surrounding agricultural land users. Refer to Appendix D5 for Site Sensitivity Verification and Agricultural Compliance Statement for the Upgrade of Wastewater Treatment Works and Sewer Reticulation, SoilzSA, Johann Lanz & David Lakey, 2025

B5 LAND USE CHARACTER OF SURROUNDING AREA

Indicate land uses and/or prominent features that currently occur within a 500m radius of the site and give description of how this influences the application or may be impacted upon by the application:

5.1 Natural area
5.2 Low density residential
5.3 Medium density residential
5.4 High density residential
5.5 Informal residential
5.6 Retail commercial & warehousing
5.7 Light industrial
5.8 Medium industrial [AN]
5.9 Heavy industrial [AN]
5.10 Power station
5.11 Office/consulting room
5.12 Military or police base/station/compound
5.13 Spoil heap or slimes dam[A]
5.14 Quarry, sand or borrow pit
5.15 Dam or reservoir
5.16 Hospital/medical centre
5.17 School
5.18 Tertiary education facility
5.19 Church
5.20 Old age home
5.21 Sewage treatment plant[AN]
5.22 Train station or shunting yard [N]
5.23 Railway line [N]
5.24 Major road (4 lanes or more) [N]
5.25 Airport [N]
5.26 Harbour
5.27 Sport facilities
5.28 Golf course
5.29 Polo fields
5.30 Filling station [H]
5.31 Landfill or waste treatment site
5.32 Plantation
5.33 Agriculture
5.34 River, stream or wetland
5.35 Nature conservation area
5.36 Mountain, koppie or ridge
5.37 Museum
5.38 Historical building
5.39 Protected Area
5.40 Graveyard

5.41 Archaeological site
5.42 Other land uses (describe) – Waste water treatment site

If any of the boxes marked with an "N "are ticked, how will this impact / be impacted upon by the proposed activity.
If any of the boxes marked with an "An" are ticked, how will this impact / be impacted upon by the proposed activity.
If YES, specify and explain: Upgrade of the Woodlands WWTW and installation of small bore sewer reticulation network
If YES, specify: Upgrade of the Woodlands WWTW and installation of small bore sewer reticulation network
If any of the boxes marked with an "H" are ticked, how will this impact / be impacted upon by the proposed activity.
If YES, specify and explain:
If YES, specify:

B6 CULTURAL/HISTORICAL FEATURES

Are there any signs of culturally or historically significant elements, as defined in section 2 of the National Heritage Resources Act, 1999, (Act No. 25 of 1999), including Archaeological or palaeontological sites, on or close (within 20m) to the site?	YES	**NO**
	Uncertain	
If YES, explain:	The proposed development triggers Section 38(1) of the National Heritage Resources Act; 1. Construction of a road, wall, powerline, pipeline, canal or other similar form of linear development or barrier over 300m in length. 2. Construction of a bridge or similar structure exceeding 50m in length. 3. Any development or activity that will change the character of a site- a) exceeding 5 000m2 in extent A screener has been compiled by CTS Heritage. The NID and the report will be submitted to the Eastern cape Heritage Resources Authority. Refer to Section D for impact assessment and accompanying mitigation measures.	
If uncertain, conduct a specialist investigation by a recognised specialist in the field to establish whether there is such a feature(s) present on or close to the site.		

Briefly explain the findings of the specialist:

CTS Heritage compiled a screener report for the site (Appendix D6) and surrounding area to determine the planetological, alcohological and heritage sensitivities in the area.

No heritage resources have been recorded on or within 3km of the site. Based on the location of the proposed WWTW adjacent to the existing waste disposal site, and its distance from any major access routes, it is unlikely that the proposed development of the WWTW will negatively impact on the cultural landscape value of the area. The proposed sewer reticulation network is to be located within the existing road network for the existing Woodlands residential development. As this network will be buried, it is unlikely that this infrastructure will negatively impact on the cultural landscape.

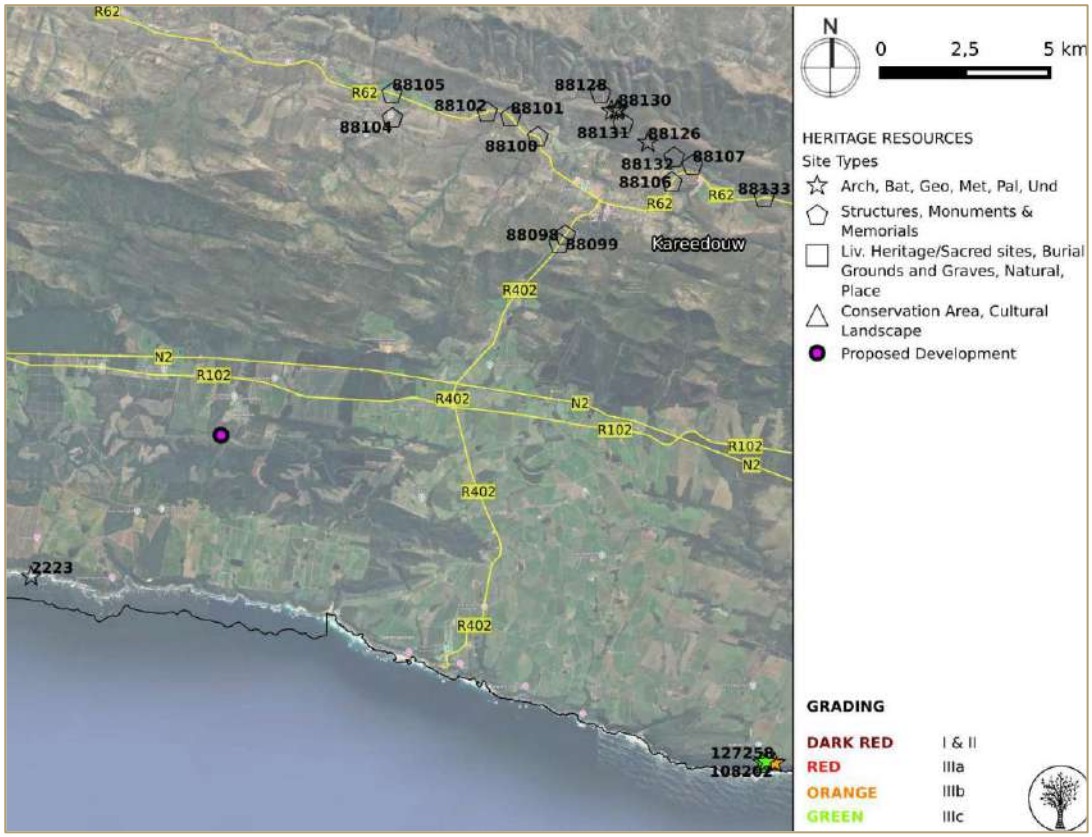

Figure 36: No heritage resources have been recorded on or within 3km of the site (adapted from CTS Heritage, 2025)

The archaeological sensitivity of the broader area can be summarised as follows, 'early stone age stone artefacts are common throughout the region and a large site is present on the hill slopes close to the confluence of the Krom and Diep Rivers, about 3.5 km south-east of Dieprivier". Artefacts have also been found about 2.3 km south-east of Dieprivier Substation, a single ESA handaxe 2.7 km north-west of proposed Tower 46, and a scatter of ESA artefacts about 8 km south-west of Dieprivier Substation (Binneman, 2010; 2012; 2021)

The area proposed for development in this application has not previously been assessed for impacts to archaeological heritage however, due to the location of the proposed WWTW adjacent to the existing waste disposal site, as well as the limited nature and scale of the proposed WWTW, it is unlikely that this proposed development will negatively impact on significant archaeological heritage.

A low fossil sensitivity is indicated for the WWTW and majority of pipeline, with some of the route noted in medium / high sensitivity areas. The high / very high sensitivity area is noted to correspond to the Peninsula and Cederberg geological forms.

Almond (2013, SAHRIS ID 131953) "Body fossils (shells, teeth, bones etc) are so far unknown from the Peninsula Formation. In the Palaeotechnical report on formations in the Eastern Cape (2009, SAHRIS ID 108744), the Peninsula Formation has low palaeontological sensitivity. An exceptionally important and interesting biota of soft-bodied (i.e. unmineralised) and shelly invertebrates, primitive jawless vertebrates and microfossils has been recorded since the middle 1970s from finely laminated, black mudrocks of the Soom Member, forming the lower, mudrock dominated portion of the **Cederberg Formation**.

The fossil record of the Goudini and Skurweberg Formations, dominated by braided alluvial sandstones, is very sparse indeed. (Almond, 2013)

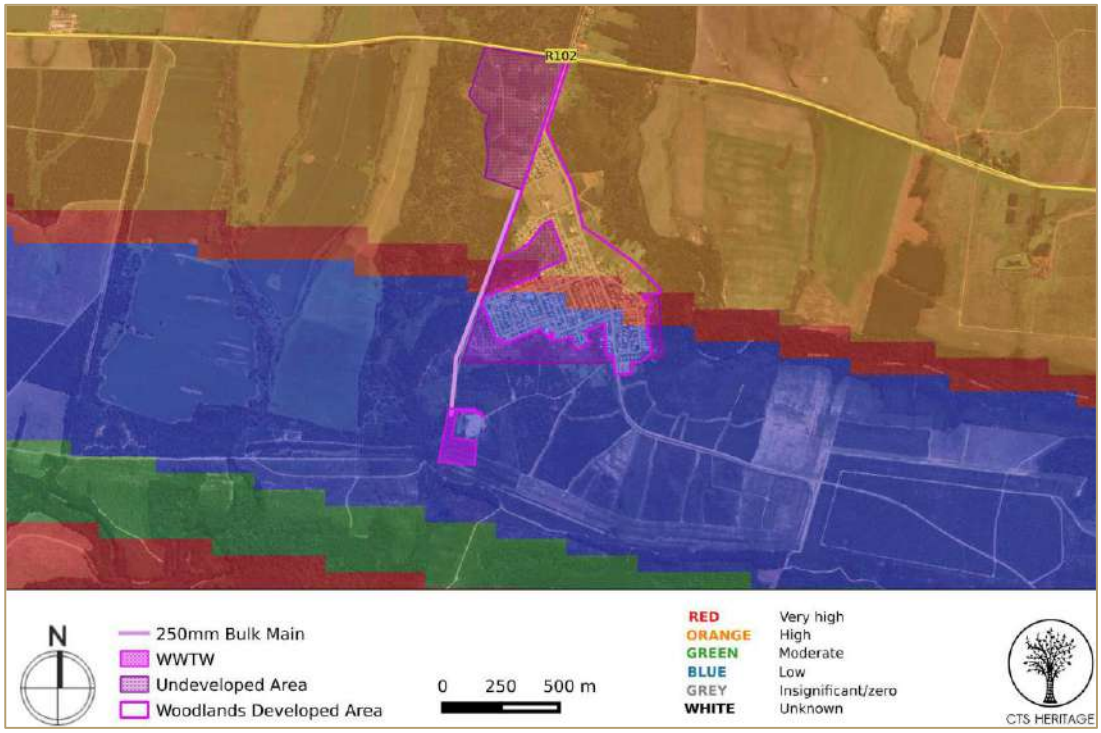

Figure 37: low fossil sensitivity is indicated for the WWTW and majority of pipeline, with some of the route noted in high / very high sensitivity areas (adapted from CTS Heritage, 2025)

The area proposed for development has not previously been assessed for impacts to palaeontological heritage however, due to the limited nature and scale of the proposed WWTW, it is unlikely that this proposed development will negatively impact on significant palaeontological heritage.

Will any building or structure older than 60 years be affected in any way?		**NO**
Is it necessary to apply for a permit in terms of the National Heritage Resources Act, 1999 (Act 25 of 1999)?	**YES**	**NO**

If yes, please submit or, make sure that the applicant or a specialist submits the necessary application to SAHRA or the relevant provincial heritage agency and attach proof thereof to this application if such application has been made.

Note: Permits will be applied for if required during excavation activities should any artefacts / resources be uncovered.

SECTION C: PUBLIC PARTICIPATION

C1 ADVERTISEMENT

The person conducting a public participation process must take into account any guidelines applicable to public participation as contemplated in section 24J of the Act and must give notice to all potential interested and affected parties of the application which is subjected to public participation by—

(a) fixing a notice board (of a size at least 60cm by 42cm; and must display the required information in lettering and in a format as may be determined by the competent authority) at a place conspicuous to the public at the boundary or on the fence of—
  (i) the site where the activity to which the application relates is or is to be undertaken; and
  (ii) any alternative site mentioned in the application;

(b) giving written notice to—
  (i) the owner or person in control of that land if the applicant is not the owner or person in control of the land;
  (ii) the occupiers of the site where the activity is or is to be undertaken or to any alternative site where the activity is to be undertaken;
  (iii) owners and occupiers of land adjacent to the site where the activity is or is to be undertaken or to any alternative site where the activity is to be undertaken;
  (iv) the municipal councillor of the ward in which the site or alternative site is situated and any organisation of ratepayers that represent the community in the area;
  (v) the municipality which has jurisdiction in the area;
  (vi) any organ of state having jurisdiction in respect of any aspect of the activity; and
  (vii) any other party as required by the competent authority;

(c) placing an advertisement in—
  (i) **one local newspaper**; or
  (ii) any official *Gazette* that is published specifically for the purpose of providing public notice of applications or other submissions made in terms of these Regulations;

(d) placing an advertisement in at least one provincial newspaper or national newspaper, if the activity has or may have an impact that extends beyond the boundaries of the metropolitan or local municipality in which it is or will be undertaken: Provided that this paragraph need not be complied with if an advertisement has been placed in an official *Gazette* referred to in subregulation 54(c)(ii); and

(e) using reasonable alternative methods, as agreed to by the competent authority, in those instances where a person is desiring of but unable to participate in the process due to—
  (i) illiteracy;
  (ii) disability; or
  (iii) any other disadvantage.

C2 CONTENT OF ADVERTISEMENTS AND NOTICES

A notice board, advertisement or notices must:

(a) indicate the details of the application which is subjected to public participation;

(b) and state—
  (i) that the application has been submitted to the competent authority in terms of these Regulations, as the case may be;

(ii) whether basic assessment or scoping procedures are being applied to the application, in the case of an application for environmental authorisation;
(iii) the nature and location of the activity to which the application relates;
(iv) where further information on the application or activity can be obtained; and
(iv) the manner in which and the person to whom representations in respect of the application may be made.

C3 PLACEMENT OF ADVERTISEMENTS AND NOTICES

Where the proposed activity may have impacts that extend beyond the municipal area where it is located, a notice must be placed in at least one provincial newspaper or national newspaper, indicating that an application will be submitted to the competent authority in terms of these regulations, the nature and location of the activity, where further information on the proposed activity can be obtained and the manner in which representations in respect of the application can be made, unless a notice has been placed in any *Gazette* that is published specifically for the purpose of providing notice to the public of applications made in terms of the EIA regulations.

Advertisements and notices must make provision for all alternatives.

C4 DETERMINATION OF APPROPRIATE MEASURES

The practitioner must ensure that the public participation is adequate and must determine whether a public meeting or any other additional measure is appropriate or not based on the particular nature of each case. Special attention should be given to the involvement of local community structures such as Ward Committees, ratepayers associations and traditional authorities where appropriate. Please note that public concerns that emerge at a later stage that should have been addressed may cause the competent authority to withdraw any authorisation it may have issued if it becomes apparent that the public participation process was inadequate.

C5 COMMENTS AND RESPONSE REPORT

The practitioner must record all comments and respond to each comment of the public before the application is submitted. The comments and responses must be captured in a comments and response report as prescribed in the EIA regulations and be attached to this application. The comments and response report must be attached under Appendix E.

The following public participation activities have been carried out:

- Initial IAP register – applicant, landowner, adjacent landowners, organs of state, identified stakeholders and any NGOs
- The notice of intention to submit a Water use license application and environmental authorisation application and call for registration of interested and affected parties was distributed as follows:
    - Placing two posters close to the site to inform the public of the process, dated 27 March 2025
    - Emailing notice and BID to organs of state, landowners, adjacent landowners and potential IAPs on 27 March 2025
    - Placing an advertisement in the KOUGA EXPRESS on 27 March 2025
- Registration period: 27 March to 2 May 2025 (NEMA and WUL) (30 days registration and initial comments)
- Update IAP register with additional registrations / identified parties (e.g. WUL officials, interested farmers, local brick making facilities)

The following public participation will take place:
Advert, site notice and notices including the following:
The pre-application draft basic assessment report (this report) will be distributed to all registered interested and affected parties for a 30-day review and comment period to registered interested and affected parties prior to submission of the NEMA EA application to the competent authority.
The relevant water use license information (this report and appendix G)will be made available for a 60-day comment and objection periods (Note: The pre-application meeting with DWS has taken place and the online ewula process has commenced; Reference: WU-42922).
Link to reports will be provided in notices and adverts.
The pre-application DBAR and accompanying PP and CRR (this report) will be updated accordingly
The NEMA EA application will be submitted to the competent authority
Upon receipt of the reference number the draft report will be distributed for a further 30-day review and comments period
The post-application report and accompanying PP and CRR (this report) will be updated accordingly
The final report submitted to the competent authority for consideration within 90 days of submission of the application (BAR process).
The NEMA decision-making time frame is 107 days. Once a decision is reached the decision will be distributed to all registered interested and affected parties and provided with a 20-day timeframe to submit an appeal against the decision.
Once all information has been accepted by the DWS, the decision-making process on the WULA is 90 days.

Refer to Appendix E: Public Participation and comments and Response Report

C6 AUTHORITY PARTICIPATION

Authorities are key interested and affected parties in each application and no decision on any application will be made before the relevant local authority is provided with the opportunity to give input. The planning and the environmental sections of the local authority must be informed of the application at least 30 (thirty) calendar days before the submission of the application.

List of authorities informed:

Name	Contact Person	Email
DWS	Portrait Tshatshu	TshatshuP@dws.gov.za
DWS	Marisa Bloem	BloemM@dws.gov.za
DWS	Vuyiseka Jack	jackv@dws.gov.za
DWS	Mpumela Ntombiyamayirha	MpumelaN@dws.gov.za
DWS	Sonke Ngxeba	NgxebaS@dws.gov.za
DWS	Chauke Hasani (PLZ)	ChaukeH@dws.gov.za
DWS	Somdaka Odwa (PLZ)	SomdakaO@dws.gov.za
DWS	Dweni Ncamile (PLZ)	DweniN@dws.gov.za
DWS	Ngcobo Siyabonga Brilliant	NgcoboS@dws.gov.za
DWS	Nyambi Musa Sifiso (PLZ)	NyambiM@dws.gov.za
DWS	Heymann Ncumisa (PLZ)	HeymannN@dws.gov.za

Name	Contact Person	Email
DWS	Gqotana Asanda(PLZ)	GqotanaA@dws.gov.za
DWS	Magwebu Bongani (PLZ)	Magwebu Bongani (PLZ)
DWS	Visagie Hammond	VisagieH@dws.gov.za>;
DWS	Van Rooyen Esmeralda	VanRooyenE2@dws.gov.za
DFFE: Waste	Lucas Mhlangu	LMahlangu@dffe.gov.za;
DFFE: Waste	Ndivhuwo Gereda	NGereda@dffe.gov.za
DFFE Oceans and Coast	Thandeka Mbambo	TMbambo@dffe.gov.za
DFFE Oceans and Coast		OCEIA@dffe.gov.za
ECHRA	Ayanda Mncwabe-Mama	ayanda.mncwabe-mama@ecsrac.gov.za
ECHRA	Lungiswa Mzazi	lungiswam@ecphra.org.za
EC Roads – Sarah Baartman DM	Randall Moore	Randall.Moore@ectransport.gov.za; Monde.Manga@ectransport.gov.za
Dept of Agriculture (EC)	Ruffus Maloma	Ruffus.Maloma@drdar.gov.za
Department of Agriculture - Regional Manager: Land Use & Soil Management	Gcinile Dumse	GcinileD@daff.gov.za
DFFE - Forestry	Babalwa Layini	BLayini@dffe.gov.za
DEDEAT	Andries Struwig	Andries.Struwig@dedea.gov.za / cc Charmaine.Mostert@dedea.gov.za
DEDEAT	Jeff Govender	dayalan.govender@dedea.gov.za
DEDEAT	Vuyo Maqutu	Vuyo.Maqutu@dedea.gov.za
DEDEAT	Adriaan Le Roux	Adriaan.leroux@dedea.gov.za
DEDEAT	Tembela Mapukata	Thembela.Mapukata@dedea.gov.za
SANBI	Vathiswa Zikishe	V.Zikishe@sanbi.org.za
Koukamma Local Municipality		
Koukamma Municipality	Nosipho N. Bota	nosipho.bota@koukamma.gov.za (Applicant representative)
Mr Pumelelo Maxwell Kate	Mayor Koukamma LM	katepm@koukamma.gov.za
Koukamma LM	Nathan Jacob	koukamma@koukamma.gov.za
Koukamma LM	Mziwamadoda M. Qalaba	mzi.qalaba@koukamma.gov.za

Mr Pumelelo Maxwell Kate	Thozamile Sompani	thozamile.sompani@koukamma.gov.za
Ward 5 councillor	Shannon May Ward 5	koukamma@koukamma.gov.za
Personal Assistant to the Community Services:	Chantelle Snyders,	chantelle.snyders@koukamma.gov.za
Personal Assistant to the Director Technical Services:	Raquel Grootboom,	Racquel.grootboom@koukamma.gov.za
Henni Britz 0825684031		britzco@mweb.co.za
PR Councillor 0735543860	Baker Smit	baker.smit@gmail.com
Sarah Baartman District Municipality		
Sarah Baartman District Municipality: Municipal Manager	Ted Pillay Natasha Peterson	ted@sbdm.co.za npeterson@sbdm.co.za
Sarah Baartman District Municipality:	Ms Unati Daniels	cmabindla@sbdm.co.za
Service Delivery		danielsu@sbdm.co.za
Refuse & Waste		tmokoena@sbdm.co.za
Roads		mmbanga@sbdm.co.za
Water		ksanyamandwe@sbdm.co.za
Sarah Baartman DM Environmental Health	Zoleka Sumi	zsomi@cacadu.co.za
Sarah Baartman District Municipality – Manager: Environmental Health	Kellelo Makgoka	kmakgoka@sbdm.co.za

List of authorities from whom comments have been received:

Registration of IAPs:

ECHRA

Find attached the ECPHRA heritage comment on the proposed development in the subject line. Note that I have also attached our process guideline for Section 38 applications including the NID form.

The preapplication draft BAR (this report) will be sent to all registered IAPs included in the register for a 30-day comment and review and advertised for a 60-day comment and objection period on the WUL related information (this report and appendix G); the public participation and comments and response report will be updated accordingly.

The register and details of public participation carried out to date is provided in Appendix E.

Refer to Appendix E

C7 CONSULTATION WITH OTHER STAKEHOLDERS

Note that, for linear activities, or where deviation from the public participation requirements may be appropriate, the person conducting the public participation process may deviate from the requirements of that subregulation to the extent and in the manner as may be agreed to by the competent authority.

Any stakeholder that has a direct interest in the site or property, such as servitude holders and service providers, should be informed of the application at least 30 (thirty) calendar days before the submission of the application and be provided with the opportunity to comment.

Has any comment been received from stakeholders?	YES	**NO**

If "YES", briefly describe the feedback below (also attach copies of any correspondence to and from the stakeholders to this application):

No comments from stakeholders have been received on notice.

The preapplication draft BAR (this report) will be sent to all registered IAPs included in the register for a 30-day comment and review and advertised for a 60-day comment and objection period on the WUL related information (this report and appendix G); the public participation and comments and response report will be updated accordingly.

The register and details of public participation carried out to date is provided in Appendix E.

Refer to Appendix E

SECTION D: IMPACT ASSESSMENT

The assessment of impacts must adhere to the minimum requirements in the EIA Regulations, 2014 as amended, and should take applicable official guidelines into account. The issues raised by interested and affected parties should also be addressed in the assessment of impacts.

D.1 ISSUES RAISED BY INTERESTED AND AFFECTED PARTIES

List the main issues raised by interested and affected parties.

Registration period: ECHRA *Find attached the ECPHRA heritage comment on the proposed development in the subject line. Note that I have also attached our process guideline for Section 38 applications including the NID form.* The preapplication draft BAR (this report) will be sent to all registered IAPs included in the register for a 30-day comment and review and advertised for a 60-day comment and objection period on the WUL related information (this report and appendix G); the public participation and comments and response report will be updated accordingly. The register and details of public participation carried out to date is provided in Appendix E. Refer to Appendix E

Response from the practitioner to the issues raised by the interested and affected parties (A full response must be given in the Comments and Response Report that must be attached to this report):

An NID will be submitted as requested by ECPHRA. The preapplication draft BAR (this report) will be sent to all registered IAPs included in the register for a 30-day comment and review and advertised for a 60-day comment and objection period on the WUL related information (this report and appendix G); the public participation and comments and response report will be updated accordingly. The register and details of public participation carried out to date is provided in Appendix E. Refer to Appendix E

D.2 IMPACTS THAT MAY RESULT FROM THE PLANNING AND DESIGN, CONSTRUCTION, OPERATIONAL, DECOMMISSIONING AND CLOSURE PHASES AS WELL AS PROPOSED MANAGEMENT OF IDENTIFIED IMPACTS AND PROPOSED MITIGATION MEASURES

List the potential direct, indirect and cumulative property/activity/design/technology/operational alternative related impacts (as appropriate) that are likely to occur as a result of the planning and design phase, construction phase, operational phase, decommissioning and closure phase, including impacts relating to the choice of site/activity/technology alternatives as well as the mitigation measures that may eliminate or reduce the potential impacts listed.

Alternative (preferred alternative)

Direct impacts:
Indirect impacts:
Cumulative impacts:

D.2.1 PLANNING AND DESIGN PHASE AND SUBSEQUENT CONSTRUCTION AND OPERATION

Alternative:	**WWTW Site, site layout, access road; no go alternative**
NEMA LN Activity	Removal vegetation; activity within 32 meters of watercourse, access road; pipeline
NWA water use	S21 c and I and f
Aspect	Site Selection
Description:	The only site alternative considered is the existing site. The site is adjacent to a landfill site and surrounding plantation / agricultural areas and is set back from the settlement with a distance of approximately 200 meters south of the nearest residential dwelling. Existing access is in place but will require to be upgraded to facilitate construction and operations. The eastern road will be used as the main access road to the site. The western access road is noted to cross the delineated wetland area, and this road will likely to be used for installation of the pipeline. The proposed access road has a 10-meter-wide road reserve, which includes a 2-meter-wide service corridor on either side to accommodate underground utilities. The road has been designed to accommodate a SANRAL single-unit design vehicle, which requires a minimum turning radius of 10 meters. The layout allows for two-way traffic and incorporates an access control point at the entrance to regulate vehicular movement. Some of the upgraded road sections fall within 32 meters of the delineated wetland area.
Impact 1:	**Placement of WWTW and supporting infrastructure on sensitive areas**
Nature of impact:	Direct (site) / Indirect (surrounding environment) / cumulative (downstream in combination with existing impacts)
Description of impact	Incorrect placement of structures in sensitive areas can result in direct, indirect and cumulative impacts on the environment. Site sensitivities indicate a very high aquatic sensitivities within close proximity to the site and the site forms part of the catchment area to the southern Groot rivier. The site is deemed acceptable as the site is already developed and currently impacted on. Existing impacts identified aim to be addressed through the installation of an upgraded treatment system. Site layout 1 shows some supporting infrastructures within the delineated wetland.

	Without the upgrade (no go) the existing pollution will continue. Based on this information Revised site layouts 2 and 3 places infrastructures outside delineated wetland. Site layout 3 includes a dried sludge storage area and is deemed acceptable.
Impact Rating	

Impact Status	Negative Impact		Negligible to negative low impact	
Impact Criteria	Without mitigation (baseline / no go alternative)		With mitigation (layout 3)	
Spatial	Local	3	Site	2
Duration	Long term	5	Short to medium	3
Frequency	Regular / weekly	4	Infrequent	2
Intensity	High	5	Low	1
Severity	Negative High	14	Negative low	6
Consequence	Negative high	17	Negative low	8
Probability	Expected	5	Slight	2
Impact Significance	Negative high (considerably harmful)	22	Negative Low	10
Mitigation	Costly and expensive to address and upgrade is urgently required to address existing contamination on site – the upgrade will address the current process and result in an improvement in treatment			
Confidence	High			

Mitigation Measures

- 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

	• Lifetime of mechanical plant estimations - pumps, Valves and Actuators (15 years); Process Plant - Wastewater (wet train) (15 years); Process Plant – Sludge (sludge train) (15 years) - ensure correct planning in place to maintain and upgrade mechanical components as required – this is extremely important as if this fails then high groundwater pollution can be expected.

Alternative:	**Pipeline route 1; Pipeline route 2; Pipeline route 3**
NEMA LN Activity	Removal vegetation; activity within / within 32 meters of watercourse, pipeline
NWA water use	S21 c and I
Aspect	Bulk pipeline
Description:	Three pipeline routes were considered. A gravity bulk pipeline is possible to convey sewage from the settlement to the site, and no pump stations are required for all three routes resulting in less construction footprint required and energy reduction during operations. Three routes were considered. Very High aquatic sensitivities occur in the preferred pipeline route area on the western side of the settlement. Consideration was given to installing the pipeline on the eastern side of the settlement where there are fewer aquatic sensitivities however the gradient is challenging and would likely require one or more pumpstations which is not desirable.
Impact 2:	**Placement of bulk pipeline on sensitive areas**
Nature of impact:	Direct (immediate environment) / Indirect (surrounding people and environment) / cumulative (downstream in combination with existing impacts in area)
Description of impact	Construction in an aquatic sensitive area can result in direct, indirect and cumulative impacts on the aquatic ecosystem and functioning; equipment failure (e.g pipeline leak) can result in impacts that would need to be immediately addressed. Route 1 is not feasible due to placement in future housing area as well as traversing delineated floodline and wetland areas. Route 2 was considered a higher risk due to its crossing the wetland over a longer distance. Route 3 is the environmentally preferred as the distance over the wetland is shorter and the gradient best suited to the gravity requirements of the pipeline.
Impact Rating	

Impact Status	Negative Impact		Negative Impact		Negative Impact		Negative Impact	
Impact Criteria	No go alternative		Pipeline 1		Pipeline 2		Pipeline 3	
Spatial	Local	3	Site	3	Site	2	Site	2
Duration	Long term	5	Short	2	Short	2	Short	2
Frequency	Regular / weekly	4	Regular	4	Seldom	3	Seldom	3
Intensity	High	5	Medium	3	Low to medium	2	Low	1
Severity	Negative High	14	Medium	9	Medium	7	Low	6
Consequence	Negative high	17	Medium	12	Medium	9	Low	8
Probability	Expected	5	Probable	4	Slight	2	Slight	2
Impact Significance	Negative high (considerably harmful)	22	Negative Medium High	16	Negative Medium	11	Negative Low	10

	Mitigation	Costly and expensive to address and upgrade is urgently required to address existing contamination on site – the upgrade will address the current process and result in an improvement in treatment
	Confidence	High
Mitigation Measures	• The environmentally preferred site is route 3, the narrowest section of the wetland, crossing approximately 37 m, and the proposal is that the pipeline should daylight across the wetland on concrete supports. 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 plan 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	

Alternative:	**Effluent management (no go; treatment via BNR and chlorine contact tank and SWMP)**
Aspect	Effluent management, SW pond, contact tanks
Description:	The Woodlands WWTW currently has a valid General Authorization in place dated 28 September 2017. The GA (Ref 27/2/2/K480/7/8) allows a volume of 1772.8 m3/annum into the Groot River. (4.8m3 / day or 4.8 Kl / day). The upgrade provides for a 0.5Ml / day treatment process. Current water quality results indicate pollution levels exceeding the authorised limits. Future hydraulic load calculations (taking into account planned SDF housing in the area) provided by SMEC (Concept and Viability report – summary treatment options, May 2025 – Appendix C) are as follows: ADWF – 462.37 kl/d, PDWF – 869.45 kl/d, PWWF – 1041.122 kl/d. The preferred treatment process will include a balancing tank (current treatment refurbished) and a biological reactor unit, surface aeration and clarification. Treated effluent will gravitate to 2x chlorine contact tanks and then discharged into the natural environment.The effluent from the clarifiers is collected in a common sump and then distributed into a 15m³ chlorine contact tank. Chlorine will be dosed at the inlet weir or in the pipe upstream of the inlet to the chlorine contact tanks. The chlorine contact tank provides 20-30 minutes of contact time at PWWF. An auto-flow metering system will be installed to ensure that a chlorine dosing rate of 5mg/l is maintained. The excess overflow at the Inlet works,

<table>
<tr><td></td><td>Balancing Tank, and Biological Reactor gravitates to a stormwater dam with a total storage capacity of ± 1100 m³. The design incorporates a freeboard allowance of 500mm for additional capacity during extreme events. The dam will be concrete lined to prevent seepage of raw sewage into the underlying soil, ensuring compliance with environmental protection standards and groundwater contamination mitigation measures. After the storm event, the contents will be pumped back to the inlet works at a slow rate to ensure the microorganisms are not washed out. Should the rain event exceed the capacity of the stormwater dam, the overflow will be discharged to the river.</td></tr>
<tr><td>Impact 3:</td><td>Treatment of effluent</td></tr>
<tr><td>NEMA LN Activity</td><td>Removal vegetation; activity within 32 meters of watercourse</td></tr>
<tr><td>NWA water use</td><td>S21 c and I and f</td></tr>
<tr><td>Nature of impact:</td><td>Direct / Indirect / cumulative as applicable</td></tr>
<tr><td>Description of impact</td><td>Treatment of sewage from woodlands settlement via the proposed BNR and chlorine contact tanks, equipped with suitable sized sw pond and operational management of SW is expected to improve the current pollution levels.</td></tr>
<tr><td>Impact Rating</td><td>
<table>
<tr><td>Impact Status</td><td>Negative</td><td></td><td>Negligible / Positive</td><td></td></tr>
<tr><td>Impact Criteria</td><td>No go alternative</td><td></td><td>Treatment of effluent</td><td></td></tr>
<tr><td>Spatial</td><td>Local</td><td>3</td><td>Site</td><td>2</td></tr>
<tr><td>Duration</td><td>Medium</td><td>3</td><td>Very short</td><td>1</td></tr>
<tr><td>Frequency</td><td>Daily</td><td>5</td><td>Daily</td><td>5</td></tr>
<tr><td>Intensity</td><td>Medium</td><td>3</td><td>Low</td><td>1</td></tr>
<tr><td>Severity</td><td>Negative Medium High</td><td>11</td><td>Medium</td><td>7</td></tr>
<tr><td>Consequence</td><td>Negative Medium high (requires in situ mitigation or repair or restoration)</td><td>14</td><td>Medium</td><td>9</td></tr>
<tr><td>Probability</td><td>Expected</td><td>5</td><td>Slim</td><td>1</td></tr>
<tr><td>Impact Significance</td><td>Negative Medium high</td><td>19</td><td>Positive Low / Negligible</td><td>10</td></tr>
<tr><td>Mitigation</td><td colspan="4">Possible and costly and expensive to address and upgrade is urgently required to address existing contamination on site – the upgrade will address the current process and result in an improvement in treatment</td></tr>
<tr><td>Confidence</td><td colspan="4">High</td></tr>
</table>
</td></tr>
<tr><td>Mitigation Measures</td><td>

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 currently built, lined, operated

</td></tr>
</table>

Alternative:	**Discharge of effluent and stormwater from emergency pond (no go; treated with SWMP)**
Aspect	Effluent discharge, stormwater pond, chlorine contact tanks

<table>
<tr><td>Description:</td><td>Approximately 0.5Ml / day will be discharged, on average, per day from the contact tank. The excess overflow at the Inlet works, Balancing Tank, and Biological Reactor gravitates to a stormwater dam with a total storage capacity of ± 1100 m³. The design incorporates a freeboard allowance of 500mm for additional capacity during extreme events. The dam will be concrete lined to prevent seepage of raw sewage into the underlying soil, ensuring compliance with environmental protection standards and groundwater contamination mitigation measures. After the storm event, the contents will be pumped back to the inlet works at a slow rate to ensure the microorganisms are not washed out. Should the rain event exceed the capacity of the stormwater dam, the overflow will be discharged to the river.

 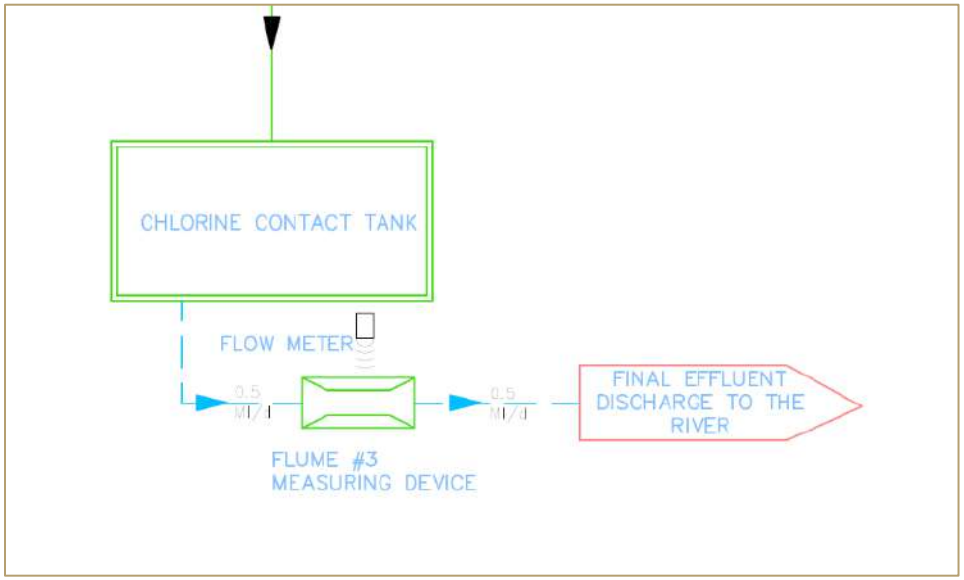

Figure 38: Adapted from SMEC (Drawing EC0047-GEN-GA-0001; REV 0)</td></tr>
<tr><td>Impact 4:</td><td>Flooding, Erosion and sedimentation</td></tr>
<tr><td>NEMA LN Activity</td><td>Removal vegetation; activity within 32 meters of watercourse, roads, pipelines</td></tr>
<tr><td>NWA water use</td><td>S21 c and I and f</td></tr>
<tr><td>Nature of impact:</td><td>Direct at discharge site / Indirect from sedimentation in streams / cumulative on streams in combination with existing erosion / sedimentation impacts in the catchment area.</td></tr>
<tr><td>Description of impact</td><td>Potential sewage overflow events; Discharge of (average) 500 000 liters of effluent per day at the same discharge point can be expected to result in erosion and subsequent sedimentation into the streams. Similarly , emergency discharge of water from the SW pond sized (1100 m³) when rain events exceed the capacity of the stormwater dam, is likely to result in erosion if preventative measures are not included in the design of the system.</td></tr>
<tr><td>Impact Rating</td><td>
<table>
<tr><td>Impact Status</td><td>Negative Impact</td><td>Negative Impact</td><td>Negative Impact</td></tr>
</table>
</td></tr>
</table>

Impact Criteria	No go alternative (current discharge of 4kl / day)		Effluent discharge no mitigation		Effluent discharge with mitigation	
Spatial	Local	3	Local	3	Activity	1
Duration	Medium	4	Medium	4	Medium	4
Frequency	Seldom	3	Seldom	3	Infrequent	2
Intensity	Low to medium	2	Low to medium	2	Low	1
Severity	Negative Medium	9	Medium	9	Low	7
Consequence	Negative medium	12	Medium	12	Low	8
Probability	Plausible	3	Plausible	3	Slight	2
Impact Significance	Negative Medium	15	Negative Medium	15	Negative Low	10
Mitigation						
Confidence	**High**	**5**				

Mitigation Measures

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

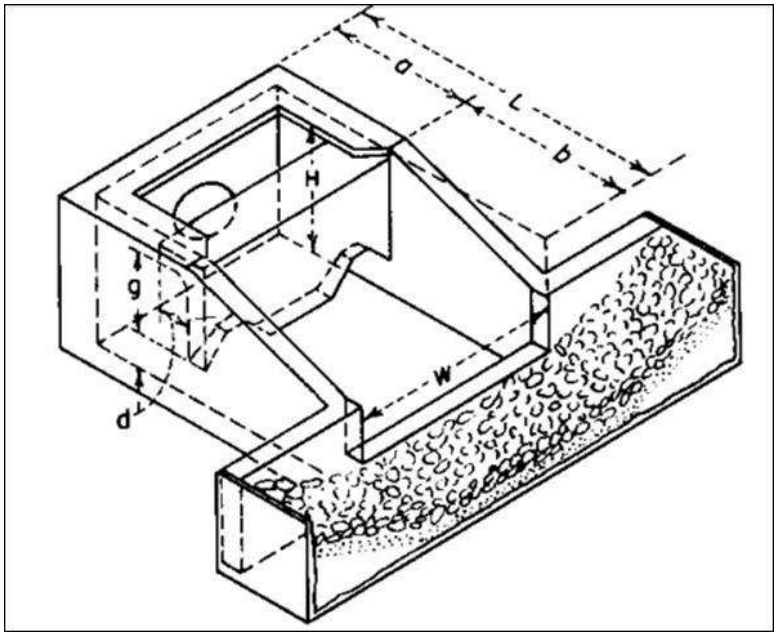

Figure 39: Concept design of effluent structure and stormwater control (SMEC, August 2025)

Alternative:	**Discharge of effluent (no go; discharge; reuse)**
Aspect	Effluent discharge
Description:	The Woodlands WWTW currently has a valid General Authorization in place dated 28 September 2017. The GA (Ref 27/2/2/K480/7/8) allows a volume of **1772.8 m3/annum** into the Groot River. Future hydraulic load calculations (taking into account planned SDF housing in the area) provided by SMEC (July 2025, May 2025 – Appendix C) are as follows: ADWF – 462.37 kl/d, PDWF – 869.45 kl/d, PWWF – 1041.122 kl/d. Approximately 0.5Ml / day will be discharged per day.
Impact 5:	**Loss of treated effluent that can be reused**
NEMA LN Activity	Activity within 32 meters of watercourse; pipeline
NWA water use	S21 c and I and f and e
Nature of impact:	Direct at discharge site
Description of impact	Reuse of treated effluent (5Kl per day) is encouraged by the KKLM and encourage to be incorporated into future planning of the area (e.g. irrigation needs of community areas, farms, plantations, sports fields, garden water etc), as opposed to discharge, eliminating the need to use potable

	water for irrigation purposes and reducing fertilizer requirements / inputs. Reuse for irrigation will only be possible if effluent meets the required standards. The effluent reuse pipeline could follow the same route back to the town where EA (if attained) would already be in place for this activity; however, pumping would be required from the works as it is upslope back to the town. A Section 21e water use license / general authorisation as applicable would need to be applied for in order to authorised irrigation with water containing waste; A provision of a suitable pump at the chlorine contact tank for future irrigation use is recommended to be included in the WWTW design. Note: A GA for irrigation is applicable when: • No more than 2 000 m3 of domestic wastewater is irrigated on any given day; and (plant is maximum 1000m3) • Water quality complies with wastewater limits (will be treated to general limits – ammonia as N will need to be 2mg/l (not 6mg/l) to irrigate) This GA is only permitted when irrigation takes place: • More than 50m above the 1 in 100-year flood line or riparian habitat whichever is the greatest; (floodline delineated – cannot irrigate within 50 m of floodline in terms of GA) • At least 100m from a water course; (watercourses delineated – cannot irrigate within 100m of watercourses in terms of GA) • At least 500m from a borehole that is utilised for drinking water or stock watering; (not likely – no registered users within 500 meters in terms of GA) • At least 500m from a wetland; and (wetland delineated – cannot irrigate within 500 meters of wetland in terms of GA) • On land that is not, or does not, overlie a major aquifer. (the aquifer is considered moderate and further assessment will be carried out once monitoring boreholes are drilled; cannot irrigate on major aquifer in terms of GA)

Table 10: Waste water limit values applicable to irrigation of any land or property up to 2000 cubic meters (REVISION OF GENERAL AUTHORISATIONS, 2013)

Table 1.1: Wastewater limit values applicable to the irrigation of any land or property up to 2000 cubic metres

Variables	**Limits**
pH	not less than 5,5 or more than 9,5 pH units
Electrical Conductivity	does not exceed 70 milliSiemens above intake to a maximum of 150 milliSiemens per metre (mS/m)
Suspended Solids	does not exceed 25 mg/l
Chloride as Free Chlorine	does not exceed 0,25 mg/l
Fluoride	does not exceed 1 mg/l
Soap, Oil and Grease	does not exceed 2,5 mg/l
Chemical Oxygen Demand	does not exceed 75 mg/l
Faecal coliforms	do not exceed 1000 per 100 ml
Ammonia (ionised and un-ionised) as Nitrogen	does not exceed 3mg/l
Nitrate/Nitrite as Nitrogen	does not exceed 15 mg/l
Ortho-Phosphate as phosphorous	does not exceed 10 mg/l

Impact Rating	Impact Status	Negative Impact		Negative Impact		Positive Impact		
	Impact Criteria	No go alternative (current discharge – no reuse)		Effluent discharge (planned discharge - no reuse)		Reuse effluent		
	Spatial	Activity	1	Activity	1	Activity	1	
	Duration	Medium term	4	Medium term	4	Life of operation	5	
	Frequency	Seldom	3	Seldom	3	Seldom	3	
	Intensity	Low	1	Low	1	Low	1	
	Severity	Negative Medium	7	Negative Medium	7	Low	9	
	Consequence	Negative Low	8	Negative Low	8	Low	10	
	Probability	Slight	2	Slight	2	Plausible	3	
	Impact Significance	Negative Low	10	Negative Low	10	Positive medium	13	
	Mitigation	Reuse options are possible but will require storage reservoirs, and RE piping which is costly in short term but will improve sustainability in the long term						
	Confidence	High	5					

Alternative:	**Sludge management (drying beds / beneficiation / offsite disposal)**
Aspect	Sludge management
Description:	Sludge management is proposed using lined sludge drying beds; the leachate from drying beds is proposed to be captured and returned to the head of works. A dried sludge storage facility has been included in the design of the WWTW layout. *A typical conventional sand drying bed (SDB) is about 6-8 meters wide and 30 meters long. The sand layer should be 230-300 mm deep.* *There are two drying beds designed to receive Waste activated sludge (WAS) for the dewatering process. The discharge of WAS from the biological reactor will be initiated manually by the process controller. The volume wasted will be recorded by means of an inline flow measuring device. An actuated knife gate valve will be controlled by the means of the measuring device, by closing the valve once the pre-set discharge volume has been reached. The selection of a drying bed will be at the discretion of the operator and/or process controller as instructed. The inlet valve to the selected will be manually opened and only closed once the WAS discharge flow has stopped. Manually operated type stop log will allow after the initial sludge settling, the decanting of the residual supernatant water from the drying beds. The underflow and supernatant from the drying beds will be collected in a channel connected to the drying beds and will be pumped back to the head of works. Once the sludge has dried, it will be manually removed. It is proposed that a skip bin be provided onsite for temporary storage of the dried sludge prior to disposal at a registered landfill site. The sludge is designed to produce waste sludge suitable for general landfill disposal or an A1a sludge that can be used for beneficiation purposes.*
Impact 6:	**Incorrect management of sludge leading to soil, surface and groundwater contamination**
NEMA LN Activity	Removal vegetation; additional triggers if not managed correctly
NWA / NEMWA	Sludge management guidelines; composting norms and standards as applicable; additional triggers if not managed correctly

Nature of impact:	Direct (immediate environment) / Indirect (downstream environment) / cumulative (in combination with downstream impacts)
Description of impact	Mismanagement of sludge due to failed operations, flooding of site or spillage onto ground can result in site contamination. The current (no – go / baselines) is resulting in such contamination. The upgrade will entail sludge management will be through the use of sludge drying beds. A storage area will be provided for dried sludge.

Impact Rating

Impact Status	Negative Impact		Negative Impact		Negative / Negligible impact	
Impact Criteria	No go alternative (current)		Upgrade with drying beds and storage area (no mitigation)		Upgrade with drying beds and storage area (with mitigation)	
Spatial	Local	3	Site	2	Activity	1
Duration	Short to medium	3	Very short at WWTW site	1	Very short	1
Frequency	Seldom	3	Seldom	3	Infrequent	2
Intensity	Medium	3	Low	1	Low	1
Severity	Negative medium	9	Low	5	Low	4
Consequence	Negative medium	12	Low	7	Low	5
Probability	Expected	5	Possible	4	Slight	2
Impact Significance	Negative Medium high	17	Negative medium	11	Negative low / negligible	7
Mitigation	Possible					
Confidence	Confidence	Confidence				

Impact 7:	**Incorrect treated sludge management leading to site contamination**
NEMA LN Activity	Removal vegetation; activity within / within 32 meters of watercourse
NWA / NEMWA	Sludge management guidelines; composting norms and standards as applicable
Nature of impact:	Direct (immediate environment) / Indirect (downstream environment) / cumulative (in combination with downstream impacts)
Description of impact	Mismanagement of dried sludge by not manually moving from drying bed to storage area; and not moving dried sludge from the storage facility can result in insufficient space provided in management facilities, operational difficulties, overdried sludge no longer useable, incorrect management (e.g burying of waste on site for example). Sludge operational procedure and skilled operators and reuse / disposal plan is imperative to ensure sludge is managed correctly. With correct management there should be negligible site impact.

Impact Rating

Impact Status	Negative Impact		Negative Impact		Negligible / Positive Impact	
Impact Criteria	No go alternative (current)		Operational sludge management (no mitigation)		Operational sludge management (with mitigation – reuse and / or disposal offsite)	
Spatial	Local	3	Site / local	3	Activity	1
Duration	Short to medium	3	Short	2	Very short	1
Frequency	Seldom	3	Infrequent	2	Infrequent - monthly	3
Intensity	Medium	3	Medium	3	Low	1
Severity	Negative medium	9	Low	7	Low	5
Consequence	Negative medium	12	medium	10	Low	6
Probability	Expected	5	Plausible	3	Slim	1

Impact Significance	Negative Medium high	17	Negative Medium	13	Positive Low / negligible	7
Mitigation						
Confidence	High	5				

Impact 8:	**Reuse versus off-site disposal of sludge**
NEMA	Duty of Care; On site disposal will trigger activities
NWA / NEMWA	Waste manage hierarchy / Sludge management guidelines; composting norms and standards as applicable; onsite disposal will trigger additional licensing
Nature of impact:	Indirect (beneficial offsite use) / cumulative (increasing disposal at landfills)
Description of impact	Reuse of sludge is preferred to disposal. Reuse options of dried sludge include agricultural use and reuse for brick making operations, the demand and feasibility of reuse in terms of logistics will need to be considered. Composting of sludge is encouraged and can prevent overdying of sludge and result in saleable product for reuse in agricultural applications / nurseries; composted material can also be used on site and in town in landscaping. Disposal of dried sludge is the last option in the waste management hierarchy, and the nearest suitable site for disposal will result in additional transport costs (estimated 3 tons generated per month on average) and therefore logistical costs must be considered in decision making by the KKLM; the disposal will need to be at a suitable licensed waste management sludge where it can be used for capping etc.

Impact Rating

Impact Status	Negative Impact		Negative Impact		Positive Impact		Negative Impact	
Impact Criteria	No go alternative (current)		Operational sludge management (no mitigation)		Operational sludge management (reuse only)		Drying beds and offsite disposal (reuse and disposal)	
Spatial	Local	3	Site / local	3	Activity	1	Activity	1
Duration	**Short to medium**	**3**	**Short**	**2**	**Very short at reuse site**	**1**	**Short to medium at landfill**	**3**
Frequency	**Seldom**	**3**	**Infrequent**	**2**	**Seldom**	**3**	**Infrequent**	**2**
Intensity	**Medium**	**3**	**Low to medium**	**2**	**Low to medium**	**2**	**Low**	**1**
Severity	Negative medium	**9**	**Low**	**6**	**Low**	**6**	**Low**	**6**
Consequence	Negative medium	12	medium	9	Low	7	Low	7
Probability	Expected	5	Plausible	3	Plausible	3	Slight	2
Impact Significance	**Negative Medium high**	**17**	**Negative medium**	**12**	**Positive Low**	**10**	**Negative Low**	**9**
Mitigation	Upgrade is urgently required to address existing contamination on site – the upgrade will address the current process and result in an improvement in treatment; the process aims to achieve a sludge classification of A1a.							
Confidence	High							

Mitigation Measures

- 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 the 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.

Alternative:	**All - Site 1; pipeline (preferred 3); BNR design; sludge drying beds; effluent discharge; internal reticulation and small-bore installation**			
Aspect	*Pipeline, sewage holding tank, WWTW, sludge management facilities, effluent, monitoring borehole*			
Description:	All infrastructure must be designed to prevent groundwater contamination			
Impact 9:	**Groundwater contamination**			
NEMA LN Activity	EA and conditions for Removal of vegetation; activity within / within 32 meters of watercourse			
NWA / NEMWA	Section 21 c, I and f, Sludge management guidelines; composting norms and standards as applicable			
Nature of impact:	Direct / Indirect / cumulative as applicable			
Description of impact	i) Leakage from pipework associated with the WWTW ii) Leakage from sewage holding tank. iii) Leaks and leachate from the WWTW. iii) Discharge of improperly treated effluent. iv) WWTW failure. v) Flooding of WWTW during storms. vi) Leachate from the sludge storage facilities. All of the aforementioned impacts could percolate into the groundwater.			
Impact Rating	Impact Status	Negative Impact	Negative Impact	Negligible / negative impact

Impact Criteria	No go (current)		Without mitigation		With mitigation	
Spatial	Local	3	Local	3	Site / Activity	2
Duration	**Medium term**	**4**	**Medium term**	**4**	**Very short**	**1**
Frequency	**Regular / weekly**	**4**	**Seldom**	**3**	**Infrequent**	**2**
Intensity	**Medium**	**3**	**Medium – low**	**2**	**Low**	**1**
Severity	**Medium high**	**11**	**Medium**	**9**	Low	4
Consequence	Negative medium high	14	Negative medium	12	Negligible	6
Probability	Expected	5	Probable	4	Slim / slight / Plausible	3
Impact Significance	**Negative Medium high**	**19**	**Negative Medium high**	**16**	**Negligible / low negative**	**9**
Mitigation	Possible					
Confidence	High					

Mitigation Measures

- 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 11 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 11: 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 microbial composition may indicate areas of groundwater contamination and be used as an early warning system to implement management/remedial actions.

D.2.2 CONSTRUCTION PHASE AND DECOMMISSIONING AS APPLICABLE AND MAINTENANCE DURING OPERATIONS AS REQUIRED

Alternative:	**All - Site 1; pipeline (preferred 3); BNR design; sludge drying beds; effluent discharge; internal reticulation and small-bore installation, roads**
Aspect	Construction and operational planning requirements
Description:	Monitoring must be undertaken by an appointed ECO and should commence prior to construction of the works so there is a clear understanding of baseline conditions to which comparisons can be made at a later point.
Impact 1:	**Inadequate planning and *Non-compliance with Conditions of the Environmental Authorisations***
NEMA LN Activity	EA and conditions for Removal of vegetation; activity within / within 32 meters of watercourse, pipeline, road
NWA / NEMWA	Section 21 c, I and f, Sludge management guidelines; composting norms and standards as applicable
NEMBA/ PNCO / NFA	Permits of scc and / or protected trees as applicable
Nature of impact:	Direct / Indirect / cumulative as applicable Poor environmental management planning and / or lack of budget for environmental management will result in unmitigated impacts.
Description of impact	Without correct planning and budget for mitigation and management (EMPr requirements) direct and indirect impacts can be expected during construction phase (waste, dust, noise, visual, fauna, flora, soil, water) and incorrect maintenance and operation can result in soil and water contamination. Careful management with accompanying budget is therefore required from the KKLM.
Impact Rating	As per impacts identified for planning, construction / operational phase as applicable without / with mitigation implemented
Mitigation Measures	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

Alternative:	**All - Site 1; pipeline (preferred 3); BNR design; sludge drying beds; effluent discharge; internal reticulation and small-bore installation, roads**
Aspect	Clearing and Excavation activities
Description:	Clearing and excavation activities can result in a number of environmental impacts if not managed correctly.
Impact 2:	**Loss of heritage, archaeological, palaeontological resources.**
NEMA LN Activity	Removal vegetation; activity within 32 meters of watercourse, pipeline, road
HRA Section 38	Permit required for any archaeological, palaeontological resource that may be uncovered during construction / maintenance activities
Nature of impact:	Direct (loss of resource / damage to resource / collection of resource)
Description of impact	Excavation activities can unearth archaeological / palaeontological resources and result in unnecessary disturbance if measures are not in place.; A NID and screening report has been submitted to the ECPHRA . The BAR will be updated with any comments / additional measures provided by the ECPHRA as required.

Impact Rating

Impact Status			Negative Impact		Positive Impact	
Impact Criteria	No go alternative		Without mitigation		With mitigation	
Spatial	-	-	Activity	1	Activity	1
Duration	-	-	Very short	1	Very short	1
Frequency	rare	-	rare	1	Rare	1
Intensity	Low	-	Low	1	Low	1
Severity	Negligible	-	Negligible	3	Negligible	3
Consequence	Negligible	-	Negligible	4	Negligible	4
Probability	Slim	1	Plausible	3	Plausible	1
Impact Significance	**Negligible**		**Low**	**7**	**Low**	**7**
Mitigation	Possible					
Confidence	High					

Mitigation Measures

Construction Planning Team

- Notice of commencement of development and a project specific chance finds procedure (CFP) to be submitted to ECPHRA by the responsible individual (ECO), before construction starts.
- Induction / Pre-construction training and proof thereof to be shared with ECPHRA;

	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 and any sites exposed to be reported to the ECO (photographs, coordinates) who must report the find to the ECPHRA. Steps provided by ECPHRA regarding the find to be followed. • The KKLM can notify surrounding universities of when site clearing will commence and if any interest form Archaeological / Paleontology students, they can be invited to inspect topsoil and subsoil stockpiles for any finds accompanied by ECO / site manager • Any chance findings as a result of maintenance activities to report to ECPHRA for lifetime of operations.

Alternative:	**All - Site 1; pipeline (preferred 3); BNR design; sludge drying beds; effluent discharge; internal reticulation and small-bore installation, roads**
Aspect	Laydown areas and development footprints
Description:	Unnecessary clearing and disturbance result in a number of environmental impacts if not managed correctly.
Impact 3:	**Unnecessary loss of vegetation, disturbance to watercourses and disturbance to fauna**
NEMA LN Activity	Removal vegetation; activity within 32 meters of watercourse, pipeline, road
NWA water use	Section c and I and f
PNCO, NEMBA, NFA	Permits required species of conservation concern included in NEMBA and PNCP (flora and fauna) and NFA (trees)
Nature of impact:	Direct (loss of vegetation, disturbance to watercourses, disturbance to fauna)
Description of impact	By their nature, construction projects involving large numbers of workers using heavy machinery, with movement of materials over a large area are likely to create more disturbance to the natural environment (and watercourses) than necessary.

Impact Rating

Impact Status	Negligible		Negative Impact		Negative Impact	
Impact Criteria	No go alternative (baseline)		No go alternative		With mitigation	
Spatial	-	-	Activity	1	Activity	1
Duration	-	-	Very short	1	Very short	1
Frequency	rare	rare	rare	1	Rare	1
Intensity	Low	Low	Low	1	Low	1
Severity	Negligible	Negligible	Negligible	3	Negligible	3
Consequence	Negligible	Negligible	Negligible	4	Negligible	4
Probability	Slim	Slim	Plausible	3	Plausible	1
Impact Significance	**Negligible**	**Negligible**	**Medium**	**7**	**Low**	**7**
Mitigation	Possible					
Confidence	High					

Mitigation Measures	**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 assists in identification) and all fauna encountered on site should be reported to the ECO immediately. This is important when:
	  o An animal is harmed or compromised in any way during construction.
	  o Any animal with limited mobility is found on site (e.g. tortoises, moles, chameleons).
	  o Any potentially dangerous animal is encountered. This includes any potentially venomous animal (e.g. snakes, scorpions)
	  o 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.

<table>
<tr><td>Alternative:</td><td>All - Site 1; pipeline (preferred 3); BNR design; sludge drying beds; effluent discharge; internal reticulation and small-bore installation, roads</td></tr>
<tr><td>Aspect</td><td>Construction and maintenance activities</td></tr>
<tr><td>Description:</td><td>Clearing resulting in exposed soils susceptible to wind / water erosion.</td></tr>
<tr><td>Impact 4:</td><td>Stormwater Runoff Causing Erosion, Sedimentation and Pollution During Construction</td></tr>
<tr><td>NEMA LN Activity</td><td>Removal vegetation; activity within 32 meters of watercourse, pipeline, road</td></tr>
<tr><td>NWA water use</td><td>Section c and I and f</td></tr>
<tr><td>NEMBA, CARA</td><td>AIS to be removed by landowner; no permits in place for keeping of AIS</td></tr>
<tr><td>Nature of impact:</td><td>Direct (loss of vegetation and soil, erosion) and indirect and cumulative (sedimentation in watercourses, disturbance to aquatic ecosystems)</td></tr>
<tr><td>Description of impact</td><td>Large areas of exposed soil, stockpiled mobile materials, and compacted soil without vegetation are susceptible to erosion, which could result in sedimentation and pollution of water in aquatic habitats. The aim for mitigating this impact are to ensure that no sediment-laden runoff enters watercourses. Cleaning up sedimentation through a wetland or stream is very difficult and time consuming, so preventing such incidents should be the primary focus. Stormwater generated on-site should be managed according to Sustainable Drainage System (SuDS) principles even during the construction phase. This means that infiltration of low velocity flows should be encouraged as far as possible. High velocity, concentrated flows of water must be avoided. Provided the recommended mitigation measures are fully implemented, this impact is rated as Negligible. However, implementation is dependent on having the correct materials available on site (as these are not always immediately available), and proactive preparation in anticipation of, during, and following rainfall is critical.</td></tr>
<tr><td>Impact Rating</td><td>
<table>
<tr><td>Impact Status</td><td colspan="2">Negligible</td><td colspan="2">Negative Impact</td><td colspan="2">Negative Impact</td></tr>
<tr><td>Impact Criteria</td><td colspan="2">No go alternative (baseline)</td><td colspan="2">Without mitigation</td><td colspan="2">With mitigation</td></tr>
<tr><td>Spatial</td><td>Site</td><td>2</td><td>Site</td><td>2</td><td>Activity</td><td>1</td></tr>
<tr><td>Duration</td><td>Short</td><td>2</td><td>Short – medium</td><td>3</td><td>Very short</td><td>1</td></tr>
<tr><td>Frequency</td><td>Seldom</td><td>3</td><td>Seldom</td><td>3</td><td>Rare</td><td>1</td></tr>
<tr><td>Intensity</td><td>Low</td><td>1</td><td>Low – medium</td><td>2</td><td>Low</td><td>1</td></tr>
<tr><td>Severity</td><td>Low</td><td>6</td><td>Medium</td><td>8</td><td>Negligible</td><td>3</td></tr>
<tr><td>Consequence</td><td>Low</td><td>8</td><td>Medium</td><td>10</td><td>Negligible</td><td>4</td></tr>
<tr><td>Probability</td><td>Slim</td><td>2</td><td>Plausible</td><td>3</td><td>Plausible</td><td>3</td></tr>
<tr><td>Impact Significance</td><td>Low</td><td>10</td><td>Medium</td><td>13</td><td>Low</td><td>7</td></tr>
<tr><td>Mitigation</td><td colspan="6">Possible</td></tr>
<tr><td>Confidence</td><td colspan="6">High</td></tr>
</table>
</td></tr>
<tr><td>Mitigation Measures</td><td>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</td></tr>
</table>

	• 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 secondatum*) and kweek (*Cynodon dactylon*) is preferable. No kikuyu to be used.

Alternative:	**All - Site 1; pipeline (preferred 3); BNR design; sludge drying beds; effluent discharge; internal reticulation and small-bore installation, roads**						
Aspect	Construction of the Bulk Sewer Line, internal reticulation, and WWTW facilities, access road and excavations						
Description:	Mismanagement of soil						
Impact 5:	**Soil disturbance**						
NEMA LN Activity	Removal vegetation; activity within 32 meters of watercourse, pipeline, road						
NWA water use	Section c and I and f						
NEMBA, CARA	AIS to be removed by landowner;						
Nature of impact:	Direct (soil erosion, soil loss, damage to soil structure); Indirect (sedimentation, impact on surrounding vegetation, aquatic systems)						
Description of impact	Mismanagement of soil leads to damage of soil structure and loss of soil						
Impact Rating	Impact Status	Negligible		Negative Impact		Negative Impact	
	Impact Criteria	Baseline / no go		Without mitigation		With mitigation	
	Spatial	Activity	1	Site	2	Activity	1
	Duration	Very short	1	Very short	1	Very short	1
	Frequency	rare	1	Regular	4	Seldom	3
	Intensity	Low	1	Low – medium	2	Low	1

Severity	Negligible	3	Medium	7	Negligible	6
Consequence	Negligible	4	Medium	9	Negligible	7
Probability	Slim	1	Plausible	3	Plausible	3
Impact Significance	Negligible	5	**Medium**	**12**	**Low**	**10**
Mitigation	Possible					
Confidence	High					

Mitigation Measures

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.

Alternative:	**All - Site 1; pipeline (preferred 3); BNR design; sludge drying beds; effluent discharge; internal reticulation and small-bore installation, roads**					
Aspect	Access road, pipeline, WWTW structures, effluent and SW Outlets					
Description:	Construction activities in wet areas can disturb soil structure					
Impact 6:	**Working in and Adjacent to the Drainage Line for Construction of the WWTW and Associated Outlets**					
NEMA LN Activity	Removal vegetation; activity within 32 meters of watercourse, pipeline, road					
NWA water use	Section c and I and f					
NEMBA, CARA	AIS to be removed by landowner; no permits in place for keeping of AIS					
Nature of impact:	Direct (erosion and sedimentation) and indirect and cumulative (disturbance to watercourses)					
Description of impact	Construction within wet areas can cause soil disturbance and impact on wetland functioning					
Impact Rating						

Impact Status	Negligible		Negative Impact		Negative Impact	
Impact Criteria	Baseline / no go		Without mitigation		With mitigation	
Spatial	Activity	1	Site	2	Activity	1
Duration	Very short	1	Very short	1	Very short	1
Frequency	rare	1	Regular	4	Seldom	3
Intensity	Low	1	Low – medium	2	Low	1
Severity	Negligible	3	Medium	7	Negligible	6
Consequence	Negligible	4	Medium	9	Negligible	7
Probability	Slim	1	Plausible	3	Plausible	3
Impact Significance	Negligible	5	Medium	12	Low	10
Mitigation	Possible					
Confidence	High					

Mitigation Measures	**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.

Alternative:	**All - Site 1; pipeline (preferred 3); BNR design; sludge drying beds; effluent discharge; internal reticulation and small-bore installation, roads**						
Aspect	Alien invasive species						
Description:	Site is currently impacted by moderate to dense AIS; introduction of AIS can occur in areas disturbed form construction / maintenance						
Impact 7:	***AIS Displacing indigenous flora and fauna; decrease of natural runoff in catchment area***						
NEMA LN Activity	Removal vegetation; activity within 32 meters of watercourse, pipeline, road						
NWA water use	Section c and I and f						
NEMBA, CARA	AIS to be removed by landowner						
NEMWA	Waste management hierarchy						
Nature of impact:	Direct and indirect and cumulative (Aquatic; terrestrial)						
Description of impact	Disturbed construction areas are often impacted with AIS seedlings. Ongoing removal during construction is expected to result in a negligible impact to low positive impact ensuring activities on site do not cause additional AIS impacts on the already impacted area.						
Impact Rating	Impact Status	Negative Impact		Negative Impact		Positive / Negative Impact	
	Impact Criteria	No go / current		Without mitigation (current)		With mitigation (remove in construction footprint area on ongoing basis)	
	Spatial	Local	3	Local	3	Activity	1
	Duration	Medium to long	4	Medium to long	4	Very short	1
	Frequency	Seldom	3	Seldom	3	Rare	1
	Intensity	Moderate	3	Moderate	3	Low	1
	Severity	Medium	10	Medium	10	Negligible	3
	Consequence	Medium High	13	Medium High	13	Low	4
	Probability	Expected	5	Expected	5	Slim to slight	5/6

	Impact Significance	Medium High	18	Medium High	18	Low to negligible	6/7
	Mitigation	Possible					
	Confidence	High.					
Mitigation Measures	**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						

Alternative:	**All - Site 1; pipeline (preferred 3); BNR design; sludge drying beds; effluent discharge; internal reticulation and small-bore installation, roads**
Aspect	Waste generation
Description:	Incorrect waste management Construction materials and waste generated needs to be carefully managed to ensure impacts on the environment are reduced. Waste streams: • Subsoils not reused • Construction rubble (broken bricks, cement, concrete spills) • General waste items (paper, tins, plastic, metals, organic, cleared vegetation not for reuse) • Hazardous materials / waste that may be used /generated: o Fuels, oils, oil-based paints, turpentine etc o Sewage waste from ablution facilities o Spillage of hazardous materials
Impact 8:	***General Waste pollution***
NEMA LN Activity	Removal vegetation; activity within 32 meters of watercourse, pipeline, road
NWA water use	Section c and I and f
NEMBA, CARA	AIS to be removed by landowner and disposed / reused correctly
NEMWA	Waste management hierarchy – avoid, reduce, reuse, recycle, dispose
Nature of impact:	Direct and indirect and cumulative (Sensitive Aquatic Habitat, groundwater and surface water, disturbance to flora and fauna; health impacts, visual impacts)
Description of impact	This impact mainly concerns the proper management of construction related waste materials.

<table>
<tr><td>Impact Rating</td><td>
<table>
<tr><td>Impact Status</td><td colspan="2">Negligible</td><td colspan="2">Negative Impact</td><td colspan="2">Negative Impact</td></tr>
<tr><td>Impact Criteria</td><td colspan="2">No go / baseline – no waste impacts from construction</td><td colspan="2">Without mitigation</td><td colspan="2">With mitigation</td></tr>
<tr><td>Spatial</td><td></td><td></td><td>Site</td><td>2</td><td>Activity</td><td>1</td></tr>
<tr><td>Duration</td><td></td><td></td><td>short</td><td>2</td><td>Very short</td><td>1</td></tr>
<tr><td>Frequency</td><td></td><td></td><td>Regular</td><td>4</td><td>Seldom</td><td>3</td></tr>
<tr><td>Intensity</td><td></td><td></td><td>Low</td><td>1</td><td>Low</td><td>1</td></tr>
<tr><td>Severity</td><td></td><td></td><td>Medium</td><td>7</td><td>Low</td><td>5</td></tr>
<tr><td>Consequence</td><td></td><td></td><td>Medium</td><td>9</td><td>Low</td><td>6</td></tr>
<tr><td>Probability</td><td></td><td></td><td>Expected</td><td>5</td><td>Plausible</td><td>3</td></tr>
<tr><td>Impact Significance</td><td></td><td></td><td>Medium</td><td>14</td><td>Low</td><td>9</td></tr>
<tr><td>Mitigation</td><td colspan="6">Possible</td></tr>
<tr><td>Confidence</td><td colspan="6">High</td></tr>
</table>
</td></tr>
<tr><td>Impact 9:</td><td>Hazardous Waste pollution</td></tr>
<tr><td>NEMA LN Activity</td><td>Removal vegetation; activity within 32 meters of watercourse, pipeline, road</td></tr>
<tr><td>NWA water use</td><td>Section c and I and f</td></tr>
<tr><td>NEMWA</td><td>Waste management hierarchy – avoid, reduce, reuse, recycle, dispose</td></tr>
<tr><td>Nature of impact:</td><td>Direct and indirect and cumulative (Sensitive Aquatic Habitat, groundwater and surface water, disturbance to flora and fauna; health impacts, visual impacts).</td></tr>
<tr><td>Description of impact</td><td>Spillages of diesel, petrol, oil, paints, clears and other harmful chemicals. These substances may potentially percolate into the groundwater and enter the surrounding environment.</td></tr>
<tr><td>Impact Rating</td><td>
<table>
<tr><td>Impact Status</td><td colspan="2">Negligible</td><td colspan="2">Negative Impact</td><td colspan="2">Negative Impact</td></tr>
<tr><td>Impact Criteria</td><td colspan="2">No go / baseline – no waste impacts from construction</td><td colspan="2">Without mitigation</td><td colspan="2">With mitigation</td></tr>
<tr><td>Spatial</td><td></td><td></td><td>Local</td><td>2</td><td>Activity</td><td>1</td></tr>
<tr><td>Duration</td><td></td><td></td><td>short</td><td>2</td><td>Very short</td><td>1</td></tr>
<tr><td>Frequency</td><td></td><td></td><td>Regular</td><td>4</td><td>Seldom</td><td>3</td></tr>
<tr><td>Intensity</td><td></td><td></td><td>Low to medium</td><td>2</td><td>Low to medium</td><td>2</td></tr>
<tr><td>Severity</td><td></td><td></td><td>Medium</td><td>8</td><td>Low</td><td>6</td></tr>
<tr><td>Consequence</td><td></td><td></td><td>Medium</td><td>10</td><td>Low</td><td>7</td></tr>
<tr><td>Probability</td><td></td><td></td><td>Expected</td><td>5</td><td>Plausible</td><td>3</td></tr>
<tr><td>Impact Significance</td><td></td><td></td><td>Medium</td><td>15</td><td>Low</td><td>10</td></tr>
<tr><td>Mitigation</td><td colspan="6">Possible</td></tr>
<tr><td>Confidence</td><td colspan="6">High</td></tr>
</table>
</td></tr>
<tr><td>Mitigation Measures</td><td>Construction – Planning
An incident/complaints register must be established and maintained on-site.</td></tr>
</table>

	• 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.

<table>
<tr><td>Alternative:</td><td>All - Site 1; pipeline (preferred 3); BNR design; sludge drying beds; effluent discharge; internal reticulation and small-bore installation, roads</td></tr>
<tr><td>Aspect</td><td>Fire Risk</td></tr>
<tr><td>Description:</td><td>Site is currently impacted by moderate to dense AIS and natural vegetation is fynbos and is therefore considered a high-risk site with regards to fire risk and preventative and response measures are required during construction and operations.</td></tr>
<tr><td>Impact 10:</td><td>Unintentional and uncontrolled fires can have high significant impacts on the social and natural environment</td></tr>
<tr><td>NEMA LN Activity</td><td>Removal vegetation; activity within 32 meters of watercourse, pipeline, road</td></tr>
<tr><td>NWA water use</td><td>Section c and I and f</td></tr>
<tr><td>NEMBA, CARA</td><td>AIS to be removed by landowner</td></tr>
<tr><td>NEMWA</td><td>Waste management hierarchy</td></tr>
<tr><td>Nature of impact:</td><td>Direct (fire) and indirect (visual, smoke, smog)</td></tr>
<tr><td>Description of impact</td><td>Unintentional and uncontrolled fires can have high significant impacts on the social and natural environment. Wet areas are west of side; settlement is north and open areas (moderate to dense AIS and fynbos) north west and south.</td></tr>
<tr><td>Impact Rating</td><td>
<table>
<tr><td>Impact Status</td><td colspan="2">Negative</td><td colspan="2">Negative Impact</td><td colspan="2">Negative Impact</td></tr>
<tr><td>Impact Criteria</td><td colspan="2">No go / baseline</td><td colspan="2">Without mitigation</td><td colspan="2">With mitigation</td></tr>
<tr><td>Spatial</td><td>Local</td><td>3</td><td>Local</td><td>3</td><td>Site</td><td>2</td></tr>
<tr><td>Duration</td><td>Very short</td><td>1</td><td>Very short</td><td>1</td><td>Very short</td><td>1</td></tr>
<tr><td>Frequency</td><td>Rare</td><td>1</td><td>Rare</td><td>1</td><td>Rare</td><td>1</td></tr>
<tr><td>Intensity</td><td>Medium High</td><td>4</td><td>Medium High</td><td>4</td><td>Medium</td><td>3</td></tr>
<tr><td>Severity</td><td>Low</td><td>6</td><td>Low</td><td>6</td><td>Low</td><td>5</td></tr>
<tr><td>Consequence</td><td>Medium</td><td>9</td><td>Medium</td><td>9</td><td>Medium</td><td>7</td></tr>
<tr><td>Probability</td><td>Plausible</td><td>3</td><td>Plausible</td><td>3</td><td>Plausible</td><td>3</td></tr>
<tr><td>Impact Significance</td><td>Medium</td><td>12</td><td>Medium</td><td>12</td><td>Low</td><td>10</td></tr>
<tr><td>Mitigation</td><td colspan="6">Possible</td></tr>
<tr><td>Confidence</td><td colspan="6">High.</td></tr>
</table>
</td></tr>
<tr><td>Mitigation Measures</td><td>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.</td></tr>
</table>

	• 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

Alternative:	**All - Site 1; pipeline (preferred 3); BNR design; sludge drying beds; effluent discharge; internal reticulation and small-bore installation, roads**
Aspect	Contractors and machinery
Description:	The wwtw is situated away from sensitive receptors; the pipeline and internal small-bore installation will take place adjacent and within the Woodlands settlement
Impact 11:	***Noise impacts***
NEMA LN Activity	Removal vegetation; activity within 32 meters of watercourse, pipeline, road
KKLM Bylaw	Related noise bylaws
Nature of impact:	Noise impacts disturbing residents and associated activities in the settlement
Description of impact	Sources of noise during construction phase include construction personnel, vehicles and machinery used for clearing of vegetation, levelling, and excavation. Any noise generated is likely to be experienced by those close to the construction activity. With mitigation measures in place, the noise impacts will be short-lived and considered to be negative and of low significance.

Impact Rating

Impact Status	Negative		Negative Impact		Negative / Negligible Impact	
Impact Criteria	No go / baseline – not applicable		Without mitigation		With mitigation	
Spatial			Activity	1	Activity	1
Duration			Very short	1	Very short	1
Frequency			Seldom	2	Rare	1
Intensity			Low to medium	2	Low	1
Severity			Low	5	Negligible	3
Consequence			Low	6	Negligible	4
Probability			Plausible	3	Slim	1
Impact Significance			**Low**	**9**	**Negligible**	**5**
Mitigation	Possible					
Confidence	High.					

Impact 12:	***Visual impacts***
NEMA LN Activity	Removal vegetation; activity within 32 meters of watercourse, pipeline, road
Nature of impact:	Visual impacts from construction activities in close proximity to residents

<table>
<tr><td>Description of impact</td><td>Sources of visual impacts during construction phase include poor housekeeping and poor waste management. Construction will take approximately 4 - 12 months to complete adjacent and within settlement. Receptors of visual impacts during construction includes the neighbouring residents in the area.</td></tr>
<tr><td>Impact Rating</td><td>
<table>
<tr><td>Impact Status</td><td colspan="2">Negative</td><td>Negative Impact</td><td></td><td>Negative / Negligible Impact</td><td></td></tr>
<tr><td>Impact Criteria</td><td colspan="2">No go / baseline – not applicable</td><td>Without mitigation</td><td></td><td>With mitigation</td><td></td></tr>
<tr><td>Spatial</td><td></td><td></td><td>Activity</td><td>1</td><td>Activity</td><td>1</td></tr>
<tr><td>Duration</td><td></td><td></td><td>Very short</td><td>1</td><td>Very short</td><td>1</td></tr>
<tr><td>Frequency</td><td></td><td></td><td>Seldom</td><td>2</td><td>Rare</td><td>1</td></tr>
<tr><td>Intensity</td><td></td><td></td><td>Low to medium</td><td>2</td><td>Low</td><td>1</td></tr>
<tr><td>Severity</td><td></td><td></td><td>Low</td><td>5</td><td>Negligible</td><td>3</td></tr>
<tr><td>Consequence</td><td></td><td></td><td>Low</td><td>6</td><td>Negligible</td><td>4</td></tr>
<tr><td>Probability</td><td></td><td></td><td>Plausible</td><td>3</td><td>Slim</td><td>1</td></tr>
<tr><td>Impact Significance</td><td></td><td></td><td>Low</td><td>9</td><td>Negligible</td><td>5</td></tr>
<tr><td>Mitigation</td><td colspan="6">Possible</td></tr>
<tr><td>Confidence</td><td colspan="6">High.</td></tr>
</table>
</td></tr>
<tr><td>Mitigation Measures</td><td>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</td></tr>
</table>

Alternative:	**All - Site 1; pipeline (preferred 3); BNR design; sludge drying beds; effluent discharge; internal reticulation and small-bore installation, roads**
Aspect	Employment and sourcing of materials and associated services
Description:	Site is currently impacted by moderate to dense AIS and natural vegetation is fynbos and is therefore considered a high-risk site with regards to fire risk and preventative and response measures are required during construction and operations.
Impact 13:	**Income generation**
NEMA LN Activity	Removal vegetation; activity within 32 meters of watercourse, pipeline, road
NWA water use	Section c and I and f
National Labour Act	As required

<table>
<tr><td>Health and Safety Act</td><td>As required</td></tr>
<tr><td>Nature of impact:</td><td>Direct (employment, sourcing of materials and associated services) and indirect (skills development and transfer of skills)</td></tr>
<tr><td>Description of impact</td><td>Construction phase of the development will result in positive impacts through direct employment, sourcing of materials and associated services required. Skills development is expected to result from associated opportunities. An estimated 40 - 70 employment opportunities will be created during the planning and construction phase. Local labour (local reputable contractor) should be sourced from the local Woodlands and surrounding community as far as possible to prevent conflict and enhance the benefits of employment creation to the immediate area . Materials and any required professional services should also be sourced locally as far as possible. The project will offer temporary employment to contractors which is a positive social impact. Indirect skills development is also expected which is a permanent positive impact. The expected value of the project is estimated at 61 million.</td></tr>
<tr><td>Impact Rating</td><td>
<table>
<tr><td>Impact Status</td><td colspan="2">Negative</td><td colspan="2">Negative Impact</td><td colspan="2">Positive Impact</td></tr>
<tr><td>Impact Criteria</td><td colspan="2">No go / baseline – no employment opportunities form construction</td><td colspan="2">Without mitigation</td><td colspan="2">With mitigation</td></tr>
<tr><td>Spatial</td><td></td><td></td><td>Local</td><td>3</td><td>Local</td><td>3</td></tr>
<tr><td>Duration</td><td></td><td></td><td>Very short</td><td>1</td><td>Very short</td><td>1</td></tr>
<tr><td>Frequency</td><td></td><td></td><td>Rare</td><td>1</td><td>Rare</td><td>5</td></tr>
<tr><td>Intensity</td><td></td><td></td><td>Low</td><td>1</td><td>Low to medium</td><td>2</td></tr>
<tr><td>Severity</td><td></td><td></td><td>Negligible</td><td>3</td><td>Low</td><td>4</td></tr>
<tr><td>Consequence</td><td></td><td></td><td>Low</td><td>6</td><td>Low</td><td>7</td></tr>
<tr><td>Probability</td><td></td><td></td><td>Possible</td><td>4</td><td>Possible</td><td>4</td></tr>
<tr><td>Impact Significance</td><td></td><td></td><td>Low</td><td>10</td><td>Medium</td><td>11</td></tr>
<tr><td>Mitigation</td><td colspan="6">Possible</td></tr>
<tr><td>Confidence</td><td colspan="6">High.</td></tr>
</table>
</td></tr>
<tr><td>Mitigation Measures</td><td>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</td></tr>
</table>

D.2.3 OPERATIONAL PHASE

<table>
<tr><td>Alternative:</td><td>All - Site 1; pipeline (preferred 3); BNR design; sludge drying beds; effluent discharge; internal reticulation and small-bore installation, roads</td></tr>
<tr><td>Aspect</td><td>Alien invasive species</td></tr>
<tr><td>Description:</td><td>Site is currently impacted by moderate to dense AIS; introduction of AIS clearing programme in area is expected to be beneficial.</td></tr>
<tr><td>Impact 1:</td><td>AIS Displacing indigenous flora and fauna; decrease of natural runoff in catchment area</td></tr>
<tr><td>NEMA LN Activity</td><td>Removal vegetation; activity within 32 meters of watercourse, pipeline, road</td></tr>
<tr><td>NWA water use</td><td>Section c and I and f</td></tr>
<tr><td>NEMBA, CARA</td><td>AIS to be removed by landowner</td></tr>
<tr><td>NEMWA</td><td>Waste management hierarchy</td></tr>
<tr><td>Nature of impact:</td><td>Direct and indirect and cumulative (Aquatic, terrestrial)</td></tr>
<tr><td>Description of impact</td><td>Ongoing removal during operations on site and in surrounding area can result in a positive impact if implemented and lead to natural rejuvenation of indigenous vegetation, if implemented.</td></tr>
<tr><td>Impact Rating</td><td>
<table>
<tr><td>Impact Status</td><td>Negative Impact</td><td></td><td>Negative Impact</td><td></td><td>Negative Impact</td><td></td></tr>
<tr><td>Impact Criteria</td><td>No go / current</td><td></td><td>Without mitigation (current)</td><td></td><td>With mitigation</td><td></td></tr>
<tr><td>Spatial</td><td>Local</td><td>3</td><td>Local</td><td>3</td><td>Site</td><td>2</td></tr>
<tr><td>Duration</td><td>Medium to long</td><td>4</td><td>Medium to long</td><td>4</td><td>Very short</td><td>1</td></tr>
<tr><td>Frequency</td><td>Seldom</td><td>3</td><td>Seldom</td><td>3</td><td>Seldom</td><td>3</td></tr>
<tr><td>Intensity</td><td>Moderate</td><td>3</td><td>Moderate</td><td>3</td><td>Low</td><td>1</td></tr>
<tr><td>Severity</td><td>Medium</td><td>10</td><td>Medium</td><td>10</td><td>Negligible</td><td>5</td></tr>
<tr><td>Consequence</td><td>Medium High</td><td>13</td><td>Medium High</td><td>13</td><td>Low</td><td>7</td></tr>
<tr><td>Probability</td><td>Expected</td><td>5</td><td>Expected</td><td>5</td><td>Slight</td><td>2</td></tr>
<tr><td>Impact Significance</td><td>Medium High</td><td>18</td><td>Medium High</td><td>18</td><td>Low</td><td>9</td></tr>
<tr><td>Mitigation</td><td colspan="6">Possible</td></tr>
<tr><td>Confidence</td><td colspan="6">High.</td></tr>
</table>
</td></tr>
<tr><td>Mitigation Measures</td><td>

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.
No dumping in area
Assess the level of alien plant invasion within development footprint areas – if AIS present, they will need to be removed;
Check outlets from the WWTW for erosion or signs that gabions may be slumping.

AIS management plan recommended to be put in place for life of operations

</td></tr>
</table>

<table>
<tr><td>Alternative:</td><td>All - Site 1; pipeline (preferred 3); BNR design; sludge drying beds; effluent discharge; internal reticulation and small-bore installation, roads</td></tr>
<tr><td>Aspect</td><td>Fire Risk</td></tr>
<tr><td>Description:</td><td>Site is currently impacted by moderate to dense AIS and natural vegetation is fynbos and is therefore considered a high-risk site with regards to fire risk and preventative and response measures are required during construction and operations.</td></tr>
<tr><td>Impact 2:</td><td>Unintentional and uncontrolled fires can have high significant impacts on the social and natural environment</td></tr>
<tr><td>NEMA LN Activity</td><td>Removal vegetation; activity within 32 meters of watercourse, pipeline, road</td></tr>
<tr><td>NWA water use</td><td>Section c and I and f</td></tr>
<tr><td>NEMBA, CARA</td><td>AIS to be removed by landowner</td></tr>
<tr><td>NEMWA</td><td>Waste management hierarchy</td></tr>
<tr><td>Nature of impact:</td><td>Direct (fire) and indirect (visual, smoke, smog)</td></tr>
<tr><td>Description of impact</td><td>Unintentional and uncontrolled fires can have high significant impacts on the social and natural environment. Ongoing AIS clearing can assist to prevent incorrect fires (AIS burning vs fynbos burning) if a fire should occur. Fires are expected in fynbos areas every 10 to 15 years as they are a fire driven ecosystem.</td></tr>
<tr><td>Impact Rating</td><td>
<table>
<tr><td>Impact Status</td><td colspan="2">Negative</td><td colspan="2">Negative Impact</td><td colspan="2">Negative Impact</td></tr>
<tr><td>Impact Criteria</td><td colspan="2">No go / baseline</td><td colspan="2">Without mitigation</td><td colspan="2">With mitigation</td></tr>
<tr><td>Spatial</td><td>Local</td><td>3</td><td>Local</td><td>3</td><td>Site</td><td>2</td></tr>
<tr><td>Duration</td><td>Very short</td><td>1</td><td>Very short</td><td>1</td><td>Very short</td><td>1</td></tr>
<tr><td>Frequency</td><td>Rare</td><td>1</td><td>Rare</td><td>1</td><td>Rare</td><td>1</td></tr>
<tr><td>Intensity</td><td>Medium High</td><td>4</td><td>Medium High</td><td>4</td><td>Medium</td><td>3</td></tr>
<tr><td>Severity</td><td>Low</td><td>6</td><td>Low</td><td>6</td><td>Low</td><td>5</td></tr>
<tr><td>Consequence</td><td>Medium</td><td>9</td><td>Medium</td><td>9</td><td>Medium</td><td>7</td></tr>
<tr><td>Probability</td><td>Plausible</td><td>3</td><td>Plausible</td><td>3</td><td>Plausible</td><td>3</td></tr>
<tr><td>Impact Significance</td><td>Medium</td><td>12</td><td>Medium</td><td>12</td><td>Low</td><td>10</td></tr>
<tr><td>Mitigation</td><td colspan="6">Possible</td></tr>
<tr><td>Confidence</td><td colspan="6">High.</td></tr>
</table>
</td></tr>
<tr><td>Mitigation Measures</td><td>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.</td></tr>
</table>

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

Alternative:	**All - Site 1; pipeline (preferred 3); BNR design; sludge drying beds; effluent discharge; internal reticulation and small-bore installation, roads**
Aspect	Employment and sourcing of materials and associated services
Description:	Operations will result in direct employment opportunities on site and associated skills development training; a number of supporting services will be required during operations
Impact 3:	**Income generation**
NEMA LN Activity	Removal vegetation; activity within 32 meters of watercourse, pipeline, road
NWA water use	Section c and I and f
National Labour Act	As required
Health and Safety Act	As required
Nature of impact:	Direct (employment, sourcing of materials and associated services) and indirect (skills development and transfer of skills)
Description of impact	Operational phase of the development will result in positive impacts through direct employment (operations on site) and associated services required (testing, monitoring, audits, transport). Skills development is expected to result from associated opportunities. An estimated 10 - 20 income opportunities will be created during the operational phase. Local labour (local reputable contractor) should be sourced from the local Woodlands and surrounding community as far as possible to prevent conflict, minimise transport to work, and enhance the benefits of employment creation to the immediate area . Materials and any required professional services should also be sourced locally as far as possible. The project will offer permanent / long term employment to contractors which is a positive social impact. Indirect skills development is also expected which is a permanent positive impact. Operational management costs estimated at R6 million over 5 years.
Impact Rating	

Impact Status	Positive		Positive		Positive Impact	
Impact Criteria	No go / baseline – current income opportunities		Without mitigation		With mitigation	
Spatial	Activity	1	Activity	1	Activity	1
Duration	Very short	1	Very short	1	Very short	1
Frequency	Seldom	3	Seldom	3	Seldom	3
Intensity	Low	1	Low	1	Low to medium	2
Severity	Negligible	5	Negligible	5	Low	5
Consequence	Low	6	Low	6	Low	6
Probability	Plausible	3	Plausible	3	Possible	4
Impact Significance	**Low**	**9**	**Low**	**9**	**Medium**	**10**
Mitigation	Possible					
Confidence	High.					

Mitigation Measures	• 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

Alternative:	**All - Site 1; pipeline (preferred 3); BNR design; sludge drying beds; effluent discharge; internal reticulation and small-bore installation, roads**
Aspect	*Pipeline, Sewage Spills, and infrastructure and components*
Description:	During the operational phase of the upgraded sewer line and WWTW, the greatest risk to watercourses is from leaking sewage which both affects water quality and necessitates maintenance. While short-term spills are likely on an occasional basis, it is chronic leakage or discharge of poorly treated or untreated sewage that causes long-term damage to aquatic ecosystem health (as is the case at present). Mitigation to prevent leakage and the appropriate response are essential.
Impact 4:	**Pipeline Blockages, Sewage Spills, and Operational Issues**
NEMA LN Activity	EA and conditions for Removal of vegetation; activity within / within 32 meters of watercourse, pipeline, road
NWA / NEMWA	Section 21 c, I and f, Sludge management guidelines; composting norms and standards as applicable
Nature of impact:	Direct / Indirect / cumulative as applicable
Description of impact	During the operational phase of the upgraded sewer line and WWTW, the greatest risk to watercourses is from leaking sewage which both affects water quality and necessitates maintenance. While short-term spills are likely on an occasional basis, it is chronic leakage or discharge of poorly treated or untreated sewage that causes long-term damage to aquatic ecosystem health (as is the case at present). Mitigation to prevent leakage and the appropriate response are essential.

Impact Rating

Impact Status	Negative Impact		Negative Impact		Negative Impact	
Impact Criteria	No-go / baseline		Without mitigation		With mitigation	
Spatial	Local	3	Local	3	Activity	1
Duration	Medium	3	Very short	1	Very short	1
Frequency	regular	4	Infrequent	2	Rare	1
Intensity	Low to medium	2	Low to medium	2	Low	1
Severity	Medium	9	Negligible	5	Negligible	3
Consequence	Medium	12	Negligible	8	Negligible	4
Probability	Probable	4	Plausible	3	Slight	2

	Impact Significance	**Medium**	**16**	**Medium**	**11**	**Low**	**6**
	Mitigation	Possible					
	Confidence	High					
Mitigation Measures	• 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: o No evidence of dumping. o Ensure outlets have suitable erosion prevention measures in place (e.g no slumping of gabions) and address as required o Water samples to be taken at identified two sampling points testing for the required parameters. o 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						

Alternative:	**All - Site 1; pipeline (preferred 3); BNR design; sludge drying beds; effluent discharge; internal reticulation and small-bore installation, roads**						
Aspect	*Stormwater management*						
Description:	Effectively managed stormwater on site to prevent flooding of facilities and contaminated runoff						
Impact 5:	**Groundwater contamination, aquatic impact, flora and fauna, health impacts**						
NEMA LN Activity	EA and conditions for Removal of vegetation; activity within / within 32 meters of watercourse, pipeline, road						
NWA / NEMWA	Section 21 c, I and f, Sludge management guidelines; composting norms and standards as applicable						
Nature of impact:	Direct / Indirect / cumulative as applicable Since the impact is negligible negative with mitigation, cumulative impacts to groundwater with other projects are not anticipated.						
Description of impact	Ineffective SW management resulting in contaminated runoff						
Impact Rating	Impact Status	Negative Impact		Negative Impact		Negative Impact	
	Impact Criteria	No-go / baseline		Without mitigation		With mitigation	
	Spatial	Local	3	Local	3	Activity	1

Duration	Medium	3	Very short	1	Very short	1
Frequency	regular	4	Infrequent	2	Rare	1
Intensity	Low to medium	2	Low to medium	2	Low	1
Severity	Medium	9	Negligible	5	Negligible	3
Consequence	Medium	12	Negligible	8	Negligible	4
Probability	Probable	4	Plausible	3	Slight	2
Impact Significance	**Medium**	**16**	**Medium**	**11**	**Low**	**6**
Mitigation	Possible					
Confidence	High					

Mitigation Measures

- 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.

Alternative:	**All - Site 1; pipeline (preferred 3); BNR design; sludge drying beds; effluent discharge; internal reticulation and small-bore installation, roads**
Aspect	*Waste management in surrounding area*
Description:	Ineffective waste management can harm terrestrial and aquatic environment and present health risk
Impact 6:	**Risk of Increased Access to Aquatic Habitats for Dumping**
NEMA LN Activity	Duty of care; Removal of vegetation; activity within / within 32 meters of watercourse, pipeline, road
NWA / NEMWA	Waste management hierarchy
Nature of impact:	Direct / Indirect / cumulative as applicable
Description of impact	Solid waste disposal is a serious issue in Woodlands. Although some sort of waste disposal facility is present to the east of the WWTW, there is extensive dumping in and around the settlement, especially in wetland areas. Residents explained that this is because the rubbish truck seldom collects their rubbish and as most residents do not own vehicles, they end up dumping and burning it in the bush nearby. The creation of a new servitude for the pipeline will result in easier access to certain areas of the wetland, which may increase the incidence of dumping in these sensitive areas.

Impact Rating

Impact Status	Negative Impact		Negative Impact		Negative Impact	
Impact Criteria	No-go / baseline		Without mitigation		With mitigation	
Spatial	Local	3	Local	3	Activity	1
Duration	Medium	3	Very short	1	Very short	1
Frequency	regular	4	Infrequent	2	Rare	1

Intensity	Low to medium	2	Low to medium	2	Low	1
Severity	Medium	9	Negligible	5	Negligible	3
Consequence	Medium	12	Negligible	8	Negligible	4
Probability	Probable	4	Plausible	3	Slight	2
Impact Significance	**Medium**	**16**	**Medium**	**11**	**Low**	**6**
Mitigation	Possible					
Confidence	High					

Mitigation Measures

- 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;

Alternative:	**All - Site 1; pipeline (preferred 3); BNR design; sludge drying beds; effluent discharge; internal reticulation and small-bore installation, roads**
Aspect	Waste generation (streams excluding sludge and effluent)
Description:	Incorrect waste management Operational activities and associated waste generated needs to be carefully managed to ensure impacts on the environment are reduced. Waste streams: • Subsoils not reused during any maintenance required • Construction rubble (broken bricks, cement, concrete spills) during any maintenance required • General waste items (paper, tins, plastic, metals, organic, cleared vegetation not for reuse) • Hazardous materials / waste that may be used /generated (excluding sludge and effluent):

<table>
<tr><td></td><td>

Fuels, oils, oil-based paints, turpentine etc
Sewage waste from operators' ablution facilities
Spillage of hazardous materials

</td></tr>
<tr><td>Impact 7:</td><td>General Waste pollution</td></tr>
<tr><td>NEMA LN Activity</td><td>Removal vegetation; activity within 32 meters of watercourse, pipelines, roads</td></tr>
<tr><td>NWA water use</td><td>Section c and I and f</td></tr>
<tr><td>NEMBA, CARA</td><td>AIS to be removed by landowner and disposed / reused correctly</td></tr>
<tr><td>NEMWA</td><td>Waste management hierarchy – avoid, reduce, reuse, recycle, dispose</td></tr>
<tr><td>Nature of impact:</td><td>Direct and indirect and cumulative (Sensitive Aquatic Habitat, groundwater and surface water, disturbance to flora and fauna; health impacts, visual impacts)</td></tr>
<tr><td>Description of impact</td><td>This impact mainly concerns the proper management of operational related waste materials</td></tr>
<tr><td>Impact Rating</td><td>
<table>
<tr><td>Impact Status</td><td colspan="2">Negative Impact</td><td colspan="2">Negative Impact</td><td colspan="2">Negative Impact</td></tr>
<tr><td>Impact Criteria</td><td colspan="2">No go / baseline</td><td colspan="2">Without mitigation</td><td colspan="2">With mitigation</td></tr>
<tr><td>Spatial</td><td>Site</td><td>2</td><td>Site</td><td>2</td><td>Activity</td><td>1</td></tr>
<tr><td>Duration</td><td>short</td><td>2</td><td>short</td><td>2</td><td>Very short</td><td>1</td></tr>
<tr><td>Frequency</td><td>Regular</td><td>4</td><td>Regular</td><td>4</td><td>Seldom</td><td>3</td></tr>
<tr><td>Intensity</td><td>Low</td><td>1</td><td>Low</td><td>1</td><td>Low</td><td>1</td></tr>
<tr><td>Severity</td><td>Medium</td><td>7</td><td>Medium</td><td>7</td><td>Low</td><td>5</td></tr>
<tr><td>Consequence</td><td>Medium</td><td>9</td><td>Medium</td><td>9</td><td>Low</td><td>6</td></tr>
<tr><td>Probability</td><td>Expected</td><td>5</td><td>Expected</td><td>5</td><td>Plausible</td><td>3</td></tr>
<tr><td>Impact Significance</td><td>Medium</td><td>14</td><td>Medium</td><td>14</td><td>Low</td><td>9</td></tr>
<tr><td>Mitigation</td><td colspan="6">Possible</td></tr>
<tr><td>Confidence</td><td colspan="6">High</td></tr>
</table>
</td></tr>
<tr><td>Impact 8:</td><td>Hazardous substance management</td></tr>
<tr><td>NEMA LN Activity</td><td>Removal vegetation; activity within 32 meters of watercourse</td></tr>
<tr><td>NWA water use</td><td>Section c and I and f</td></tr>
<tr><td>NEMWA</td><td>Waste management hierarchy – avoid, reduce, reuse, recycle, dispose</td></tr>
<tr><td>Health and safety act</td><td>As required</td></tr>
<tr><td>Nature of impact:</td><td>Direct and indirect and cumulative (Sensitive Aquatic Habitat, groundwater and surface water, disturbance to flora and fauna; health impacts, visual impacts).</td></tr>
<tr><td>Description of impact</td><td>Spillages of diesel, petrol, oil, paints, clears and other harmful chemicals. These substances may potentially percolate into the groundwater and enter the surrounding environment. Ablutions facilities will be equipped with 8000-liter conservancy tank.</td></tr>
</table>

Impact Rating

Impact Status	Negligible		Negative Impact		Negative Impact	
Impact Criteria	No go / baseline		Without mitigation		With mitigation	
Spatial			Local	2	Activity	1
Duration			short	2	Very short	1
Frequency			Regular	4	Seldom	3
Intensity			Low to medium	2	Low to medium	2
Severity			Medium	8	Low	6
Consequence			Medium	10	Low	7
Probability			Expected	5	Plausible	3
Impact Significance			Medium	15	Low	**10**
Mitigation	Possible					
Confidence	High					

Mitigation Measures

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.

Alternative:	**All - Site 1; pipeline (preferred 3); BNR design; sludge drying beds; effluent discharge; internal reticulation and small-bore installation, roads**
Aspect	Woodland's settlement and surrounding area
Description:	The proposed upgrade and installation of small-bore reticulation is expected to address the current health risks in the area resulting form current system
Impact 9:	***Health impacts from pollution in the area***
NEMA LN Activity	Removal vegetation; activity within 32 meters of watercourse, pipeline, roads
NWA water use	Section c and I and f

<table>
<tr><td>National Health Act, 2003</td><td>Vectors, waste management, vacant land management, protection of children and residents</td></tr>
<tr><td>Nature of impact:</td><td>Direct (Pollution from current sewage and waste water management at Woodlands settlement); indirect and cumulative (users downstream)</td></tr>
<tr><td>Description of impact</td><td>Current sewage management is resulting in pollution impacting on the natural and social environment. Inadequate management and operation of upgraded system can result in negative impact and associated health and pollution risks on the site and in the surrounding area. The upgrade is expected to address the current impacts. Effective operational management and supporting facilities, electricity and operators is critical to ensure this treatment process is operationally sound.</td></tr>
<tr><td>Impact Rating</td><td>
<table>
<tr><td>Impact Status</td><td colspan="2">Negative</td><td colspan="2">Negative Impact</td><td colspan="2">Negligible Impact</td></tr>
<tr><td>Impact Criteria</td><td colspan="2">No go / baseline</td><td colspan="2">Without mitigation</td><td colspan="2">With mitigation</td></tr>
<tr><td>Spatial</td><td>Local</td><td>3</td><td>Activity</td><td>1</td><td>Activity</td><td>1</td></tr>
<tr><td>Duration</td><td>Medium</td><td>4</td><td>Short</td><td>2</td><td>Very short</td><td>1</td></tr>
<tr><td>Frequency</td><td>Seldom</td><td>3</td><td>Seldom</td><td>3</td><td>Rare</td><td>1</td></tr>
<tr><td>Intensity</td><td>Medium</td><td>3</td><td>Low</td><td>1</td><td>Low</td><td>1</td></tr>
<tr><td>Severity</td><td>Medium high</td><td>10</td><td>Medium</td><td>5</td><td>Negligible</td><td>3</td></tr>
<tr><td>Consequence</td><td>Medium high</td><td>13</td><td>Medium</td><td>6</td><td>Negligible</td><td>4</td></tr>
<tr><td>Probability</td><td>Probable</td><td>4</td><td>Probable</td><td>4</td><td>Slim</td><td>1</td></tr>
<tr><td>Impact Significance</td><td>Medium high</td><td>17</td><td>Low</td><td>10</td><td>Negligible</td><td>5</td></tr>
<tr><td>Mitigation</td><td colspan="6">Possible</td></tr>
<tr><td>Confidence</td><td colspan="6">High.</td></tr>
</table>
</td></tr>
<tr><td>Mitigation Measures</td><td>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.

</td></tr>
</table>

D.2.4 DECOMMISSIONING AND CLOSURE PHASE (ALTERNATIVE (PREFERRED ALTERNATIVE))

This phase is applicable to the decommissioning of all existing structures as required. Planning and Construction phase impacts and mitigations are relevant to decommissioning of structures.

D.2.3 CLIMATE CHANGE ASSESSMENT

Climate change issues must be considered as part of the EIA process Please consider the Climate Change guideline. EAP must determine:
a)The potential impact of climate change on society and the economy, whether the impact is negative or positive, considering that society needs to be at the centre of the proposed development;
b)The potential alternatives of the proposed development, alternatives that will have less impact on climate change (environment and generation of waste included), the society and economy;
c)whether, and to what extent, the proposed development will result in the release of greenhouse gas (GHG) emissions;
d)whether the proposed development is necessary to achieve long term decarbonisation goals;
e)the impact of the development on social, economic, natural and built environment that are crucial for climate change, adaptation and resilience;
f) the projected impact of climate change on proposed development; and surrounding environment, and implications for the development.
g)Explanation of how the impacts is likely to be exacerbated or minimised as result of climate change and what measures are likely to be implemented to accommodate and manage (adapt to) the anticipated worst scenario where applicable
h) whether, and to what extent, the impacts identified in (a) -(g) can be mitigated.

Climate Change
Description and mitigation • 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)

Impact 1:	**Climate change impact on the site - Stormwater events resulting in flooding on site and localised contamination on site**
Nature of impact:	**Cumulative**

Impact Rating

Impact Status	Negative Impact		Negligible	
Impact Criteria	Impact significance			
	Without mitigation		With mitigation	
Spatial	Local	2	Activity	1
Duration	Very short	1	Very short	1
Frequency	Rare	1	Rarely	1
Intensity	Medium	3	Low	1
Severity	Low	5	Negligible	3
Consequence	Low	7	Negligible	4
Probability	Expected	5	Slim	1
Impact Significance	**Medium**	**12**	**Negligible**	**5**
Mitigation	Possible – SW management infrastructure and correct operations and maintenance			
Confidence	High			

Impact 2:	**Project impact on climate change - Use of greenhouse gases -onsite electricity requirements and fuel for transport during construction and operations**
Nature of impact:	**Cumulative**

Impact Rating

Impact Status	Negative Impact		Negative Impact	
Impact Criteria	Impact significance			
	Without mitigation		With mitigation	
Spatial	Local	3	Local	3
Duration	Very short	1	Very short	1
Frequency	Infrequent	2	Infrequent	2
Intensity	Low	1	Low	1
Severity	Low	4	Low	4
Consequence	Low	6	Low	6
Probability	Slight	2	Slight	2
Impact Significance	**Low**	**8**	**Low**	**8**

	Mitigation	Possible to reduce - incorporated solar panels where possible, source materials as locally as possible, schedule delivery of materials from source to site at same time to reduce trips required
	Confidence	High

Impact 3:	**Operations impact on climate change – Accumulation of sludge onsite / landfill increasing methane at site; transport to landfill generating fuel emissions**
Nature of impact	**Cumulative**

Impact Rating

Impact Status	Negative Impact		Negative Impact	
Impact Criteria	Impact significance			
	Without mitigation		With mitigation	
Spatial	Local	3	Local	3
Duration	Very short	1	Very short	1
Frequency	Infrequent	2	Rare	1
Intensity	Low	1	Low	1
Severity	Low	4	Negligible	3
Consequence	Low	7	Low	6
Probability	Probable	4	Slim	2
Impact Significance	Medium	**11**	Low	**8**
Mitigation	Possible – avoid transport offsite for disposal at landfill where possible			
Confidence	Medium			

Mitigation Measures	• As per mitigation measures for planning, construction and operational phase

9. ENVIRONMENTAL IMPACT STATEMENT

Taking the assessment of potential impacts into account, please provide an environmental impact statement that summarises the impact that the proposed activity and its alternatives may have on the environment after the management and mitigation of impacts have been taken into account, with specific reference to types of impact, duration of impacts, likelihood of potential impacts actually occurring and the significance of impacts.

The proposed upgrade and planned placement of facilities and treatment and operational facilities are considered, overall, to be beneficial for the local environment (natural and social). Long term impacts on surface water and groundwater must be prevented through effective planning and design, effective construction and placement of facilities, and effective operations of the plant ensuring operators are suitably qualified and trained and on-site during workdays and on call after hours. Groundwater monitoring is required to be implemented prior to start of construction and continue for the life of operations. The wetlands to the west of the site and 5 meters buffers around these areas must be designated as no go areas (with exception of pipeline / road sections within this area). The current negative impacts are expected to be adequately addressed through the upgrade and with all recommendations and mitigation measures in place. Effective operational management and supporting facilities, electricity and operators is critical to ensure this treatment process is operationally sound. The significance of the majority of impacts with mitigations in place are rated as low / negligible; the exception is income generation which is considered to be a positive impact; reuse of all sludge is considered positive, an AIS management plan implemented in operations can have a positive impact.

Alternative A (preferred alternative)

The environmentally preferred site is the current site and the proposed layout of structures on the site, the environmentally preferred bulk line pipeline route is alternative route 3. The preferred BNR treatment and proposed effluent treatment using chlorine contact tanks and the proposed sludge drying beds and dried sludge storage area is deemed sufficient to manage the incoming wastewater to the treatment plant. Effective operational management and supporting facilities, electricity and operators is critical to ensure this treatment process is operationally sound.

Reuse of sludge is preferred to offsite disposal and on-site composting is encouraged. An effective sludge operational management procedure will be required to be in place once all options have been considered by KKLM and firm decisions and commitments have been made.

No-go alternative (compulsory)

The 'no-go' option assumes the site remains in its current state - pollution resulting from current management of sewage and waste water at Woodlands settlement with no clear management in place. The current situation is recommended to be urgently addressed via the proposed upgrade and installation of small-bore sewage reticulation system.

Table 12: Summary of impacts associated with planning and design Phase and subsequent construction and operation

Impact 1:	**Placement of WWTW and supporting infrastructure on sensitive areas**				
Nature	Direct (site) / Indirect (surrounding environment) / cumulative (downstream in combination with existing impacts)				
Description	Incorrect placement of structures in sensitive areas can result in direct, indirect and cumulative impacts on the environment. Site layout 3 is deemed an acceptable site option for the upgrade.				
Impact Rating	Impact Status	Negative Impact		Negligible to negative low impact	
	Impact Criteria	Without mitigation (baseline / no go alternative)		With mitigation (site layout 3)	
	Impact Significance	Negative high (considerably harmful)	22	Negative Low	10
Impact 2:	**Placement of bulk pipeline on sensitive areas**				
Nature	Direct (immediate environment) / Indirect (surrounding people and environment) / cumulative (downstream)				
Description	Route 1 is not feasible due to placement in future housing area and traversing delineated floodline, wetland. Route 2 crosses the wetland over a longer distance. Route 3 is environmentally preferred; distance over the wetland is shorter, gradient best suited to the gravity requirements.				

Impact Rating	Impact Status	Negative Impact		Negative Impact		Negative Impact		Negative Impact	
	Impact Criteria	No go alternative		Pipeline 1		Pipeline 2		Pipeline 3	
	Impact Significance	Negative high	22	Negative Medium High	16	Negative Medium	11	Negative Low	10
Impact 3:	**Treatment of effluent**								
Nature	Direct / Indirect / cumulative as applicable								
Description	Treatment of sewage from woodlands settlement via the proposed BNR and chlorine contact tanks, sw pond								
Impact Rating	Impact Status	Negative				Negligible			
	Impact Criteria	No go alternative				Treatment of effluent			
	Impact Significance	Negative medium high		19		Positive Low / Negligible		10	
Impact 4:	**Flooding, Erosion and sedimentation**								
Nature	Direct at discharge site / Indirect from sedimentation in streams / cumulative on streams								
Description	Potential sewage overflow events; Discharge of effluent per day, emergency discharge of SW								
Impact Rating	Impact Status	Negative Impact		Negative Impact		Negative Impact			
	Impact Criteria	No go alternative (current discharge)		discharge no mitigation		discharge with mitigation			
	Impact Significance	Negative Medium	15	Negative Medium	15	Negative Low	10		
Impact 5:	**Loss of treated effluent that can be reused**								
Nature	Direct at discharge site / reuse								
Description	Reuse of treated effluent (5Kl per day) is encouraged by the KKLM to be incorporated into future planning of the area. A Section 21e water use license / general authorisation as applicable would need to be applied for in order to authorised irrigation with water containing waste;								
Impact Rating	Impact Status	Negative Impact		Negative Impact		Positive Impact			
	Impact Criteria	No go alternative (current discharge – no reuse)		Effluent discharge (planned discharge - no reuse)		Reuse effluent			
	Impact Significance	Negative Low	10	Negative Low	10	Positive medium	13		
Impact 6:	**Incorrect management of sludge leading to soil, surface and groundwater contamination**								
Nature	Direct (immediate environment) / Indirect (downstream environment) / cumulative (in combination with downstream impacts)								
Description	Mismanagement of sludge due to failed operations, flooding of site or spillage onto ground can result in site contamination.								
Impact Rating	Impact Status	Negative Impact		Negative Impact		Negative / Negligible impact			
	Impact Criteria	No go alternative (current)		drying beds, storage area (no mitigation)		drying beds and storage area (with mitigation)			
	Impact Significance	Negative Medium high	17	Negative medium	11	Negative low / negligible	7		
Impact 7:	**Incorrect treated sludge management leading to site contamination**								
Nature	Direct (immediate environment) / Indirect (downstream environment) / cumulative (in combination with downstream impacts)								
Description	Mismanagement of dried sludge can result in insufficient space in management facilities, operational difficulties, overdried sludge no longer useable, incorrect management (e.g burying of waste). Sludge operational procedure, skilled operators, reuse / disposal plan required.								
Impact Rating	Impact Status	Negative Impact		Negative Impact		Negligible / Positive Impact			
	Impact Criteria	No go alternative (current)		Operational sludge management (no mitigation)		Operational sludge management (with mitigation; reuse & / or disposal offsite)			
	Impact Significance	Negative Medium high	17	Negative Medium	13	Positive Low / negligible	7		
Impact 8:	**Reuse versus off-site disposal of sludge**								
Nature	Indirect (beneficial offsite use) / cumulative (increasing disposal at landfills)								
Description	Reuse of sludge is preferred to offsite disposal. Reuse options of dried sludge include agricultural use, reuse for brick making operations. Composting of sludge is encouraged and can prevent overdying of sludge and result in saleable product for reuse.								
Impact Rating	Impact Status	Negative Impact		Negative Impact		Positive Impact		Negative Impact	

	Impact Criteria	No go alternative (current)		Operational sludge management (no mitigation)		Operational sludge management (reuse only)		Drying beds and offsite disposal (reuse and disposal)	
	Impact Significance	Negative Medium high	17	Negative Medium	12	Positive Low	10	Negative Low	9
Impact 9:	**Groundwater contamination**								
Nature	Direct / Indirect / cumulative as applicable								
Description	i)Leakage from pipework associated with the WWTW ii) Leakage from sewage holding tank. iii) Leaks, leachate from the WWTW. iii) Discharge of improperly treated effluent. iv) WWTW failure. v) Flooding of WWTW during storms. vi) Leachate from the sludge storage facilities.								
Impact Rating	Impact Status	Negative Impact		Negative Impact		Negligible / negative Impact			
	Impact Criteria	No go (current)		Without mitigation		With mitigation			
	Impact Significance	Negative Medium high	19	Negative Medium high	16	Negligible / low negative	9		

Table 13: Summary of impacts associated with construction phase and decommissioning as applicable and maintenance during operations as required

Alternative:	**All - Site 1; pipeline (preferred 3); BNR design; sludge drying beds; effluent discharge; internal reticulation and small-bore installation, roads**						
Impact 1:	**Inadequate planning and *Non-compliance with Conditions of the Environmental Authorisations***						
Nature	Direct / Indirect / cumulative. Poor planning and / or lack of budget for environmental management will result in unmitigated impacts.						
Description	Without correct planning negative impacts can be expected during construction phase and operations						
Impact Rating	As per impacts identified for planning, construction / operational phase as applicable without / with mitigation implemented						
Impact 2:	**Loss of heritage, archaeological, palaeontological resources.**						
Nature	Direct (loss of resource / damage to resource / collection of resource)						
Description	Excavation activities can unearth archaeological / palaeontological resources and result in unnecessary disturbance if measures are not in place.;						
Impact Rating	Impact Status			Negative Impact		Positive Impact	
	Impact Criteria	No go alternative		Without mitigation		With mitigation	
	Impact Significance	Negligible		Low	7	Low	7
Impact 3:	**Unnecessary loss of vegetation, disturbance to watercourses and disturbance to fauna**						
Nature	Direct (loss of vegetation, disturbance to watercourses, disturbance to fauna)						
Description	By their nature, construction projects involving large numbers of workers using heavy machinery, with movement of materials over a large area are likely to create more disturbance to the natural environment (and watercourses) than necessary.						
Impact Rating	Impact Status	Negligible		Negative Impact		Negative Impact	
	Impact Criteria	No go alternative (baseline)		No go alternative		With mitigation	
	Impact Significance	Negligible	Negligible	Medium	7	Low	7
Impact 4:	**Stormwater Runoff Causing Erosion, Sedimentation and Pollution During Construction**						
Nature	Direct (loss of vegetation and soil, erosion) and indirect and cumulative (sedimentation in watercourses, disturbance to aquatic ecosystems)						
Description	Large areas of exposed soil, stockpiled mobile materials, and compacted soil without vegetation are susceptible to erosion						
Impact Rating	Impact Status	Negligible		Negative Impact		Negative Impact	
	Impact Criteria	No go alternative (baseline)		Without mitigation		With mitigation	
	Impact Significance	Low	10	Medium	13	Low	7
Impact 5:	**Soil disturbance**						
Nature	Direct (soil erosion, soil loss, damage to soil structure); Indirect (sedimentation, impact on surrounding vegetation, aquatic systems)						
Description	Mismanagement of soil leads to damage of soil structure and loss of soil						
Impact Rating	Impact Status	Negligible		Negative Impact		Negative Impact	
	Impact Criteria	Baseline / no go		Without mitigation		With mitigation	

	Impact Significance	Negligible	5	Medium	12	Low	10
Impact 6:	**Working in and Adjacent to the Drainage Line for Construction of the WWTW and Associated Outlets**						
Nature	Direct (erosion and sedimentation) and indirect and cumulative (disturbance to watercourses)						
Description	Construction within wet areas can cause soil disturbance and impact on wetland functioning						
Impact Rating	Impact Status	Negligible		Negative Impact		Negative Impact	
	Impact Criteria	Baseline / no go		Without mitigation		With mitigation	
	Impact Significance	Negligible	5	Medium	12	Low	10
Impact 7:	***AIS Displacing indigenous flora and fauna; decrease of natural runoff in catchment area***						
Nature	Direct and indirect and cumulative (Sensitive Aquatic Habitat, water, disturbance to flora and fauna; health impacts)						
Description	Disturbed construction areas are often impacted with AIS seedlings. Ongoing removal during construction required.						
Impact Rating	Impact Status	Negative Impact		Negative Impact		Positive / negligible Impact	
	Impact Criteria	No go / current		Without mitigation (current)		With mitigation	
	Impact Significance	Medium High	18	Medium High	18	Low to negligible	6/7
Impact 8:	***General Waste pollution***						
Nature	Direct and indirect and cumulative (Aquatic Habitat, groundwater, surface water, disturbance to flora and fauna; health impacts, visual impacts)						
Description	This impact mainly concerns the proper management of construction related waste materials.						
Impact Rating	Impact Status	Negligible		Negative Impact		Negative Impact	
	Impact Criteria	No go / baseline		Without mitigation		With mitigation	
	Impact Significance			Medium	14	Low	9
Impact 9:	***Hazardous Waste pollution***						
Nature	Direct and indirect and cumulative (Aquatic Habitat, groundwater, surface water, disturbance to flora and fauna; health impacts, visual impacts).						
Description	Spillages of diesel, petrol, oil, paints, other harmful chemicals. Potentially percolate into groundwater and enter surrounding environment.						
Impact Rating	Impact Status	Negligible		Negative Impact		Negative Impact	
	Impact Criteria	No go / baseline		Without mitigation		With mitigation	
	Impact Significance			Medium	15	Low	10
Impact 10:	***Unintentional and uncontrolled fires can have high significant impacts on the social and natural environment***						
Nature	Direct (fire) and indirect (visual, smoke, smog)						
Description	Unintentional and uncontrolled fires can have high significant impacts on the social and natural environment.						
Impact Rating	Impact Status	Negative		Negative Impact		Negative Impact	
	Impact Criteria	No go / baseline		Without mitigation		With mitigation	
	Impact Significance	Medium	12	Medium	12	Low	10
Impact 11:	***Noise impacts***						
Nature	Noise impacts disturbing residents and associated activities in the settlement						
Description	With mitigation measures in place, the noise impacts will be short-lived and considered to be negative and of low significance.						
Impact Rating	Impact Status	Negative		Negative Impact		Negative / Negligible	
	Impact Criteria	No go / baseline – not applicable		Without mitigation		With mitigation	
	Impact Significance			Low	9	Negligible	5
Impact 12:	***Visual impacts***						
Nature	Visual impacts from construction activities in close proximity to residents						
Description	Poor housekeeping and waste management. Receptors of visual impacts during construction includes the neighbouring residents in the area.						
Impact Rating	Impact Status	Negative		Negative Impact		Negative / Negligible	
	Impact Criteria	No go / baseline – not applicable		Without mitigation		With mitigation	
	Impact Significance			Low	9	Negligible	5
Impact 13:	**Income generation**						

Nature	Direct (employment, sourcing of materials and associated services) and indirect (skills development and transfer of skills)
Description	Direct employment, sourcing of materials and services Skills development An estimated 40 - 70 employment opportunities. The expected value of the project is estimated at 61 million.

Impact Rating

Impact Status	Negative		Negative Impact		Positive Impact	
Impact Criteria	No go / baseline – no employment opportunities form construction		Without mitigation		With mitigation	
Impact Significance			Low	10	Medium	11

Table 14: Summary of impacts associated with operational phase

Alternative:	**All - Site 1; pipeline (preferred 3); BNR design; sludge drying beds; effluent discharge; internal reticulation and small-bore installation, roads**
Impact 1:	***AIS Displacing indigenous flora and fauna; decrease of natural runoff in catchment area***
Nature	Direct and indirect and cumulative (Aquatic Habitat, terrestrial)
Description	Ongoing removal during operations during operations on site and in surrounding area can result in a positive impact if implemented and lead to natural rejuvenation of indigenous vegetation, if implemented.

Impact Rating

Impact Status	Negative Impact		Negative Impact		Positive Impact	
Impact Criteria	No go / current		Without mitigation (current)		With mitigation	
Impact Significance	Medium High	18	Medium High	18	Low	9

Impact 2:	***Unintentional and uncontrolled fires can have high significant impacts on the social and natural environment***
Nature	Direct (fire) and indirect (visual, smoke, smog)
Description	Unintentional and uncontrolled fires can have high significant impacts on the social and natural environment.

Impact Rating

Impact Status	Negative		Negative Impact		Negative Impact	
Impact Criteria	No go / baseline		Without mitigation		With mitigation	
Impact Significance	Medium	12	Medium	12	Low	10

Impact 3:	**Income generation**
Nature	Direct (employment, sourcing of materials and associated services) and indirect (skills development and transfer of skills)
Description	Direct employment (operations on site) and associated services required. Skills development is expected to result. An estimated 10 - 20 income opportunities will be created during the operational phase. Operational management costs estimated at R6 million over 5 years.

Impact Rating

Impact Status	Positive		Positive		Positive Impact	
Impact Criteria	No go / baseline		Without mitigation		With mitigation	
Impact Significance	Low	9	Low	9	Medium	10

Impact 4:	**Pipeline Blockages, Sewage Spills, and Operational Issues**
Nature	Direct / Indirect / cumulative as applicable
Description	Short-term spills are likely on an occasional basis; chronic leakage or discharge of poorly treated or untreated sewage causes long-term damage Mitigation to prevent leakage, and the appropriate response are essential.

Impact Rating

Impact Status	Negative Impact		Negative Impact		Negative Impact	
Impact Criteria	No-go / baseline		Without mitigation		With mitigation	
Impact Significance	Medium	16	Medium	11	Low	6
Mitigation	Possible					
Confidence	High					

Impact 5:	**Groundwater contamination, aquatic impact, flora and fauna, health impacts**
Nature	Direct / Indirect / cumulative as applicable Since the impact is negligible negative with mitigation, cumulative impacts to groundwater with other projects are not anticipated.
Description	Ineffective SW management resulting in contaminated runoff

Impact Rating

Impact Status	Negative Impact		Negative Impact		Negative Impact	
Impact Criteria	No-go / baseline		Without mitigation		With mitigation	
Impact Significance	Medium	16	Medium	11	Low	6

Impact 6:	**Risk of Increased Access to Aquatic Habitats for Dumping**							
Nature	Direct / Indirect / cumulative as applicable							
Description	The creation of a new servitude for the pipeline will result in easier access and may lead to increased dumping incidences							
Impact Rating	Impact Status	Negative Impact		Negative Impact		Negative Impact		
	Impact Criteria	No-go / baseline		Without mitigation		With mitigation		
	Impact Significance	Medium	16	Medium	11	Low	6	
Impact 7:	***General Waste pollution***							
Nature	Direct and indirect and cumulative (Aquatic Habitat, groundwater, surface water, disturbance to flora and fauna; health impacts, visual impacts)							
Description	This impact mainly concerns the proper management of operational related waste materials							
Impact Rating	Impact Status	Negligible		Negative Impact		Negative Impact		
	Impact Criteria	No go / baseline		Without mitigation		With mitigation		
	Impact Significance	Medium	14	Medium	14	Low	**9**	
Impact 8:	***Hazardous substance management***							
Nature	Direct and indirect and cumulative (Aquatic Habitat, groundwater, surface water, disturbance to flora and fauna; health impacts, visual impacts).							
Description	Spillages of diesel, petrol, oil, paints, clears and other harmful chemicals. These substances may potentially percolate into the groundwater and enter the surrounding environment. Ablutions facilities will be equipped with 8000-liter conservancy tank.							
Impact Rating	Impact Status	Negligible		Negative Impact		Negative Impact		
	Impact Criteria	No go / baseline		Without mitigation		With mitigation		
	Impact Significance			Medium	15	Low	**10**	
Impact 9:	***Health impacts from pollution in the area***							
Nature	Direct (Pollution from current sewage and waste water management); indirect, cumulative (users downstream)							
Description	Current sewage management is resulting in pollution impacting on the natural and social environment. Inadequate management and operation of upgraded system can result in negative impact and associated health and pollution risks on the site and in the surrounding area. The upgrade is expected to address the current impacts. Effective operational management and supporting facilities, electricity and operators is critical to ensure this treatment process is operationally sound.							
Impact Rating	Impact Status	Negative		Negative Impact		Negligible Impact		
	Impact Criteria	No go / baseline		Without mitigation		With mitigation		
	Impact Significance	Medium high	17	Low	10	Negligible	5	

SECTION E. RECOMMENDATIONS OF PRACTITIONER

Is the information contained in this report and the documentation attached hereto sufficient to make a decision in respect of the activity applied for (in the view of the environmental assessment practitioner)?	YES	NO
Is an EMPr attached?	YES	NO

The EMPr must be attached as Appendix F.

If "NO", indicate the aspects that should be assessed further as part of a Scoping and EIA process before a decision can be made (list the aspects that require further assessment):

The Draft EMPr will contain all mitigation contained within the pre-application draft BAR. Following the comment and review period pre-application draft BAR will be updated to address all comments received and any additional mitigation measures will be included if and as required. The post-application report will be submitted with a draft EMPr for a 30-day review and comment period.

If "YES", please list any recommended conditions, including mitigation measures that should be considered for inclusion in any authorisation that may be granted by the competent authority in respect of the application:

All recommended mitigation measures included in this BAR

SECTION F: APPENDICES

The following appendixes must be attached as appropriate:

Appendix A: Site plan(s)

Appendix A1 – Site layout 1 – inside wetland

Appendix A2 – Site layout 2 – outside wetland

Appendix B: Photographs

Appendix C: Facility illustration(s)

C1 - Concept and viability report, SMEC, November 2024

C2 - Concept and viability report – summary treatment options, SMEC, May 2025

C3 - Detail Design Report, SMEC, July 2025

Appendix D: Specialist reports

D1 - Geological and groundwater assessment (DHS Groundwater)

D2 - Aquatic Assessment (Confluent Environmental Pty (Ltd))

D3 - -Terrestrial Biodiversity Assessment and Flora Assessment (Jamie Pote)

-D4 - Fauna Assessment (Jonathan Colville and Callan Cohen)

-D5 - Agriculture desktop assessment (SoilzSa)

-D6 - Heritage, archaeology, paleontology screening assessment (CTS Heritage)

Appendix E: Comments and responses report, August 2025

Appendix F: Environmental Management Programme (EMPr) (to be submitted with post application DBAR)

Appendix G: Other information –

G1 - Sludge management guidelines,

G2 - Composting norms and standards,

G3 - Title deeds and letter of consent

G4 – Current GA from DWS

G5 - Impact Assessment Methodology

G6 – EAP application declaration

G7 – WULA information (Compiled by Confluent, September 2025)