GEORGE
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ADDRESS: Unit 17 Cathedral Square, Cathedral Street, George, 6530
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TEL: +27 (0) 21 554 5195 **FAX:** +27 (0) 86 575 2869
EMAIL: betsy@sescc.net **WEBSITE:** www.sescc.net
ADDRESS: Tableview, Cape Town, 7441
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DRAFT
BASIC ASSESSMENT REPORT

FOR THE

PROPOSED UPGRADE OF THE GWAING WASTEWATER TREATMENT WORKS ON ERF RE/464, GEORGE.

In terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) and the Environmental Impact Assessment Regulations, 2014 (as amended 7 April 2017)

PREPARED FOR: *George Municipality*
71 York Street
George CBD
PO Box 19, 6530

DATE: 29 January 2026

SES REF NO: 464/UGR/GWWTW/01/24
DEA&DP REF.NO.: 16/3/3/6/7/1/D2/19/0141/24

Western Cape Government

Department of Environmental Affairs and Development Planning

BASIC ASSESSMENT REPORT

THE NATIONAL ENVIRONMENTAL MANAGEMENT ACT, 1998 (ACT NO. 107 OF 1998) AND THE ENVIRONMENTAL IMPACT ASSESSMENT REGULATIONS.

APRIL 2024

BASIC ASSESSMENT REPORT

THE NATIONAL ENVIRONMENTAL MANAGEMENT ACT, 1998 (ACT NO. 107 OF 1998) AND THE ENVIRONMENTAL IMPACT ASSESSMENT REGULATIONS.

APRIL 2024

(For official use only)	
Pre-application Reference Number (if applicable):	
EIA Application Reference Number:	
NEAS Reference Number:	
Exemption Reference Number (if applicable):	
Date BAR received by Department:	
Date BAR received by Directorate:	
Date BAR received by Case Officer:	

GENERAL PROJECT DESCRIPTION

(This must Include an overview of the project including the Farm name/Portion/Erf number)

Proposed upgrade of the Gwaing Wastewater Treatment Works on Erf RE/464, George.

IMPORTANT INFORMATION TO BE READ PRIOR TO COMPLETING THIS BASIC ASSESSMENT REPORT

1. **The purpose** of this template is to provide a format for the Basic Assessment report as set out in Appendix 1 of the National Environmental Management Act, 1998 (Act No. 107 of 1998) ("NEMA"), Environmental Impact Assessment ("EIA") Regulations, 2014 (as amended) in order to ultimately obtain Environmental Authorisation.

2. The Environmental Impact Assessment ("EIA") Regulations is defined in terms of Chapter 5 of the National Environmental Management Act, 19998 (Act No. 107 of 1998) ("NEMA") hereinafter referred to as the "NEMA EIA Regulations".

3. *Submission of documentation, reports and other correspondence:*

   The Department has adopted a digital format for corresponding with proponents/applicants or the general public. If there is a conflict between this approach and any provision in the legislation, then the provisions in the legislation prevail. If there is any uncertainty about the requirements or arrangements, the relevant Competent Authority must be consulted.

   The Directorate: Development Management has created generic e-mail addresses for the respective Regions, to centralise their administration. Please make use of the relevant general administration e-mail address below when submitting documents:

   DEADPEIAAdmin@westerncape.gov.za
   Directorate: Development Management (Region 1):
   City of Cape Town; West Coast District Municipal area;
   Cape Winelands District Municipal area and Overberg District Municipal area.

   DEADPEIAAdmin.George@westerncape.gov.za
   Directorate: Development Management (Region 3):
   Garden Route District Municipal area and Central Karoo District Municipal area

   General queries must be submitted via the general administration e-mail for EIA related queries. Where a case-officer of DEA&DP has been assigned, correspondence may be directed to such official and copied to the relevant general administration e-mail for record purposes.

   All correspondence, comments, requests and decisions in terms of applications, will be issued to either the applicant/requester in a digital format via email, with digital signatures, and copied to the Environmental Assessment Practitioner ("EAP") (where applicable).

4. The required information must be typed within the spaces provided in this Basic Assessment Report ("BAR"). The sizes of the spaces provided are not necessarily indicative of the amount of information to be provided.

5. All applicable sections of this BAR must be completed.

6. Unless protected by law, all information contained in, and attached to this BAR, will become public information on receipt by the Competent Authority. If information is not submitted with this BAR due to such information being protected by law, the applicant and/or Environmental Assessment Practitioner ("EAP") must declare such non-disclosure and provide the reasons for believing that the information is protected.

7. This BAR is current as of **April 2024**. It is the responsibility of the Applicant/ EAP to ascertain whether subsequent versions of the BAR have been released by the Department. Visit this Department's website at http://www.westerncape.gov.za to check for the latest version of this BAR.

8. This BAR is the standard format, which must be used in all instances when preparing a BAR for Basic Assessment applications for an environmental authorisation in terms of the NEMA EIA Regulations when the Western Cape Government Department of Environmental Affairs and Development Planning ("DEA&DP") is the Competent Authority.

9. Unless otherwise indicated by the Department, one hard copy and one electronic copy of this BAR must be submitted to the Department at the postal address given below or by delivery thereof to the Registry Office of the Department. Reasonable access to copies of this Report must be provided to the relevant Organs of State for consultation purposes, which may, if so indicated by the Department, include providing a printed copy to a specific Organ of State.

10. This BAR must be duly dated and originally signed by the Applicant, EAP (if applicable) and Specialist(s) and must be submitted to the Department at the details provided below.

11. The Department's latest Circulars pertaining to the "One Environmental Management System" and the EIA Regulations, any subsequent Circulars, and guidelines must be taken into account when completing this BAR.

12. Should a water use licence application be required in terms of the National Water Act, 1998 (Act No. 36 of 1998) ("NWA"), the "One Environmental System" is applicable, specifically in terms of the synchronisation of the consideration of the application in terms of the NEMA and the NWA. Refer to this Department's Circular EADP 0028/2014: One Environmental Management System.

13. Where Section 38 of the National Heritage Resources Act, 1999 (Act No. 25 of 1999) ("NHRA") is triggered, a copy of Heritage Western Cape's final comment must be attached to the BAR.

14. The Screening Tool developed by the National Department of Environmental Affairs must be used to generate a screening report. Please use the Screening Tool link https://screening.environment.gov.za/screeningtool to generate the Screening Tool Report. The screening tool report must be attached to this BAR.

15. Where this Department is also identified as the Licencing Authority to decide on applications under the National Environmental Management: Air Quality Act (Act No. 29 of 2004) ('NEM:AQA"), the submission of the Report must also be made as follows, for-
Waste Management Licence Applications, this report must also (i.e., another hard copy and electronic copy) be submitted for the attention of the Department's Waste Management Directorate (Tel: 021-483-2728/2705 and Fax: 021-483-4425) at the same postal address as the Cape Town Office.

    Atmospheric Emissions Licence Applications, this report must also be (i.e., another hard copy and electronic copy) submitted for the attention of the Licensing Authority or this Department's Air Quality Management Directorate (Tel: 021 483 2888 and Fax: 021 483 4368) at the same postal address as the Cape Town Office.

DEPARTMENTAL DETAILS	
CAPE TOWN OFFICE: **DIRECTORATE: DEVELOPMENT MANAGEMENT (REGION 1)** (City of Cape Town, West Coast District, Cape Winelands District & Overberg District)	**GEORGE REGIONAL OFFICE:** **DIRECTORATE: DEVELOPMENT MANAGEMENT (REGION 3)** (Central Karoo District & Garden Route District)
The completed Form must be sent via electronic mail to: DEADPEIAAdmin@westerncape.gov.za Queries should be directed to the Directorate: Development Management (Region 1) at: E-mail: DEADPEIAAdmin@westerncape.gov.za Tel: (021) 483-5829 Western Cape Government Department of Environmental Affairs and Development Planning Attention: Directorate: Development Management (Region 1) Private Bag X 9086 Cape Town, 8000	The completed Form must be sent via electronic mail to: DEADPEIAAdmin.George@westerncape.gov.za Queries should be directed to the Directorate: Development Management (Region 3) at: E-mail: DEADPEIAAdmin.George@westerncape.gov.za Tel: (044) 814-2006 Western Cape Government Department of Environmental Affairs and Development Planning Attention: Directorate: Development Management (Region 3) Private Bag X 6509 George, 6530

MAPS

Provide a location map (see below) as Appendix A1 to this BAR that shows the location of the proposed development and associated structures and infrastructure on the property.	
Locality Map:	The scale of the locality map must be at least 1:50 000. For linear activities or development proposals of more than 25 kilometres, a smaller scale e.g., 1:250 000 can be used. The scale must be indicated on the map. The map must indicate the following: • an accurate indication of the project site position as well as the positions of the alternative sites, if any; • road names or numbers of all the major roads as well as the roads that provide access to the site(s) • a north arrow; • a legend; and • a linear scale. For ocean based or aquatic activity, the coordinates must be provided within which the activity is to be undertaken and a map at an appropriate scale clearly indicating the area within which the activity is to be undertaken. Where comment from the Western Cape Government: Transport and Public Works is required, a map illustrating the properties (owned by the Western Cape Government: Transport and Public Works) that will be affected by the proposed development must be included in the Report.
Provide a detailed site development plan / site map (see below) as Appendix B1 to this BAR; and if applicable, all alternative properties and locations.	
Site Plan:	Detailed site development plan(s) must be prepared for each alternative site or alternative activity. The site plans must contain or conform to the following: • The detailed site plan must preferably be at a scale of 1:500 or at an appropriate scale. The scale must be clearly indicated on the plan, preferably together with a linear scale. • The property boundaries and numbers of all the properties within 50m of the site must be indicated on the site plan. • On land where the property has not been defined, the co-ordinates of the area in which the proposed activity or development is proposed must be provided. • The current land use (not zoning) as well as the land use zoning of each of the adjoining properties must be clearly indicated on the site plan. • The position of each component of the proposed activity or development as well as any other structures on the site must be indicated on the site plan. • Services, including electricity supply cables (indicate aboveground or underground), water supply pipelines, boreholes, sewage pipelines, storm water infrastructure and access roads that will form part of the proposed development **must** be clearly indicated on the site plan. • Servitudes and an indication of the purpose of each servitude must be indicated on the site plan. • Sensitive environmental elements within 100m of the site must be included on the site plan, including (but not limited to): o Watercourses / Rivers / Wetlands o Flood lines (*i.e.*, 1:100 year, 1:50 year and 1:10 year where applicable);

	○ Coastal Risk Zones as delineated for the Western Cape by the Department of Environmental Affairs and Development Planning ("DEA&DP"): ○ Ridges; ○ Cultural and historical features/landscapes; ○ Areas with indigenous vegetation (even if degraded or infested with alien species). • Whenever the slope of the site exceeds 1:10, a contour map of the site must be submitted. • North arrow A map/site plan must also be provided at an appropriate scale, which superimposes the proposed development and its associated structures and infrastructure on the environmental sensitivities of the preferred and alternative sites indicating any areas that should be avoided, including buffer areas.
Site photographs	Colour photographs of the site that shows the overall condition of the site and its surroundings (taken on the site and taken from outside the site) with a description of each photograph. The vantage points from which the photographs were taken must be indicated on the site plan, or locality plan as applicable. If available, please also provide a recent aerial photograph. Photographs must be attached to this BAR as **Appendix C**. The aerial photograph(s) should be supplemented with additional photographs of relevant features on the site. Date of photographs must be included. Please note that the above requirements must be duplicated for all alternative sites.
Biodiversity Overlay Map:	A map of the relevant biodiversity information and conditions must be provided as an overlay map on the property/site plan. The Map must be attached to this BAR as **Appendix D**.
Linear activities or development and multiple properties	GPS co-ordinates must be provided in degrees, minutes and seconds using the Hartebeeshoek 94 WGS84 co-ordinate system. Where numerous properties/sites are involved (linear activities) you must attach a list of the Farm Name(s)/Portion(s)/Erf number(s) to this BAR as an Appendix. For linear activities that are longer than 500m, please provide a map with the co-ordinates taken every 100m along the route to this BAR as **Appendix A3**.

ACRONYMS

DAFF:	Department of Forestry and Fisheries
DEA:	Department of Environmental Affairs
DEA& DP:	Department of Environmental Affairs and Development Planning
DHS:	Department of Human Settlement
DoA:	Department of Agriculture
DoH:	Department of Health
DWS:	Department of Water and Sanitation
EMPr:	Environmental Management Programme
HWC:	Heritage Western Cape
NFEPA:	National Freshwater Ecosystem Protection Assessment
NSBA:	National Spatial Biodiversity Assessment
TOR:	Terms of Reference
WCBSP:	Western Cape Biodiversity Spatial Plan
WCG:	Western Cape Government

ATTACHMENTS

Note: The Appendices must be attached to the BAR as per the list below. Please use a ✓ **(**tick) or a **x** (cross) to indicate whether the Appendix is attached to the BAR.

The following checklist of attachments must be completed.

APPENDIX			**✓ (Tick) or x (cross)**
Appendix A:	**Maps**		
	Appendix A1:	**Locality Map**	✓
	Appendix A2:	**Coastal Risk Zones as delineated in terms of ICMA for the Western Cape by the Department of Environmental Affairs and Development Planning**	N/A
	Appendix A3:	**Map with the GPS co-ordinates for linear activities**	N/A
Appendix B:	**Appendix B1:**	**Site development plan(s)**	✓
	Appendix B2	**A map of appropriate scale, which superimposes the proposed development and its associated structures and infrastructure on the environmental sensitivities of the preferred site, indicating any areas that should be avoided, including buffer areas;**	
Appendix C:	**Photographs**		✓
Appendix D:	**Biodiversity overlay map**		✓
Appendix E:	**Permit(s) / license(s) / exemption notice, agreements, comments from State Department/Organs of state and service letters from the municipality.**		
	Appendix E1:	**Final comment/ROD from HWC**	✓
	Appendix E2:	**Copy of comment from Cape Nature**	
	Appendix E3:	**Final Comment from the DWS**	✓
	Appendix E4:	**Comment from the DEA: Oceans and Coast**	
	Appendix E5:	**Comment from the DAFF**	
	Appendix E6:	**Comment from WCG: Transport and Public Works**	
	Appendix E7:	**Comment from WCG: DoA**	
	Appendix E8:	**Comment from WCG: DHS**	

	Appendix E9:	**Comment from WCG: DoH**	
	Appendix E10:	**Comment from DEA&DP: Pollution Management**	✓
	Appendix E11:	**Comment from DEA&DP: Waste Management**	
	Appendix E12:	**Comment from DEA&DP: Biodiversity**	
	Appendix E13:	**Comment from DEA&DP: Air Quality**	
	Appendix E14:	**Comment from DEA&DP: Coastal Management**	
	Appendix E15:	**Comment from the local authority**	✓
	Appendix E16:	**Confirmation of all services (water, electricity, sewage, solid waste management)**	
	Appendix E17:	**Comment from the District Municipality**	
	Appendix E18:	**Copy of an exemption notice**	
	Appendix E19	**Pre-approval for the reclamation of land**	
	Appendix E20:	**Proof of agreement/TOR of the specialist studies conducted.**	✓
	Appendix E21:	**Proof of land use rights**	
	Appendix E22:	**Proof of public participation agreement for linear activities**	
Appendix F1:	**Comments and responses Report**		✓
Appendix F2:	**Register of I&APs**		✓
Appendix F3:	**Proof of Public Participation Process**		✓
Appendix F4:	**Comments received**		✓
Appendix G1:	**Terrestrial Animal Species Specialist Assessment - Kim Daniels from Confluent Environmental Pty (Ltd)**		✓
Appendix G2:	**Botanical and Terrestrial Biodiversity Assessment - Bianke Fouche from Confluent Environmental Pty (Ltd)**		✓
Appendix G3:	**Aquatic Biodiversity Impact Assessment for the BBF Site - Debbie Fordham from Upstream Consulting**		✓

Appendix G4:	**Aquatic Biodiversity Impact Assessment for the Gwaing Site - Debbie Fordham from Upstream Consulting**	✓
Appendix G5:	**GROUNDWATER MONITORING: GEORGE WWTW SITES Drilling & Installation of Monitoring Boreholes, Monitoring Programme and Site Hydrogeology - Veltwater Groundwater Specialists CC**	✓
Appendix G6:	**Engineering Geological Report - Terra Geotechnical**	✓
Appendix G7:	**GWAING WWTW MASTER PLAN - LUKHOZI CONSULTING ENGINEERS (PTY) LTD**	✓
Appendix G8:	**GWAING WWTW CONCEPT DESIGN REPORT: PHASE A & B - LUKHOZI CONSULTING ENGINEERS (PTY) LTD**	✓
Appendix G9:	**Electricity Capacity Investigation Proposal for Gwaing WWTW - GLS Consulting (Pty) Ltd**	✓
Appendix H1:	**Operational and Construction EMPr**	✓
Appendix H2:	**Operations and Maintenance Manual**	✓
Appendix I:	**Screening tool report**	✓
Appendix J:	**The impact and risk assessment for each alternative**	
Appendix K:	**Need and desirability for the proposed activity or development in terms of this Department's guideline on Need and Desirability (March 2013)/DEA Integrated Environmental Management Guideline**	
Appendix L:	**Stormwater Management Plan Report.**	✓
Appendix M:	**Service provider Quality statement**	✓
Appendix N:	**Service provider Process Flow**	✓

SECTION A: ADMINISTRATIVE DETAILS

Highlight the Departmental Region in which the intended application will fall	CAPE TOWN OFFICE: REGION 1		**GEORGE OFFICE: BEGION 3**
	(City of Cape Town, West Coast District	(Cape Winelands District & Overberg District)	**(Central Karoo District & Garden Route District)**
Duplicate this section where there is more than one Proponent Name of Applicant/Proponent:	George Municipality: Civil Engineering Services Directorate		
Name of contact person for Applicant/Proponent (if other):	Johannes Franciscus Koegelenberg Melanie Geyer		
Company/ Trading name/State Department/Organ of State:	George Municipality: Civil Engineering Services		
Company Registration Number:			
Postal address:	PO Box 19		
	George	Postal code: 6530	
Telephone:	044 801 1565	Cell:	
E-mail:	jkoegelenberg@george.gov.za mgeyer@george.gov.za	Fax: ( )	
Company of EAP:	Sharples Environmental Services cc		
EAP name:	Michael Bennett (Registered EAP) Lu-anne de Waal (Candidate EAP) Onela Mhobo(Candidate EAP)		
Postal address:	PO Box 9087		
	George	Postal code: 6530	
Telephone:	044 873 9087	Cell:	
E-mail:	michael@sescc.net luanne@sescc.net	Fax: ( )	
Qualifications:	*Michael:* *Lu-anne:* *Onela:*	BSc Environmental & Geographic Sciences and Ocean and Atmospheric Science BSc Zoology & Botany BSc Honours Environmental Management BSc Environmental Science Bsc Environmental Management	
EAP registration no:	Michael: 2021/3163 Lu-anne: 2024/7962 Onela: 2022/4522		
Duplicate this section where there is more than one landowner Name of landowner:	George Municipality		
Name of contact person for landowner (if other):	Johannes Franciscus Koegelenberg		
Postal address:	PO Box 19		
	George	Postal code:6530	
Telephone:	044 801 9278	Cell:	
E-mail:	jkoegelenberg@george.gov.za	Fax: ( )	
Name of Person in control of the land:	Same as above		
Name of contact person for person in control of the land:			
Postal address:			
		Postal code:	
Telephone:	( )	Cell:	
E-mail:		Fax: ( )	

Duplicate this section where there is more than one Municipal Jurisdiction Municipality in whose area of jurisdiction the proposed activity will fall:	George Municipality	
Contact person:	Godfrey Louw	
Postal address:	PO Box 19	
	George	Postal code: 6530
Telephone	044 801 9111	Cell:
E-mail:	glouw@george.gov.za	Fax: ( )

SECTION B: CONFIRMATION OF SPECIFIC PROJECT DETAILS AS INLCUDED IN THE APPLICATION FORM

1.	Is the proposed development (please tick):	New		**Expansion**	**X**
2.	Is the proposed site(s) a brownfield of greenfield site? Please explain.				
The proposed upgrade activities will take place on the WWTW grounds, therefor it is considered a brownfield.					
3.	**For Linear activities or developments**				
3.1.	Provide the Farm(s)/Farm Portion(s)/Erf number(s) for all routes:				
3.2.	Development footprint of the proposed development for all alternatives.				m^2
3.3.	Provide a description of the proposed development (e.g. for roads the length, width and width of the road reserve in the case of pipelines indicate the length and diameter) for all alternatives.				
3.4.	Indicate how access to the proposed routes will be obtained for all alternatives.				
3.5.	SG Digit codes of the Farms/Farm Portions/Erf numbers for all alternatives				
3.6.	**Starting point co-ordinates for all alternatives**				
	Latitude (S)	°	‘	“	
	Longitude (E)	°	‘	“	
	Middle point co-ordinates for all alternatives				
	Latitude (S)	°	‘	“	
	Longitude (E)	°	‘	“	
	End point co-ordinates for all alternatives				
	Latitude (S)	°	‘	“	
	Longitude (E)	°	‘	“	
Note: For Linear activities or developments longer than 500m, a map indicating the co-ordinates for every 100m along the route must be attached to this BAR as Appendix A3.					
4.	**Other developments**				
4.1.	Property size(s) of all proposed site(s):				3485059.1m^2
4.2.	Developed footprint of the existing facility and associated infrastructure (if applicable):				Approx. 26 368 m^2
4.3.	Development footprint of the proposed development and associated infrastructure size(s) for all alternatives:				Approx. 107 221m^2
4.4.	Provide a detailed description of the proposed development and its associated infrastructure (This must include details of e.g. buildings, structures, infrastructure, storage facilities, sewage/effluent treatment and holding facilities).				

(Source: GWAING WWTW CONCEPT DESIGN REPORT: PHASE A & B REV02, 9 April 2025, Prepared by LUKHOZI CONSULTING ENGINEERS (PTY) LTD)

PLEASE NOTE: The reports referenced above and attached as Appendix G7 and G8, will be revised to match the information presented below.

PROJECT OVERVIEW

The Gwaing Wastewater Treatment Works in George, Western Cape, recently completed minor upgrades, resulting in a total average dry weather flow (ADWF) capacity of 10.4 million litres per day (MLD) when operating an MLE process and 8.6 MLD when operating a UCT process. Given that the Gwaing WWTW is operating at the edge of its capacity, it is imperative to accelerate the implementation of at least Phase A (4.6 MLD UCT). Doing so will ensure that the effluent from the works remains compliant. Similarly, the detail design and planning for Phase B (8.8 MLD UCT) should not be delayed ensuring that this phase can be commissioned before 2029 when the load on the plant is projected to exceed the capacity created by the implementation of Phase A. It would make sense to procure Phases A and B simultaneously, but to prioritize the scope of Phase A during implementation of this project. Phase A & B combined will increase the WWW capacity by 10 MLD resulting in a combined capacity of 22 MLD (UCT) and 28 MLD (MLE).

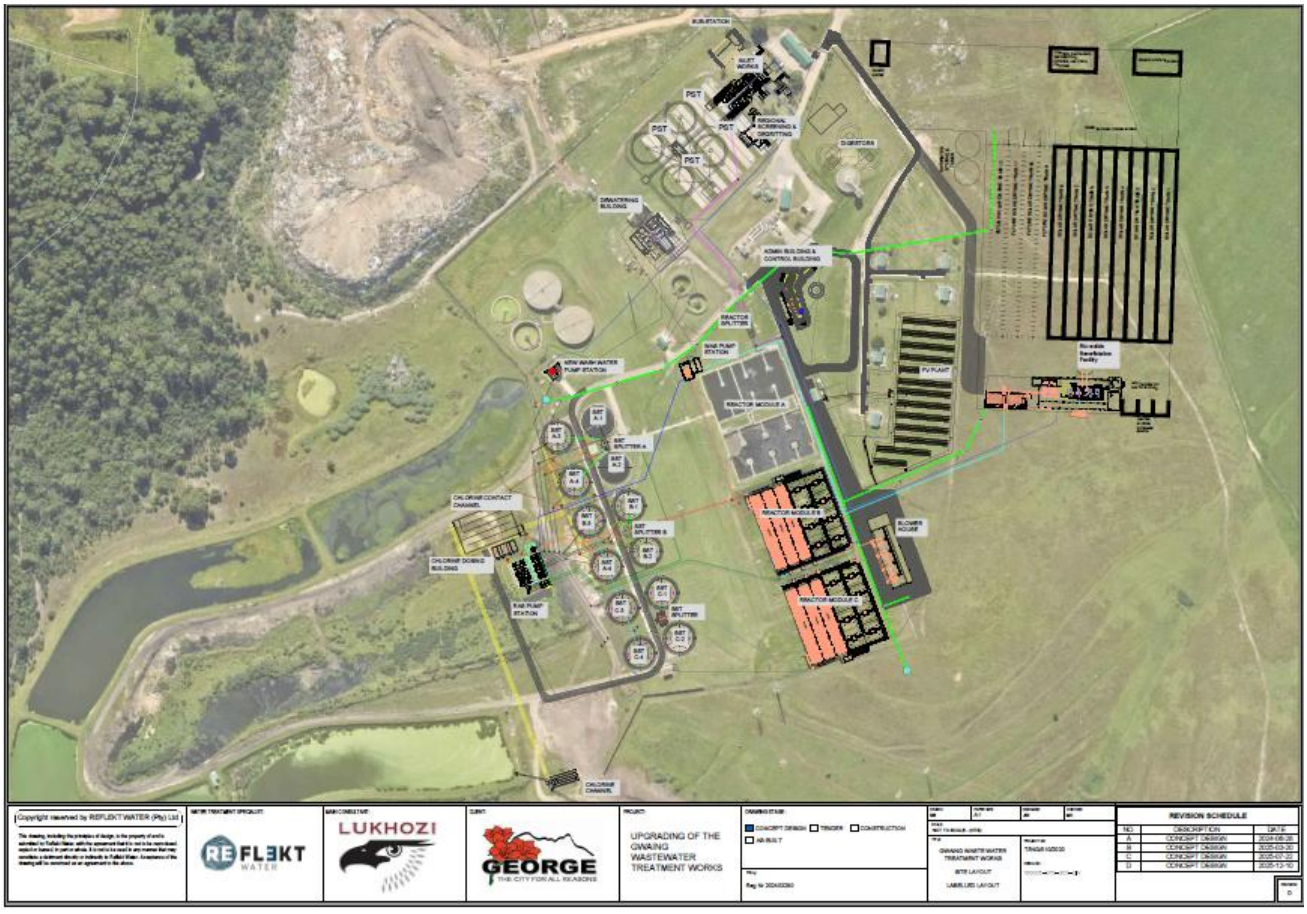

Figure 1: Gwaing WWTW upgrades site layout

George Municipality (GM) aims to upgrade the Gwaing WWTW to remain compliant with the effluent standards as dictated by the Water Use Licence (WUL) issued by the Department of Water and Sanitation (DWS). GM have appointed Lukhozi Consulting Engineers (Pty) Ltd (LCE) to create a Master Plan that will guide future upgrades. The Master Plan seeks an ultimate capacity of 50 MLD based on a UCT process and 68 MLD based on the MLE process, allowing for phased intermediate upgrades aligned with the ultimate solution. Additionally, it optimizes spatial requirements on a site with various constraints.

The four phases proposed, with the relevant processes and capacities are summarised in Table 1 below. The commissioning dates for each phase were selected based on a population growth of 4%. The exact dates of implementation will be determined as time progresses and as the demand increase becomes more

apparent with actual figures. The 4% growth selected is the worst-case scenario and is used for illustration purposes.

Table 1: Summary of phasing capacities

Phase	Date of commissioning based on 4% population growth	Additional Capacity (MLD)	Total Capacity UCT (MLD)	Total Capacity MLE (MLD)
Existing Plant			8.6	10.4
Phase A	2026	4.6	13.2	17
Phase B	2029	8.8	22	28
Phase C	2041	11	33	42
Phase D	2051	17	50	68

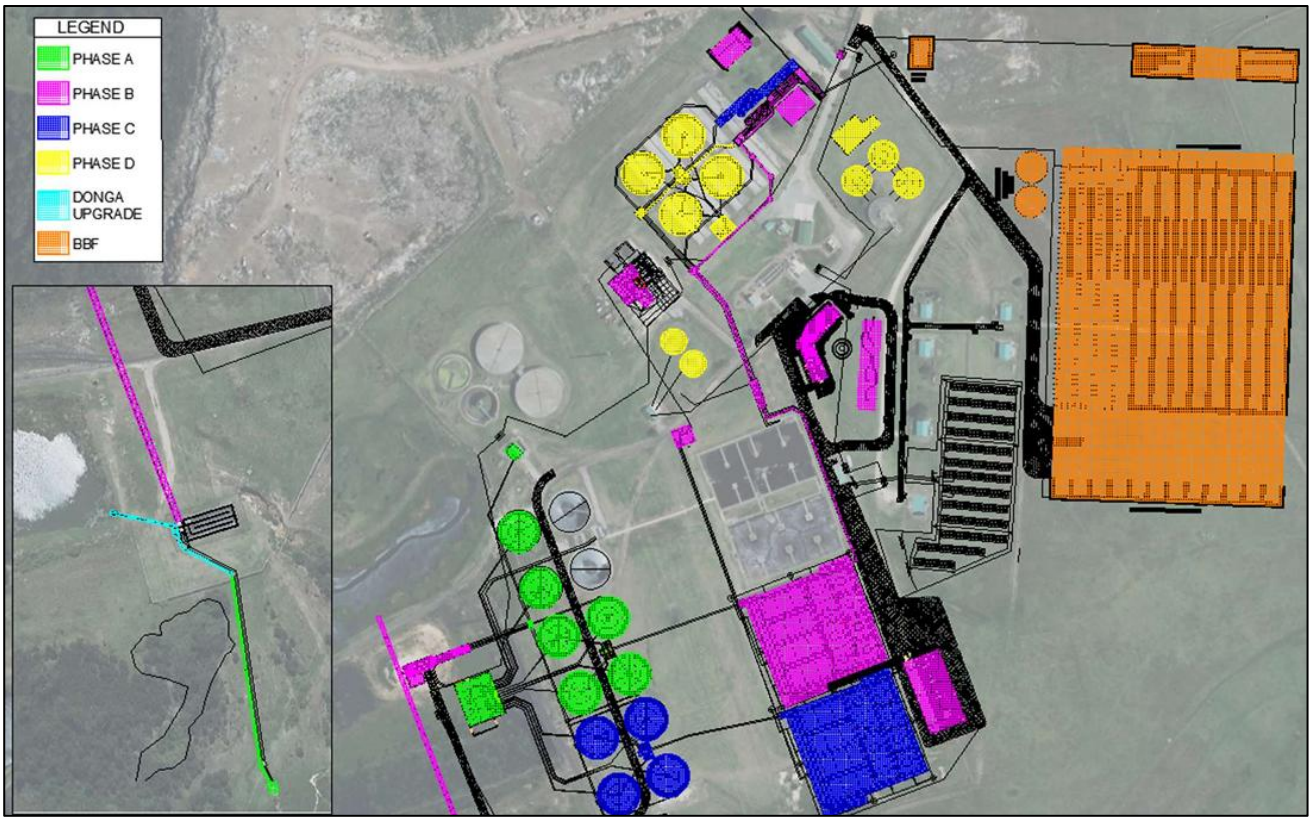

Figure 2: Phased Implementation Site Layout

The vision for Gwaing WWTW extends beyond waste management. It aims to transform the facility into a Water Resource Recovery Facility (WRRF), emphasizing resource recovery. Key strategies include:

- Regional grit processing facilities to enable reuse of grit as part of composting or fill material.
- Regional screenings processing facility to minimise volume, odours, pathogens and vector attraction of screenings.
- Sludge beneficiation in the form of solar drying and fertilizer production is envisaged.
- The methane gas produced from anaerobic digestion will be used for generating heat and power (as part of Phase D).
- Effluent from the Gwaing WWTW can in future be pumped to neighbouring industries or golf courses for non-potable use. Alternatively, it can be further treated together with the effluent from Outeniqua WWTW before it is pumped to the Garden Route Dam as part of an indirect potable reuse scheme.
- Effluent will be recycled and pressurized on-site in a wash water ring main for various uses including irrigation, reducing the potable water demand of the WWTW.

- Energy efficient design principles are used to reduce the power consumption of the plant, while a solar PV plant will both provide backup power during loadshedding events and shift the plant's reliance from the national grid to renewable energy sources.

It remains crucial to ensure that the Gwaing WWTW's primary task - producing compliant effluent - is executed effectively and consistently. This objective takes precedence over secondary goals like energy efficiency or automation. Two examples of design decisions that were made on this basis include:

1. Surface aeration will be maintained initially in Reactor A even though there would be a 50% energy saving by replacing it with FBDA. Surface aeration is a much more simple - and therefore reliable - technology and for this reason (as well as the sloped floors) it was decided to keep surface aeration for Reactor A while including FBDA for Reactors B and C to obtain the energy efficiency benefits.
2. Including PSTs and anaerobic digestion (AD) has a significant theoretical energy savings advantage over reactors without PSTs for plants above 25 MLD capacity. However, AD has a bad track record in South Africa due to several operational aspects discussed briefly in this report. While PSTs and AD do form part of the Master Plan for Gwaing WWTW, these unit processes are intentionally delayed until Phase D to ensure that the scale of the plant at the time of implementation warrants sufficient operational resourcing and attention for it to succeed.

The fact that Gwaing WWTW and Outeniqua WWTW are only 4 km apart has several advantages. It is proposed that the benefits of centralisation and economies of scale be harnessed in the following ways:

- Continue to use Gwaing WWTW as a centralized sludge dewatering and beneficiation location for both WWTWs in the region as well as other WWTWs in the George Municipal Area.
- Re-establish a centralized effluent reuse plant at Outeniqua WWTW and include pumping of effluent from Gwaing WWTW to Outeniqua WWTW if required. This can include industrial reuse, irrigation and indirect potable reuse schemes.
- Establish cross connection for raw sewage to be transferred (pumped) between the two WWTWs to shift load from the one plant to the other during planned maintenance periods or unforeseen operational issues. Alternatively, this flexibility can be provided further upstream in the sewerage reticulation network.

The George BBF is poised to transform the way sludge is handled and perceived in the local market. New regulations are making the beneficiation of sludge a necessity. The George BBF will ensure that sludge handling complies to regulations and will facilitate a circular economy for sludge.

At this stage, the GM believes that the BBF Phase will be implemented first.

WATER USE LICENSE

The Water Use License (WUL), dated 18 December 2015, stipulates the treated effluent compliance in terms of the General Limit Values as detailed in the Government Gazette of 6 September 2013, as shown in Table 2. The only deviation of the WUL is that E Coli is limited to 150 cfu/ 100 ml instead of the 1000 cfu/100 ml prescribed by the General Limit. Generally, the standard is achievable with a conventional BNR activated sludge plant including disinfection. A new WUL is being applied for by Debbie Fordham.

Table 2: Anticipated discharge Standards for the Gwaing WWTW based on the current 11 Mℓ/day WUL

Parameter	Units	General Limit	Current Water Use Licence Limit
Faecal coliforms	Count per 100 ml	1000	Not specified
E coli	Count per 100 ml	Not specified	150
COD	mgCOD/l	75	75
PH		5.5-9.5	5.5-9.5
Ammonia (as N)	mgN/l	6.0	6.0
Nitrate (as N)	mgN/l	15	15
Chlorine as Free Chlorine	mgN/l	0.25	0.25
Suspended Solids	mgN/l	25	25

EC	m/mS	70*	70*
Ortho Phosphate (as P)	mgP/l	10	10
Fluoride	mg/l	1	1
Soap, oil and grease	mg/l	2.5	2.5

** 70 above intake to a maximum of 150 mˢ/m*

PHASE A

The primary purpose of Phase A is to increase the capacity of the plant in the shortest possible time to ensure the works have enough capacity to sufficiently treat wastewater to comply with effluent requirements.

The proposed solution is to construct 6 additional SSTs to operate together with the existing Reactor A. The 8 SSTs in total (2 existing and 6 new), together with Reactor A will give an additional capacity of 4.6MLD (from the existing 8.6 MLD when operating the UCT process) resulting in a total capacity of 13.2 MLD (ADWF). When operated as an MLE process a capacity of 17 MLD can be achieved. The additional infrastructure of Phase A is highlighted in Figure 2.

Included in Phase A of the upgrade will be the construction of a new outlet chamber sufficient for the ultimate solution. The donga and maturation pond outlet channel to the existing chlorine contact channel has been upgraded on a separate contract due to the urgency of restoring the donga and as this aspect was not listed and not directly related to the proposed WWTW upgrades. The pipe and channel sizing and positions as part of the donga upgrade contract will be aligned with the Master Plan upgrade.

This phase includes:

- 2 additional SSTs for Module A
- 4 SSTs for Module B (can operate with Reactor A)
- New RAS Pumpstation
- New Substation building
- Replacement of the DN450 with a DN950 pipe from the existing chlorine contact channel to the river outlet.
- Electrical Equipment
- Associated road and stormwater infrastructure

Capacity achieved:

- 13.2 MLD ADWF as a Raw UCT process
- 17 MLD ADWF as Raw MLE process

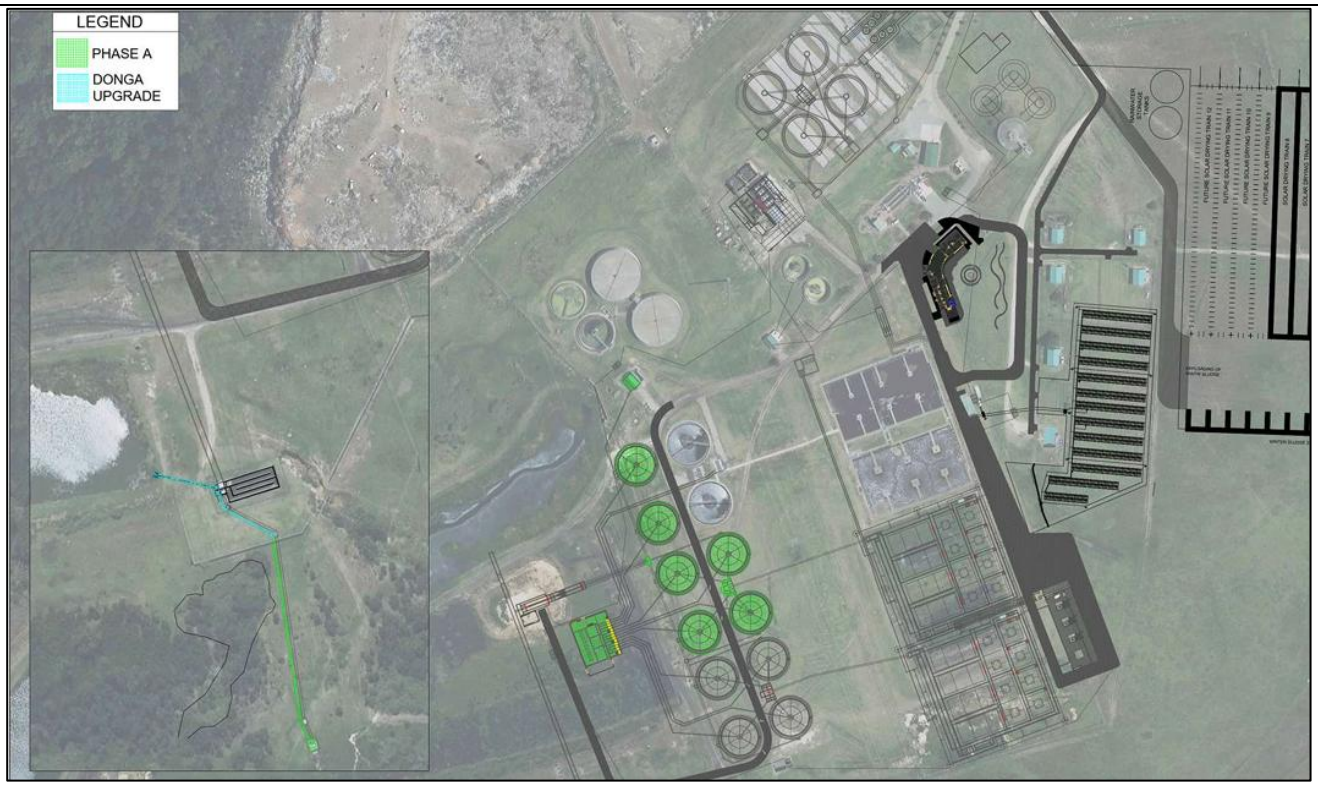

Figure 3: Phase A site layout

PHASE B

There were two options investigated for Phase B of the upgrade. The first option is implementing an additional reactor and operating a UCT system with unsettled wastewater. The second option is to implement primary settling (including all primary sludge handling) and operate a UCT settled process with the existing Reactor A. The two options were compared to each other and workshopped together with George Municipality. The optioneering exercise resulted in Option 1 being the preferred option for Phase B.

Table 3: Phase A + B - Option summary

Unit Process	Phase A & B: Option 1 (preferred)	Phase A & B: Option 2
Phase A + B Capacity	22 MLD	20.7 MLD
Inlet Works	1	1
Primary Settling Tanks	-	2
Gravity Thickeners	-	2
Anaerobic Digestors	-	2
Biological Reactors	2 (1 existing, 1 new)	1
Secondary Settling Tanks	8 (2 existing, 6 new)	8 (2 existing, 6 new)
Chlorine Contact Tank	1	1

Figure 4: Left: Phase A & B - Option 1 layout. Right: Phase A & B - Option 2 layout

Phase B will see the construction of a new inlet works (half the ultimate upgrade proposed inlet works), including regional screening and degritting facility, for the washing of screenings and grit from other pumpstations and wastewater treatments works within the Municipal area. An additional reactor (Reactor Module B) will be constructed together with its associated pipework to connect to the SSTs constructed in Phase A. The additional reactor will be aerated with fine bubble diffusers and therefore a blower house will be constructed. UV disinfection and WAS dewatering are also included in the construction of Phase B. Phase B will give an additional capacity of 8.8 MLD UCT from the 13.2MLD achieved in Phase A, resulting in a total capacity of 22 MLD (ADWF) UCT. The additional infrastructure of Phase B is highlighted in Figure 4.

Phase B includes:

- New Inlet Works Train 1
- Regional Grit and Screenings Facility (Construction may be in a later phase or on a separate contract depending on funding availability)
- New biological reactor (Module B)
- New Blower House and aeration system
- Service corridor for air header
- New WAS pumpstation
- Chlorine contact tank upgrade
- Extension to WAS Dewatering Facility
- New Process Control including Admin Building (Construction of Admin Building may be in a later phase or on a separate contract depending on funding availability)
- Electrical Equipment
- Potentially sludge storage bunds and sludge drying facility (can be implemented separately, please refer to the BBF details below)
- Demolition of sludge drying beds
- Associated roads and stormwater infrastructure

Capacity achieved:

- 28 MLD ADWF as MLE
- 22 MLD ADWF as UCT

Figure 5: Phase B Site Layout

Roads and Stormwater Network

The details of the roads and stormwater infrastructure will be developed during the detail design phase. Including roads to the existing operator houses and proposed new BBF. All new roads including the roads to the operator's houses will be constructed with interlocking pavers. All existing roads will be refurbished. A layout of the proposed new roads is shown in Figure 5. Due to the nature of the plant and future upgrades, future services (pipes and cables) will inevitably need to cross new and existing roads. Pavers are easy to remove and re-use in the case where excavation through roads is required.

A new stormwater system will convey stormwater through concrete pipes. It is envisaged that stormwater will drain to the existing maturation ponds on site since it is located at the lowest point of the site and has sufficient capacity to attenuate the flow.

Figure 6: Layout of proposed new roads

Demolition Work

Figure 6 shows the structures to be demolished as part of the Gwaing WWTW phase A&B upgrade. The structures that need to be demolished is the old sludge drying beds and the bio trickling filter process train. The old sludge drying beds at Gwaing WWTW are not operational anymore and need to be demolished to make space for the new inlet works, the PSTs, and the primary sludge pump station. The bio-trickling filter process train is no longer operational and has been decommissioned for some years. Once Phase B is commissioned, the existing inlet works will no longer receive any flow. Thus, if required, demolition of the existing inlet works can be done to make space for future infrastructure.

Figure 7: Structures to be Demolished as part of Gwaing WWTW upgrades

PHASE C

Phase C of the upgrade will be to construct Module C's reactor and SSTs. It is proposed to construct the final reactor and SSTs prior to constructing the PSTs and associated primary sludge handling unit processes as all the ancillary infrastructure for the reactors and SSTs would have been constructed as part of Phase B. This includes the Blower House, RAS pump station and WAS pumpstation. It would also give more redundancy with the additional reactor and SSTs should maintenance on any of the existing infrastructure be required. The site layout for the proposed Phase C of the upgrades is shown in Figure 7. The total capacity of the plant after the Phase C upgrade will be 33 MLD operating a UCT process.

This phase includes:

- 1 New biological reactor (Module C)
- Extension of Blower House and aeration system
- 4 new SSTs (Module C)
- Additional UV banks (M&E) (If approved by George Municipality)
- New Inlet Works Train 2
- Additional DN950 outlet pipe from existing chlorine contact channel to the river outlet
- Electrical Equipment
- Associated roads and stormwater infrastructure

Capacity achieved:

- 42 MLD ADWF as MLE
- 33 MLD ADWF as UCT

Figure 8: Phase C site layout

PHASE D

Phase D of the upgrades will be the final phase of the Master Plan. The phase will see the construction of the four PSTs, primary sludge pumpstation and three additional anaerobic digestors. The existing PSTs will be refurbished and used as gravity thickeners for the primary sludge. Phase D will increase the plant's capacity from 33 MLD to 50 MLD, operating a UCT settled process. The sequencing of Phase C and D can be switched around if the Municipality chooses to do so. Switching the two phases will have the same impact on the capacity. Figure 8 shows the site layout of the proposed Phase D upgrade.

This phase includes:

- 4 New PSTs
- Primary Sludge Pump Station
- 2 Gravity Thickeners (repurpose old PSTs)
- 4 Anaerobic Digesters
- Primary Sludge Dewatering Facility
- Electrical Equipment
- Associated roads and stormwater infrastructure

Capacity achieved:

- 68 MLD ADWF as MLE
- 50 MLD ADWF as UCT

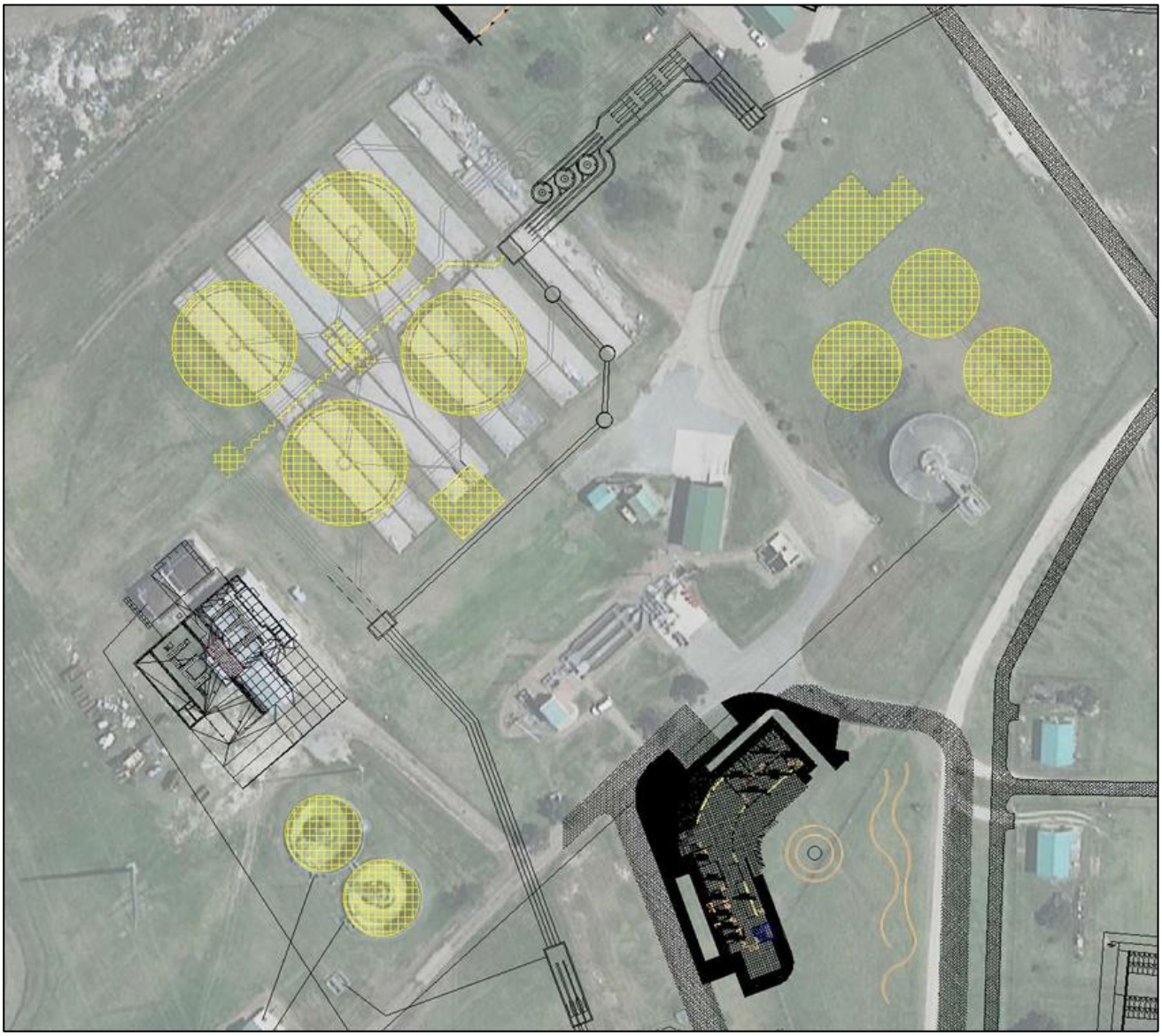

Figure 9: Phase D site layout

BIOSOLIDS BENEFICIATION FACILITY (BBF) PHASE

This phase includes the new biosolids beneficiation plant which comprises of the following infrastructure:

- Guard House
- Perimeter fencing and access gate
- Approximately 30 000 m² of concrete slabs for the various stages of sludge stockpiling, solar drying, composing and sludge handling. This includes the areas under translucent roof sheeting for solar drying.
- Approximately 13 000 m² in plain view of translucent roof sheeting ('greenhouse') structures.
- One 18m x 36m shed with a clear height of 4.5m and without any columns inside the building for the sludge granulation plant.
- A second building of similar footprint for the packaging plant and distribution depot. This building is to include offices, ablution and a canteen for the operating staff of approximately 6 people.
- Movable precast concrete walls placed on slabs to demarcate separated process areas and to prevent contamination of treated sludge by raw sludge.
- Access Roads
- Rainwater collection and storage from all roof structures
- Stormwater collection and drainage from concrete slabs with pipeline to Gwaing WWTW inlet works.

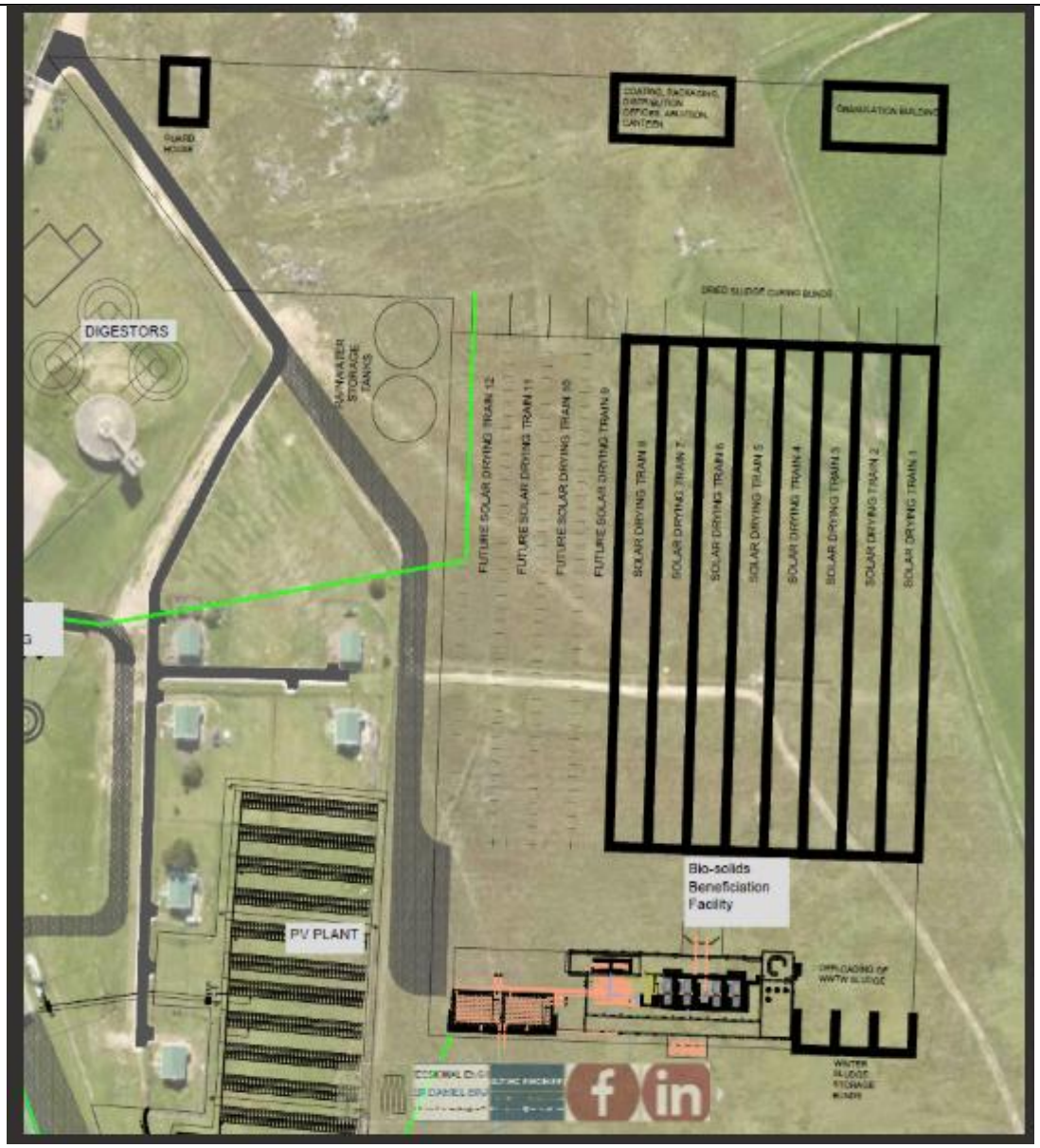

Figure 10: Bio-Solids Beneficiation Facility phase layout

Current Sludge Handling

George Municipality's current sludge disposal method is not compliant with sludge management guidelines. Sludge is currently being stored between the maturation ponds in an unlined area. This causes seepage of nutrients to the maturation ponds and the underlying aquifer. The sludge produced currently is classified as class B1a according to a report by Herselman Consulting Services compiled in October 2021. This places restrictions on how the sludge can be utilised. To make the sludge a more attractive commodity for either the municipal composting facility or private compost and fertilizer manufacturers the sludge needs to be processed further at Gwaing WWTW to achieve a higher dryness (solids content) and/or a classification of A1a.

Sludge Disposal Option 1: Producing Fertilizer

The preferred option for disposal of sludge is to produce fertilizer from it. Solar dried sludge (>80% DS) granules are optionally mixed with chemical fertilizers and sold to farmers for application to agricultural land. This option creates a high-value product that warrants the additional capital and operational expenditure required for a solar drying plant. George Municipality is currently busy with a Request for Proposal (RFP) process to ascertain whether private industry would be interested in using the sludge for fertilizer, composting or other beneficiation projects. The current intention is for George Municipality to construct a solar drying and granulation plant. This will be referred to as the George Biosolids Beneficiation Facility. George Municipality plans to construct the capital infrastructure and only outsource operation of the facility, including the selling of the granulated sludge as fertilizer.

Sludge Disposal Option 2: Composting

Composting could be employed to sterilize the sludge to a class A1a sludge. If this is achieved the sludge can be sold as compost for agriculture or horticulture use, reducing the need for sludge storage or landfill application. Delta Built Environmental Consultants were appointed to investigate the feasibility of composting as a sludge beneficiation strategy for George Municipality at the newly implemented Municipal Composting Facility. Their Report titled: Sludge Utilisation Within George Municipality Compost Facilities Recommendations Report is currently in draft format. Overall, the use of sludge in compost was not well received by private composting companies. This is due to their target market being end users and the possible health risks that are perceived with sludge. The use of compost containing sludge was better received but still with hesitation to resell to customers.

Presently the decision is not to pursue composting as a direct option for the beneficiation of the Gwaing WWTW sludge. However, with the implementation of a solar drying facility that achieves a class A1a sludge, the dried sludge will be more palatable for composting plants and end users, and it is foreseen that the sludge could be sold or given to these facilities as an alternative option to fertilizer production.

Sludge Storage

Regardless of the sludge beneficiation option chosen by GM, there may well be a need for the temporary storage/stockpiling of sludge. Such a storage facility would be valuable if the composting facility is not able to receive sludge for a period. If solar drying is employed, the drying rate is much lower in winter and therefore it may be sensible to store a portion of the sludge during winter so that it can be dried in summer when higher drying rates are achievable.

Due to the high rainfall in George, it is advisable to cover the sludge storage area to prevent rainwater ingress. By making the covers translucent, some consequential solar drying will also take place in the stockpiles. The bunded areas must include impermeable floors and contained stormwater retention so that nutrient-rich runoff does not enter the maturation ponds or stormwater networks. Sludge must be easily transportable by means of a TLB or similar.

Figure 11: An Example of sludge storage bunds with concrete floors and translucent roof covers.

Solar Drying

Solar drying of sewage sludge is typically done after initial dewatering to 14% - 17% dry solids (DS). Solar drying can be done to achieve between 65% and 90% DS. Above 65% DS the sludge forms granules or powder and is not lumpy or sticky any longer. The drying process reduces pathogens and faecal coliforms. A microbiological class of A could potentially be achieved to reach an overall sludge classification of A1a. However, it should be noted that temperature has been found to be the main parameter in the removal of helminth eggs and therefore the achievement of A1a may be dependent on the temperatures reached during the solar drying process. Stockpiling and curing of the sludge after drying has also been effective for pathogen reduction.

Solar drying can be done with or without roof coverings. No roof coverings are possible with a high solar irradiance and sufficient evaporation rate. This makes it feasible to operate the drying facility without any roof structure. Simple concrete slabs with allowance for drainage are sufficient, with mechanical plant used to spread and turn the sludge periodically.

Figure 12 shows a solution often employed in colder climates. This includes translucent roof sheeting, forced ventilation and automated sludge spreading and turning. It seems apparent at this stage that translucent roof sheeting may be required for a solar drying plant at Gwaing WWTW to limit the footprint required to within reasonable limits. Different options for sludge spreading and turning can be considered. This approach results in a drastic reduction of processing time or footprint and produces a better-quality sludge.

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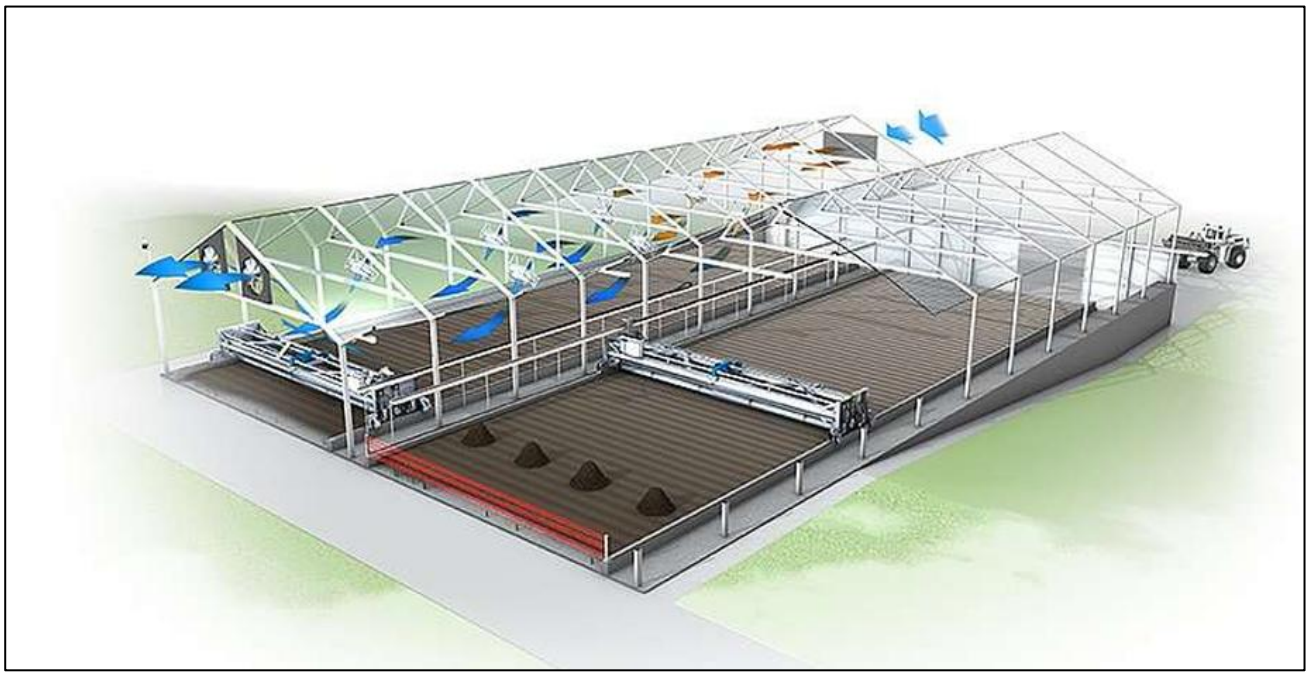


Figure 12: Example of advanced biosolid beneficiation facility including translucent roof sheeting, forced ventilation and a sludge turner and spreader (Huber)

Continuous drying vs. batch drying

Continuous solar sludge drying and batch solar sludge drying are two distinct methods used for reducing the moisture content of sludge using solar energy. Continuous solar sludge drying involves a steady, ongoing process where sludge is continuously fed into the drying system, typically spread in thin layers within a greenhouse structure. This method ensures uniform drying through regular agitation and optimal air circulation, leading to efficient moisture evaporation and consistent output quality.

Batch solar sludge drying processes sludge in discrete batches, where each batch is dried separately before the next one begins. This method can be less efficient due to the downtime between batches and potential inconsistencies in drying conditions. However, batch drying allows for greater control over individual batches, which can be beneficial for handling varying sludge characteristics.

The batch plant seems better suited for the George BBF.

Solar Drying Sludge Volumes

It is proposed that the facility be sized initially to receive approximately 50 tonne/d at 15% DS which will result in a dried mass of about 8.3 tonne/d at 90% DS. Additional drying trains can be added in future in line with the realized population rates. The capacity of the BBF should be sufficient until at least 2030, depending on the population growth rate.

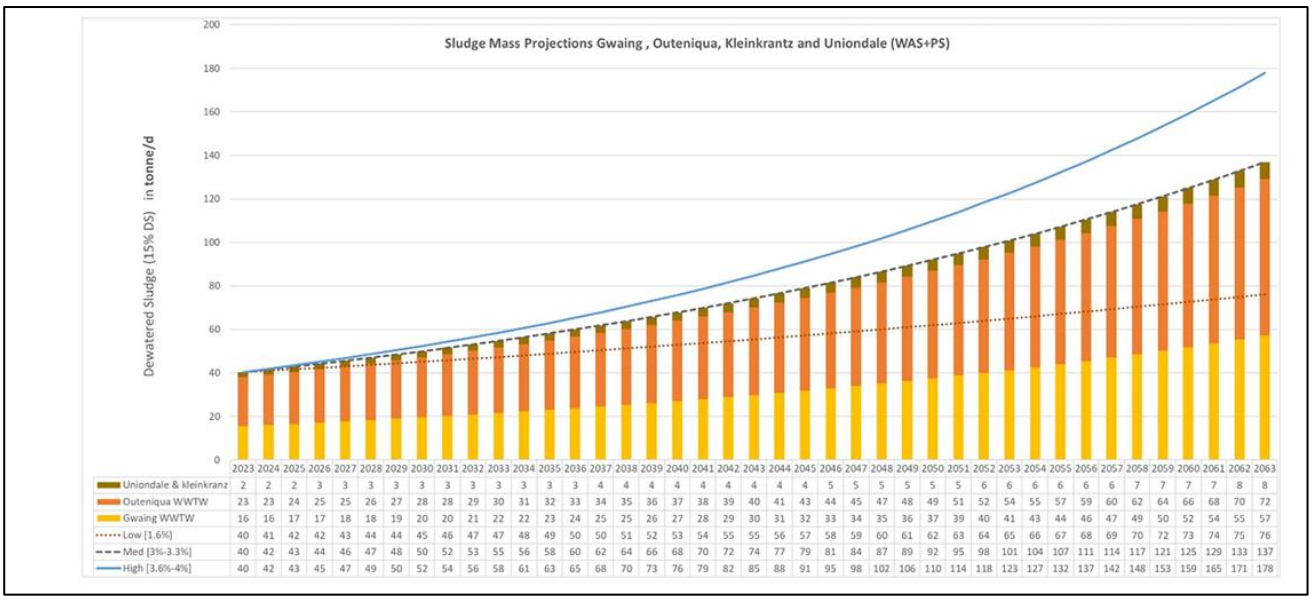


Figure 13: Detwatered sludge (at 15% DS) mass projections for the George Municipal WWTW's combined current and future projections

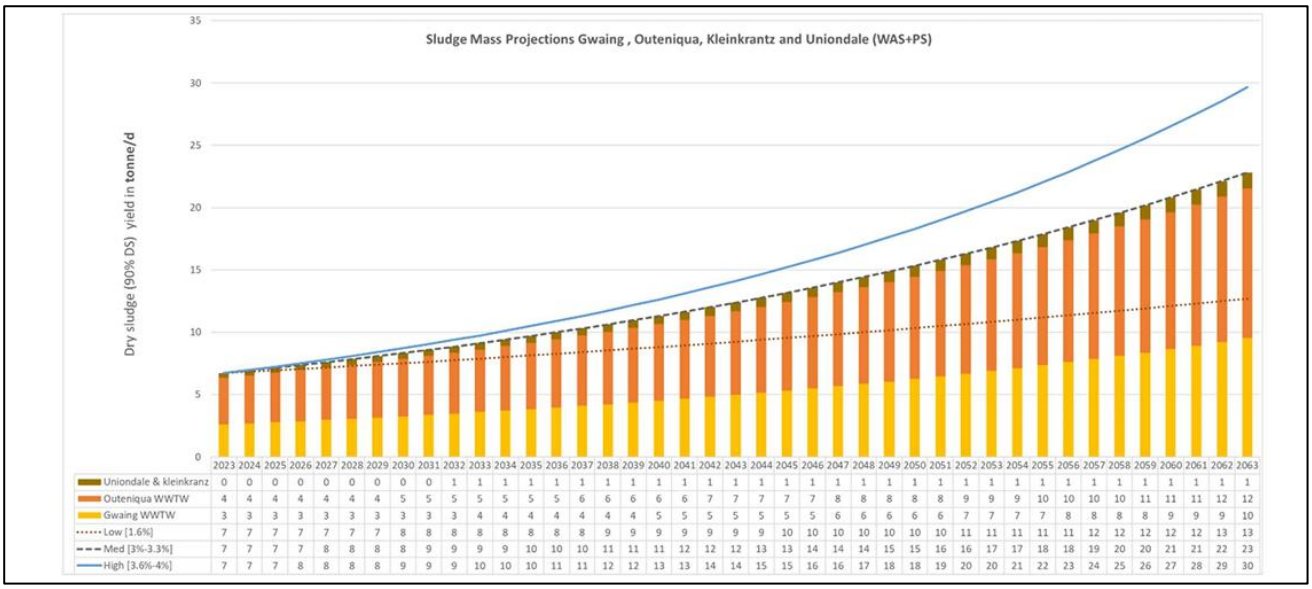


Figure 14: Dry sludge (90%DS) mass projections for George WWTW combined current and future projections

BBF Infrastructure Layout

The BBF process comprises primarily of the following steps:

- Receiving dewatered sludge from the WWTW with front end loaders, skips or similar.
- During winter when the temperatures and solar radiation is lower and the drying capacity of the plant is reduced, excess sludge will be stockpiled in bunds. (Note this will be done if a batch system is used as opposed to a continuous drying system). During summer the bunds will gradually be emptied as the drying capacity increases.
- Loading of the solar drying trains with front end loaders, approximately one train every 3rd day.
- Solar drying of the sludge while sludge is continuously being turned and spread by an electric mole or similar equipment. This process will take approximately 30 days.
- Removing of the dried sludge with front end loaders, approximately one train every 3rd day.

- Stockpiling the dried sludge in curing bunds for 6-8 weeks to get additional pathogen removal in order to obtain class A1a sludge.
- The dried sludge is taken to a granulation plant where it is granulated to a size suitable for agricultural applications.
- After granulation the product is coated and packaged before being transported to an off-site fertilizer production facility.

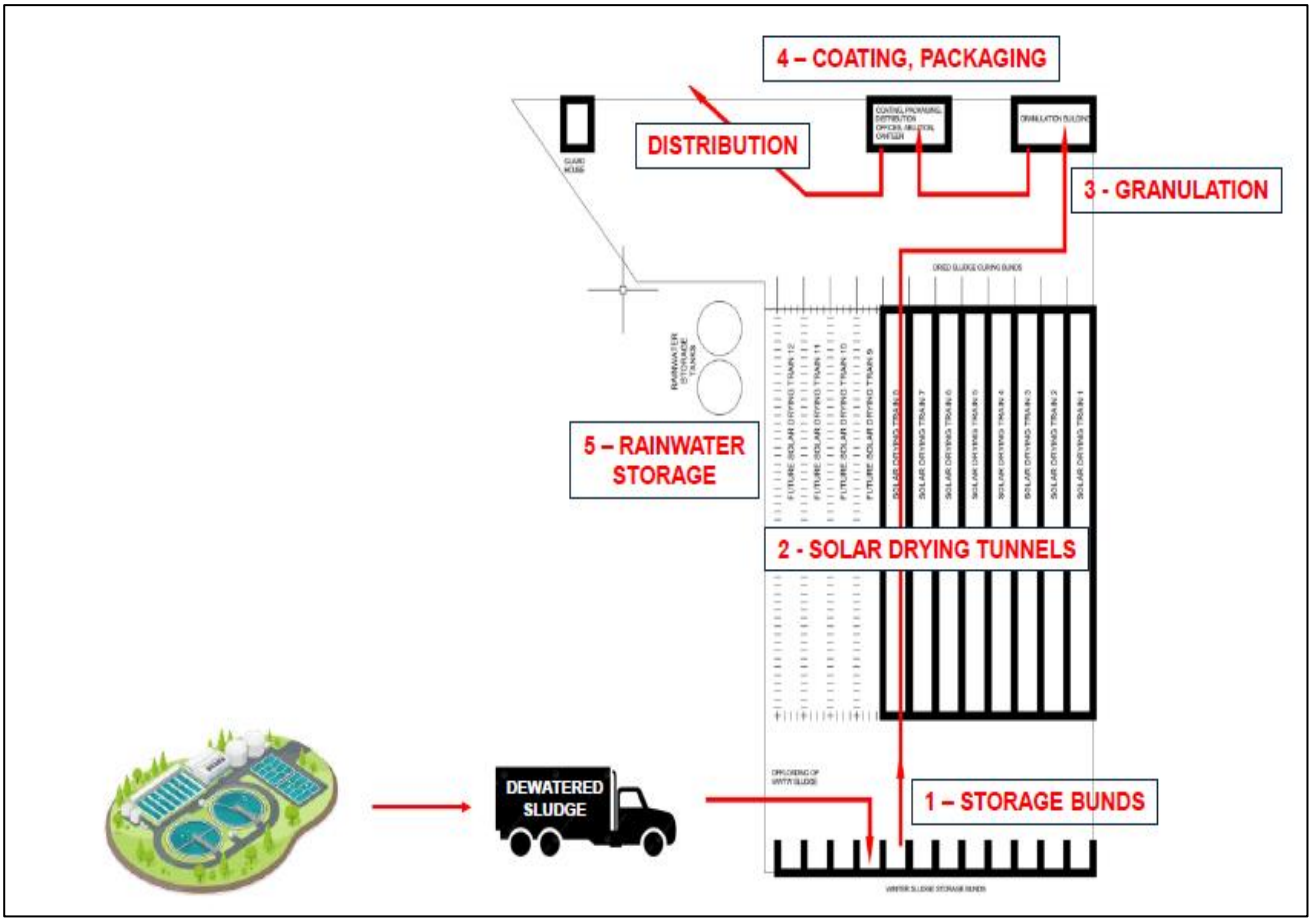


Figure 15: Gwaing BBF schematic layout with basic process flow

The trains can have a width ranging between 11m and 20m. Factors that influence the chosen width are:

- The weight of the translucent sheeting. Glass is heavier than polycarbonate sheeting and therefore may require a shorter span.
- The sludge turning equipment – travelling bridges from different suppliers come in specific sizes. An electric mole can operate over a wider range of widths.
- The design of the steel structure.

The trains can be up to 150m long. The main limitation in the length is the electrical equipment required for the travelling bridges or moles when moving up and down the train. The height of the structures is governed by the size of the front-end loader that loads and unloads the trains. The layout of the BBF is shown with reference to the WWTW and how it fits onto erven 57, 59, 61 and 63 of the proposed Gwayang development (Figure 15). Please note, the proposed Gwayang development layout has changed and the below erven 57, 59, 61 and 63 has been consolidated to form erf 73 (please see Figure 16 below).

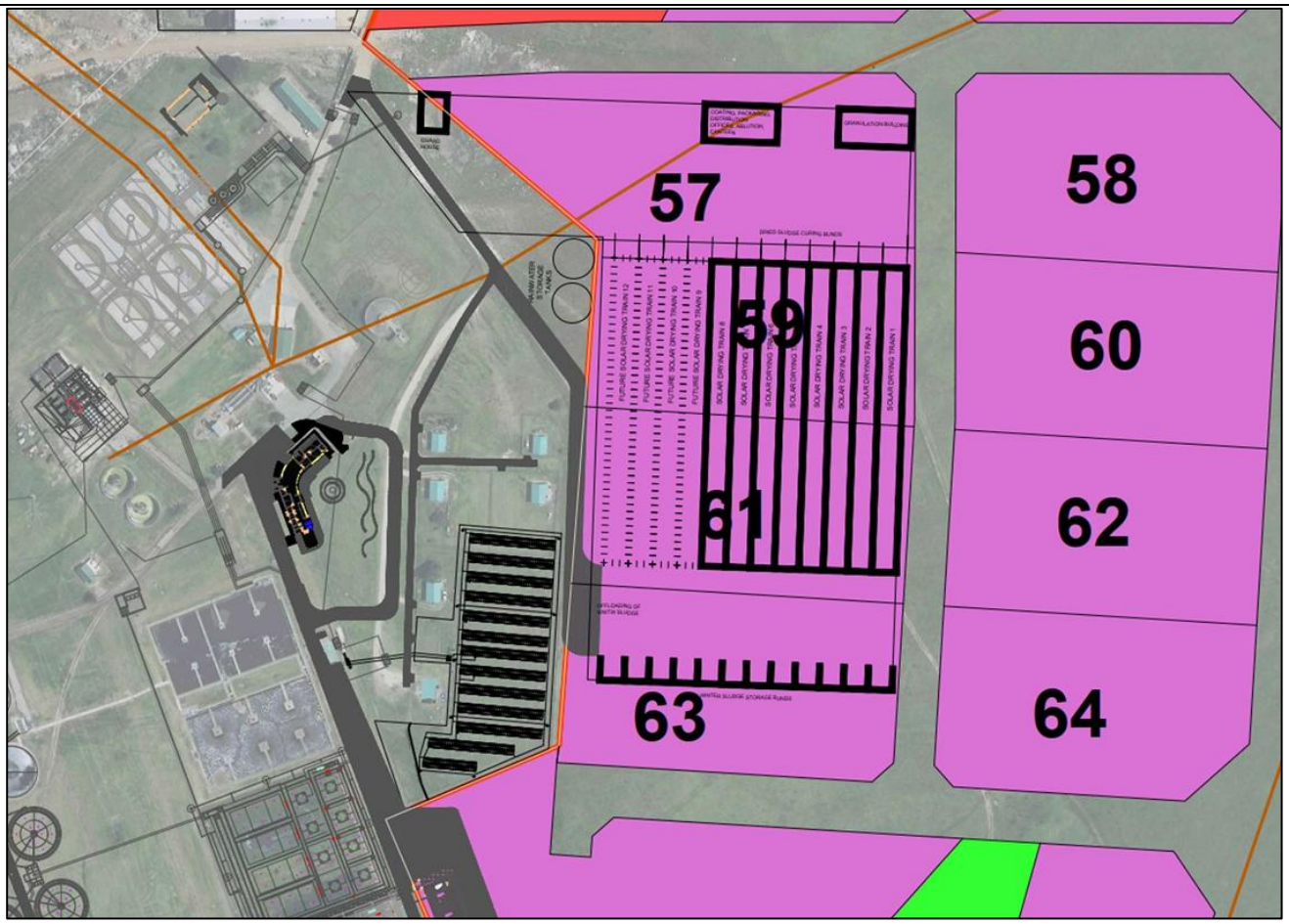


Figure 16: Proposed position for the BBF site.

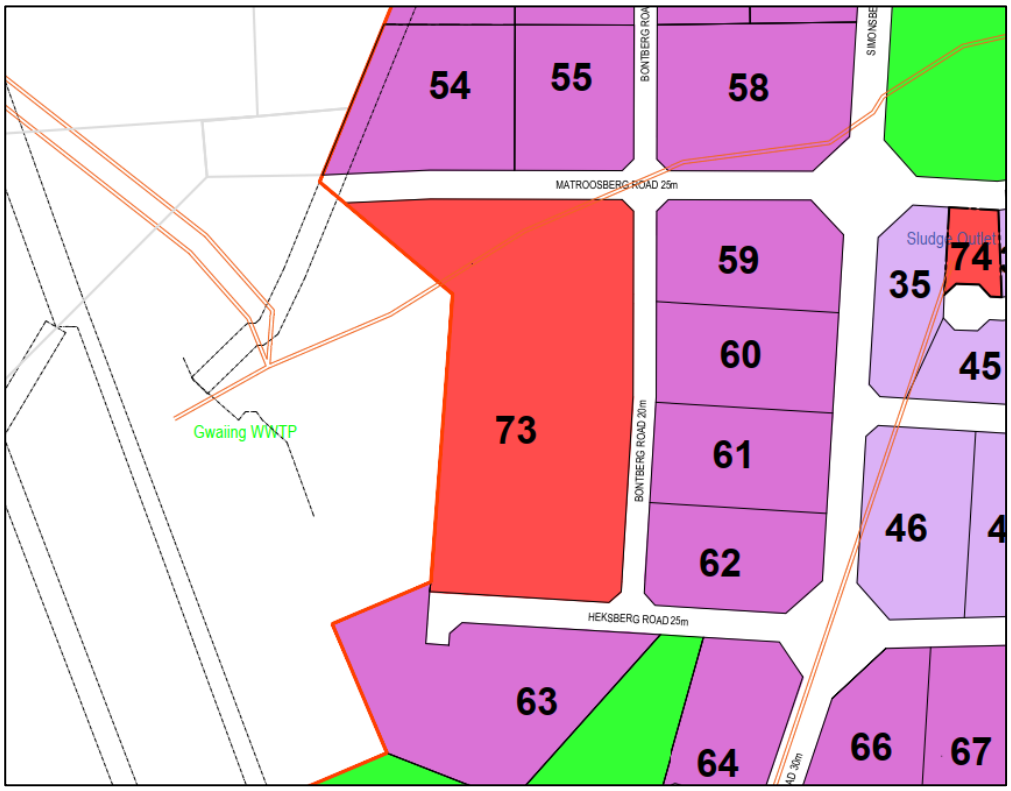


Figure 17: Erf 73-consolidated erven 57,59,61,63

Biosecurity- Biosolid beneficiation facility

The proposed development is located within proximity to the existing Gwaing Wastewater Treatment Works (WWTW) and associated sludge handling activities. As such, consideration must be given to the potential biosecurity risks posed by the proposed facility to adjacent land uses, particularly agricultural areas, poultry facilities, and other livestock-related operations that may be sensitive to pathogen transmission and contamination. It should be noted that the perceived biosecurity risks of the BBF already exist at the existing WWTW, and the implementation of the BBF is a remedial measure in addressing these risks.

Biosecurity risks associated with wastewater and sludge handling activities typically arise from the potential spread of harmful organisms, pathogens, bioaerosols, and disease vectors, as well as through vehicular movement, personnel access, and operational activities.

The George Municipality officially and successfully awarded a long-term contract (10 years with a further possible 5-year extension) to Agriman (Pty) Ltd for the operation of the proposed Biosolids Beneficiation Facility (BBF) on 29 December 2025. Agriman (Pty) Ltd has an international footprint that provides a complete value chain solution for the handling, processing, and beneficiation of wastewater sludge to a commercially marketable registered fertilizer product.

The appointed service provider will ensure that the facility is managed and operated in accordance with relevant regulatory requirements and best operational practices to minimise biosecurity risks.

Buffer distances have been refined based on the surrounding land-use context, prevailing wind conditions, and the rural–peri-urban interface characteristic of the Gwaing area.
The proposed buffer distances are not fixed but rather intended to highlight that if future development is planned within these areas, consideration must be given to the BBF, and the buffers may be increased or decreased as recommended by a specialist study to adequately mitigate potential impacts. The conservative buffers comply with current, surrounding land uses.

Figure 18: 500m Buffer

Biosecurity risks will be effectively managed through the implementation of mitigation measures contained in the EMPr:

Mitigation Measures to Reduce Biosecurity Risks Associated with the Biosolid beneficiation facility

1. Facility Design and Engineering Controls
Solar sludge drying facilities shall be designed and constructed to treat and reduce pathogens contaminants under controlled conditions as prescribed in the sludge disposal guidelines, allowing for the beneficiation of sludge for commercial use. Thus diverting sludge from sacrificial land disposal or landfill which is not sustainable.

- The BBF will be designed as to limit access by wildlife, rodents, insects, and other potential disease vectors. This is typically controlled by means of a secure perimeter fence and the implementation of access management to the BFF.
- The biosolids beneficiation facility will be enclosed or semi-enclosed (e.g. greenhouse-type structures), where feasible, to limit access by birds, rodents, insects, and other potential disease vectors.
- The biosolids beneficiation facility should be constructed using impermeable liners (such as reinforced concrete or HDPE) to reduce the risk of seepage into underlying soils and groundwater
- The biosolids beneficiation facility should be designed with appropriate slopes to promote effective drainage and prevent the ponding of liquids.
- Leachate and drainage water should be collected and either returned to the wastewater treatment works or managed to an appropriate standard prior to discharge.

2. Pathogen Reduction and Sludge Quality Management
The proposed biosolid beneficiation facility is a long-term project and the future may bring changes to the processes. Sludge will be handled and processed in line with the sludge management guidelines to the class designated for its use. Currently The target is class A1a sludge as the end product is a registered fertiliser for commercial sale and use. The product end use might change in the future if the municipality would for example operate the BBF themselves.

3. Vector and Pest Control Measures
- Sludge should remain on the biosolids beneficiation facility for a sufficient residence period to promote pathogen die-off through solar heating, desiccation, and ultraviolet exposure
- Standing water shall be prevented to minimise fly breeding.
- The facility should be well managed, clean and tidy. Rodents are typically not interested in sludge but rather general waste
- Given the nature of wastewater treatment operations, the presence of birds is unavoidable. Management measures will be implemented to minimise associated risks where practicable.

4. Operational and Handling Controls
- Access to the facility shall be restricted to authorised personnel.
- Personnel shall use appropriate personal protective equipment (PPE).
- The facility layout makes provision for the separation of beneficiated sludge from incoming sludge. A wash bay for the cleaning of equipment to be used that is contaminated with pre-beneficiated sludge before leaving the site.
- Dust cannot be avoided in the drying and processing of the sludge as the final product needs to be dry for commercial use. Dust can be mitigated at sieving and screening processes with implementing a dust screen/curtain to reduce the amount of dust generated but it is no able to prevent dust generation throughout the process.

5. Spatial Planning and Buffer Zones
- Adequate buffer distances should be provided between the biosolids beneficiation facility and sensitive receptors.
- Vegetated buffer zones may be established, where feasible, to assist with odour, dust, and visual mitigation.
- Facility siting should take into account prevailing wind directions.

6. Monitoring, Compliance, and Legislative Alignment
- Routine monitoring of sludge quality, odours, and vector activity shall be undertaken.

- Records of sludge handling and disposal shall be maintained.
- Operations shall comply with NEMA (Act 107 of 1998), and the National Water Act (Act 36 of 1998).

7. Emergency and Contingency Measures
- Emergency procedures shall be developed for spills, storm damage, and vector outbreaks.
- Operations shall be suspended during extreme weather events.
- Incidents shall be reported and corrective actions implemented promptly.

With appropriate engineering controls, operational discipline, and regulatory compliance, biosecurity risks associated with biosolid beneficiation facilities can be effectively mitigated. Sludge beneficiation in a well-designed and controlled facility according to the Sludge Disposal Guidelines is a desired solution to regulate and mitigate the risk of environmental contamination resulting from uncontrolled sludge disposal practices.

Stormwater Management

Source: Preliminary stormwater management report (Report No. 1752- STW-01) for Gwaing WWTW (Phase A &B) prepared by Lukhozi Consulting Engineers (PTY) LTD, dated 12 December 2025.

PLEASE NOTE: The report referenced above is attached as Appendix L.

STORMWATER GEOLOGICAL MODELLING

The following can be extrapolated from the geotechnical assessment from a hydrodynamic modelling and associated stormwater system design perspective:

- Granitic soils were encountered throughout the site, and are prone to erosion.
- Dewatering for excavations deeper than 1.5m, with a perched groundwater table being observed, indicates that minimal infiltration is likely to occur during a storm event and that significant portion of the rainfall shall be conveyed via surface runoff can be expected.

The infiltration parameters applied for hydrodynamic modelling are further described under Section 3.2.1h) of the Gwaing WWTW Stormwater Management Plan. Cognisance of the limited infiltration shall be accounted for; and should the regional SCS-SA Soils Mapping (which shall be described in further detail under Section 3.2.1h)) indicate relatively free-draining soils, a more conservative approach shall be applied.

The proposed layout of the WWTW is presented in Figure 1. It is noted that the various measures proposed are to be phased; from a stormwater drainage perspective the ultimate scenario stormwater drainage system shall be assessed hydrodynamically.

From a construction perspective, the stormwater drainage system shall be constructed to serve the ultimate scenario regardless of phasing.

This may require additional monitoring and maintenance / cleaning of the new infrastructure for the initial phases, as less runoff and associated peak flows shall impact on associated peak flow velocities and self-cleansing velocities might not be met. Increased siltation from the erodible granites may therefore occur.

EXTERNAL CONTRIBUTING CATCHMENTS

The Gwaing WWTW is located adjacent to the confluence of the Gwaing River and a small tributary. There is a proposed commercial / industrial development proposed to the east of the WWTW within Groeneweide Park.
For this study:

- The hydrology and associated peak flows for the Gwaing River and its tributary has not been estimated. Floodlines were not available for this study, however it is assumed that the original WWTW design would have been constructed above and outside of at least the 100-year return period flood levels and associated floodlines. The proposed upgrades are all set back from the watercourses, and shall not be impacted on by the existing floodlines.

- It is assumed that the proposed commercial / industrial development shall both provide its own attenuation to reduce peak flows to pre-development levels; and that the existing flow regime which currently bypasses the WWTW will continue to bypass the WWTW post-construction (i.e. the WWTW shall not receive any additional peak flows from the proposed development and that the proposed stormwater drainage systems for the WWTW are not required to be designed to include external catchment inflows.

The proposed stormwater drainage system for the Gwaing WWTW for the ultimate design scenario shall consist of:

- The roads shall be constructed with Mountable Kerbs (MK) to provide conveyance capacity and act as cut-offs for the downstream WWTW infrastructure. 465m of road shall be served by a minor stormwater drainage system consisting of 185m of 450mm diameter and 280m of 600mm diameter stormwater pipes and associated catchpits, to allow the road cross-section to convey up to and including the 100- year return period, with the exception of one reach where approximately 200l/s will discharge downstream as overland flow for the 100-year return period. This is not considered problematic; the existing roads network currently has no conveyance capacity and no significant issues have been reported on site. These pipelines are however recommended as operationally, the occurrence of significant storm events (e.g. the 50-year and 100-year return periods) are rare. The erosion potential and scour which is highlighted in the geotechnical report is considered a risk, and utilising the road network as conveyances will provide protection downstream. An assumed maximum kerb height of 75mm has been assessed; this shall have no impact on access vehicles from a safety perspective.
- The BBF's platforming, bulk earthworks and / or roof guttering shall be designed to:
    - Drain a 2.7 hectare contributing catchment to the north-western corner of the BBF. A 600mm diameter Class 100D pipeline with an approximate length of 160m and which shall convey the 10-year return period of 0.44 m3/s shall discharge into the 600mm diameter stormwater line conveying runoff to the maturation ponds. Flows greater than the 10-year return period shall be conveyed overland in a westerly direction.
    - Drain a 0.68 hectare contributing catchment south via a 450mm diameter stormwater pipeline, which shall discharge into a new reactor. The 0.68-hectare catchment area, with an estimated 10-year peak runoff of 0.11 m3/s, shall contain the sludge stockpiles, and runoff may be contaminated; hence routing of the runoff to the reactor for treatment.
- All other runoff shall consist of overland / surface flow with no structural stormwater drainage infrastructure proposed.
- The existing maturation ponds shall not overtop the main embankments (i.e. excluding the berms acting as weirs between the four maturation ponds); therefore, direct discharge into the Gwaing River and its tributary shall not occur for up to and including the 100-year return period storm event.

<u>RECOMMENDATIONS</u>

It is recommended that:

- The proposed stormwater drainage system be utilised during the ECSA Stage 3 (Detailed Design) stage of the project.
- Due to the erodible nature of the soils, it is recommended that suitable localized measures be considered at each building and structure (e.g. earthworks profiling to route surface runoff around the building / structure) to avoid potential scour / undercutting of foundations. This would form part of the detailed design and is not considered to be bulk stormwater infrastructure.
- Erosion protection must be constructed at all stormwater outlets to mitigate erosion.
- The open areas should be suitably vegetated and maintained to protect the natural soils from erosion.

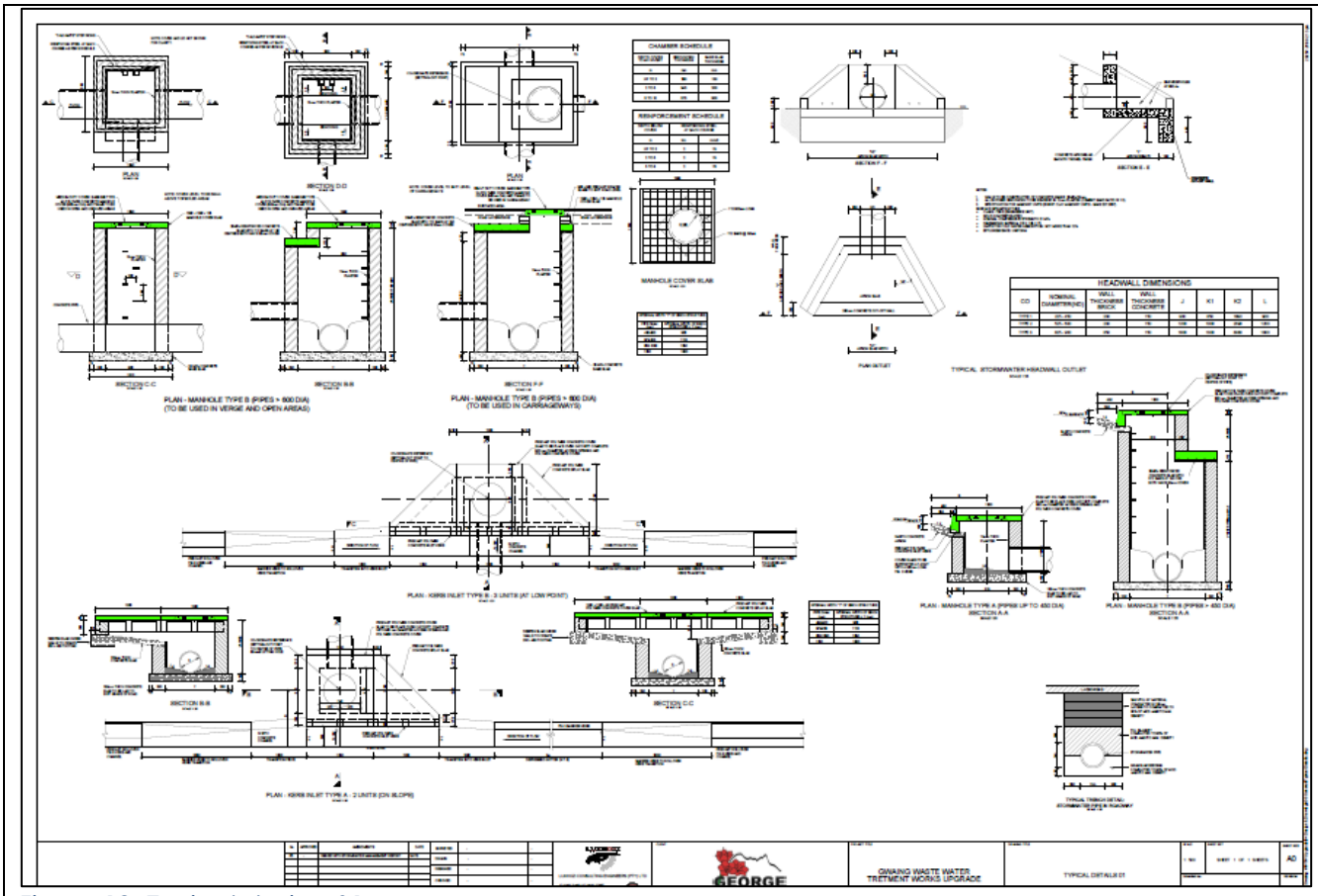


Figure 19: Typical design 01

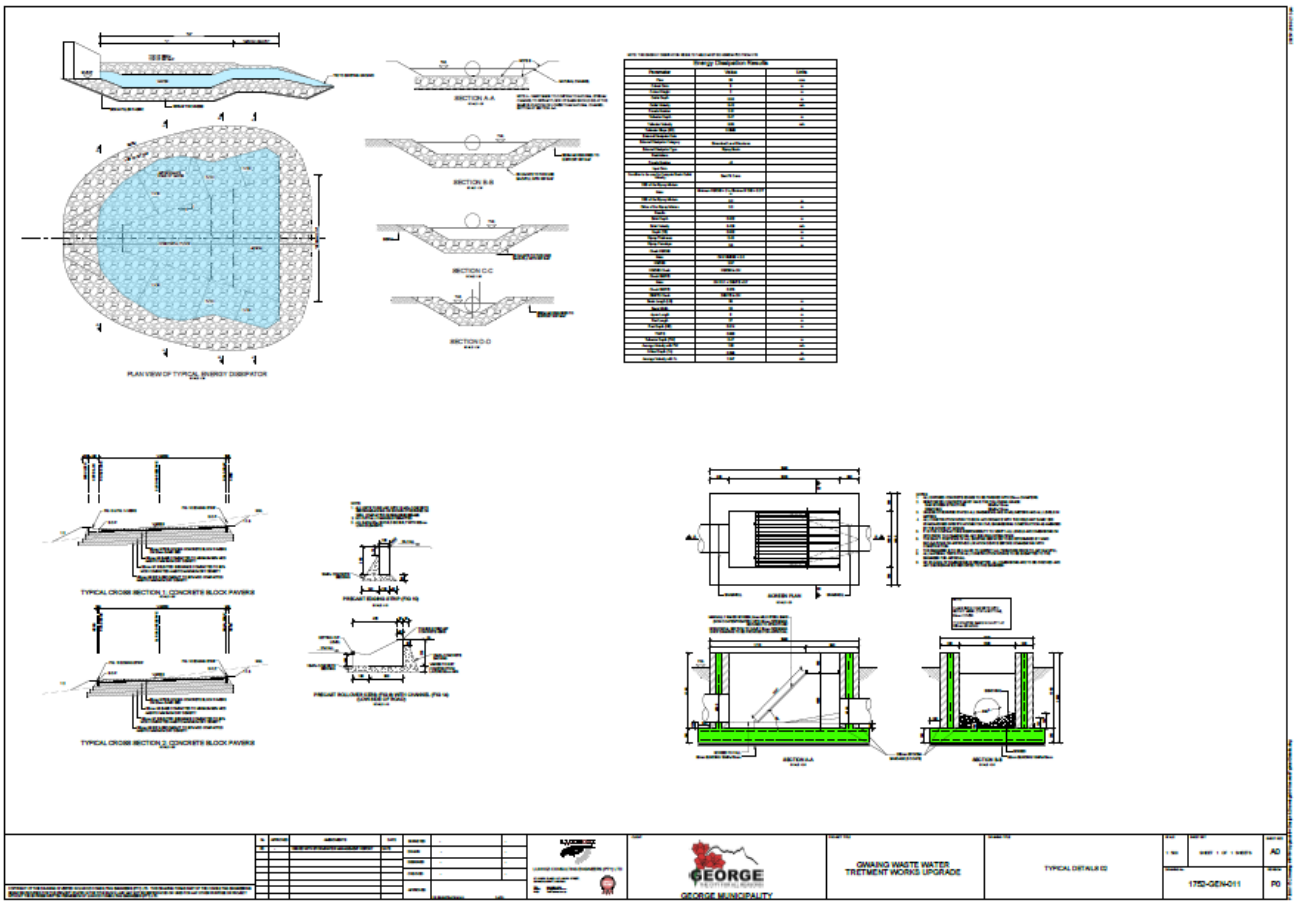


Figure 20: Typical Details 01

Figure 21: Roads and Stormwater layout

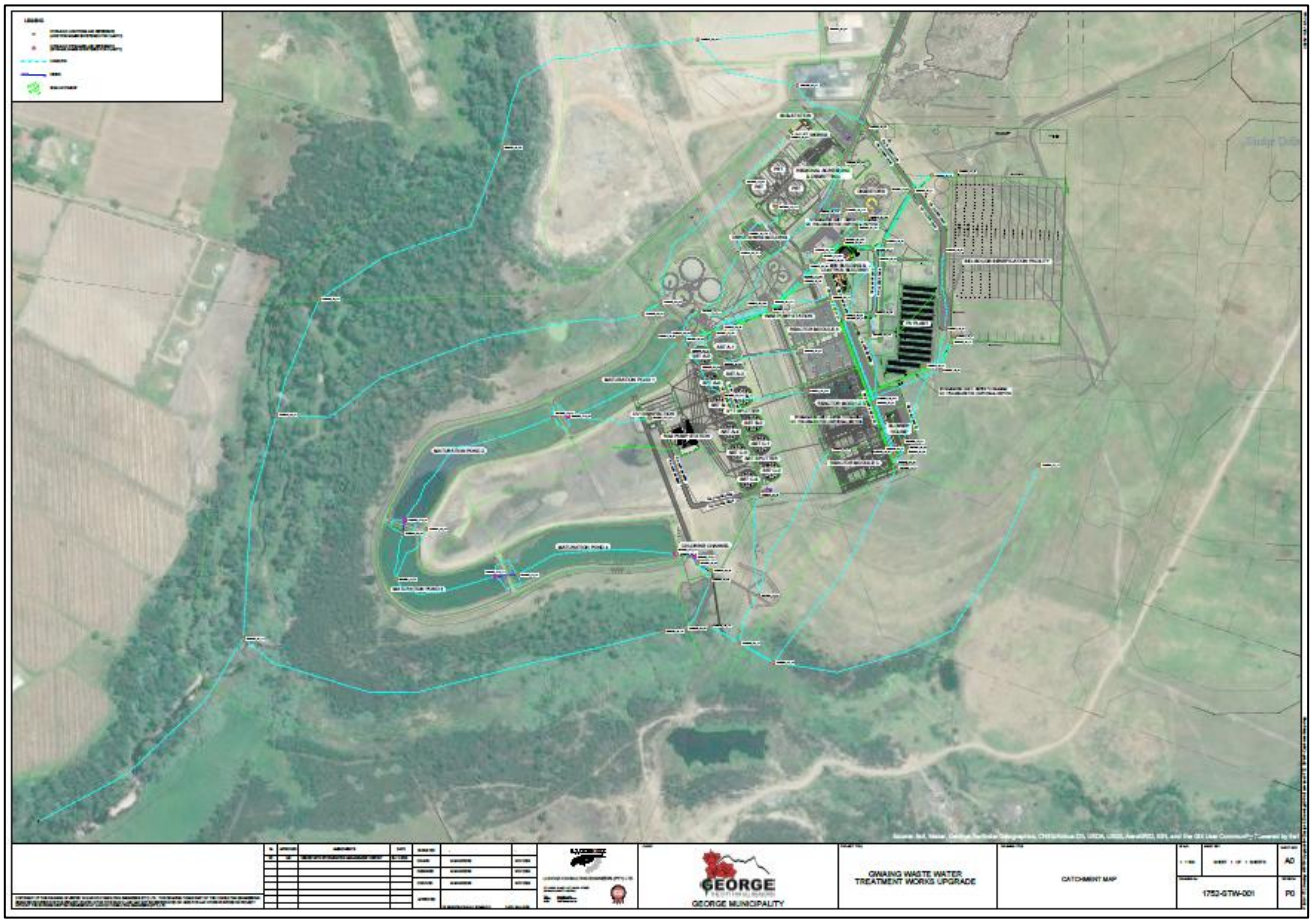


Figure 22: Catchment Map

COMPENSATION WORK

The proposed BBF development will result in the loss of a small, artificial wetland that has formed within an old excavation. This feature is not considered a natural wetland and does not support sensitive aquatic biodiversity. While its loss represents a direct impact, the significance is negligible at both local and broader ecological scales.

Crucially, the BBF will reduce ongoing pollution risks from unlined sludge stockpiles, thereby improving water quality protection for the Gwaing River.

According to the aquatic impact assessment report by Debbie Fordham: It was determined that no wetland offsets for the loss of the artificial wetland on the BBF site are necessary.

Rehabilitation efforts in nearby aquatic habitat will sufficiently compensate for the negligible amount and significance of loss. It should also be a requirement for the overall upgrade project to ensure that the wetland can 'cope' and adapt with the increased discharge volumes. This rehabilitation is also in alignment with the Duty of Care principles and CARA legislation. Therefore, from an aquatic perspective, the proposed project is deemed as acceptable, and the BBF construction will have a Low impact, after mitigation and rehabilitation.

The rehabilitation efforts must be undertaken concurrently with the upgrades to the discharge outlet and/or construction of the BBF but prior to any increased discharge from the WWTW. It is important that additional funding, above that dedicated to the standard rehabilitation after work on the outlet, be budgeted for rehabilitation.

The area recommended for rehabilitation of HGM2 is (as a minimum) approximately 50m upstream and 100m downstream of the WWTW discharge point, in lieu of infilling the artificial depression within the BBF site. While the focus is on the eroding channel, alien plant clearing should span over the width of the valley floor adjacent to this reach of the channel. The location of rehabilitation interventions for channel incision is also to be focused on the area approximately 100m downstream of the discharge point (as a minimum), however, interventions at key intervals all the way to the confluence are encouraged (to be identified by the engineer in consultation with a professional wetland scientist).

Key rehabilitation measures include:

- Including the recommended rehabilitation in the project scope
- Provision of financial resources for rehabilitation efforts
- Appointment of a qualified engineer to design and implement interventions to rehabilitate the eroded channel
- Stabilisation of the erosion at the discharge outlet in the reach of the HGM2 wetland and at least 50m downstream, as indicated in the maps below
- Compile a method statement for the removal of alien invasive plant species, and follow-up, in the indicated rehabilitation area.
- Provide for the financial resources required for the alien plant clearing as part of this project
- Include the rehabilitation and monitoring of the alien plant clearing activities in project scope as separate section – not to be confused with the standard rehabilitation of work at the outlet. (The municipality has indicated that clearing of alien vegetation is a function of the George Municipality's Parks and Recreation unit and not that of the Civil Engineering Services Unit).
- Consult with an ecologist throughout regarding rehabilitation measures and monitoring of success

ELECTRICAL (PLEASE REFER TO FIGURE 26)

There is an existing 11 kV electricity network for the facility which (from GM electricity accounts provided) does not utilise more than 600 kVA maximum demand for a single month. The electricity network is currently a straight-line network and not a ring network.

The existing 11kV overhead line from the R102 supply the Gwaing WWTW and Electrotechnical is currently investigating options for a secondary supply to the WWTW for redundancy in case of power failures or damages on the supply, therefore the requirements for backup generators will be finalized during detailed design to determine the requirements of full load backup supply or only essential specific process equipment

backup supply, pending a feasible options for the secondary supply and implementation timeframes thereof. Contact has been made with ESKOM to establish if a secondary line from the R102 can be installed in their servitude. Should this not be possible, the secondary line could be installed underground and parallel with the existing feeder along the existing access road to the WWTW and preferably along the new planned road reserve of the Gwayang development.

There is an allowance made for a new substation building which will house the switchgear for the required three (3) MVA demand to accommodate the existing and the additional power requirements for phases A and B. Phase A and B would require standby generator capacity to accommodate the three (3) MVA electricity demand. As part of phases A and B, the medium voltage cables will be installed throughout the site to allow for a ring network. There are also allowances made for street lighting and security lighting. Various of the existing buildings will be modernised and new power and lighting allowed.

There are motor control centres that will be upgraded and modernised with power factor correction.

A network capacity study was received from GLS Consulting (Pty) Ltd which indicated that there is sufficient medium voltage capacity for the upgrade of the facility. There was a request for a second electricity supply line to the facility. Refer to Appendix D: GLS Electrical Capacity Investigation Study. The phases for the processing work and the electrical works are out of sync due to the infrastructure and the complexity of the medium voltage network. The current concept design provides maximum flexibility for alteration and/or additions in the future. The electrical design will take into consideration. Scenario 2 of the loading upgrades as defined in Appendix D: GLS Electrical Capacity Investigation Study.

Recommendations

Phase A

The only scope under phase A will be additional SST's and the RAS Pumpstation with very minor electrical amendments/additions. The additional power requirements under Phase A are low and the existing capacity will suffice for the upgrades under Phase A.

Phase B

Phase B will consist of the new 4MV medium voltage network upgrade with a new intake substation building that will consist of a Generator Room, Transformer Room, MV Switchgear room and a LV Room.
The following electrical work and equipment are foreseen for phase B:

- Make safe and remove redundant equipment
- Medium Voltage Network
- Distribution Boards
- Cables
- Earthing
- Luminaires
- Power
- Street lighting
- Standby Generator

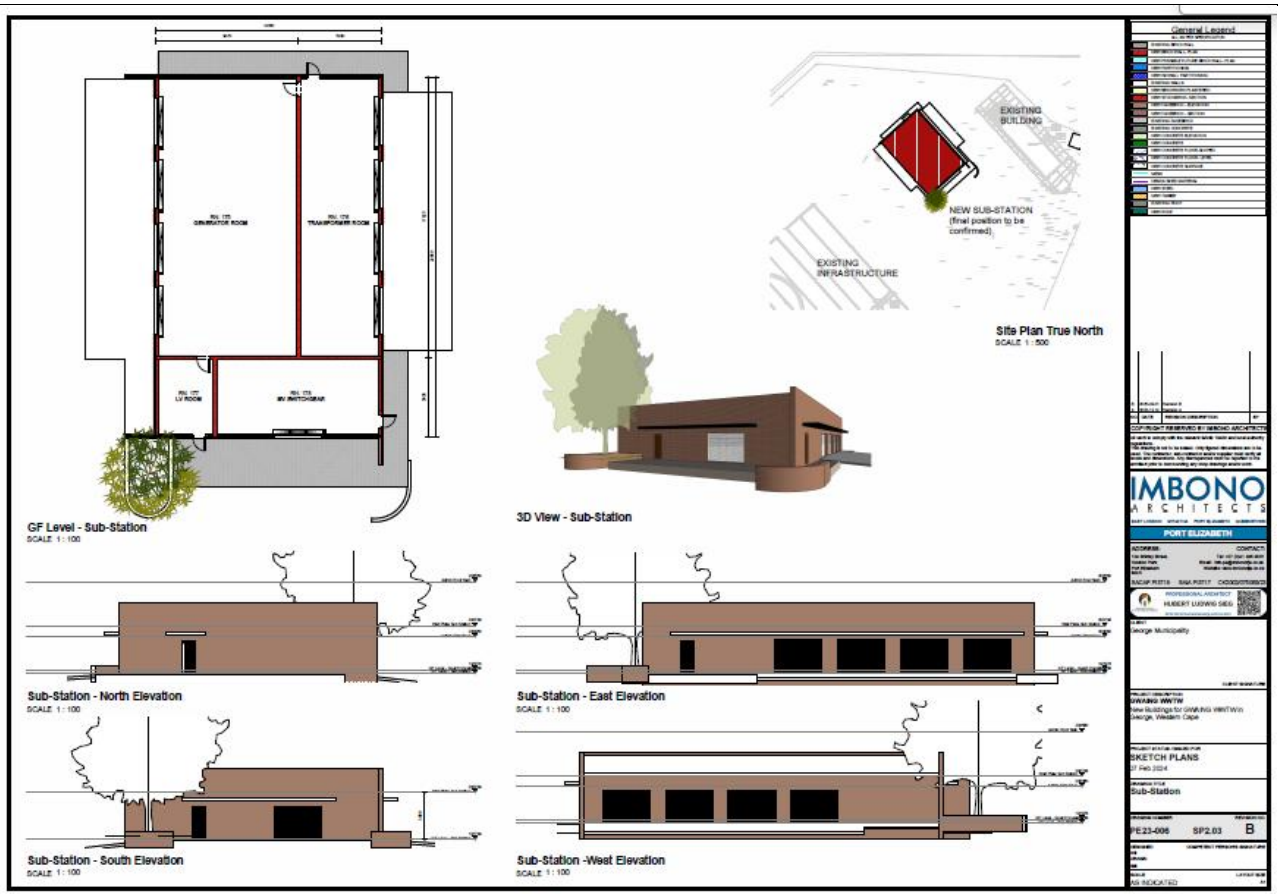


Figure 23: New intake substation building.

Phase C

There is an allowance made for the additional miniature substation for the equipment required in Phase C as well as additional generator capacity. An allowance for maintenance is included for some of the buildings, not included in Phase A and B.

The following electrical work and equipment are foreseen for phase C:

- Medium Voltage Network
- Distribution Boards
- Cables
- Power
- Standby Generator

Phase D

There is an allowance made for the additional miniature substation for the equipment required in Phase D as well as additional generator capacity. An allowance for maintenance is included for some of the buildings, not included in Phase A, B and C.

The following electrical work and equipment are foreseen for phase D:

- Medium Voltage Network
- Distribution Boards
- Cables
- Power

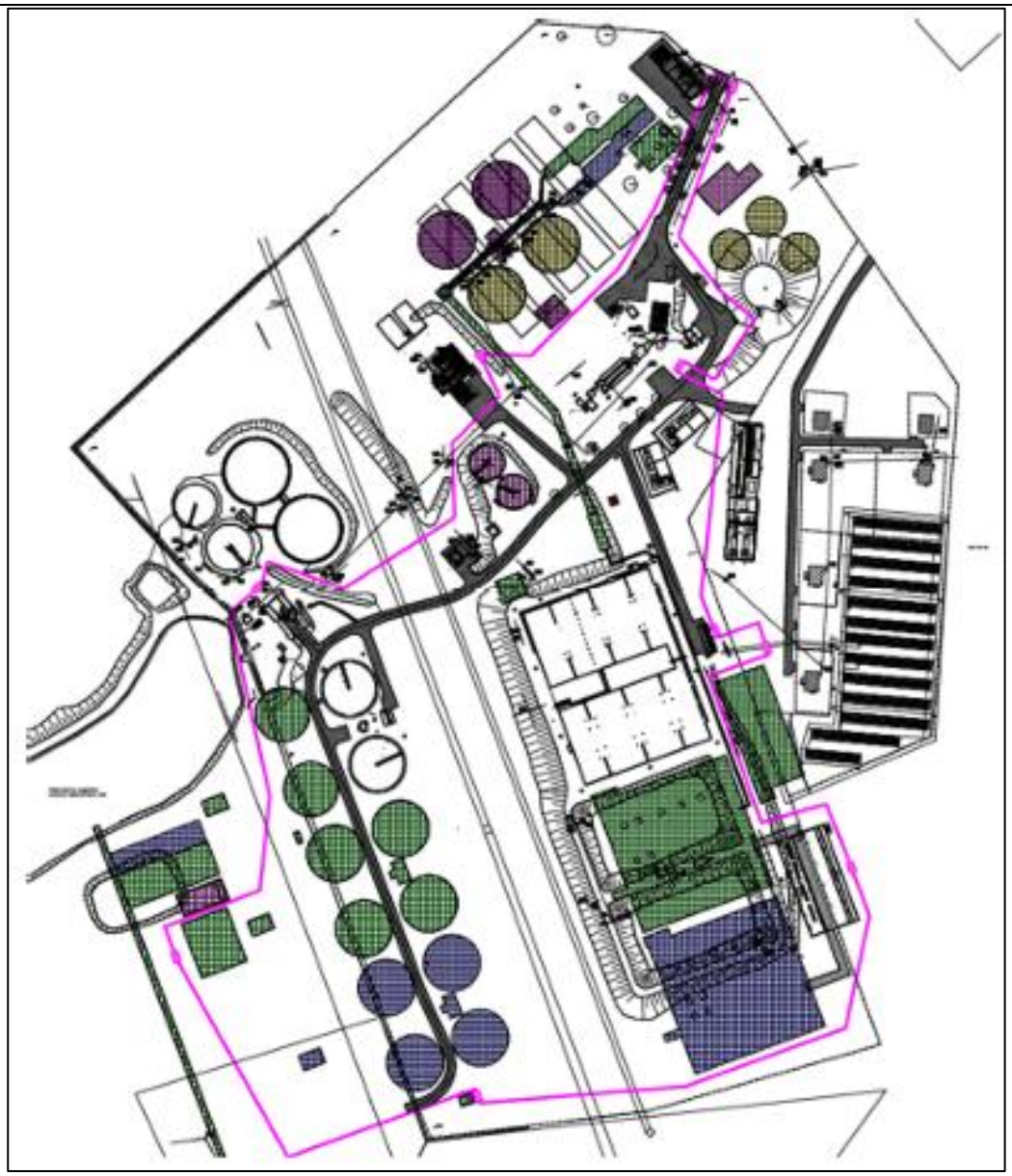


Figure 24: Electric MV Ring Main Layout

Figure 25: Electric installation site reticulation

OTHER UPGRADES

1. New Admin Building
    - The new Admin Building is located in an open portion of land on the existing site, in a central position providing access and visibility to the majority of the infrastructure and sewer treatment processes that take place on-site. The building has been designed in alignment with the above-mentioned principles and incorporates a green/planted courtyard on the east side of the building.
    - Fire detection
2. New Guard House
    - The new Guard House is necessarily located at the entrance to the site and incorporates the same material palette established in the design of the Admin Building, with the idea of creating consistency and uniformity throughout the site and will serve as an access control point for the site.
    - Allowance has been made for intruder alarm systems for each building which would be able to be monitored from the guard house.
    - Additional closed-circuit cameras will be installed allowing security to provide better surveillance for the premises.
    - The fire detection design for each building and collectively for the entire premises will be designed in accordance with SANS 10139. Each building will have its own fire panel and a master panel in the guard house at the entrance.
3. New Electrical Sub-Station
    - The new Electrical Substation is located near the entrance to the site to pick up on the incoming electrical supply and has also been aesthetically designed in line with the Admin Building.
4. New Blower House
    - The Blower House is located south of the new Admin Building, as dictated by the industrial process on site. The spaces required are dictated by the function of the building and the materials used are also in line with the general site aesthetic that has been established.

5. Upgrade/Extension to existing De-Watering Facility .

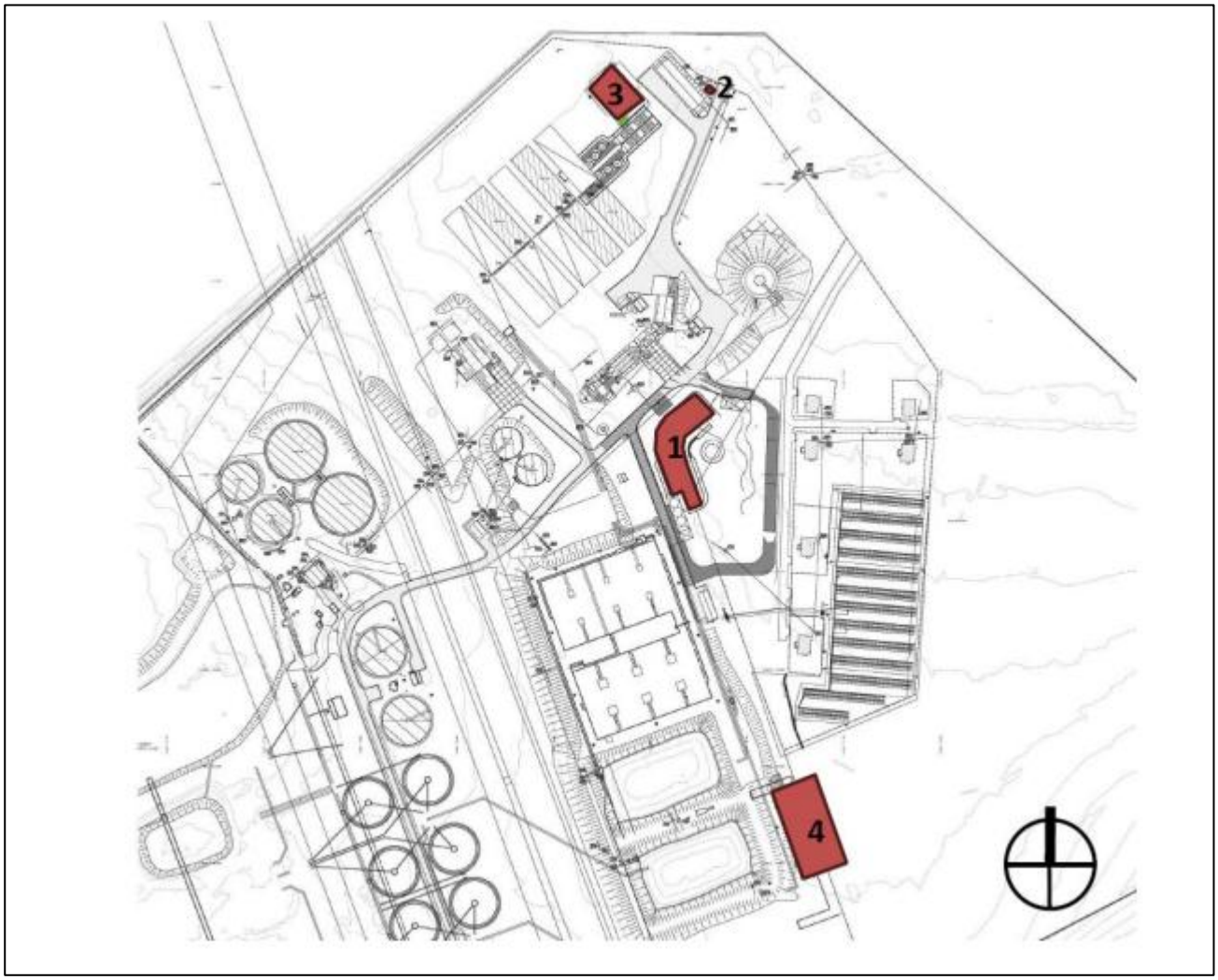


Figure 26:Positioning of Architectural Buildings on Site

WASTE REDUCTION AND RESOURCE RECOVERY

The vision for Gwaing WWTW is to change the focus from simply dealing with waste to recovering multiple resources and thereby transitioning it from being a WWTW to a WRRF (Water Resource Recovery Facility). Several waste reduction and resource recovery strategies are employed in the design of the upgrades, including:

- Regional grit processing facilities to enable the reuse of grit as part of composting or fill material. [Phase B]
- Regional screenings processing facility to minimise volume, odours, pathogens and vector attraction of screenings. [Phase B]
- Sludge beneficiation in the form of composting or fertilizer production. [Phase B]
- The methane gas produced from anaerobic digestion will be used for generating heat and power. [Phase D]
- Effluent from the Gwaing WWTW can in the future be pumped to neighbouring industries or golf courses for non-potable use. Alternatively, it can be further treated together with the effluent from Outeniqua WWTW before it is pumped to the dam as part of an indirect potable reuse scheme. [Future]
- Effluent will be recycled and pressurized on-site in a wash water ring main for various uses and irrigation, reducing the potable water demand of the WWTW. [Phase B]

REUSE OPPORTUNITIES FOR GWAING WWTW

Various reuse options are viable from Gwaing WWTW and to achieve them further tertiary treatment will be required. Given the risk of future droughts, population growth and limited additional surface water sources

for GM, direct, indirect, and industrial reuse was also considered as part of the Gwaing WWTW Master Plan. Final effluent is a substantial water source considering that about two-thirds of George's potable water consumption ends up at its WWTWs.

Since 2010 GM has been operating a 10 MLD indirect reuse plant from Outeniqua WWTW. The reuse treatment train consists of phosphorous removal with ferric chloride, screening, Ultrafiltration (UF) and chlorination before being diffused into the Garden Route Dam. The pipeline from the Outeniqua WWTW to the garden route dam has been sized for an ultimate capacity of 35 MLD. The additional capacity in the pipeline was provided to unlock future reuse opportunities at Outeniqua WWTW and Gwaing WWTW via the Garden Route Dam. Outeniqua WWTW has recently been upgraded to a capacity of 25 MLD. If all the final effluent from Outeniqua WWTW is reused via the Garden Route Dam, about 10MLD of the 35MLD pipeline capacity is left to be used by Gwaing WWTW.

Three reuse options at Gwaing WWTW are identified:

1. Tie into the Outeniqua WWTW reuse system through the Garden Route Dam indirect potable reuse (IPR) system,
    a. Option 1 will require the following: The NEMA Process will be followed through a separate process and is not relevant to this upgrade.
        i. A pump station and pipeline from Gwaing WWTW to Outeniqua WWTW.
        ii. The humus tanks of the trickling filters could potentially be used as tanks from which to pump to Outeniqua WWTW. (proposed to be demolished in the future, therefore not viable)
        iii. Upgrade of the Outeniqua UF, chlorination and UF facilities.
2. Implement an independent industrial reuse system from Gwaing WWTW
    a. Option 2 will require the following:
        i. Advanced tertiary treatment at Gwaing WWTW.
        ii. Planning activity with no technical support.
        iii. Pump station and distribution network from Gwaing WWTW to industrial users.
3. Implement and independent non-potable reuse system for interested users along the R102. Option 3 will require the following:
        i. New PS (within the Gwaing WWTW footprint) and distribution pipeline from Gwaing WTW to users along the R102 for irrigation purposes.
        - A new pipeline will be required along the Gwaing WWTW and the R102
        - A new PS (within the Gwaing WWTW footprint.
        - The existing potable water pipeline, that will be decommissioned once upgraded will be refurbished and utilised to convey the treated effluent to the respective users.

Figure 27: Proposed Area for Future Reuse Infrastructure

REHABILITATION INTERVENTIONS

The George Local Municipality appointed Zutari (Pty) Ltd to develop Integrated River Management Plan (RMP) for Gwaing river. Should this RMP be adopted the rehabilitation and Maintenance interventions and mitigations recommended in the report take precedence.

The aquatic impact assessment report by Debbie Fordham recommended the following rehabilitation interventions:

The HGM2 wetland would not naturally have such an incised channel, and this change is related to the concentrated discharge of water at the outlet. Higher discharge volumes will likely cause further degradation, and even collapse, should the erosion at the outlet not be remediated and the upgraded outlet structure designed accordingly. Therefore, as part of mitigation, the disturbance area at the outlet associated with the upgrades should be rehabilitated.

Over-and -above this, it is recommended that ecological rehabilitation be done downstream. This will increase the resilience of the wetland to increased volumes in future. Following project team discussions, it was accepted that such rehabilitation can be conducted as part of the BBF facility report, but perhaps simultaneously with the upgrades at the outlet. But that rehabilitation will be included into the overall project plan.

It is important for downstream habitat to be improved to avoid collapse in future. For the entire project, including the BBF, to achieve a low impact to aquatic biodiversity, and implement the required duty of care, it is recommended that apart from fixing erosion at the outlet during upgrades, appropriate rehabilitation interventions be constructed in the wetland and alien invasive plants be controlled

throughout the wetland going forward. Interventions should be designed to withstand the discharge flow velocities and stabilise the channel.

RECOMMENDED INTERVENTIONS.

Channel Erosion Rehabilitation

Grade-Control Structures

Objective: Halt incision and raise the wetland bed profile.

Options:

- Gabion weirs or rock-packed check dams spaced at intervals (typically every 15–25 m, depending on slope) to create a stepped longitudinal profile.
- Log or brush weirs (bio-check structures) for smaller, shallower sections -constructed from anchored logs or brush fascines, backfilled with brush and rock.
- Reno mattresses on flatter gradients to spread flow and trap fine sediment.

Design notes:

- Crest heights should match the upstream invert to ensure a stable energy gradient.
- Structures should be semi-permeable to allow controlled seepage and sediment deposition.
- Each structure must be keyed securely into the bed and banks (minimum 0.3 m embedment).

Expected outcomes:

- Flow velocity reduction.
- Sediment deposition upstream of structures.
- Gradual bed level rise and rehydration of adjacent wetland soils

Figure 28: Example of a weir structure

Figure 29: Example of multiple check dams for gully control.

Figure 30: Example of fibre bags used to deactivate gully head erosion

Figure 31: Example of soft engineering interventions- a stake brush mattress structure

Two-Stage Channel Design

Objective: Create a self-maintaining morphology that can handle both low-flow and high-flow conditions.
Approach:

- Excavate inset floodplain benches along one or both sides of the entrenched channel.
- The main (low-flow) channel conveys baseflow, while benches accommodate moderate flood events.
- Benches should be vegetated with emergent wetland species to stabilise soils and slow overbank flow.

Ecological outcome:

- Improved hydraulic diversity.
- Enhanced floodplain connectivity.
- Restored groundwater levels through lateral water retention.

Flow Energy Dissipation at Discharge Point
Objective: Reduce erosive energy of effluent discharge before entering natural soil.
Options:

- Construct a stilling basin or plunge pool immediately below the outlet.
- Install rock rip-rap aprons or cascades with variable stone sizes to break up turbulence.
- Incorporate a v-notch spreader weir to distribute flow evenly into the wetland channel.

Ecological outcome:

- Minimized scour at discharge.
- Controlled flow velocity entering wetland channel.

Channel Re-Profiling and Benching
Objective: Re-shape steep eroded banks to stable slopes (ideally 1:3 or flatter) and create vegetated benches.

Methods:

- Cut back vertical banks and re-grade to stable slopes.

- Place excavated material behind erosion control structures for backfilling.
- Plant or seed with indigenous wetland and riparian vegetation.

Ecological outcome:
- Reduced risk of bank collapse.
- Enhanced habitat diversity and vegetative reinforcement.

Bio-engineering Measures
Objective: Stabilise re-profiled banks and enhance ecological recovery using natural materials.

Methods:
- Coir logs, brush mattresses, bundles, or plant plugs with indigenous species (e.g., *Phragmites australis*, *Juncus kraussii*, *Cyperus textilis*).
- Protect young vegetation with temporary fencing from trampling by livestock.

Ecological outcome:
- Biological soil reinforcement.
- Improved moisture retention and rapid vegetation establishment

ALIEN INVASIVE PLANT CONTROL
(The municipality has indicated that clearing of alien vegetation is a function of the George Municipality's Parks and Recreation unit and not that of the Civil Engineering Services Unit).

Target Species
- *Acacia mearnsii* (Black Wattle)
- *Solanum mauritianum* (Bugweed)

Control Objectives
- Eradicate mature stands of *A. mearnsii* and *S. mauritianum* in the designated HGM2 reach.
- Prevent re-establishment through follow-up control and revegetation.
- Restore wetland species to stabilise soils and shade out seedlings.

Recommended Methods
Mechanical & Chemical Integration:
- Fell mature wattle trees at ground level. Immediately apply an approved herbicide (e.g. Triclopyr or Glyphosate formulation) to the cut surface within 30 seconds.
- Remove smaller saplings and resprouting bugweed manually, ensuring root removal.
- Stack felled biomass outside the 1:100-year floodline. Either chip or burn under controlled conditions (with approval).
- Conduct follow-up control after 6 months and again after the next growing season.

Rehabilitation After Clearing
- Replant disturbed soil with indigenous pioneer grasses (*Eragrostis curvula*, *Panicum maximum*) and wetland sedges (*Cyperus textilis*, *Juncus effusus*).
- Mulch cleared areas to retain moisture and suppress regrowth.
- Monitor quarterly for regrowth and re-treat as required for at least 3 years.

IMPLEMENTATION SEQUENCE
1. Pre-construction survey – confirm erosion hotspots, select control structure locations, and mark alien vegetation stands.
2. Engineering design – develop detailed drawings and bill of quantities for structures and earthworks.
3. Construction / installation – implement energy dissipaters, grade control, and re-profiling works.

4. Revegetation and alien clearing – immediately following construction.
5. Maintenance and monitoring – monthly inspections in the first six months, quarterly thereafter.
6. Adaptive management – adjust structure spacing or vegetation efforts as needed based on performance.

4.5.	Indicate how access to the proposed site(s) will be obtained for all alternatives.

The site is directly accessed from the R102.

4.6.	SG Digit code(s) of the proposed site(s) for all alternatives:	C02700020000046400000

4.7. Coordinates of the proposed site(s) for all alternatives:

Figure 32: Coordinates of the proposed site

SECTION C: LEGISLATION/POLICIES AND/OR GUIDELINES/PROTOCOLS

1. Exemption applied for in terms of the NEMA and the NEMA EIA Regulations

Has exemption been applied for in terms of the NEMA and the NEMA EIA Regulations. If yes, include a copy of the exemption notice in Appendix E18.	YES	**NO**

2. Is the following legislation applicable to the proposed activity or development.

The National Environmental Management: Integrated Coastal Management Act, 2008 (Act No. 24 of 2008) ("ICMA"). If yes, attach a copy of the comment from the relevant competent authority as Appendix E4 and the pre-approval for the reclamation of land as Appendix E19.	YES	**NO**
The National Heritage Resources Act, 1999 (Act No. 25 of 1999) ("NHRA"). If yes, attach a copy of the comment from Heritage Western Cape as Appendix E1.	YES	**NO**
The National Water Act, 1998 (Act No. 36 of 1998) ("NWA"). If yes, attach a copy of the comment from the DWS as Appendix E3.	**YES**	NO
The National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004) ("NEM:AQA"). If yes, attach a copy of the comment from the relevant authorities as Appendix E13.	YES	**NO**
The National Environmental Management Waste Act (Act No. 59 of 2008) ("NEM:WA")	YES	**NO**
The National Environmental Management Biodiversity Act, 2004 (Act No. 10 of 2004 ("NEMBA").	YES	**NO**
The National Environmental Management: Protected Areas Act, 2003 (Act No. 57 of 2003) ("NEMPAA").	YES	**NO**
The Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983). If yes, attach comment from the relevant competent authority as Appendix E5.	YES	**NO**

3. Other legislation

List any other legislation that is applicable to the proposed activity or development.
• Amended Environmental Impact Assessment Regulations, GN No. R. 324 – 327 (7 April 2017) • The Constitution of the Republic of South Africa, 1996 (Act 108 of 1996) • Spatial Planning and Land Use Management Act, No. 16 of 2013 (SPLUMA) • Infrastructure Development Act, 2014 (Act No. 23 of 2014) • The National Environmental Management Laws Amendment Act, 2022 • Fertilizers Act (Act 36 of 1947)

4. Policies

Explain which policies were considered and how the proposed activity or development complies and responds to these policies.
No Policies

5. Guidelines

List the guidelines which have been considered relevant to the proposed activity or development and explain how they have influenced the development proposal.

Guideline on Need and Desirability (2013/2017)	Guideline considered during the assessment of the Need and Desirability of the proposed development project.
Guideline on Environmental Management Plans (2005)	Guideline considered in the compilation of the EMP attached to this Basic Assessment Report.
Guideline for the Review of Specialist Input into the EIA Process (2005)	Guideline considered during the review and integration of specialist input into this Basic Assessment Report
External Guideline: Generic Water Use Authorization Application Process (2007)	Guideline considered during the process of applying for the required water use authorization
Integrated Environmental Management Information Series 5: Impact Significance (2002)	Guideline considering during the identification and evaluation of potential impacts associated with the proposed development, and the reporting thereof in this Basic Assessment Report
Integrated Environmental Management Information Series 7: Cumulative Effects Assessment (2004)	Guideline considering during the assessment of the cumulative effect of the identified impacts.
Guideline on Public Participation (2013)	Guideline considered in the undertaking of the public participation for the proposed development. All relevant provisions contained in the guideline were adhered to in the basic assessment process as appropriate, except where an exemption/ deviation has been granted by the Competent Authority.
Guideline on Alternatives (2013)	Guideline considered when identifying and evaluating possible alternatives for the proposed development. Alternatives that were considered in the impact assessment process are reported on in this Basic Assessment Report (see section E)

6. Protocols

Explain how the proposed activity or development complies with the requirements of the protocols referred to in the NOI and/or application form

The following specialist studies were undertaken for this proposal:

Specialist Assessment	Assessment Protocol
Aquatic Biodiversity Impact Assessment (Gwaing WWTW site)	Aquatic
Terrestrial Biodiversity Assessment (BBF site)	Terrestrial Biodiversity
Animal Species Assessment (BBF site)	Animal
Plant Species Assessment (BBF site)	Plant

The corresponding assessment protocols were used by the specialists to compile and structure their reports.

SECTION D: APPLICABLE LISTED ACTIVITIES

List the applicable activities in terms of the NEMA EIA Regulations

Activity No(s):	Provide the relevant **Basic Assessment Activity(ies)** as set out in **Listing Notice 1**	Describe the portion of the proposed development to which the applicable listed activity relates.
12	**The development of—** (i) dams or weirs, where the dam or weir, including infrastructure and water surface area, exceeds 100 square metres; or **(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—** (aa) the development of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour; (bb) where such development activities are related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies; (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; (ee) where such development occurs within existing roads, road reserves or railway line reserves; or (ff) the development of temporary infrastructure or structures where such infrastructure or structures will be removed within 6 weeks of the	The sites will be within 32m of a watercourse. An artificial wetland will be infilled on the BBF site. Therefore, this activity will be triggered.

	commencement of development and where indigenous vegetation will not be cleared.	
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; (c)falls within the ambit of activity 21 in this Notice, in which case that activity applies; (d) occurs within existing ports or harbours that will not increase the development footprint of the port or harbour; or (e) where such development is related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies.	An artificial wetland of low sensitivity was found on the BBF site and will be infilled. Therefore, this activity will be triggered.
24	**The development of a road—** (i) for which an environmental authorisation was obtained for the route determination in terms of activity 5 in Government Notice 387 of 2006 or activity 18 in Government Notice 545 of 2010; or (ii) with a reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 metres; but excluding a road— (a) which is identified and included in activity 27 in Listing Notice 2 of 2014; (b) where the entire road falls within an urban area; or (c) which is 1 kilometre or shorter.	The exact size of the proposed new internal roads for the BBF site is still to be determined. Therefore, this activity will be applied for if the road exceeds13.5m or 8m if no road reserve exists.
27	**The clearance of an area of 1 hectares 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.	The solar drying facility will require the clearance of 2 hectares. Garden Route Shale Fynbos is the mapped vegetation type of the sites, and it has an ecological threat status of critically endangered, however the Botanical and Terrestrial Biodiversity Assessment concluded that the site is transformed and is currently being utilised as fields for grazing animals like cows.

		The image below also shows the conditions of the preferred site for the solar drying facility.  The vegetation on the WWTW site consists of Kikuyu grass lawns and the whole proposed site is disturbed and transformed, and no natural vegetation remains. <u>Therefore, this activity will not be triggered.</u>
46	**The expansion and related operation of infrastructure for the bulk transportation of sewage, effluent, process water, wastewater, return water, industrial discharge or slimes where the existing infrastructure—** **i) has an internal diameter of 0,36 metres or more; or** **ii) has a peak throughput of 120 litres per second or more; and** (a) where the facility or infrastructure is expanded by more than 1 000 metres in length; or **(b) where the throughput capacity of the facility or infrastructure will be increased by 10% or more; excluding where such expansion—** (aa) relates to the bulk transportation of sewage, effluent, process water, waste water, return water, industrial discharge or slimes within a road reserve or railway line reserve; or (bb) will occur within an urban area.	The proposed upgrades will have peak throughput of 578.7 litres per second after all phases of the upgrading are completed. This also means that the throughput capacity will increase by more than 10%. For Phases A & B, the throughput capacity will also increase by more than 10%. <u>This activity is therefore be triggered.</u>
48	**The expansion of—** **(i) infrastructure or structures where the physical footprint is expanded by 100 square metres or more; or** (ii) dams or weirs, where the dam or weir, including infrastructure and water	The proposed site is located within 32m of a watercourse. However, the site is within the urban edge, but not within an urban area. <u>Therefore, this activity will be triggered.</u>

	surface area, is expanded by 100 square metres or more; where such expansion 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— (aa) the expansion of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour; (bb) where such expansion activities are related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies; (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.	
56	The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre— (i) where the existing reserve is wider than 13,5 meters; or (ii) where no reserve exists, where the existing road is wider than 8 metres; excluding where widening or lengthening occur inside urban areas.	The exact size of the proposed new internal roads is still to be determined, however the site is considered to be within an urban area, therefore this activity will not be triggered.
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.	The WWTW's treatment of effluent, wastewater or sewage 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. Therefore, this activity is triggered by the proposal.
Activity No(s):	Provide the relevant **Basic Assessment Activity(ies)** as set out in **Listing Notice 3**	Describe the portion of the proposed development to which the applicable listed activity relates.
4	**The development of a road wider than 4 metres with a reserve less than 13,5 metres.** i. Western Cape i. Areas zoned for use as public open space or equivalent zoning; **ii. Areas outside urban areas;** (aa) Areas containing indigenous vegetation;	The exact size of the proposed new internal roads for the BBF site is still to be determined, however the Botanical and Terrestrial Biodiversity Assessment concluded that the site is transformed and is currently being utilised as fields for grazing animals like cows. Therefore, this activity is not triggered.

	(bb) Areas on the estuary side of the development setback line or in an estuarine functional zone where no such setback line has been determined; or iii. Inside urban areas: (aa) Areas zoned for conservation use; or (bb) Areas designated for conservation use in Spatial Development Frameworks adopted by the competent authority.	
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. **i. Western 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; iii. Within the littoral active zone or 100 metres inland from high water mark of the sea or an estuarine functional zone, whichever distance is the greater, excluding where such removal will occur behind the development setback line on erven in urban areas; iv. On land, where, at the time of the coming into effect of this Notice or thereafter such land was zoned open space, conservation or had an equivalent zoning; or v. On land designated for protection or conservation purposes in an Environmental Management Framework adopted in the prescribed manner, or a Spatial Development Framework adopted by the MEC or Minister	Garden Route Shale Fynbos is the mapped vegetation type of the sites, and it has an ecological threat status of critically endangered. As the WWTW has Kikuyu grass lawns, and the BBF site is transformed and is currently being utilised as fields for grazing animals like cows, <u>this activity is not triggered.</u>
14	**The development of—** (i) dams or weirs, where the dam or weir, including infrastructure and water surface area exceeds 10 square metres; or **(ii) infrastructure or structures with a physical footprint of 10 square metres or more;** where such development occurs— (a) within a watercourse; (b) in front of a development setback; or	An artificial wetland of low sensitivity was found on the BBF site and will be infilled. <u>Therefore, this activity will be triggered.</u>

	(c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse; excluding the development of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour	
18	**The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre.** **i. Western Cape** i. Areas zoned for use as public open space or equivalent zoning; ii. All areas outside urban areas: (aa) Areas containing indigenous vegetation; (bb) Areas on the estuary side of the development setback line or in an estuarine functional zone where no such setback line has been determined; or iii. Inside urban areas: (aa) Areas zoned for conservation use; or (bb) Areas designated for conservation use in Spatial Development Frameworks adopted by the competent authority.	The exact size of the proposed new internal roads is still to be determined, however, none of the Western Cape triggers are applicable. Therefore, this activity will not be triggered.
23	**The expansion of—** (i) dams or weirs where the dam or weir is expanded by 10 square metres or more; or **(ii) infrastructure or structures where the physical footprint is expanded by 10 square metres or more, where such expansion occurs—** (a) within a watercourse; (b) in front of a development setback adopted in The prescribed manner; or **(c) if no development setback has been adopted, within 32 metres of a watercourse,** measured from the edge of a watercourse; excluding the expansion of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour. Western 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) World Heritage Sites; (dd) Sensitive areas as identified in an environmental management framework	The proposed site is located within 32m of a watercourse. However, the site is within the urban edge, but not within an urban area. Therefore, this activity will be triggered.

	as contemplated in chapter 5 of the Act and as the proposed site is located within 32m of a watercourse. However, the site is within an urban area. The developmental footprint is still to be determined; it is however very likely that the 100m² threshold will be exceeded within the 32m of the watercourse adopted by the competent authority; (ee) Sites or areas listed 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; (gg) Core areas in biosphere reserves; or (hh) Areas on the estuary side of the development setback line or in an estuarine functional zone where no such setback line has been determined.	

Note:

- The listed activities specified above must reconcile with activities applied for in the application form. The onus is on the Applicant to ensure that all applicable listed activities are included in the application. If a specific listed activity is not included in an Environmental Authorisation, a new application for Environmental Authorisation will have to be submitted.
- Where additional listed activities have been identified, that have not been included in the application form, and amended application form must be submitted to the competent authority.

List the applicable waste management listed activities in terms of the NEM:WA

Activity No(s):	Provide the relevant **Basic Assessment Activity(ies)** as set out in **Category A**	Describe the portion of the proposed development to which the applicable listed activity relates.

List the applicable listed activities in terms of the NEM:AQA

Activity No(s):	Provide the relevant **Listed Activity(ies)**	Describe the portion of the proposed development to which the applicable listed activity relates.

SECTION E: PLANNING CONTEXT AND NEED AND DESIRABILITY

1.	Provide a description of the preferred alternative.

The preferred and only alternative is to upgrade the existing Wastewater Treatment Works.

The upgrades for Phase A to achieve 13.2 MLD ADWF as a Raw UCT process and 17 MLD ADWF as Raw MLE process consist of:

- 2 additional SSTs for Module A
- 4 SSTs for Module B (can operate with Reactor A)
- New RAS Pumpstation
- New Substation building
- Replacement of the DN450 with a DN950 pipe from the existing chlorine contact channel to the river outlet.
- Electrical Equipment
- Associated road and stormwater infrastructure

The upgrades for Phase B to achieve 22 MLD ADWF as Raw UCT process and 28 MLD ADWF as MLE consist of:

- New Inlet Works Train 1

- Regional Grit and Screenings Facility (Construction may be in a later phase or on a separate contract depending on funding availability)
- New biological reactor (Module B)
- New Blower House and aeration system
- Service corridor for air header
- New WAS pumpstation
- Chlorine tank upgrade
- Extension to WAS Dewatering Facility
- New Process Control including Admin Building (Construction of Admin Building may be in a later phase or on a separate contract depending on funding availability)
- Electrical Equipment
- Potentially sludge storage bunds and/or sludge drying facility (can be implemented separately, please refer to the BBF details below)
- Demolition of sludge drying beds
- Associated roads and stormwater infrastructure

The upgrades for Phase C to achieve 33 MLD ADWF as Raw UCT process and 42 MLD ADWF as MLE consist of:

- 1 New biological reactor (Module C)
- Extension of Blower House and aeration system
- 4 new SSTs (Module C)
- Chlorine contact tank upgrade
- New Inlet Works Train 2
- Additional DN950 outlet pipe from existing chlorine contact channel to the river outlet
- Electrical Equipment
- Associated roads and stormwater infrastructure

The upgrades for Phase D to achieve 50 MLD ADWF as settled UCT process and 68 MLD ADWF as MLE consist of:

- 4 New PSTs
- Primary Sludge Pump Station
- 2 Gravity Thickeners (repurpose old PSTs)
- 4 Anaerobic Digesters
- Primary Sludge Dewatering Facility
- Electrical Equipment
- Associated roads and stormwater infrastructure

BBF Phase comprises of the following infrastructure:

- Guard House
- Perimeter fencing and access gate
- Approximately 30 000 m² of concrete slabs for the various stages of sludge stockpiling, solar drying, composing and sludge handling. This includes the areas under translucent roof sheeting for solar drying.
- Approximately 13 000 m² in plain view of translucent roof sheeting ('greenhouse') structures.
- One 18m x 36m shed with a clear height of 4.5m and without any columns inside the building for the sludge granulation plant.
- A second building of similar footprint for the packaging plant and distribution depot. This building is to include offices, ablution and a canteen for the operating staff of approximately 6 people.
- Movable precast concrete walls placed on slabs to demarcate separated process areas and to prevent contamination of treated sludge by raw sludge.
- Access Roads
- Rainwater collection and storage from all roof structures
- Stormwater collection and drainage from concrete slabs with pipeline to Gwaing WWTW inlet works.

2.	Explain how the proposed development is in line with the existing land use rights of the property as you have indicated in the NOI and application form? Include the proof of the existing land use rights granted in Appendix E21.

The WWTW site is zoned as Utility Zone and the proposal is to upgrade the existing facility within the existing property. The BBF site is zoned as Undetermined Use Zone and will be zoned as Utility Zone as part of the formal land use approval process.

3.	Explain how potential conflict with respect to existing approvals for the proposed site (as indicated in the NOI/and or application form) and the proposed development have been resolved.

The Gwaing WWTW currently has a Water Use License for "Discharging waste or water containing waste into water recourses through a pipe, canal, sewer or other conduit, subject to the conditions set out in Appendices I and II." The license was granted in 2015 and authorizes the George Local Municipality to discharge a maximum of 4 015 00 m³/a waste from the Gwaing WWTW. This means the average 11 000 m³ per day is discharged.

With the new proposed upgrades (Phase A & B), the cubic meter discharge per day will increase to an average of 50 000 m³ per day.

The new BBF site will also be included in the new WULA.

Debbie Fordham is in the process of obtaining a new WULA.

An audit was done by BOCMA in September of 2024 and a few non-compliances were noted. These non-compliances include:

- No outflow meter at the final effluent discharge point was present
- An outflow meter to measure the quantity of treated effluent discharged is not in place, therefore the quantity could not be verified.
- The water quality monitoring reports for July 2023 to June 2024 were assessed and there are periodic non-compliances to the set limits for pH, COD, and E. coli over the period reviewed.
- Monitoring for flow is currently not undertaken at the discharge point.
- Biomonitoring is currently not being conducted by the George Local Municipality as per the Water Use Licence requirements.
- An aquatic scientist has not been appointed to conduct biomonitoring.
- Groundwater Monitoring is not undertaken on a quarterly basis as per the WUL condition.
- Sludge is disposed and stockpiled in an open environment that is un-bunded.

The George Municipality was required to submit an action plan on measures to be taken to rectify noncompliant conditions and comply with the timeframes set out. The action plan was submitted on 25 October 2024 and was acknowledged on the 31st of March 2025.

4.	Explain how the proposed development will be in line with the following?
4.1	The Provincial Spatial Development Framework.

The proposal is to upgrade the existing wastewater treatment facility and construct the new BBF. Due to the population growth in George, it is necessary to upgrade the facility. Phase A and B upgrades will be able to achieve 22 MLD UCT capacity. The final Phase D will achieve 50 MLD UCT capacity. As such the proposal is not a development on undeveloped land and as such does not have to align with the PSDF.

4.2	The Integrated Development Plan of the local municipality.

According to the George Municipality IDM, 2022-2027:

Strategic Objective 03: Affordable Quality Services

It is essential that all citizens in George have access to basic services as provided by local government. Access to basic services by all citizens should be 100%. All service-delivery constraints need to be mitigated. It is also essential that the municipality ensures that strategic measures are in place to manage risk areas for service delivery such as shortage of electricity and water, and that the green industry is stimulated to increase recycling practices and water- and electricity- saving practices are encouraged.

PRIORITY	DEPARTMENTAL OBJECTIVES/PREDETERMINED OBJECTIVES (PDOS)
WASTEWATER MANAGEMENT	a) To provide and maintain safe and sustainable sanitation management and infrastructure b) Accelerated delivery in addressing sanitation backlogs

	c) To provide basic services to informal settlements that comply with the minimum standards d) To enhance the quality of sanitation
WATER	a) To provide world-class water services in George to promote development and fulfil basic needs b) To provide basic services to informal settlements that comply with the minimum standards c) To improve service delivery practices
INFRASTRUCTURE AND EFFECTIVE SERVICEDELIVERY	a) To ensure infrastructure planning and development keeps pace with growing city needs by aligning all strategic documents and efforts. b) To identify and access grant funding for prioritised capital projects c) To ensure proper asset management by providing sufficient funding and operating capacity for maintenance of existing infrastructure. d) To explore and implement measures to preserve resources and ensure sustainable development e) To focus on the new wards (DMA) as a priority area for service delivery for the rural areas which are relevant to their unique environment

4.3.	The Spatial Development Framework of the local municipality.

According to the George Municipality SDF, May 2023/27:

Strategy 3: Affordable Quality Services
Towards offering residents, visitors, and investors a unique lifestyle, and ensuring that all have equal access to a quality living environment the Municipality are embarking on a wide-ranging initiative in both the built and natural environment. These encompass delivery of services to all households, upgrading of informal settlements and degraded neighbourhoods, housing delivery to subsidy market; promotion of "green" household technologies and protection of the municipal area's natural and cultural heritage.

Strategy 5: Good Governance and Human Capital
The Municipality strive towards institutional excellence in providing a high standard of services to consumers and functioning as developmental local government. To this end the required human resource capacity is being built up, administrative systems are being streamlined, and financial planning, control and management systems are being upgraded.

4.4.	The Environmental Management Framework applicable to the area.

No intersections with EMF areas found.

5.	Explain how comments from the relevant authorities and/or specialist(s) with respect to biodiversity have influenced the proposed development.
	The Aquatic Specialist (Debbie Fordham) found an artificial wetland on the BBF site. The proposed BBF development will result in the loss of a small, artificial wetland that has formed within an old excavation. This feature is not considered a natural wetland and does not support sensitive aquatic biodiversity. While its loss represents a direct impact, the significance is negligible at both local and broader ecological scales. No formal wetland offsets are required; however, voluntary compensation through rehabilitation of the eroded wetland area downstream of the WWTW discharge outlet is strongly recommended and will result in a net ecological gain.
6.	Explain how the Western Cape Biodiversity Spatial Plan (including the guidelines in the handbook) has influenced the proposed development.

The Western Cape Biodiversity Spatial Plan (WCBSP) is the product of a systematic biodiversity planning assessment that delineates Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs) which require safeguarding to ensure the continued existence and functioning of species and ecosystems, including the delivery of ecosystem services, across terrestrial and freshwater realms. These spatial priorities are used to inform sustainable development in the Western Cape Province.

The study area currently overlaps with CBA: Terrestrial and CBA2: Terrestrial. However, the Aquatic Assessment report for the Gwaing WWTW site and the BBF site indicates that the site is not located

upon any biodiversity priority areas, CBA nor ESAs. However, the watercourse downslope of the WWTW outlet structure is classified as CBA 1 wetland habitat, as is the Gwaing River downstream.

The Botanical and terrestrial assessment also confirmed that the BBF site is not located within any CBA's.

Currently the Gwaing WWTW site is being maintained as Kikuyu grass lawn and has no natural vegetation or animal biodiversity left due to the site being highly disturbed. The BBF site is transformed and is currently being utilised as fields for grazing animals like cows. Therefore, the placement of the proposed development footprint is not going to affect biodiversity and ecological patterns within the study area landscape.

Figure 33: Biodiversity Overlay Map for the site and surrounding area

7.	Explain how the proposed development is in line with the intention/purpose of the relevant zones as defined in the ICMA.
Not applicable	
8.	Explain whether the screening report has changed from the one submitted together with the application form. The screening report must be attached as Appendix I.
No changes to the screening report.	
9.	Explain how the proposed development will optimise vacant land available within an urban area.
N/A	
10.	Explain how the proposed development will optimise the use of existing resources and infrastructure.
The site has existing resources and infrastructure which will be upgraded and expanded.	
11.	Explain whether the necessary services are available and whether the local authority has confirmed sufficient, spare, unallocated service capacity. (Confirmation of all services must be included in Appendix E16).
N/A – it is proposed to upgrade the existing wastewater treatment works (service).	
12.	In addition to the above, explain the need and desirability of the proposed activity or development in terms of this Department's guideline on Need and Desirability (March 2013) or the DEA's Integrated Environmental Management Guideline on Need and Desirability. This may be attached to this BAR as Appendix K.
In order to properly interpret the EIA Regulations' requirement to consider "need and desirability", it is necessary to turn to the principles contained in NEMA, which serve as a guide for the interpretation, administration and implementation of NEMA and the EIA Regulations. With regard to the issue of "need", it is important to note that this "need" is not the same as the "general purpose	

and requirements" of the activity. While the "general purpose and requirements" of the activity might to some extent relate to the specific requirements, intentions and reasons that the applicant has for proposing the specific activity, the "need" relates to the interests and needs of the broader public. In this regard the NEMA principles specifically inter alia require that environmental management must:

- "place people and their needs at the forefront of its concern" and equitably serve their interests;
- "be integrated, acknowledging that all elements of the environment are linked and interrelated, and it must take into account the effects of decisions on all aspects of the environment and all people in the environment by pursuing the selection of the best practicable environmental option;
- pursue environmental justice "so that adverse environmental impacts shall not be distributed in such a manner as to unfairly discriminate against any person";
- ensure that decisions take "into account the interests, needs and values of all interested and affected parties"; and
- ensure that the environment is "held in public trust for the people, the beneficial use of environmental resources must serve the public interest and the environment must be protected as the people's common heritage".

Community Wellbeing – Clean Water and Sanitation
Sewer systems are essential to the wellbeing of a community. They help to transport wastewater filled with bacteria out of the area and to a place for treatment, so that clean water can be safely distributed back into the environment. But there's a lot that goes into maintaining this essential infrastructure, and every section of it requires routine inspections and upkeep to protect the community it serves.

Need and desirability:
The Gwaing Wastewater Treatment works is one of the two major wastewater treatment works in George, Western Cape. It is George Municipality's objective to upgrade the Gwaing WWTW and for the upgrade to comply with all current and relevant South African codes and standards. The plant currently receives an ADWF of 10 MLD per day. The plant is operating over capacity. In addition, with an expectant the population growth rate of 4% in George makes the extension of the wastewater treatment works a priority.

SECTION F: PUBLIC PARTICIPATION

The Public Participation Process ("PPP") must fulfil the requirements as outlined in the NEMA EIA Regulations and must be attached as Appendix F. Please note that If the NEM: WA and/or the NEM: AQA is applicable to the proposed development, an advertisement must be placed in at least two newspapers.

1. Exclusively for linear activities: Indicate what PPP was agreed to by the competent authority. Include proof of this agreement in Appendix E22.

N/A

2. Confirm that the PPP as indicated in the application form has been complied with. All the PPP must be included in Appendix F.

Please refer to Appendix F

3. Confirm which of the State Departments and Organs of State indicated in the Notice of Intent/application form were consulted with.

Nina Viljoen - Garden Route District Municipality Carlo Abrahams - Breede-Gouritz Catchment Management Agency Megan Simons - Cape Nature Lizelle Stroh - South African Civil Aviation Authority Stephanie-Ann Barnardt - Heritage Western Cape Browen Johnson - Ward 23 Councillor: George Municipality Gavin Benjamin - Western Cape Government: DEADP

Brandon Laymen - Department of Agriculture Nathan Jacobs - Western Cape Department of Health Gunther Frantz / Rabiah Reynolds - Pollution and Chemicals Management

4. If any of the State Departments and Organs of State were not consulted, indicate which and why.

Only applicable State Department will be provided an opportunity to comment on the proposal.

5. if any of the State Departments and Organs of State did not respond, indicate which.

To be included in the final BAR

6. Provide a summary of the issues raised by I&APs and an indication of the manner in which the issues were incorporated into the development proposal.

To be included in the final BAR

Note:

A register of all the I&AP's notified, including the Organs of State, and all the registered I&APs must be included in Appendix F. The register must be maintained and made available to any person requesting access to the register in writing.

The EAP must notify I&AP's that all information submitted by I&AP's becomes public information.

Your attention is drawn to Regulation 40 (3) of the NEMA EIA Regulations which states that *"Potential or registered interested and affected parties, including the competent authority, may be provided with an opportunity to comment on reports and plans contemplated in subregulation (1) prior to submission of an application but **must** be provided with an opportunity to comment on such reports once an application has been submitted to the competent authority."*

All the comments received from I&APs on the pre -application BAR (if applicable and the draft BAR must be recorded, responded to and included in the Comments and Responses Report and must be included in Appendix F.

All information obtained during the PPP (the minutes of any meetings held by the EAP with I&APs and other role players wherein the views of the participants are recorded) and must be included in Appendix F.

Please note that proof of the PPP conducted must be included in Appendix F. In terms of the required "proof" the following is required:

- a site map showing where the site notice was displayed, dated photographs showing the notice displayed on site and a copy of the text displayed on the notice;
- in terms of the written notices given, a copy of the written notice sent, as well as:
  - if registered mail was sent, a list of the registered mail sent (showing the registered mail number, the name of the person the mail was sent to, the address of the person and the date the registered mail was sent);
  - if normal mail was sent, a list of the mail sent (showing the name of the person the mail was sent to, the address of the person, the date the mail was sent, and the signature of the post office worker or the post office stamp indicating that the letter was sent);
  - if a facsimile was sent, a copy of the facsimile Report;
  - if an electronic mail was sent, a copy of the electronic mail sent; and
  - if a "mail drop" was done, a signed register of "mail drops" received (showing the name of the person the notice was handed to, the address of the person, the date, and the signature of the person); and
- a copy of the newspaper advertisement ("newspaper clipping") that was placed, indicating the name of the newspaper and date of publication (of such quality that the wording in the advertisement is legible).

SECTION G: DESCRIPTION OF THE RECEIVING ENVIRONMENT

All specialist studies must be attached as Appendix G.

1. Groundwater

1.1.	Was a specialist study conducted?	**YES**	NO
1.2.	Provide the name and or company who conducted the specialist study.		
Veltwater Groundwater Specialists CC			
1.3.	Indicate above which aquifer your proposed development will be located and explain how this has influenced your proposed development.		
(Source: GROUNDWATER MONITORING: GEORGE WWTW SITES Drilling & Installation of Monitoring Boreholes, Monitoring Programme and Site Hydrogeology, June 2021, prepared by Veltwater Groundwater Specialists CC)			

The published 1: 250 000 Geological sheet 3322 Oudtshoorn, shows that the George WWTWs and surrounding areas are underlain by gneissic granite, granodiorite and albitite of the Maalgaten and related granites of the George batholith. According to the geological map there is no prominent faulting present in the immediate area of the site.

The soil horizons in the area consist of sands and lithosols that are imperfectly and poorly drained to structureless loamy sand and sandy loams. The reported clay content for this area range between 6 and 15%.
The aquifers associated with these deposits are classified as intergranular and fractured and are considered minor (low yielding) to poor aquifer systems with minimal vulnerability of groundwater contamination and variable permeability for groundwater flow. Higher yields are generally expected at intersections of fracture / fault zones or in transition/contact zones between the weathered aquifer and bedrock.

The dominant yield classes range between 0.1 and 0.5 l/s, and the natural quality of the groundwater is reported as variable to poor. Most of the groundwater flow occur in the weathered zone, or in the openings between joints and fractures within the bedrock mass. The calculated groundwater flow gradient for the aquifers across both sites ranged between 0.02 and 0.023.

1.4.	Indicate the depth of groundwater and explain how the depth of groundwater and type of aquifer (if present) has influenced your proposed development.

(Source: GROUNDWATER MONITORING: GEORGE WWTW SITES Drilling & Installation of Monitoring Boreholes, Monitoring Programme and Site Hydrogeology, June 2021, prepared by Veltwater Groundwater Specialists CC)

Monitoring borehole positions was selected based on available site information, expected groundwater flow pathways (source-pathway-receptor principles) and accessibility of a drill rig to the drill sites.

The Gwaing (GN) boreholes were completed to final depths ranging between 27 (GN 02) and 40 metres below ground level (mbgl) (GN 01). The completion depth of the uPVC in GN 01 reached 39.2 m due to the collapsing clay formations at depth. Groundwater was intersected at 24 m during the drilling process of borehole OQ 02. No further groundwater was intersected at the remainder of the monitoring boreholes. All boreholes could recover overnight and were then checked for the presence of water prior to borehole development. Due to the minimal amount of water in the columns, accumulative yields recorded ranged from >0.01 (GN 01 and GN 03) to 0.03 l/s (GN 02). The calculated groundwater flow gradient for the aquifers across both sites ranged between 0.02 and 0.023.

(Source: Engineering Geological Report Gwaing Wastewater Treatment Works Phase 2 George – Western Cape, Dated June 2024, Prepared by Terra Geotechnical)

Groundwater seepage was observed in three test pits (TP1, TP3 & TP12) across the site. This seepage is categorized as a perched groundwater table, and it was generally identified as slow to moderate flow. It is mainly present within the fill, pedogenic horizon and the upper transported soils. Perched groundwater occurs when an impermeable layer restricts water from infiltrating deeper into the aquifer, causing it to move laterally through the strata. Perched groundwater seepage was observed across the site, generally with slow to moderate flow. Ferruginous material indicates seasonal fluctuating groundwater or excessive soil moisture movement.

2. Surface water

2.1.	Was a specialist study conducted?	**YES**	NO
2.2.	Provide the name and/or company who conducted the specialist study.		
Debbie Fordham – Upstream Consulting			
2.3.	Explain how the presence of watercourse(s) and/or wetlands on the property(ies) has influenced your proposed development.		

(Source: AQUATIC BIODIVERSITY IMPACT ASSESSMENT for the proposed UPGRADING OF THE GWAING WASTEWATER TREATMENT WORKS, GEORGE LOCAL MUNICIPALITY, Dated 3 November 2025 Prepared by Debbie Fordham)

GWAING WWTW SITE

Catchment Characteristics

The site is located near the Gwaing River within the DWS Quaternary Catchment K30B and falls within the Outeniqua Strategic Water Source Area for surface water. The Gwaing River is the major river system in the catchment with tributaries such as the Malgas and Camfersdrift Rivers. The site falls within the Southern Coastal Belt Ecoregion which is described as an area of hills and mountains with moderate to high relief and surrounding plains. The area is characterised by gently undulating topography on the coastal plateau between the Outeniqua Mountains and the ocean. According to the Freshwater Biodiversity Information System (FBIS), the reach of the Gwaing River near the site is situated in the perennial, Upper Foothills geomorphological zone of the river profile (DWAF, 2006).

The study area is primarily drained through surface runoff, with stormwater flowing westward towards the Gwaing River. The natural drainage patterns across the site have been modified due to previous construction activities. It is located on the raised coastal platform which, at the coast, rises steeply from sea level to elevations > 100 m. The rivers are deeply incised into this coastal platform, their catchment areas being relatively small.

The Gwaing river is the largest system in the catchment and supports a significant amount of habitat, including the estuarine habitat at the coast, and acts as an important ecological corridor. Sedimentation can result in changes to estuary mouth closure dynamics. Changes to flow regime and nutrient loads can lead to increased alien invasive species encroachment downstream. Water quality changes can affect the estuarine biota. The area is mapped as a SWSA for surface water and therefore it is critical that the water resources are not polluted.

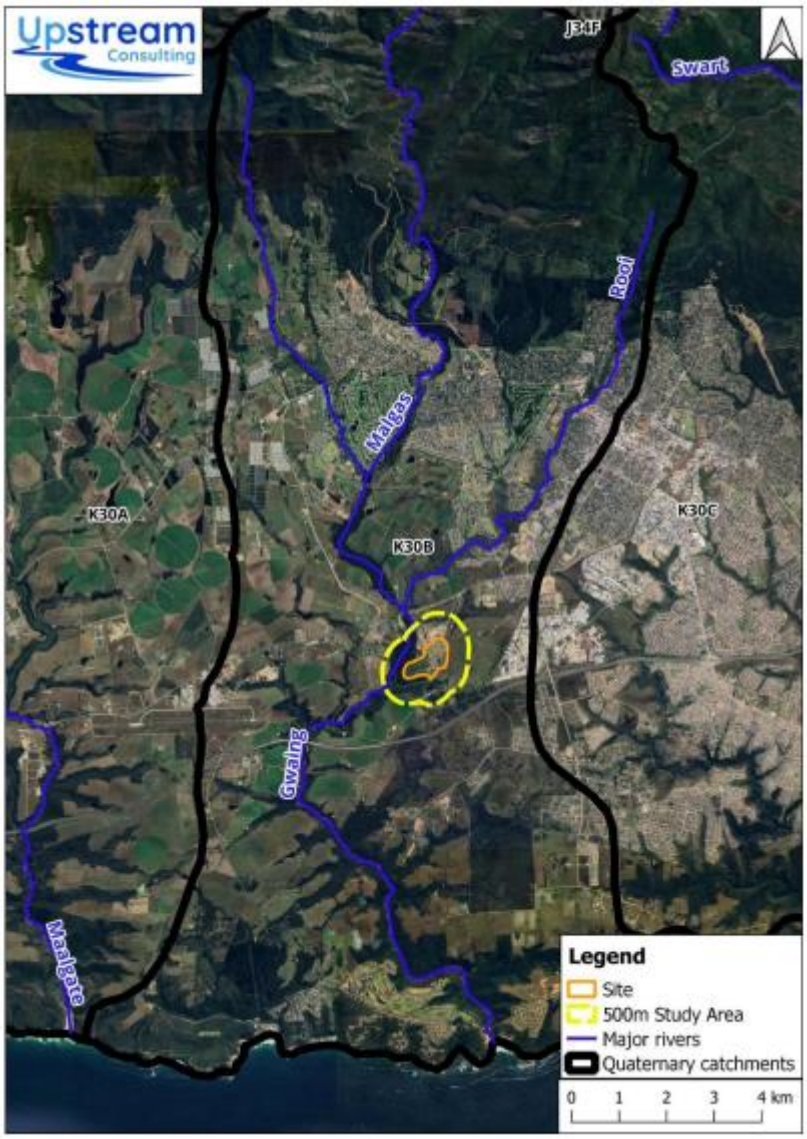


Figure 34: Map of the site in relation to the Gwaing River in quaternary catchment K30B

Strategic Water Source Area

The study area falls within the Outeniqua Strategic Water Source Area for surface water (Le Maitre et al. 2018). Refer to Figure 35. A Strategic Water Source Areas (SWSA) is where the water that is supplied is considered to be of national importance for water security.

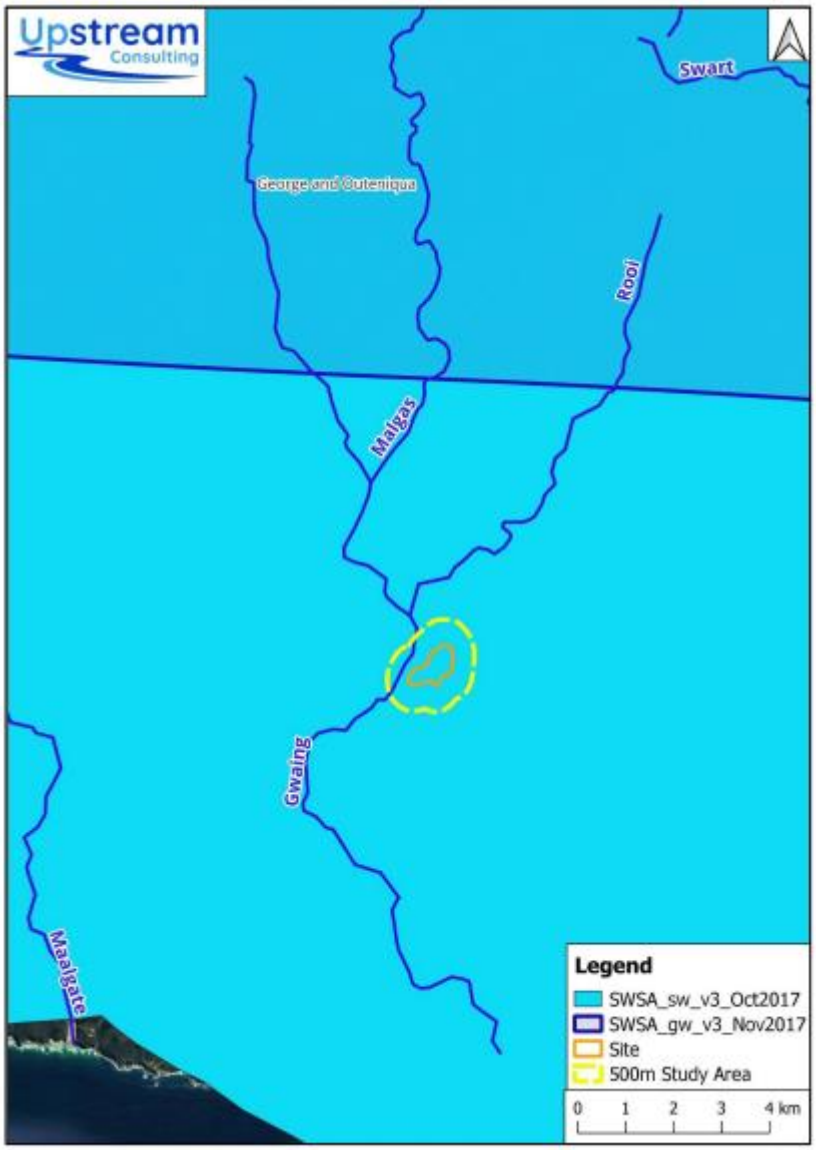


Figure 35: Map of the site in relation to SWAs

Watercourse Classification

Five watercourses were identified and mapped within a 500m radius of the proposed Development but due to the topography of the site resulting in surface runoff in a south westerly direction, and location of the WWTW outlet, it was determined that only the southern watercourse (mapped as HGM 2) has potential to be directly impacted by the upgrades.

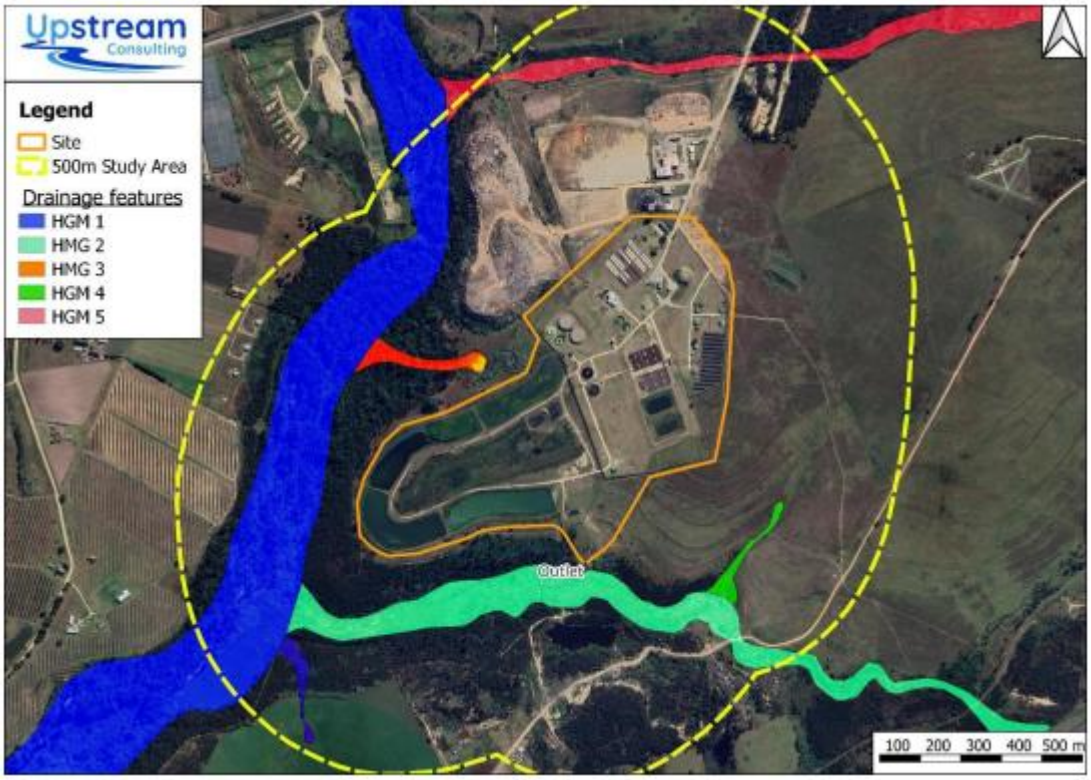


Figure 36: Map of the aquatic habitat identified within the 500m radius study area.

The Gwaing River, and two watercourses (one north and another south of the WWTW), are mapped as channelled valley bottom wetland habitat by the NWM5. It is shown to be in a poor present ecological state. The wetland falls within the Eastern Fynbos-Renosterveld Bioregion (Valley-bottom). This wetland type is listed as poorly protection and critically endangered.

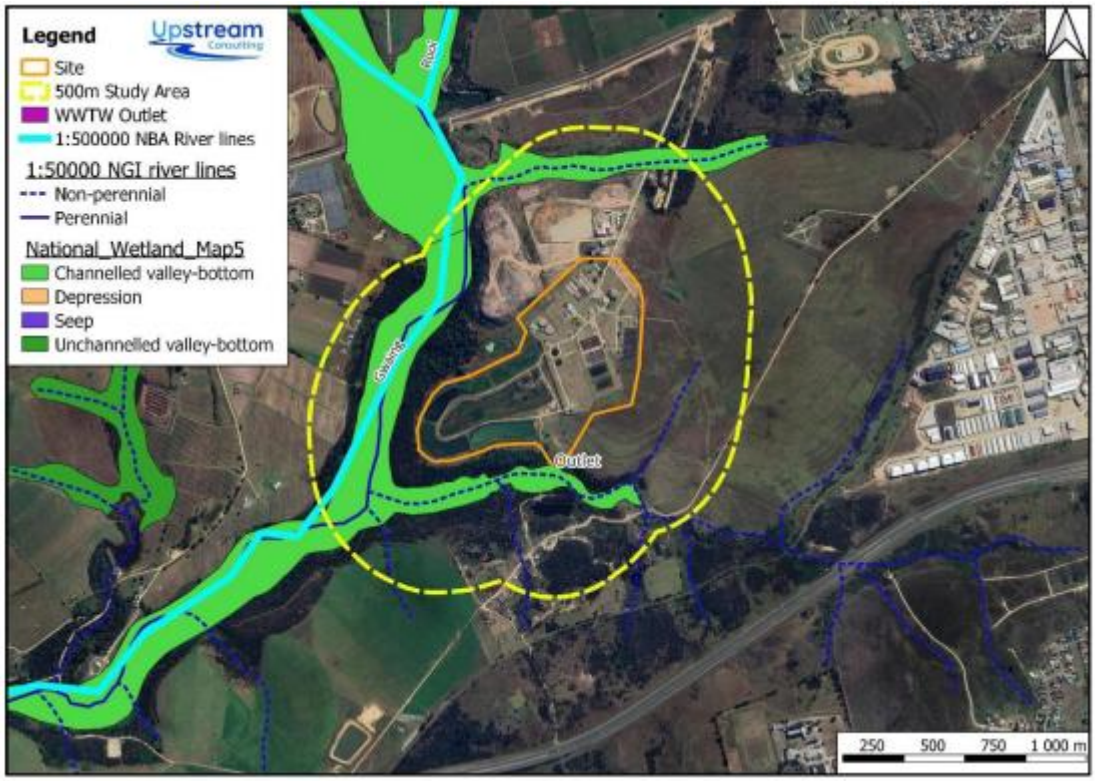


Figure 37: The project site in relation to the national river and wetland inventories (CSIR, 2018)

Conservation context

The site is not located upon any biodiversity priority areas, CBA nor ESAs. However, the watercourse downslope of the WWTW outlet structure is classified as CBA 1 wetland habitat, as is the Gwaing River

downstream. No endemic or conservation worthy aquatic species (Listed or Protected) were observed within the site, but the wetland habitats downslope may contain such species. Although, due to the highly modified condition of the area, it is likely that the majority of the aquatic species are disturbance tolerant.

According to the National Freshwater Ecosystem Priority Atlas (NFEPA; Nel et al., 2011) the sub-quaternary is classified as a Fish Support Area. Fish species of conservation significance that are meant to occur in the Gwaing River are *Sandelia capensis*, *Galaxias zebratus*, and *Pseudobarbus afer*. The river is also home to the Longfin Eel *(Anguilla mossambica*), a migratory and near-threatened species. These eels spawn in the ocean but mature in freshwater systems, meaning they need access to both habitats. Consequently, the Gwaing River serves as a crucial migratory route for *A. mossambica* and other fish species. For the fish indicated to survive and reproduce successfully good water quality which includes high clarity and low nutrients is important.

Downstream habitat of significant ecological importance includes the estuary at the river mouth. The Gwaing River estuary is defined in the 2018 National Biodiversity Assessment (SANBI, 2019) as a small, temporarily closed estuarine system located within the warm temperate biogeographic region on the southern Cape coastline. The size of the estuary, as defined by the estuarine functional zone (EFZ), is approximately 10.6 ha, extending over a length of approximately 1.4 km. Although the Gwaing WWTW is located upstream, there is potential for impacts to affect the estuary. The 2019 Gwaing River Estuary Management Plan specifically states that an issue that requires attention is the water quality impacts from the WWTW as well as agricultural run-off.

Present Ecological State (PES) – Riparian
It was determined that the effluent from the Gwaing WWTW is typically within the General Limits of the General Authorisation for discharging water into a river. This is a good indication of compliance and the performance from the WWTW. However, the river itself has poor water quality with a high E.Coli count. The river reach assessed falls within the 'D' ecological category for present ecological state (PES) as it is in a Largely Modified condition, but it has a High ecological importance and sensitivity (EIS). Despite its ecological value, the Gwaing River faces several threats, including pollution from agricultural runoff, urban development, and invasive alien plant species.

Under the 2024 design, the implementation of UV disinfection was expected to substantially reduce microbial loading, including E. coli and other pathogens. The updated information (2025) indicates that the UV system will no longer be installed, and instead, chlorine disinfection and maturation ponds will be retained.
This approach reintroduces the risk of variable microbial performance depending on chlorine dosing and pond function, especially under high inflow conditions. The maturation ponds, which under the previous scenario were retained primarily for redundancy and flow equalisation, now become essential components for final effluent polishing and pathogen attenuation. Given the poor present ecological state of the Gwaing River (PES = D) and the high ecological importance and sensitivity (EIS = High), any reduction in effluent treatment efficiency could exacerbate downstream water quality degradation. Monitoring and proactive chlorine management will be critical.

Table 4: The habitat integrity PES categories

Habitat Integrity PES Category	Description
A: Natural	Unmodified, natural.
B: Good	Largely natural with few modifications. A small change in natural habitats and biota may have taken place but the ecosystem functions are essentially unchanged.
C: Fair	Moderately modified. Loss and change of natural habitat and biota have occurred, but the basic ecosystem functions are still predominantly unchanged.
D: Poor	Largely modified. A large loss of natural habitat, biota and basic ecosystem functions has occurred.
E: Seriously modified	Seriously modified. The loss of natural habitat, biota and basic ecosystem functions is extensive.
F: Critically modified	Critically / Extremely modified. Modifications have reached a critical level and the system has been modified completely with an almost complete loss of natural habitat and biota. In the worst instances the basic ecosystem functions have been destroyed and the changes are irreversible.

Ecological Importance and Sensitivity - Riparian

The ecological importance of a wetland/river is an expression of its importance to the maintenance of biological diversity and ecological functioning on local and wider scales. Ecological sensitivity (or fragility) refers to the system's ability to resist disturbance and its capability to recover from disturbance once it has occurred (resilience) (Kleynhans & Louw, 2007; Resh et al., 1988; Milner, 1994). Both abiotic and biotic components of the system are taken into consideration in the assessment of ecological importance and sensitivity.

The scores assigned to the criteria in Table 5 were used to rate the overall EIS of each mapped unit according to Table 6, below, which was based on the criteria used by DWS for river eco-classification (Kleynhans & Louw, 2007) and the WET-Health wetland integrity assessment method (Macfarlane et al., 2008).

Table 5: Components considered for the assessment of the ecological importance and sensitivity of a riparian system. An example of the scoring has also been provided.

Ecological Importance and Sensitivity assessment (Rivers)		
Determinants		Score (0-4)
BIOTA (RIPARIAN & INSTREAM)	Rare & endangered (range: 4=very high - 0 = none)	0,5
	Unique (endemic, isolated, etc.) (range: 4=very high - 0 = none)	0,0
	Intolerant (flow & flow related water quality) (range: 4=very high - 0 = none)	0,5
	Species/taxon richness (range: 4=very high - 1=low/marginal)	1,5
INSTREAM & RIPARIAN HABITATS	Diversity of types (4=Very high - 1=marginal/low)	1,0
	Refugia (4=Very high - 1=marginal/low)	1,5
	Sensitivity to flow changes (4=Very high - 1=marginal/low)	1,0
	Sensitivity to flow related water quality changes (4=Very high - 1=marginal/low)	1,0
	Migration route/corridor (instream & riparian, range: 4=very high - 0 = none)	1,0
	Importance of conservation & natural areas (range, 4=very high - 0=very low)	2
MEDIAN OF DETERMINANTS		1,00
ECOLOGICAL IMPORTANCE AND SENSITIVITY CATEGORY (EIS)		LOW, EC=D

Table 6: The ratings associated with the assessment of the EIA for riparian areas

Rating	Explanation
None, Rating = 0	Rarely sensitive to changes in water quality/hydrological regime
Low, Rating =1	One or a few elements sensitive to changes in water quality/hydrological regime
Moderate, Rating =2	Some elements sensitive to changes in water quality/hydrological regime
High, Rating =3	Many elements sensitive to changes in water quality/ hydrological regime
Very high, Rating =4	Very many elements sensitive to changes in water quality/ hydrological regime

Present Ecological State (PES) – Wetland
The HGM 2 wetland occupies the valley south of the Gwaing WWTW. Water flows through an incised channel in a westerly direction to the Gwaing River. The upper reaches are severely degraded and have little remaining habitat. The downstream habitat is disturbed but intact. The seasonal and temporary zones have been subjected to soil disturbance and vegetation clearance for grazing, resulting in alien invasive plant encroachment, such as kikuyu grass and bugweed trees. However, the permanent zone is robustly vegetated with indigenous reeds (dense Phragmites australis beds) and retains a high level of ecological functioning. The significant habitat loss in the upper reaches, and alien invasive plant infestation throughout the system, results in an overall 'D' (poor) Present Ecological State (PES) score. The wetland supplies important regulatory and supporting ecosystem services such as stream flow regulation, pollutant assimilation and the provision of water.

Description of affected aquatic habitat - HGM 1 – Gwaing River
The Gwaing River originates in the Outeniqua Mountains and flows southwest towards the Indian Ocean, covering an approximate length of 20 km. The study area is within the upper foothills geomorphic reach and has a perennial flow regime. There is some remaining channelled valley wetland habitat remaining, but the channel has become incised, and alien invasive plants have encroached into the riparian area.

The water quality of the Gwaing River is influenced by a variety of natural and anthropogenic factors. As a vital freshwater resource, its quality has direct implications for the health of local ecosystems and agricultural productivity. The water quality is subject to various pressures from both natural and human activities. The river reach assessed falls within the 'D' ecological category for present ecological state (PES) as it is in a Largely Modified condition, but it has a High ecological importance and sensitivity (EIS). The Gwaing River is of significant ecological importance due to its role in sustaining biodiversity and providing ecosystem services. It serves as a critical water source for both the natural environment and human use, supporting agriculture, recreation, and urban water supply. Despite its ecological value, the Gwaing River faces several threats, including pollution from agricultural runoff, urban development, and invasive alien plant species. Climate change poses additional challenges, potentially altering the river's flow patterns and impacting its ecosystems. Approximately 12km downstream of the study area the river enters the Gwaing River Estuary at its mouth. The estuary is a small temporarily closed estuary that lies within a steep valley incised into the coastal plain and is about 1.4 km long. According to the Gwaing River Estuary Management Plan (2019), the Mean Annual Runoff (MAR) to the estuary has been slightly reduced by 8% from its natural state and nutrient enrichment from golf courses, agriculture, and sewage spills is expected.

Description of affected aquatic habitat - HGM 2 – Unnamed channelled valley bottom wetland
The HGM 2 wetland occupies the valley south of the Gwaing WWTW. Water flows through an incised channel in a westerly direction to the Gwaing River. The upper reaches are severely degraded and have little remaining habitat. The downstream habitat is disturbed but intact. The seasonal and temporary zones have been subjected to soil disturbance and vegetation clearance for grazing, resulting in alien invasive plant encroachment, such as kikuyu grass and bugweed trees. However, the permanent zone is robustly vegetated with indigenous reeds (dense Phragmites australis beds)

and retains a high level of ecological functioning. Other indigenous wetland plant species identified on site were *Zantedeschia aethiopica*, *Typha capensis, Cliffortia odorata, Cyperus textillis,* and *Juncus effusus.*

The significant habitat loss in the upper reaches, and alien invasive plant infestation throughout the system, results in an overall 'D' (poor) Present Ecological State (PES) score. It is recommended that the management objective for the wetland be to improve the system though alien plant removal and reducing contaminants from surrounding land uses.

The wetland supplies important regulatory and supporting ecosystem services such as stream flow regulation, pollutant assimilation and the provision of water. However, towards the eastern portion the wetland becomes increasingly degraded and ultimately transformed. Additionally, the water is severely contaminated by urban and agricultural activities. Therefore, while there are portions of HGM2 of high ecological value, such as at the confluence with the Gwaing River, the upper reach of the wetland is critically modified.

(Source: AQUATIC BIODIVERSITY IMPACT ASSESSMENT for the proposed BIOSOLIDS BENEFICIATION FACILITY (BBF) AT GWAING WASTEWATER TREATMENT WORKS, GEORGE LOCAL MUNICIPALITY, compiled by Debbie Fordham, dated 3 November 2025)

BBF SITE

Conservation context

Figure 38 shows that the site is not located upon any biodiversity priority areas, CBA nor ESAs. However, the drainage line located south of the BFF is classified as ESA 2 aquatic habitat.

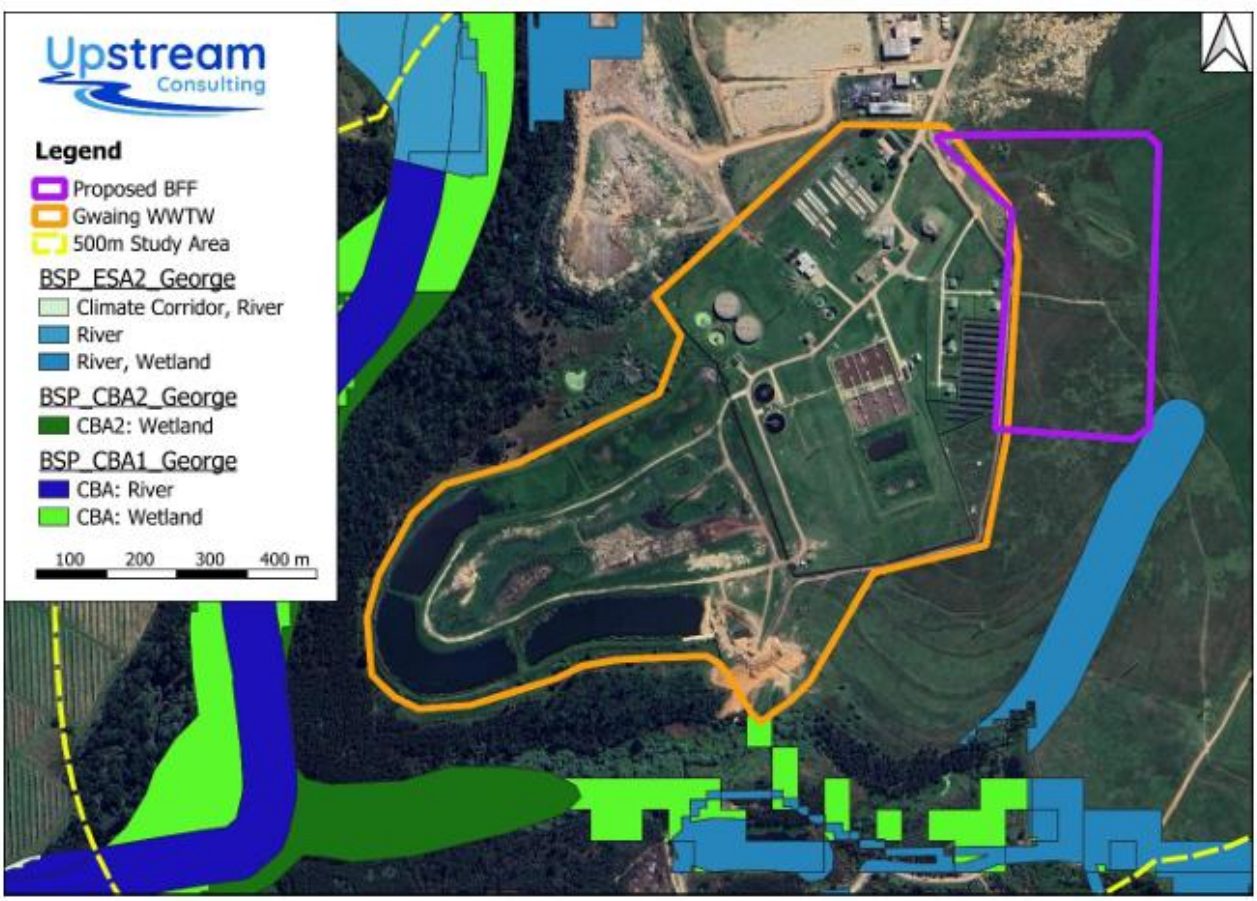


Figure 38: The site in relation to aquatic biodiversity priority areas identified in the WCBSP (2017)

Historic Context

In the aquatic sensitivity assessment of the Gwayang Precinct Plan, conducted in May 2024 by Confluent Environmental (Pty) Ltd, entitled 'Mixed Use Development for RE/464 Gwayang Industrial Park, George', a small area in the BFF locality is described as "historical natural wetland now

excavated". It is indicated by an arrow on historic Google imagery in Section 3.4 – Artificial Wetlands. Refer to Figure 39. However, it is important to note that this area was seemingly not groundtruthed during that assessment.

3.4 Artificial Wetlands

Historical irrigation with wastewater from the WWTW creates what can appear to be wetlands in some of the fields (Figure 13). However, irrigation has ceased for approximately 5 years and areas that were previously irrigated now show no indication of wetland features.

Figure 13. Periodic irrigation of wastewater from the WWTW on agricultural fields. Arrow indicates historical natural wetland now excavated.

Figure 39: Excerpt from the confluent 2024 aquatic assessment of the Gwaing Prescient Plan artificial wetland on the BBF site on google imagery

In this assessment, a comprehensive groundtruthing exercise was undertaken which found only a small pocket of artificial wetland within an old excavation. All evidence indicates that this artificial wetland originated from a small livestock drinking pond excavated into the perched water table (Figure 40), which later was modified into the old sludge ponds. It is disputed that this site ever contained natural wetland habitat. It is argued to be a result of past excavations (Figure 40).

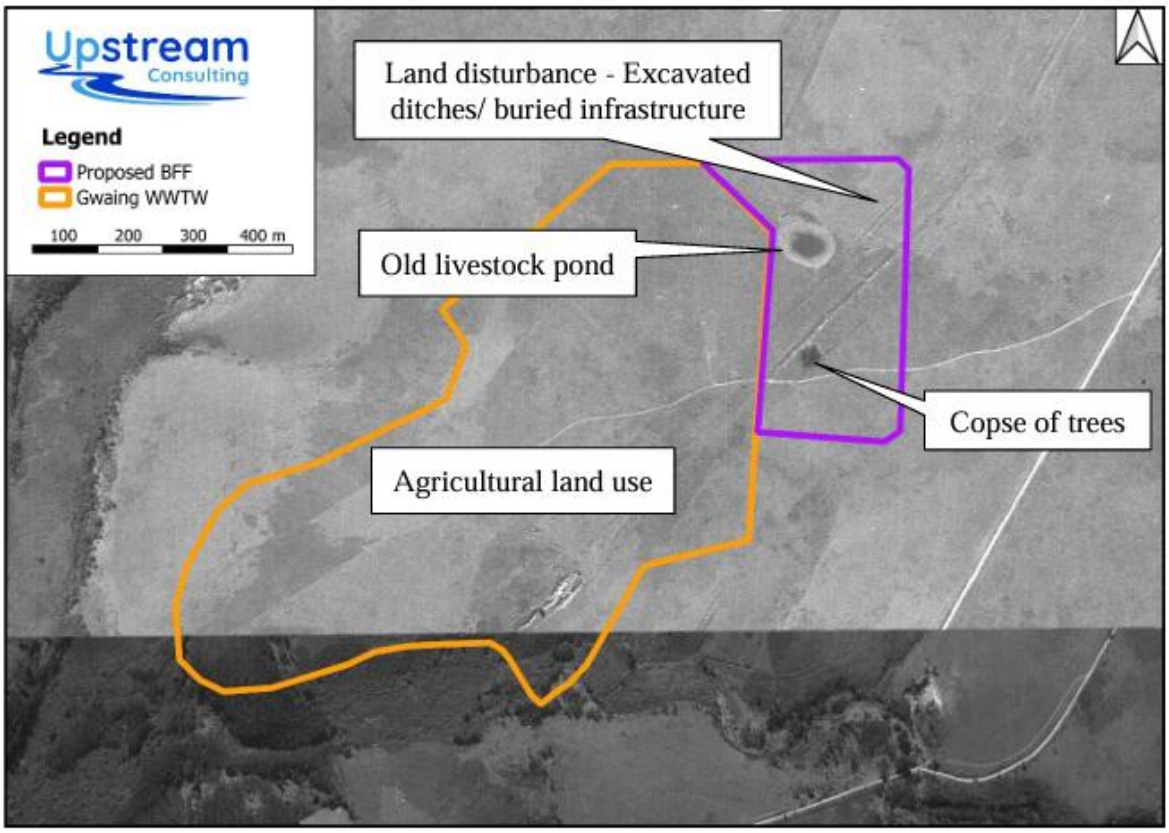


Figure 40: Historic ariel photography of the site in 1957

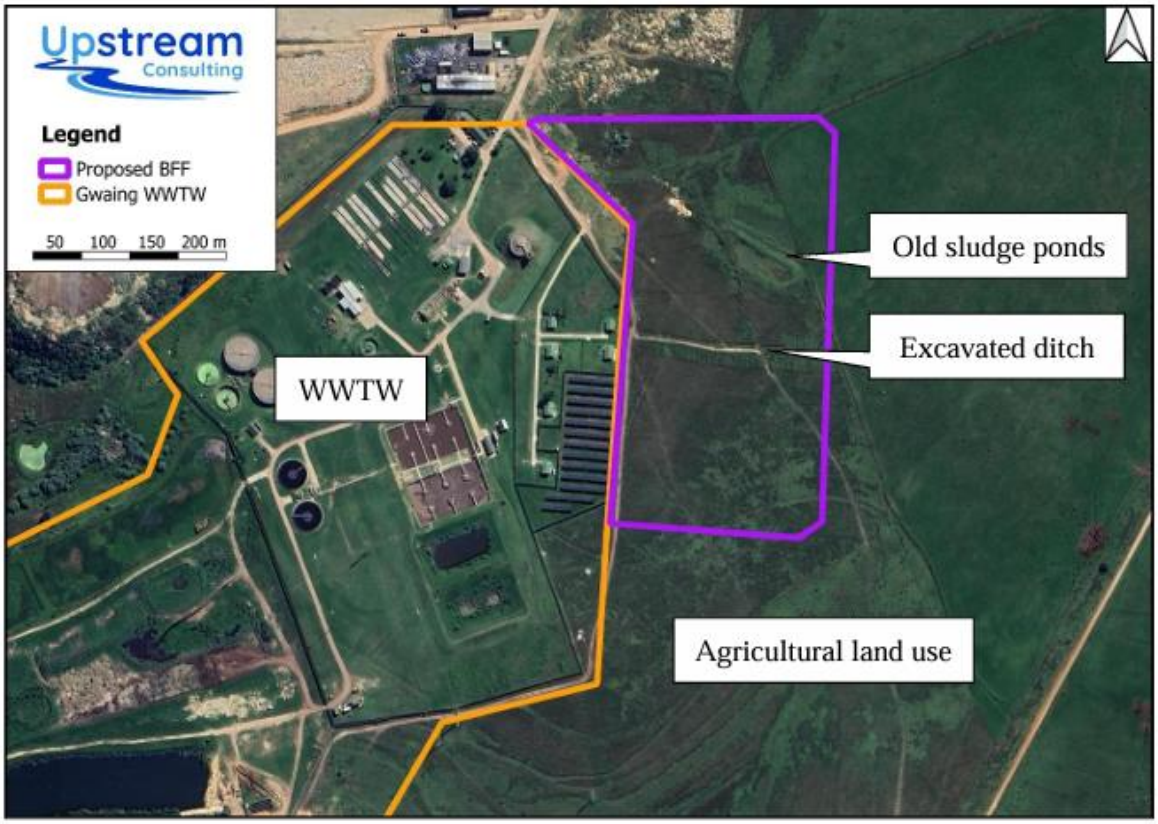


Figure 41: Google satelite Imagery of the site dated 11/03/2025

Delineation and Classification

Five (5) watercourses were identified and mapped within a 500m radius of the proposed upgrade works. An artificial wetland was identified and delineated within excavations on the BBF site. Due to the topography of the site resulting in surface runoff in a south westerly direction, and location of the WWTW outlet, it was determined that the southern watercourse (mapped as HGM 2) has potential to

be directly impacted by the upgrades (Figure 42). However, there is also potential for the downstream section of the Gwaing River (mapped as HGM 1) to be indirectly impacted by the WWTW upgrades. Less likely, but still possible, is for the HGM 4 watercourse (located south of the BFF site) to be indirectly impacted by construction upslope. However, it is definite that the artificial wetland formed in the old excavations on the BFF site will be directly impacted. The other watercourses identified within the 500m radius of the site are unlikely to be impacted by any of the proposed activities and were therefore not assessed further.

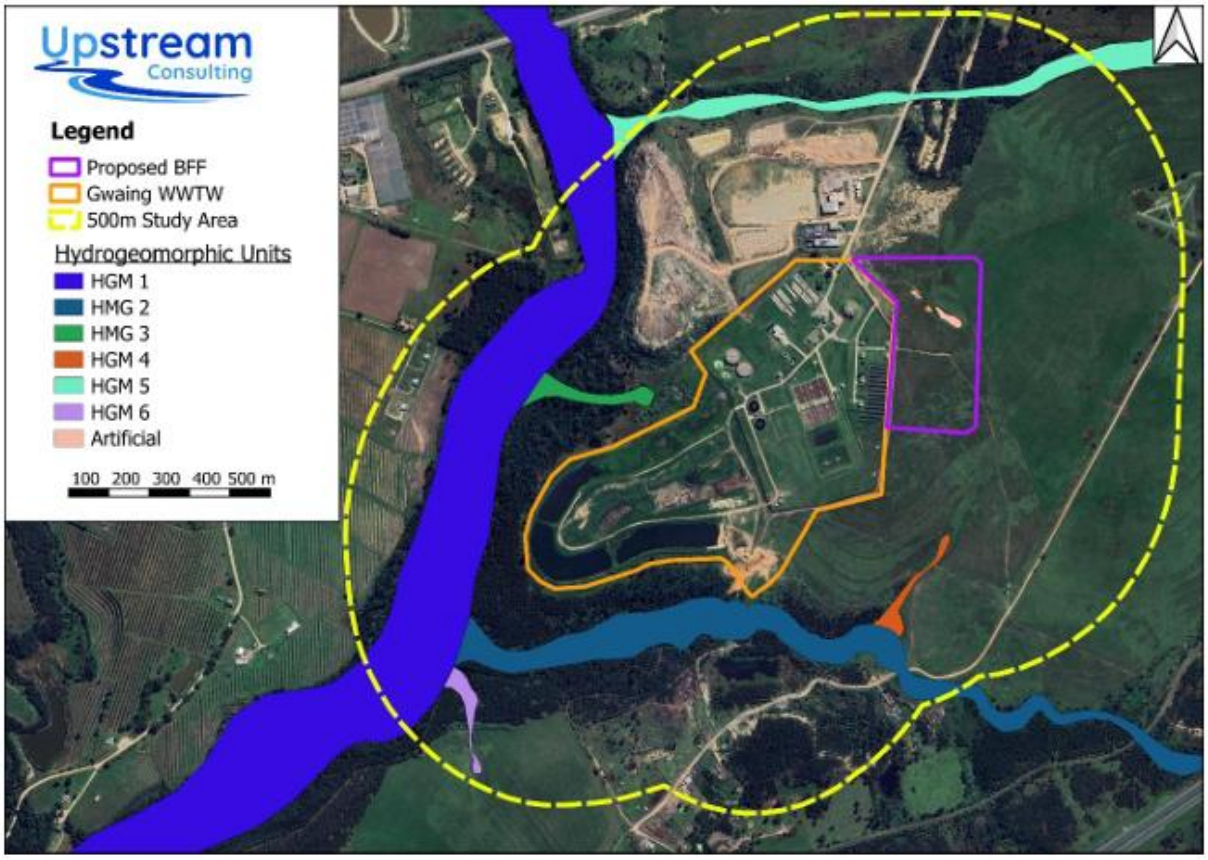


Figure 42: Map of the aquatic habitat identified within the 500m radius study area

The watercourses potentially affected by the upgrades to the WWTW infrastructure have already been assessed **in the AQUATIC BIODIVERSITY IMPACT ASSESSMENT for the proposed UPGRADING OF THE GWAING WASTEWATER TREATMENT WORKS, GEORGE LOCAL MUNICIPALITY, Dated 3 NOVEMBER 2025, Prepared by Debbie Fordham**. Therefore, only the artificial wetland on the BFF site, and HGM 4 to the south, are described in this report.

Artificial Wetland

Past excavations and land surface disturbances upon this level plateau (probably undertaken for old sludge ponds, drainage ditches, buried infrastructure, or simply soil material) have resulted in numerous small, artificial depressions. Over time, wetland characteristics have developed due to prolonged soil saturation from digging into the perched water table. These wetland areas are not connected to the drainage network and soil augering throughout the site determined that there are no natural wetlands. These artificial depressions do not support sensitive aquatic habitat. No rare, endangered, nor endemic species were observed, and none are expected to occur.

Figure 43: Artificial wetland formed in a shallow excavation

HGM 4

The southern portion of the BFF site slopes more steeply towards the HGM 4 drainage, which joins the tributary to the Gwaing in the valley bottom. HGM 4 can be classified as a 1st order ephemeral stream. However, the upper reach is critically modified by agricultural activity and supports very little aquatic habitat. HGM 4 is more than 100m away from the proposed BFF and therefore, provided stormwater runoff is managed appropriately, it is unlikely to be impacted by the project.

Figure 44: Looking south from the BBF Site to the head of HGM4 drainage line located > 100m away

Offset Investigation
The construction of the BFF will result in the direct loss of the very small artificial wetland (0.465ha). In order to assess the need for any formal compensation, such as offsets, a wetland offset investigation was undertaken to determine if such an approach is required to mitigate the residual impacts of loss of the artificial depression.

The potential loss of the wetland area was assessed using the DWS Wetland Offset Calculator (as developed by McFarlane et al (2014) and included in the 2017 Draft National Offset Guidelines (GN 276 of March 2017)) to determine the wetland targets that would need to be achieved by any wetland offset.

It was determined that no functional wetland offsets are required. The small, artificial depression does not provide significant ecological functions at any scale and therefore there is a negligible loss. The same result was calculated for species conservation offset targets as there are no species of conservation concern within, or supported by, the artificial wetland.

The loss of the artificial wetland will not influence any biodiversity conservation targets or compromise water resource protection in any way, or on any scale. There is no need for wetland offsets to be implemented. However, compensation is encouraged to achieve a net gain. The GM has agreed to implement compensation work as discussed in Section B4.4, however the municipality has indicated that clearing of alien vegetation is a function of the George Municipality's Parks and Recreation unit and not that of the Civil Engineering Services Unit.

3. Coastal Environment

3.1.	Was a specialist study conducted?	YES	**NO**
3.2.	Provide the name and/or company who conducted the specialist study.		
3.3.	Explain how the relevant considerations of Section 63 of the ICMA were taken into account and explain how this influenced your proposed development.		
3.4.	Explain how estuary management plans (if applicable) has influenced the proposed development.		
	Preferred		
3.5.	Explain how the modelled coastal risk zones, the coastal protection zone, littoral active zone and estuarine functional zones, have influenced the proposed development.		

4. Biodiversity

4.1.	Were specialist studies conducted?	YES	**NO**
4.2.	Provide the name and/or company who conducted the specialist studies.		
Bianke Fouche - Confluent Environmental Pty (Ltd)			
4.3.	Explain which systematic conservation planning and other biodiversity informants such as vegetation maps, NFEPA, NSBA etc. have been used and how has this influenced your proposed development.		

Vegetation map: A product of The Vegetation of South Africa, Lesotho, and Swaziland (VEGMAP) (Mucina & Rutherford, 2006). The South African National Biodiversity Institute (SANBI) has updated the VEGMAP (2018) and again in 2024. These shapefiles were used. In addition, the National Web-based Environmental Screening Tool was applied to determine the Relative Plant Species Theme Sensitivity as is required of botanical specialists.

According to the 2024 Vegetation Map of South Africa, the site is located inside Garden Route Granite Fynbos. Due to its transformed state, Garden Route Granite Fynbos is currently listed as Critically Endangered in the SANBI Red List of Ecosystems: Original. It has been transformed mainly for cultivation, pine plantations and urban development (Mucina, 2006).

The vegetation on the Gwaing WWTW site consists of Kikuyu grass lawns. The whole proposed site is disturbed and transformed, and no natural vegetation remains. Due to various threats including habitat loss due to development, invasive species, and climate change. The vegetation type is narrowly distributed with high rates of habitat transformation. The upgrades are being undertaken within the same boundaries as the existing WWTW which has already been transformed from the

natural vegetation. The surrounding hillslopes and valleys contain some indigenous vegetation but are largely infested with alien invasive plant species such as Bugweed and Black Wattle, these areas do not form part of the proposed upgrades' footprint.

(SOURCE: Botanical and Terrestrial Biodiversity Assessment for the Gwaing Biosolids Beneficiation Facility on Erf 73, George, compiled by Bianke Fouche from Confluent Environmental Pty (Ltd), dated 8 April 2025)

The 2024 versions of the National Vegetation Map (NVM) of South Africa identifies the proposed BBF site mostly as critically endangered (CR) Garden Route Granite Fynbos. The site is transformed and is currently being utilised as fields for grazing animals like cows. Cows grazing and the maintenance of pasture fields on the site has contributed largely to the complete transformation of the flora here to no natural vegetation remaining. This has also led to the dominance of numerous IAPs, such as kikuyu grass. Fields currently used for grazing seem to have been disturbed since at least the 1950s.

Ecosystem threat status: Informed by (1) The National List of Threatened Terrestrial Ecosystems (Government Gazette, 2011), (2) The Western Cape State of Biodiversity 2017 Report (Turner, 2017), and (3) The National Biodiversity Assessment (2018) (SANBI, 2019).
According to The National List of Ecosystems that are Threatened and Need of Protection (Government Gazette, 2011), the project footprint overlaps with a "Critically Endangered" ecosystem type following from the historical presence of Garden Route Granite Fynbos vegetation. Even so, this designation fails to take into account the degraded habitat conditions on the site, which point to a degraded and compromised ecosystem dynamic.

Biodiversity planning: The 2023 Western Cape Biodiversity Spatial Plan (CapeNature, 2023) GIS (Geographical Information System) shapefiles for the George Municipality is important for determining the conservation importance of the designated habitat. Ground-truthing is an essential component in terms of determining the habitat condition.

Important species: The presence or absence of threatened (i.e., species of conservation concern) and ecologically important species informs the ecological condition and sensitivity of the site. The latest conservation status of species is checked in the Red List of South African Plants (Raimondo et al. 2009) (www.redlist.sanbi.org).

Site boundary: These and other resource layers were used to define the site boundary and to compile several maps. This information is available on the CapeFarmMapper website (Department of Agriculture: gis.elsenberg.com).

4.4.	Explain how the objectives and management guidelines of the Biodiversity Spatial Plan have been used and how has this influenced your proposed development.

The Western Cape Biodiversity Spatial Plan (WCBSP) identifies biodiversity priority areas, Critical Biodiversity Areas, Ecological Support Areas (ESAs) and Other Natural Areas (ONA), which, together with Protected Areas (PA), are important for the persistence of a viable representative sample of all ecosystem types and species, as well as the long-term ecological functioning of the landscape as a whole. The primary purpose of a map of CBAs and ESAs is to guide decision-making about where best to locate development. CBA's are required to meet biodiversity targets. According to the WCBSP, these areas have high biodiversity and ecological value and therefore must be kept in a natural state without further loss of habitat or species.

As the proposal is for the upgrades to an existing facility, the Biodiversity Spatial Plan has not influenced the proposal.

The study area currently overlaps with CBA: Terrestrial and CBA2: Terrestrial. However, the Aquatic Assessment report for the Gwaing WWTW site and the BBF site indicates that the site is not located upon any biodiversity priority areas, CBA nor ESAs. However, the watercourse downslope of the WWTW outlet structure is classified as CBA 1 wetland habitat, as is the Gwaing River downstream.

The Botanical and terrestrial assessment also confirmed that the BBF site is not located within any CBA's.

Currently the Gwaing WWTW site is being maintained as Kikuyu grass lawn and has no natural vegetation or animal biodiversity left due to the site being highly disturbed. The BBF site is transformed and is currently being utilised as fields for grazing animals like cows. Therefore, the placement of the proposed development footprint is not going to affect biodiversity and ecological patterns within the study area landscape.

The 2017 WCBSP Handbook (Pool-Stanvliet et al., 2017) distinguishes between the various conservation planning categories. Critical Biodiversity Areas are habitats with high biodiversity and ecological value. Such areas include those that are likely to be in a natural condition (CBA 1) and those that are potentially degraded or represent secondary vegetation (CBA 2).

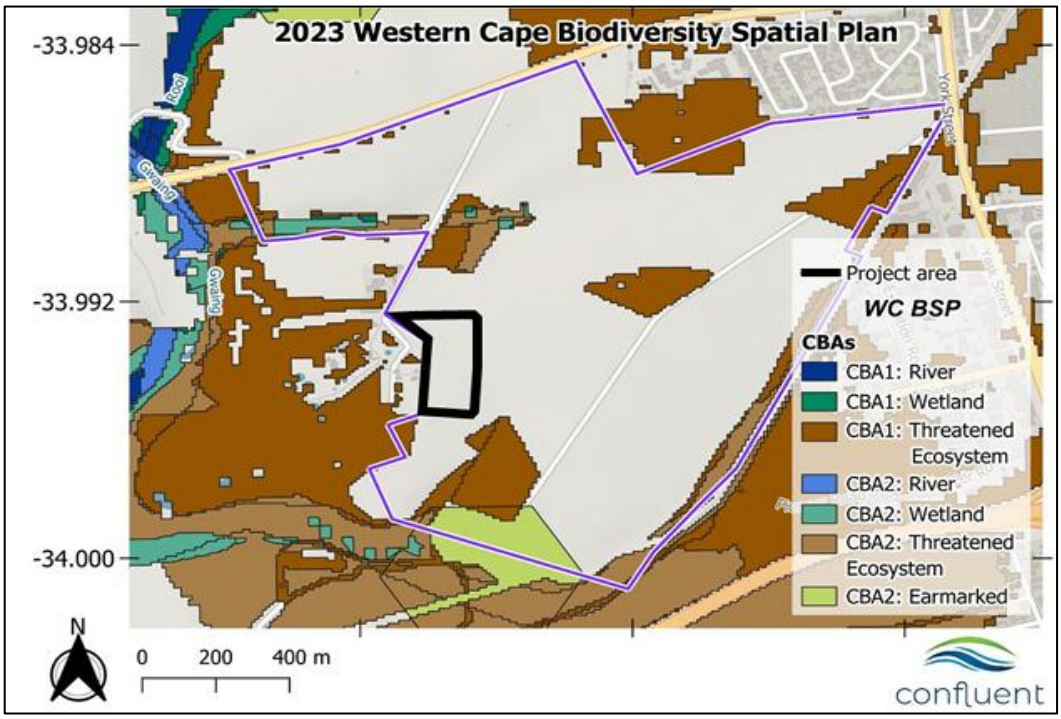


Figure 45: The CBA and ESA areas for the site and immediate surrounding are illustrated according to the updated 2023 version of the WC BSP

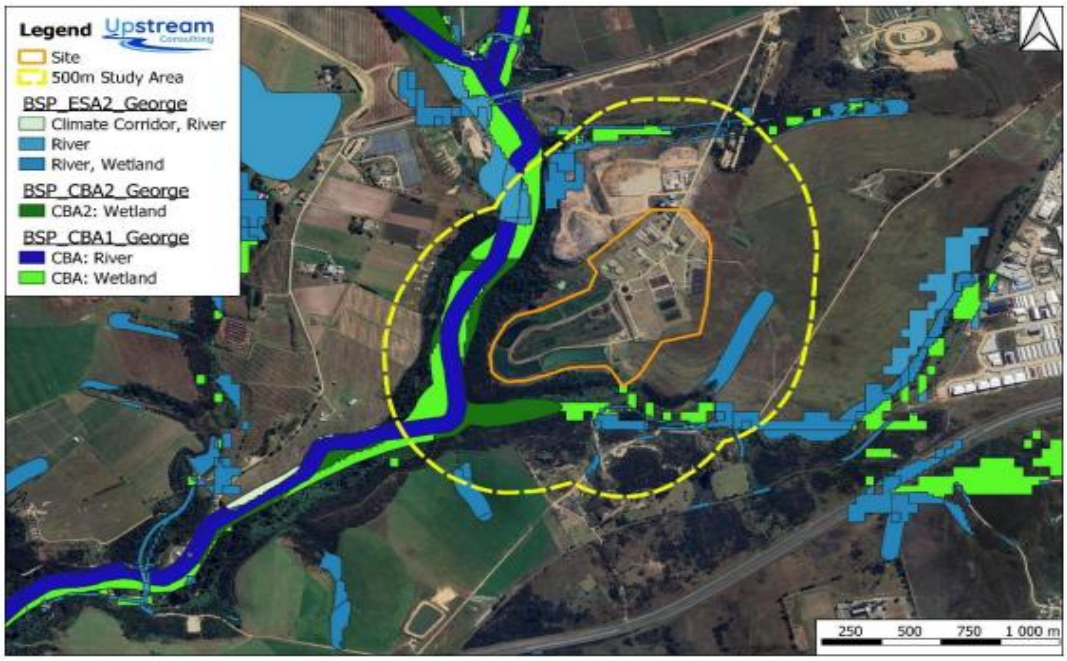


Figure 46: Map of the site in relation to aquatic biodiversity priority areas identified in the WCBSP (2017)

4.5.	Explain what impact the proposed development will have on the site specific features and/or function of the Biodiversity Spatial Plan category and how has this influenced the proposed development.

For the Gwaing WWTW Site:
The terrestrial and aquatic CBA does not meet the definition of: "Areas in a natural condition that are required to meet biodiversity targets, for species, ecosystems or ecological processes and infrastructure". Management objectives for these areas therefore are to: "Maintain in a natural or near-natural state, with no further loss of natural habitat. Degraded areas should be rehabilitated. Only low-impact, biodiversity-sensitive land uses are appropriate". This further supports our statement that the entire site is highly modified and disturbed and does not form any crucial link in providing ecosystem services. The need to maintain the natural state of the site is also not applicable since the current state of the site has no natural fauna or flora and is currently a functioning WWTW. Therefore, the placement of the proposed footprint of the upgrade of the WWTW facility in this habitat type is not going to affect biodiversity and ecological patterns within the study area landscape.

CapeNature will be requested to provide comments during the Public Participation Process.

For the BBF Site:
This site is not mapped as CBA, therefore there is no impact on the WCBSP. The site is transformed and is currently being utilised as fields for grazing animals like cows. Therefore, the placement of the proposed development footprint is not going to affect biodiversity and ecological patterns within the study area landscape.

The loss of the artificial wetland will not influence any biodiversity conservation targets or compromise water resource protection in any way, or on any scale. There is no need for wetland offsets to be implemented. However, compensation is encouraged to achieve a net gain. The GM has agreed to implement compensation work as discussed in Section B4.4.

CapeNature will be requested to provide comments during the Public Participation Process.

4.6.	If your proposed development is located in a protected area, explain how the proposed development is in line with the protected area management plan.

The site is not located in a protected area.

4.7.	Explain how the presence of fauna on and adjacent to the proposed development has influenced your proposed development.

Gwaing WWTW Site:
No fauna had been observed at the site itself. The site has been transformed for many years and is fenced. The probability of any sensitive species occurring or moving through the site is very low.

BBF Site according to the Terrestrial Animal Species Specialist Assessment compiled by Kim Daniels from Confluent Environmental Pty (Ltd), dated April 2025:

Mammals:
No mammal SCC were encountered during the site visit. The only subterranean mammal present is the molerat, as evidenced by the presence of molehills. A mongoose was observed north of the site. Domestic cattle (Bos taurus) were found grazing across the project area and beyond, with most of the grazing happening in the project area rather than in the fenced area just east of the site.

Avifauna:
No SCC were encountered during the site visit. Species identified are primarily those commonly associated with pasture. A total of 12 bird species were identified during the site visit.

Terrestrial invertebrates:
No SCC were found during the site inspections. A number of butterflies and moths were encountered, as were insects of other orders such as true bugs and grasshoppers.

Amphibians:
No amphibians were found, which is not surprising given the lack of any waterbodies/watercourses present on site. Consequently, there was no suitable habitat for the amphibian SCC.

Reptiles:
No reptile SCC were highlighted for this site by the DFFE Screening Tool or any of the public platforms. As such, no targeted sampling took place for this group. No opportunistic observations were made of individuals in the clade.

5. Geographical Aspects

Explain whether any geographical aspects will be affected and how has this influenced the proposed activity or development.
According to the Gwaing WWTW Master Plan REV02, 9 April 2025, Prepared by Lukhozi Consulting Engineers, the Gwaing WWTW is situated on a site that has a relatively steep gradient. The site falls from the North-East down to the South-West. The gradient of the site has both advantages and disadvantages. Advantage: • Structures can be constructed at ground level • There is sufficient fall between unit processes that the water can flow from the inlet works through to the outfall without intermittent pumping. The hydraulic gradient through the plant has a similar profile to the ground level. Disadvantage: • Restricts the layout of the plant to fit in with the fall, it leaves little flexibility to optimise the layout for maximised usage of the site boundary. • If unit processes are to be constructed in areas that do not follow the gradient of the natural ground level, structures will need to be either very deep in the ground, requiring large excavation work, or they will be elevated in the air and require large volumes of imported earthworks and extensive concrete support structure. The gradient of Gwaing WWTW is of such a nature, that it can be utilized advantageously without uncommon amounts of earthworks and platform construction. The contours with schematic fall direction arrows are shown in Figure 39.

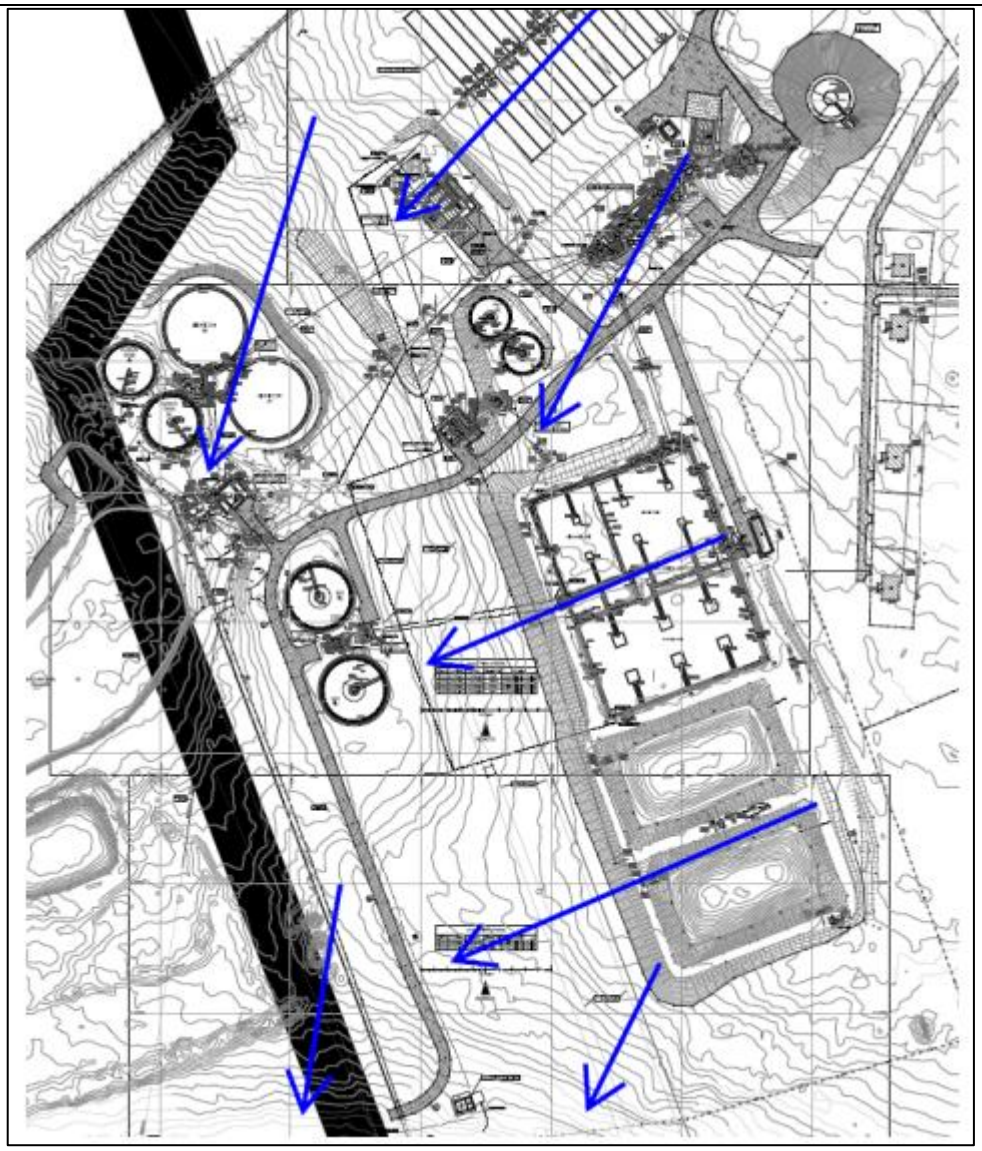


Figure 47: Site contours and fall directions

6. Heritage Resources

6.1.	Was a specialist study conducted?	**YES**	NO
6.2.	Provide the name and/or company who conducted the specialist study.		
Jonathan Kaplan has been appointed to compile and submit a NID to HWC.			
6.3.	Explain how areas that contain sensitive heritage resources have influenced the proposed development.		
	A NID was submitted to Heritage Western Cape (case number: 226046CSI0903 / HWC25062507CSI0903). The matter was discussed at the heritage officers meeting held on the 15th of September 2025. It was concluded that since there is no reason to believe that the proposed development for upgrading the Gwaing Waste Water Treatment Works (WWTW) to an ultimate capacity of 50 MLD and construction of a Biosolid Beneficiation Facility (BBF) on Farm 464-RE, off the R103, Pacaltsdorp, George, will impact on heritage resources, no further action under Section 38 of the National Heritage Resources Act (Act 25 of 1999) is required		

7. Historical and Cultural Aspects

Explain whether there are any culturally or historically significant elements as defined in Section 2 of the NHRA that will be affected and how has this influenced the proposed development.
A NID was submitted to Heritage Western Cape (case number: 226046CSI0903 / HWC25062507CSI0903). The matter was discussed at the heritage officers meeting held on the 15th of September 2025. It was concluded that since there is no reason to believe that the proposed development for upgrading the Gwaing Waste Water Treatment Works (WWTW) to an ultimate capacity of 50 MLD and construction of a Biosolid Beneficiation Facility (BBF) on Farm 464-RE, off the R103, Pacaltsdorp, George, will impact on heritage resources, no further action under Section 38 of the National Heritage Resources Act (Act 25 of 1999) is required

8. Socio/Economic Aspects

8.1.	Describe the existing social and economic characteristics of the community in the vicinity of the proposed site.
	The George city area is the primary urban centre of the Municipality with 84% of the municipal area's population located in the city. According to the Western Cape Government/Statistics SA, in 2011 the total population for George was estimated at 193 672. The 2016 Community Household Survey estimated George's total population to be 204,197 people or 61,441 households. The GMSDF of 2019 (George Municipal Spatial Development Framework, 2019) projected that the population will grow to 248,779 people by 2023, however, according to the 2022 Census, the population far surpassed the prediction with a total population of 294,929 (in 2022). The Gwaing WWTW site and the BBF site is located near Groeneweide Park. The Groeneweide north area provides opportunity for a mixed use, high intensity development, to be a suitable interface between proposed and existing uses.
8.2.	Explain the socio-economic value/contribution of the proposed development.

A conceptual-level estimate of the four phases of the Master Plan was compiled. The estimate was based on rates from similar projects completed in recent years with relevant escalation values. All values are current values, although the project will extend over several years, the values exclude any contract price adjustment (CPA). All costs are shown excluding VAT.

Combined Cost Estimate - 2025 Rates	TOTAL COST 50 MLD	BBF Construction	Phase A - 13.2 MLD UCT	Phase B - 22 MLD UCT	Phase C	Phase D
Civil Cost Estimate	R 848 440 684.35	R 164 360 845	R 101 763 309	R 284 721 621	R 175 145 801	R 122 449 108
M&E Cost Estimate	R 796 885 657.02	R 75 240 000	R 67 706 766	R 338 034 717	R 160 818 718	R 155 085 456
TOTAL Excl VAT:	**R 1 645 326 341**	**R 239 600 845**	**R 169 470 075**	**R 622 756 338**	**R 335 964 520**	**R 277 534 563**

Figure 48: Combined civil and M&E capital cost estimate

Parameter	BBF (2028)	Phase A&B (2028)	Phase C (2041)	Phase D (2051)
Capacity (MLD)		22	33	50
Polymer				
Cost/day (R/d)		R1 656.66	R2 470.01	R2 173.27
R/a - 2025		R604 680.69	R901 555.17	R793 245.23
R/annum in future value *		R720 184.38	R2 427 683.24	R3 825 302.93
*** in the year shown in the column heading**				

Figure 49: Annual Chemical Costs (Polymer

Parameter	BBF (2028)	Phase A&B (2028)	Phase C (2041)	Phase D (2051)
Capacity (MLD)		22	33	50
Cost/day (R/d)	R20 865.60	R74 538.65	R104 237.08	R113 726.52
R/a – 2025	R7 615 944.00	R27 206 606.27	R38 046 532.62	R41 510 180.54
R/annum in future value *	R9 070 711.16	R33 862 106.13	R63 051 564.78	R79 754 473.26
* in the year shown in the column heading				

Figure 50: Annual Electrical Costs

Parameter	BBF (2028)	Phase A&B (2028)	Phase C (2041)	Phase D (2051)
Capacity (MLD)		22	33	50
R/a - 2025	R2 772 208.45	R9 950 971.54	R14 114 710.33	R17 665 483.24
R/annum in future value *	R3 301 744.62	R11 851 766.32	R23 736 488.97	R41 886 927.63
* in the year shown in the column heading				

Figure 51: Annual Maintenance costs

Social value:

- Creation of employment opportunities: The direct employment opportunities associated with the operational phase of this project are relatively limited. However, most employment will be in the construction phase.
- The upgrades will increase the pumping capacity and resilience of the sewerage network which will benefit the George community.

8.3.	Explain what social initiatives will be implemented by applicant to address the needs of the community and to uplift the area.

This proposal is going to address the needs of the community and provide jobs to locals during the construction phase and operational phase. The upgrading of the Gwaing WWTW will also allow more capacity in the sewage system for new developments in George.

8.4.	Explain whether the proposed development will impact on people's health and well-being (e.g. in terms of noise, odours, visual character and sense of place etc) and how has this influenced the proposed development.

The Gwaing Wastewater Treatment works is currently receiving a total average dry weather flow (ADWF) of 10 MLD per day. The plant is operating over capacity. In addition, the population growth rate in George makes the extension of the wastewater treatment works a priority. Therefor it will benefit the community's well-being and health as overflowing WWTW's pose a serious health risk.

Impacts will be temporary in nature and limited to the construction phase. Since the proposal entails to upgrade the existing WWTW facility, the sense of place will not be disturbed.

SECTION H: ALTERNATIVES, METHODOLOGY AND ASSESSMENT OF ALTERNATIVES

1. Details of the alternatives identified and considered

1.1.	Property and site alternatives to avoid negative impacts, mitigate unavoidable negative impacts and maximise positive impacts.

Provide a description of the preferred property and site site alternative.

The Gwaing Wastewater Treatment Works is located on Remainder of Erf 464 near Groeneweide Park. As the existing WWTW will be upgraded, no property or site alternatives for this site exists.

The preferred site for the BBF is also located on RE/464, east of the WWTW site on the proposed Gwayang precinct erf 57, 59, 61 and 63, now consolidated to form erf 73.

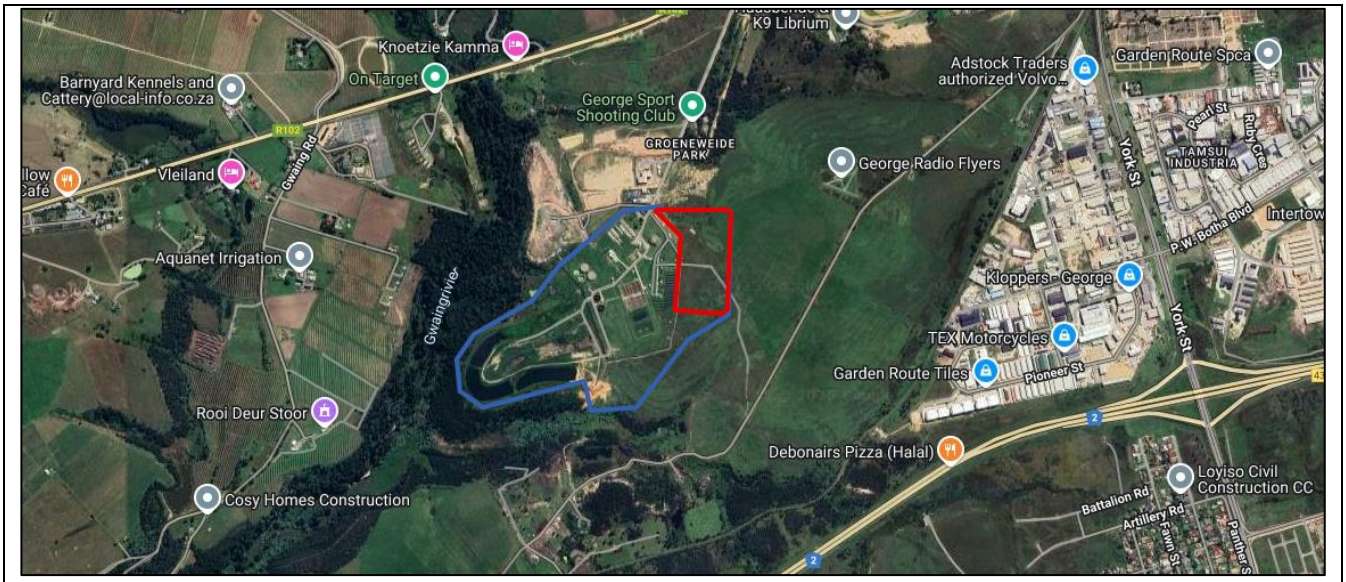


Figure 52: Blue-Gwaing WWTW Site, Red - BBF Site located on RE/464

Provide a description of any other property and site alternatives investigated.

No property or site alternatives are being investigated for the Gwaing WWTW site as the proposal is for the upgrade of an existing facility, and it will not make sense to move the whole site somewhere else.

Two site alternatives were considered for the BBF. The blue area had the advantages that it is less constrained than the pink area (due to ponds) and it is more easily accessible by road. The pink and blue area is municipal land for which approval could be obtained more readily. The George Municipality ultimately decided to go with the preferred location mentioned above.

Figure 53 BBF site alternatives investigated

Provide a motivation for the preferred property and site alternative including the outcome of the site selectin matrix.

No property or site alternatives are being investigated for the Gwaing WWTW site as the proposal is for the upgrade of an existing facility, and it will not make sense to move the whole site somewhere else.

Two site alternatives were considered for the BBF as shown in Figure 53 above. After discussion between different departments in the George Municipality, the size requirement of the BBF and the ground composition the applicant decided to go with the preferred location for the BBF site shown in Figure 52

Provide a full description of the process followed to reach the preferred alternative within the site.

Not applicable

Provide a detailed motivation if no property and site alternatives were considered.

No property or site alternatives are being investigated for the Gwaing WWTW site as the proposal is for the upgrade of an existing facility, and it will not make sense to move the whole site somewhere else.

List the positive and negative impacts that the property and site alternatives will have on the environment.

The preferred BBF site results in a loss of undeveloped land, while the pink area indicated in Figure 45 was on developed land. All three sites are disturbed.

1.2.	Activity alternatives to avoid negative impacts, mitigate unavoidable negative impacts and maximise positive impacts.

Provide a description of the preferred activity alternative.

The preferred activity is to upgrade the Gwaing WWTW facility to receive 50 MLD (UCT) for average dry weather flow and construct the BBF.

Provide a description of any other activity alternatives investigated.

No other activity has been investigated.

Provide a motivation for the preferred activity alternative.

Not applicable

Provide a detailed motivation if no activity alternatives exist.

Not applicable

List the positive and negative impacts that the activity alternatives will have on the environment.

Not applicable

1.3.	Design or layout alternatives to avoid negative impacts, mitigate unavoidable negative impacts and maximise positive impacts

Provide a description of the preferred design or layout alternative.

1. The preferred and only layout alternative is to upgrade the existing Gwaing WWTW and construct the BBF. Please refer to Section E 1 for a description of the proposed upgrades. Please note that the donga upgrades shown in the figure below does not form part of this project as it was recently completed, not listed and not directly related to the proposed WWTW upgrades and the work was completed in July 2025.

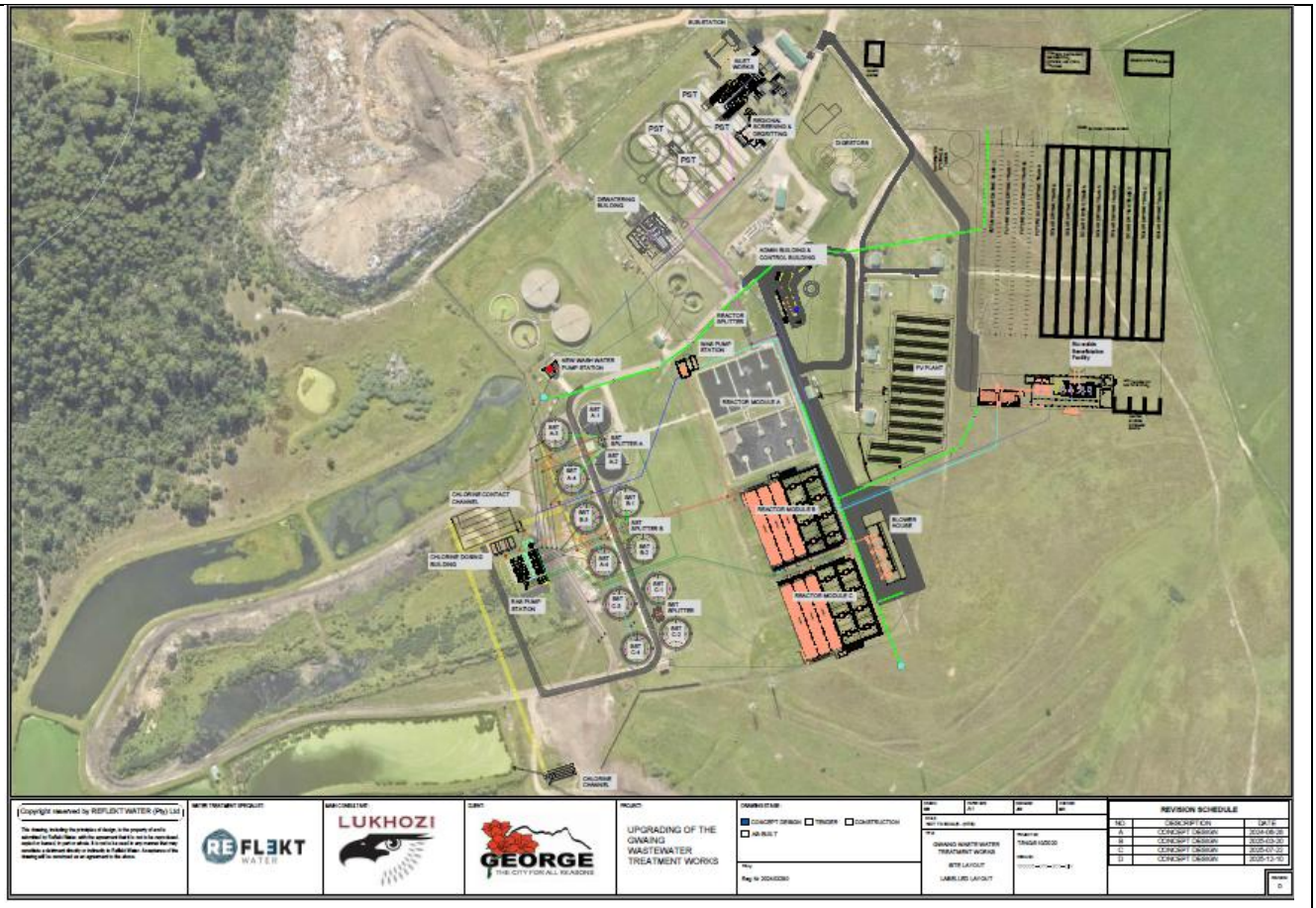


Figure 54: Gwaing upgrades Site layout

2. Two options were investigated for Phase B of the upgrade. The first option is implementing an additional reactor and operating a UCT system with unsettled wastewater. The second option is to implement primary settling (including all primary sludge handling) and operate a UCT settled process with the existing Reactor A. Option 1 is the preferred option for Phase B. Please refer to the master Plan (Appendix G7) for more details.

3. The effluent standards required by the WULA are of such a nature that an activated sludge treatment process is required. The two processes considered in this design are the Modified Ludzack-Ettinger (MLE) process and the UCT process. All upgrades and phases leading up to the Master Plan design are designed with the option of operating it as a UCT or MLE process. Additional process configurations such as the modified UCT process and the Johannesburg process will also be included without the need for more equipment or infrastructure. Please refer to the master Plan (Appendix G7) for more details.

Provide a description of any other design or layout alternatives investigated.

1. No layout alternatives exist.

2. Two options were investigated for Phase B of the upgrade. The first option is implementing an additional reactor and operating a UCT system with unsettled wastewater. The second option is to implement primary settling (including all primary sludge handling) and operate a UCT settled process with the existing Reactor A. Option 1 is the preferred option for Phase B. Please refer to the master Plan (Appendix G7) for more details.

3. The effluent standards required by the WULA are of such a nature that an activated sludge treatment process is required. The two processes considered in this design are the Modified Ludzack-Ettinger (MLE) process and the UCT process. All upgrades and phases leading up to the

Master Plan design are designed with the option of operating it as a UCT or MLE process. Additional process configurations such as the modified UCT process and the Johannesburg process will also be included without the need for more equipment or infrastructure. Please refer to the master Plan (Appendix G7) for more details.

Provide a motivation for the preferred design or layout alternative.

1. No layout alternatives exist.

2. Option 1 was chosen for Phase B. Please refer to pages 147-149 of Appendix G7 for the optioneering exercise which was conducted to compare key attributes between Option 1 and Option 2 for Phase B of the upgrades.

3. The current water use licence does not have a strict effluent phosphorus requirement; however, it needs to be considered that the effluent requirements for phosphorus may become stricter in future years. Even if it does not, it will be good for the receiving water body to limit effluent phosphate as far as possible since it is the limiting nutrient for eutrophication. As a result of this eventuality, all upgrades and phases leading up to the Master Plan design are designed with the option of operating it as a UCT or MLE process. Additional process configurations such as the modified UCT process and the Johannesburg process will also be included without the need for more equipment or infrastructure.

Provide a detailed motivation if no design or layout alternatives exist.

Not applicable

List the positive and negative impacts that the design alternatives will have on the environment.

The design alternatives will not have an impact on the environment only on engineering aspects.

1.4.	Technology alternatives (e.g., to reduce resource demand and increase resource use efficiency) to avoid negative impacts, mitigate unavoidable negative impacts and maximise positive impacts.

Provide a description of the preferred technology alternative:

The preferred technology of the proposed upgrades was carefully selected by the applicant in consultation with the Engineers to match the specific demands of the Gwaing WWTW while taking the physical constraints of the area into account.

Provide a description of any other technology alternatives investigated.

The preferred technology of the proposed upgrades was carefully selected by the applicant in consultation with the Engineers to match the specific demands of the Gwaing WWTW while taking the physical constraints of the area into account.

Provide a motivation for the preferred technology alternative.

Not applicable

Provide a detailed motivation if no alternatives exist.

Not applicable

List the positive and negative impacts that the technology alternatives will have on the environment.

Not applicable

1.5.	Operational alternatives to avoid negative impacts, mitigate unavoidable negative impacts and maximise positive impacts.

Provide a description of the preferred operational alternative.

Two sludge disposal option were investigated. Option 1: Producing fertiliser is the preferred disposal method.

Provide a description of any other operational alternatives investigated.

Disposing sludge as compost was investigated as option 2.

Provide a motivation for the preferred operational alternative.

Presently the decision is not to pursue composting as a direct option for the beneficiation of the Gwaing WWTW sludge. However, with the implementation of a solar drying facility that achieves a class A1a sludge, the dried sludge will be more palatable for composting plants and end users, and it is foreseen that the sludge could be sold or given to these facilities as an alternative option to fertilizer production.

Provide a detailed motivation if no alternatives exist.

Not applicable

List the positive and negative impacts that the operational alternatives will have on the environment.	
Not applicable.	
1.6.	The option of not implementing the activity (the 'No-Go' Option).
Provide an explanation as to why the 'No-Go' Option is not preferred.	
The effluent will become non-compliant due to the expected population growth and result in negative impacts upon aquatic biodiversity and developments relying on the Gwaing WWTW will not be able to move forward causing a decline in developments.	
1.7.	Provide and explanation as to whether any other alternatives to avoid negative impacts, mitigate unavoidable negative impacts and maximise positive impacts, or detailed motivation if no reasonable or feasible alternatives exist.
Not Applicable	
1.8.	Provide a concluding statement indicating the preferred alternatives, including the preferred location of the activity.
The preferred site is located on Remainder of Erf 464, George Western Cape. The preferred activity is to upgrade the Gwaing WWTW facility to receive 50 MLD UCT and 68 MLD MLE for average dry weather flow and construct the BBF. Please refer to section E 1.	

2. "No-Go" areas

Explain what "no-go" area(s) have been identified during identification of the alternatives and provide the co-ordinates of the "no-go" area(s).
The construction activities a required to upgrade the outlet structure may result in a disturbance or loss of aquatic vegetation and habitat due to the proximity of the HGM 2 wetland. This refers to the direct physical destruction or disturbance of aquatic habitat caused by earthworks, vegetation clearing, and encroachment and colonisation of habitat by invasive alien plants. For this reason, the HGM 2 Wetland is considered a No-Go area when upgrading the outlet structure. Please note that the No-Go area, as indicated below, will be altered due to the compensation work to be implemented. For this project aquatic buffer zones are not applicable. The upgrades are confined to existing infrastructure or transformed land within the current boundary of the Gwaing WWTW. Therefore, determining an aquatic buffer zone is unnecessary. The only potential for physical habitat disturbance is at the outlet structure. It is recommended that any upgrades to this infrastructure avoid encroaching further into the wetland, unless specified in a rehabilitation plan. Since the outlet is already on the wetland boundary, establishing a buffer zone would not be practical. It is more practical to adopt a No-Go Area around the wetland habitat by the outlet structure. The designated no-go area applies specifically to the outlet construction works and the immediate surrounding area required to protect sensitive environmental features associated with the outlet. The proposed voluntary compensation through rehabilitation measures will be implemented across the broader project footprint where disturbances to the environment may occur. These measures will serve to minimise potential environmental impacts, ensure that disturbance is limited in extent and duration, and promote the rehabilitation of affected areas to a stable and functional condition post-construction.

Figure 55 Map indicating No-go Area when upgrading the outlet structure

3. Methodology to determine the significance ratings of the potential environmental impacts and risks associated with the alternatives.

Describe the methodology to be used in determining and ranking the nature, significance, consequences, extent, duration of the potential environmental impacts and risks associated with the proposed activity or development and alternatives, the degree to which the impact or risk can be reversed and the degree to which the impact and risk may cause irreplaceable loss of resources.

The assessment criteria utilised in this environmental impact assessment is based on, and adapted from, the Guideline on Impact Significance, Integrated Environmental Management Information Series 5 (Department of Environmental Affairs and Tourism (DEAT), 2002) and the Guideline 5: Assessment of Alternatives and Impacts in Support of the Environmental Impact Assessment Regulations (DEAT, 2006).

Determination of Extent (Scale):

Site specific	On site or within 100 m of the site boundary, but not beyond the property boundaries.
Local	The impacted area includes the whole or a measurable portion of the site and property, but could affect the area surrounding the development, including the neighbouring properties and wider municipal area.
Regional	The impact would affect the broader region (e.g., neighbouring towns) beyond the boundaries of the adjacent properties.
National	The impact would affect the whole country (if applicable).

Determination of Duration:

Temporary	The impact will be limited to the construction phase.

Short term	The impact will either disappear with mitigation or will be mitigated through a natural process in a period shorter than 8 months after the completion of the construction phase.
Medium term	The impact will last up to the end of the construction phase, where after it will be entirely negated in a period shorter than 3 years after the completion of construction activities.
Long term	The impact will continue for the entire operational lifetime of the development but will be mitigated by direct human action or by natural processes thereafter.
Permanent	This is the only class of impact that will be non-transitory. Such impacts are regarded to be irreversible, irrespective of what mitigation is applied.

Determination of Probability:

Improbable	The possibility of the impact occurring is very low, due either to the circumstances, design or experience.
Probable	There is a possibility that the impact will occur to the extent that provisions must therefore be made.
Highly probable	It is most likely that the impacts will occur at some stage of the development. Plans must be drawn up to mitigate the activity before the activity commences.
Definite	The impact will take place regardless of any prevention plans.

Determination of Significance (without mitigation):

No significance	The impact is not substantial and does not require any mitigation action.
Low	The impact is of little importance but may require limited mitigation.
Medium	The impact is of sufficient importance and is therefore considered to have a negative impact. Mitigation is required to reduce the negative impacts to acceptable levels.
Medium-High	The impact is of high importance and is therefore considered to have a negative impact. Mitigation is required to manage the negative impacts to acceptable levels.
High	The impact is of great importance. Failure to mitigate, with the objective of reducing the impact to acceptable levels, could render the entire development option or entire project proposal unacceptable. Mitigation is therefore essential.
Very High	The impact is critical. Mitigation measures cannot reduce the impact to acceptable levels. As such the impact renders the proposal unacceptable.

Determination of Significance (with mitigation):

No significance	The impact will be mitigated to the point where it is regarded to be insubstantial.
Low	The impact will be mitigated to the point where it is of limited importance.
Medium	Notwithstanding the successful implementation of the mitigation measures, the impact will remain of significance. However, taken within the overall context of the project, such a persistent impact does not constitute a fatal flaw.
High	Mitigation of the impact is not possible on a cost-effective basis. The impact continues to be of great importance, and taken within the overall context of the project, is considered to be a fatal flaw in the project proposal.

Determination of Reversibility:

Completely Reversible	The impact is reversible with implementation of minor mitigation measures
Partly Reversible	The impact is partly reversible but more intense mitigation measures
Barely Reversible	The impact is unlikely to be reversed even with intense mitigation measures
Irreversible	The impact is irreversible, and no mitigation measures exist

Determination of Degree to which an Impact can be Mitigated:

Can be mitigated	The impact is reversible with implementation of minor mitigation measures
Can be partly mitigated	The impact is partly reversible but more intense mitigation measures
Can be barely mitigated	The impact is unlikely to be reversed even with intense mitigation measures
Not able to mitigate	The impact is irreversible, and no mitigation measures exist

Determination of Loss of Resources:

No loss of resource	The impact will not result in the loss of any resources
Marginal loss of resource	The impact will result in marginal loss of resources
Significant loss of resources	The impact will result in significant loss of resources
Complete loss of resources	The impact will result in a complete loss of all resources

Determination of Cumulative Impact:

Negligible	The impact would result in negligible to no cumulative effects
Low	The impact would result in insignificant cumulative effects
Medium	The impact would result in minor cumulative effects
High	The impact would result in significant cumulative effects

Determination of Consequence significance:

Negligible	The impact would result in negligible to no consequences
Low	The impact would result in insignificant consequences
Medium	The impact would result in minor consequences
High	The impact would result in significant consequences

4. Assessment of each impact and risk identified for each alternative

Note: The following table serves as a guide for summarising each alternative. The table should be repeated for each alternative to ensure a comparative assessment. The EAP may decide to include this section as Appendix J to this BAR.

Development/Construction Phase Impacts

Alternative:	**Preferred alternative A**	**No-Go Alternative**
PLANNING, DESIGN AND DEVELOPMENT PHASE		
DISTURBANCE OF AQUATIC HABITAT BIOTA		

Potential impact and risk:	DISTURBANCE OF AQUATIC HABITAT BIOTA FROM CLEARANCE OF VEGETATION, EARTHWORKS, AND FURTHER INVASIVE ALIEN PLANT INFESTATION, WHICH CAN RESULT IN FURTHER DETERIORATION IN FRESHWATER ECOSYSTEM INTEGRITY, AND A REDUCTION IN THE SUPPLY OF ECOSYSTEM SERVICES	
Nature of impact:	Negative	None
Extent and duration of impact:	• Long term • Limited extent	None
Consequence of impact or risk:	Low - Impacts would result in low consequences.	
Probability of occurrence:	Probable	
Degree to which the impact may cause irreplaceable loss of resources:	Marginal loss	
Degree to which the impact can be reversed:	Barely Reversible	
Indirect impacts:	Probable	
Cumulative impact prior to mitigation:	Medium	
Significance rating of impact prior to mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	**Low (-)**	
Degree to which the impact can be avoided:	High	
Degree to which the impact can be managed:	High	
Degree to which the impact can be mitigated:	Can be mitigated	
Proposed mitigation:	See below	Duty of Care- Alien clearing and pollution control.
Residual impacts:	Negligible	
Cumulative impact post mitigation:	Low	
Significance rating of impact after mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	**Low (-)**	**None**

Recommended mitigation measures:

- A construction method statement must be compiled and available on site. It must consider the no go area and include methods to avoid unnecessary disturbance and prevent material being washed downslope into the wetland.
- Any contractor found working within No-Go areas must be fined as per fining schedule/system setup for the project.
- It is the contractor's responsibility to continuously monitor the area for newly established alien species during the contract and establishment period, which if present must be removed. Removal of these species shall be undertaken in a way which prevents any damage to the remaining indigenous species and inhibits the reinfestation of the cleaned areas. Any use of herbicides in removing alien plant species is required to be investigated by the ECO before use.
- Where vegetation has been cleared in the buffer and open ground in the riparian area has resulted it is recommended that cover components be reinstated appropriately. Only indigenous species are to be considered.
- Monitoring by an independent ECO during construction in the outlet area.

Alternative:	Preferred alternative A	No-Go Alternative
PLANNING, DESIGN AND DEVELOPMENT PHASE		

LOSS OF ARTIFICIAL DEPRESSION FOR THE BFF		
Potential impact and risk:	**LOSS OF ARTIFICIAL WETLAND HABITAT**	
Nature of impact:	Negative	None
Extent and duration of impact:	• Permanent • Site specific	None
Consequence of impact or risk:	Low	
Probability of occurrence:	Definite	
Degree to which the impact may cause irreplaceable loss of resources:	Irreplaceable loss	
Degree to which the impact can be reversed:	Irreversible	
Indirect impacts:	None	
Cumulative impact prior to mitigation:	Medium	
Significance rating of impact prior to mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	**Low (-)**	
Degree to which the impact can be avoided:	None	
Degree to which the impact can be managed:	None	
Degree to which the impact can be mitigated:	Can be mitigated	
Proposed mitigation:	• Implement rehabilitation efforts in nearby aquatic habitat to compensate for loss of artificial depression. • Appropriate stormwater management and prevention of hillslope erosion surrounding the facility	Duty of Care- Alien clearing and pollution control
Residual impacts:	Negligible	
Cumulative impact post mitigation:	Low	
Significance rating of impact after mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	**Low (-)**	**None**

Alternative:	**Preferred alternative A**	**No-Go Alternative**
PLANNING, DESIGN AND DEVELOPMENT PHASE		
IMPACT ON CAPITAL EXPENDITURE DUE TO CONSTRUCTION COSTS		
Potential impact and risk:	**IT IS ANTICIPATED THAT CONSTRUCTION RELATED COSTS FOR PHASES A AND B WILL BE IN THE REGION OF R775 895 413**	
Nature of impact:	Positive	No Impact
Extent and duration of impact:	• Local • Short – long term	
Consequence of impact or risk:	Capital influx for businesses involved and knock on effect as the businesses that will supply services and materials for the development will benefit from the capital influx and job creation.	

Probability of occurrence:	Definite	
Degree to which the impact may cause irreplaceable loss of resources:	No loss of resource	
Degree to which the impact can be reversed:		No impact
Indirect impacts:	Growth for business involved in the development and general influx of capital into the construction sector support industries	
Cumulative impact prior to mitigation:		
Significance rating of impact prior to mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	**Low-medium (+)**	**No Impact**
Degree to which the impact can be avoided:		
Degree to which the impact can be managed:	Can be managed by encouraging proponent to support local business	
Degree to which the impact can be mitigated:	Support of local businesses can be encouraged but not guaranteed.	
Proposed mitigation:	Local business should be supported as far as possible	
Residual impacts:	Certain services or materials may need to be sourced from outside of the George Municipal area	
Cumulative impact post mitigation:		
Significance rating of impact after mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	**Medium (+)**	**No Impact**

Alternative:	**Preferred alternative A**	**No-Go Alternative**
PLANNING, DESIGN AND DEVELOPMENT PHASE		
IMPACT GENERATED BY CONSTRUCTION ACTIVITIES		
Potential impact and risk:	**CONSTRUCTION RELATED NOISE**	
Nature of impact:	Negative	No Impact
Extent and duration of impact:	• Local • Temporary	
Consequence of impact or risk:	Negligible • Frustrations and disruptions experienced by surrounding landowners	
Probability of occurrence:	Definite	
Degree to which the impact may cause irreplaceable loss of resources:	No loss of resource	
Degree to which the impact can be reversed:	High	No impact
Indirect impacts:	None identified	
Cumulative impact prior to mitigation:	Low	
Significance rating of impact prior to mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	**Negligible (-)**	**No Impact**
Degree to which the impact can be avoided:	Not avoidable	
Degree to which the impact can be managed:	Medium	
Degree to which the impact can be mitigated:	Medium	

Proposed mitigation:	• Restricting construction activities to weekdays from 8am to 5pm • There are no nearby noise receptors (such as residential or office blocks) and as such no mitigation is required.	
Residual impacts:	Non-identified	
Cumulative impact post mitigation:	•	
Significance rating of impact after mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	**Negligible (-)**	**No Impact**

Alternative:	**Preferred alternative A**	**No-Go**
PLANNING, DESIGN AND DEVELOPMENT PHASE		
IMPACT GENERATED BY CONSTRUCTION ACTIVITIES		
Potential impact and risk:	**Temporary Job creation –** The development phase is expected to provide jobs for unskilled and skilled labourers.	
Nature of impact:	Positive	No Impact
Extent and duration of impact:	Local and Temporary	
Consequence of impact or risk:	Medium • Temporary income for those employed during the construction phase • Skill building for first time construction labourers	
Probability of occurrence:	Definite	
Degree to which the impact may cause irreplaceable loss of resources:	Not Applicable	
Degree to which the impact can be reversed:	Not Applicable	
Indirect impacts:	Quality of life for labourers is temporarily uplifted Capital influx for households	
Cumulative impact prior to mitigation:	Not Applicable	
Significance rating of impact prior to mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)		
Degree to which the impact can be avoided:		
Degree to which the impact can be managed:		
Degree to which the impact can be mitigated:		
Proposed mitigation:		
Residual impacts:		
Cumulative impact post mitigation:		
Significance rating of impact after mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	**Medium (+)**	

Operational Phase Impacts

Alternative:	**Preferred alternative A**	**No-Go Alternative**

PLANNING, DESIGN AND DEVELOPMENT PHASE		
IMPACT CHANGES TO THE HYDROLOGICAL REGIME		
Potential impact and risk:	**INCREASE IN WATER INPUTS RESULTING IN CHANGES TO HYDROLOGICAL FORM AND FUNCTION. THE IMPACT CAN RESULT IN FURTHER DETERIORATION IN FRESHWATER ECOSYSTEM INTEGRITY, AND A REDUCTION IN THE SUPPLY OF ECOSYSTEM SERVICES.**	
Nature of impact:	Negative	None
Extent and duration of impact:	• Permanent • Regional	None
Consequence of impact or risk:	Medium	
Probability of occurrence:	Definite	
Degree to which the impact may cause irreplaceable loss of resources:	Partial loss	
Degree to which the impact can be reversed:	Partly Reversible	
Indirect impacts:	Probable	
Cumulative impact prior to mitigation:	Medium	
Significance rating of impact prior to mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	**Medium (-)**	
Degree to which the impact can be avoided:	Low	
Degree to which the impact can be managed:	High	
Degree to which the impact can be mitigated:	Can be barely mitigated	
Proposed mitigation:	See below	Duty of Care- Alien clearing and pollution control.
Residual impacts:	Low	
Cumulative impact post mitigation:	Low	
Significance rating of impact after mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	**Low (-)**	**None**

Recommended Mitigation Measures:

- Effluent from the Gwaing WWTW can in future be pumped to neighbouring industries or golf courses for non-potable use. Alternatively, it can be further treated together with the effluent from Outeniqua WWTW before it is pumped to the Garden Route Dam as part of an indirect potable reuse scheme.
- Effluent will be recycled and pressurized on-site in a wash water ring main for various uses including irrigation, reducing the potable water demand of the WWTW.
- Controlled Discharges: Regulating the timing and volume of discharges can help mimic natural flow regimes and reduce hydrological disruptions, especially during flood events.
- Habitat Restoration: Restoring and protecting natural habitats can enhance the river's resilience to changes in water flow and quality.

Construction and Operational Phase Impacts

Alternative:	**Preferred alternative A**	**No-Go Alternative**
CONSTRUCTION AND OPERATIONAL PHASE		
IMPACT SEDIMENTATION AND EROSION		
Potential impact and risk:	**FROM DISCHARGE WATER: CHANGES TO HYDROLOGICAL REGIMES THAT COULD ALSO LEAD TO SEDIMENTATION AND EROSION.FROM HILLSLOPE EROSION AND EROSION AT OUTLET: CONCENTRATED STORMWATER FLOW PATHS AND ALTERED FLOW PATTERNS CAUSING INCREASED EROSION AND SEDIMENTATION AS THE DISTURBED SOILS ARE CARRIED BY UNMANAGED**	

	SURFACE RUNOFF DOWN SLOPE. THESE IMPACTS CAN RESULT IN THE DETERIORATION OF AQUATIC ECOSYSTEM INTEGRITY AND A REDUCTION/LOSS OF HABITAT FOR FLORA & FAUNA.	
Nature of impact:	Negative	None
Extent and duration of impact:	• Long-term • Regional	None
Consequence of impact or risk:	High	
Probability of occurrence:	Probable	
Degree to which the impact may cause irreplaceable loss of resources:	Partial loss	
Degree to which the impact can be reversed:	Partly Reversible	
Indirect impacts:	Probable	
Cumulative impact prior to mitigation:	Medium	
Significance rating of impact prior to mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	**Medium (-)**	
Degree to which the impact can be avoided:	Medium	
Degree to which the impact can be managed:	High	
Degree to which the impact can be mitigated:	Can be mitigated	
Proposed mitigation:	See below	Duty of Care- Alien clearing and pollution control.
Residual impacts:	Low	
Cumulative impact post mitigation:	Low	
Significance rating of impact after mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	**Low (-)**	**None**

Recommended mitigation measures:

- Efficient site stormwater management
- Stabilise any erosion features upslope of watercourses and do not concentrate flows into wetland
- Prevent erosion at outlet and design upgraded structure accordingly
- Do not encroach into wetland habitat with excavations or drains
- The volume and velocity of water must be reduced through discharging the surface flow at multiple locations surrounding the WWTWs. Effective stormwater management must include effective stabilisation of exposed soil.
- Sedimentation must be minimised with appropriate measures. Any construction causing bare slopes and surfaces to be exposed to the elements must include measures to protect against erosion using covers, silt fences, sandbags, earthen berms etc.

Alternative:	**Preferred alternative A**	**No-Go Alternative**
CONSTRUCTION AND OPERATIONAL PHASE		
IMPACT CHANGES TO WATER QUALITY		
Potential impact and risk:	**WATER CONTAMINATION OF WETLAND DURING OUTLET UPGRADES IN CONSTRUCTION PHASE. ALTERED WATER QUALITY FROM DISCHARGING MORE TREATED EFFLUENT FROM WWTW IN OPERATIONAL PHASE**	
Nature of impact:	Negative	None
Extent and duration of impact:	• Permanent • Regional	None

Consequence of impact or risk:	High	
Probability of occurrence:	Improbable	
Degree to which the impact may cause irreplaceable loss of resources:	Partial loss	
Degree to which the impact can be reversed:	Partly Reversible	
Indirect impacts:	Probable	
Cumulative impact prior to mitigation:	High	
Significance rating of impact prior to mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	**Medium - High (-)**	
Degree to which the impact can be avoided:	Low	
Degree to which the impact can be managed:	High	
Degree to which the impact can be mitigated:	Can be partly mitigated	
Proposed mitigation:	See below	Duty of Care- Alien clearing and pollution control.
Residual impacts:	Low	
Cumulative impact post mitigation:	Medium	
Significance rating of impact after mitigation (e.g. Low, Medium, Medium-High, High, or Very-High)	**Low (-)**	**None**

Recommended mitigation measures:

- Ensure that the WWTW complies with all relevant water quality standards and regulations. Regular inspections and audits by regulatory authorities can enforce compliance and identify any areas needing improvement.
- Habitat restoration of the HGM 2 wetland through alien plant eradication and halting erosion.
- Using the recommended settled UCT system from Concept Design Report, as this process produces much lower orthophosphate levels.
- Upgrading the treatment processes. For example, the use of ultraviolet (UV) disinfection, as recommended in Concept Design report, will assist with effluent water quality management.
- The reuse of the effluent, recommended above, will also contribute to mitigating against cumulative water quality change impacts.
- The Department of Water Affairs regional office should be notified, as soon as possible, of any significant chemical spill or leakage to the environment where there is the potential to contaminate surface water or groundwater.
- Effluent Standards: Enforcing stricter effluent discharge standards and regular monitoring can ensure that only high-quality effluent is released into SWSAs, minimizing negative impacts on water quality and ecosystem health.
- Implement continuous monitoring systems to regularly check the quality of the treated effluent
- Establish strict maintenance protocols to ensure that all treatment equipment and infrastructure are functioning optimally, preventing any bypass or failure in the treatment process.
- Develop and implement emergency response plans to address accidental discharges or treatment failures. This includes having backup systems in place and protocols for immediate action to contain and mitigate any potential impacts on the river.
- Provide incentives for WWTWs that consistently meet or exceed water quality standards.
- Require industrial facilities to pretreat their wastewater before discharging it into municipal systems, reducing the load of contaminants entering the WWTW.
- Improve sludge management to reduce the amount of sludge stockpiles on unlined ground.

SECTION I: FINDINGS, IMPACT MANAGEMENT AND MITIGATION MEASURES

1.	Provide a summary of the findings and impact management measures identified by all Specialist and an indication of how these findings and recommendations have influenced the proposed development.

Table 7 below summarises the potential Impacts associated with the proposal. Please refer to the Section I (2) for the proposed mitigation measures to ensure the corresponding rating post mitigation. The findings of the Specialists have been taken into consideration in this BAR and the impact management measures identified by all the Specialists have been incorporated into the EMPr where appropriate and will thus ensure that, through the implementation of the EMPr that the potential impacts are mitigated to the significance ratings as shown in Table 7 and that impacts to the environment for the proposal are minimised and that the proposal is undertaken in a sustainable manner.

Table 7: Summary of the Impacts Post Mitigation

Impact	Preferred Alternative	No-Go Alternative
Construction Phase		
Noise	Negligible (-)	No impact
Temporary job creation	Medium (+)	No impact
Capital expenditure	Medium (+)	No impact
Changes to water quality	Low (-)	No impact
Sedimentation and erosion	Low (-)	No impact
Disturbance of aquatic habitat biota	Low (-)	No impact
Loss of artificial depression wetland for the BBF	Low (-)	No impact
Operational Phase		
Change to water quality	Low (-)	No impact
Sedimentation and erosion	Low (-)	No impact
Changes to hydrological regime	Low (-)	No impact

All impact management measures that were identified by all the Specialists have been included in the EMPr.

Key findings by Groundwater Specialist:
The monitoring boreholes at the George WWTWs were drilled via conventional air percussion methods and constructed to ensure integrity as monitoring boreholes. The boreholes were subjected to a baseline groundwater monitoring and sampling event and the laboratory results returned indicated long term seepage into the clayey weathered granites that underlies both the George WWTWs process and containment facilities.

Groundwater at the sites flows in a south, south-easterly and south-westerly direction toward the Skaapkop River for Outeniqua WWTW and in a mainly south-westerly direction towards the Gwaing River for Gwaing WWTW. The calculated groundwater flow gradient for the aquifers across both sites ranged between 0.02 and 0.023.

Parsons (2017) noted, from hydrocensus information, the absence of boreholes actively being used by neighbouring properties in the vicinities of both George WWTWs. The closest boreholes where north of the current site, while groundwater flows to the south.

Therefore, no groundwater users exist downstream of the sites that can be impacted. The main environmental impact from the GWWTWs remains the long-term seepage from the facilities into the sub-surface and discharge in the weathered zone of the nearby rivers. The groundwater monitoring programme should be implemented on a quarterly basis and scheduled accordingly to ensure regular intervals.

Recommended mitigation measures by Groundwater specialist:

Groundwater monitoring is essential for measuring any changes in water levels and / or chemical indicators to show changes in the groundwater system that should trigger a mitigation response.

The George WULs mandated the development of a groundwater monitoring programme, at each facility, to determine the impacts on the groundwater system. The George WULs requires that the monitoring information be made available to the DWS upon written request or inspection. However, it is recommended that a qualified hydrogeologist evaluate the data and make the necessary adjustments to the monitoring programme after the first year's monitoring data is available. Reporting of results, including long-term trends, and recommendations of management actions would be to the benefit of the George Municipality for understanding current impacts and where facilities are likely to contribute more to environmental pollution versus other parts of the same facility.

Routine groundwater monitoring and sampling of the newly installed monitoring boreholes should include the following:

- On-site monitoring of water levels in the monitoring boreholes, including the date and time of the measurement taken. A manual water level device (dipmeter) is recommended; and
- Groundwater sampling and analyses of groundwater quality, including the date and time of each sample taken. Sampling methods include the following:

RECOMMENDED: Sampling utilising disposable bailers to avoid cross contamination or water-bearing monitoring boreholes can be purged using a <0.1 litre per second (l/s) pump to remove groundwater, until either three times of the volume of groundwater contained within the monitoring boreholes have been removed, or until the monitoring boreholes are pumped dry. This will aid in the removal of any stagnant water introduced into the boreholes. The sample should be collected prior to the end of pumping. Care should be taken to ensure that all equipment be de-contaminated between boreholes.

Key findings by Freshwater Specialist for the Gwaing WWTW Site:
Five watercourses were identified and mapped within a 500m radius of the proposed development. Due to the topography of the site resulting in surface runoff in a south westerly direction, and location of the WWTW outlet, it was determined that only the southern watercourse (mapped as HGM 2) has potential to be directly impacted by the upgrades. It can also be classified as a channelled valley bottom wetland. And although the Gwaing River would have supported vast wetland habitat in its natural state, it has been significantly modified from the reference condition and is presently typical of a riparian ecosystem. There is also potential for the downstream section of the Gwaing River (mapped as HGM 1) to be indirectly impacted by the project.

After reviewing the proposed activities and locations for upgrading the WWTW, and conducting in-field assessment, it was determined that the only realistic potential impacts from the project are associated with the construction at the outlet structure (as it is near the HGM 2 wetland) and the increase in effluent to be discharged from the WWTW in the operational phase. There are no immediate impacts associated with the No Go Alternative. However, it is highly likely that, should the plant not receive upgrades, the effluent will become non-compliant due to the expected population growth and result in negative impacts upon aquatic biodiversity.

It was determined that, after mitigation, the project is of Low negative significance to aquatic biodiversity. There is potential for positive impacts and risk avoidance. Therefore, from an aquatic perspective, the proposed project is deemed as acceptable. Any potential risks must be managed and mitigated to ensure that no deterioration to the water resource takes place. Monitoring should focus on adherence to the No-Go area, preventing erosion and pollution.

Recommended mitigation measures by Freshwater specialist:

- A construction method statement must be compiled and available on site. It must consider the no go area and include methods to avoid unnecessary disturbance and prevent material being washed downslope into the wetland.
- Any contractor found working within No-Go areas must be fined as per fining schedule/system setup for the project.

- It is the contractor's responsibility to continuously monitor the area for newly established alien species during the contract and establishment period, which if present must be removed. Removal of these species shall be undertaken in a way which prevents any damage to the remaining indigenous species and inhibits the reinfestation of the cleaned areas. Any use of herbicides in removing alien plant species is required to be investigated by the ECO before use.
- Where vegetation has been cleared in the buffer and open ground in the riparian area has resulted it is recommended that cover components be reinstated appropriately. Only indigenous species are to be considered.
- Monitoring by an independent ECO during construction in the outlet area.
- Effluent from the Gwaing WWTW can in future be pumped to neighbouring industries or golf courses for non-potable use. Alternatively, it can be further treated together with the effluent from Outeniqua WWTW before it is pumped to the Garden Route Dam as part of an indirect potable reuse scheme.
- Effluent will be recycled and pressurized on-site in a wash water ring main for various uses including irrigation, reducing the potable water demand of the WWTW.
- Controlled Discharges: Regulating the timing and volume of discharges can help mimic natural flow regimes and reduce hydrological disruptions, especially during flood events.
- Habitat Restoration: Restoring and protecting natural habitats can enhance the river's resilience to changes in water flow and quality.
- Efficient site stormwater management
- Stabilise any erosion features upslope of watercourses and do not concentrate flows into wetland
- Prevent erosion at outlet and design upgraded structure accordingly
- Do not encroach into wetland habitat with excavations or drains
- The volume and velocity of water must be reduced through discharging the surface flow at multiple locations surrounding the WWTWs. Effective stormwater management must include effective stabilisation of exposed soil.
- Sedimentation must be minimised with appropriate measures. Any construction causing bare slopes and surfaces to be exposed to the elements must include measures to protect against erosion using covers, silt fences, sandbags, earthen berms etc.
- Ensure that the WWTW complies with all relevant water quality standards and regulations. Regular inspections and audits by regulatory authorities can enforce compliance and identify any areas needing improvement.
- Habitat restoration of the HGM 2 wetland through alien plant eradication and halting erosion.
- Using the recommended settled UCT system from Concept Design Report, as this process produces much lower orthophosphate levels.
- Upgrading the treatment processes. For example, the use of ultraviolet (UV) disinfection, as recommended in Concept Design report, will assist with effluent water quality management.
- The reuse of the effluent, recommended above, will also contribute to mitigating against cumulative water quality change impacts.
- The Department of Water Affairs regional office should be notified, as soon as possible, of any significant chemical spill or leakage to the environment where there is the potential to contaminate surface water or groundwater.
- Effluent Standards: Enforcing stricter effluent discharge standards and regular monitoring can ensure that only high-quality effluent is released into SWSAs, minimizing negative impacts on water quality and ecosystem health.
- Implement continuous monitoring systems to regularly check the quality of the treated effluent
- Establish strict maintenance protocols to ensure that all treatment equipment and infrastructure are functioning optimally, preventing any bypass or failure in the treatment process.

- Develop and implement emergency response plans to address accidental discharges or treatment failures. This includes having backup systems in place and protocols for immediate action to contain and mitigate any potential impacts on the river.
- Provide incentives for WWTWs that consistently meet or exceed water quality standards.
- Require industrial facilities to pretreat their wastewater before discharging it into municipal systems, reducing the load of contaminants entering the WWTW.
- Improve sludge management to reduce the amount of sludge stockpiles on unlined ground.

Key findings by Freshwater Specialist for the BBF Site:
The proposed BBF development will result in the loss of a small, artificial wetland that has formed within an old excavation. This feature is not considered a natural wetland and does not support sensitive aquatic biodiversity. While its loss represents a direct impact, the significance is negligible at both local and broader ecological scales.

Crucially, the BBF will reduce ongoing pollution risks from unlined sludge stockpiles, thereby improving water quality protection for the Gwaing River. No formal wetland offsets are required; however, voluntary compensation through rehabilitation of the eroded wetland area downstream of the WWTW discharge outlet is strongly recommended and will result in a net ecological gain.

From an aquatic biodiversity perspective, the BBF project is considered environmentally acceptable, provided that the recommended mitigation and rehabilitation measures are implemented.

Key rehabilitation measures recommended by the Freshwater specialist:
- Including the recommended rehabilitation in the project scope
- Provision of financial resources for rehabilitation efforts
- Appointment of a qualified engineer to design and implement interventions to rehabilitate the eroded channel
- Stabilisation of the erosion at the discharge outlet in the reach of the HGM2 wetland and at least 50m downstream, as indicated in the maps below
- Compile a method statement for the removal of alien invasive plant species, and follow-up, in the indicated rehabilitation area.
- Provide for the financial resources required for the alien plant clearing as part of this project
- Include the rehabilitation and monitoring of the alien plant clearing activities in project scope as separate section – not to be confused with the standard rehabilitation of work at the outlet. (Clearing of alien vegetation is a function of the George Municipality's Parks and Recreation unit and not that of the Civil Engineering Services Unit).
- Consult with an ecologist throughout regarding rehabilitation measures and monitoring of success

Recommended mitigation measures by Freshwater specialist:
- Implement rehabilitation efforts in nearby aquatic habitat to compensate for loss of artificial depression.
- Appropriate stormwater management and prevention of hillslope erosion surrounding the facility.

Key findings by Faunal specialist:
After the site visit and fauna surveys, it is determined that the site sensitivity for the terrestrial animal theme of the project area is LOW. This differs from the HIGH and MEDIUM sensitivities assigned by the DFFE Screening tool for the site.

No SCC were found during the site visit, and none have a high likelihood of occurrence. General recommendations and best practice guidelines should be followed for all animal species encountered (regardless of whether they are SCC or not) during any stage of construction at the site.

Best practice principles for ALL fauna encounters during construction or operational phases of projects:

- If any animals are seen on site, a photo or a video should be taken if possible (to assist in identification) and all fauna encountered on site should be reported to the EO or ECO immediately.
- This is particularly important when:
    - An animal is harmed or compromised in any way during construction.
    - Ground-dwelling animals their nests or eggs are unearthed during construction (e.g. moles, tortoise eggs, terrapins/frogs estivating).
    - Any animal with limited mobility is found on site (e.g. tortoises, moles, chameleons). - Any potentially dangerous animal is encountered. This includes any potentially venomous animal (e.g. snakes, scorpions) or any medium-large animal that has become cornered in an enclosed area such that it cannot escape (e.g. porcupines, monkeys, baboons, antelope).It is critical in the case of snakes/ scorpions to get pictures/videos to aid in identification and appropriate treatment of anyone needing medical assistance.
    - Any animal that shows a reluctance to escape or move away from the construction site thereby increasing its exposure to harm or increasing the risk of injuring people on site.
- The EO or ECO should provide guidance or assistance to get all animals to safety, treating any injured animals, and issuing instructions on when to continue with construction (once they are satisfied that all animals have been removed from site) or put additional mitigation measures in place to protect animals on the site from harm.
- For any injured animals or animals to be removed from site (domestic or wild):
    - A local SPCA or animal welfare society can collect and treat most animals and should be the first point of call for assistance. If they cannot directly assist, they will revert and notify the relevant authorities/vets.
    - For any assistance with snake removals/relocations, identifications, or bite treatment contact the African Snakebite Institute. The contact details of a suitably qualified snake handler can be found at the following link: https://snakeremoval.co.za/george

Key findings of Botanical and Terrestrial Biodiversity specialist:
The proposed BBF location is highly transformed, within a municipal service zone and directly adjacent to the WWTW and landfill of George. Taking the BSP priority areas, and SEI into consideration, the terrestrial sensitivity is Low. The historical imagery, evidence of past and ongoing disturbance, and long-term degradation of the site supports this finding.

The botanical theme sensitivity is confirmed to be Low. No SCC were found during the site visit, and no SCC are likely to occur here. Furthermore, no habitat for SCC are expected here in the future either (i.e., this site does not have the potential to act as a potential range expansion for some species under climate change, given the transformed state where no natural habitat remains).

Based on field observations, the project site comprises primarily disturbed or previously cultivated land, with no significant presence of threatened, endemic, or protected plant species. Minor ecological concerns such as soil compaction, temporary vegetation clearance, or introduction of non-native species can be effectively managed through standard mitigation measures, and ensuring the project remains within the defined footprint only.

Best practice recommendations by Botanical and Terrestrial Biodiversity specialist:
- Define access routes and restrict vehicle movement to designated areas using temporary track mats or gravel paths.
- Use light-footprint machinery for construction and maintenance if and where possible.
- Avoid operations during wet conditions to minimize soil deformation.
- Minimize clearance zones to what's absolutely necessary for construction and operation.
- Implement erosion control measures (e.g., jute netting) in cleared areas.
- Rapidly revegetate disturbed areas using fast-establishing pioneer species (do not use NEMBA or CARA listed invasive species like kikuyu).

- Consider establishing a low-maintenance green belt around the facility with hardy, pollution-tolerant native species,
    - e.g., Shrubs like Searsia lucida, Diospyros dichrophylla, Leonotus leonurus, Osteospermum moniliferum, Passerina falcifolia, Salvia africana-lutea, Agathosma ovata, and Leucadendron salignum.
    - Groundcovers like Carpobrotus edulis, Pelargonium capitatum, Helichrysum cymosum, and H. petiolare,
    - Graminoids like Eragrostis curvula and Cyperus textilis in wetter areas.

Key finding of Geotechnical specialist:
The results of this study reveal that the site exhibits geotechnical characteristics that may require the implementation of specific design and precautionary measures to reduce the risk of structural damage due to adverse geotechnical conditions.

The soils covering the site may experience heave and/or consolidation (volume loss and gain) under loading or when saturated. Adequate strengthening of structures is necessary to prevent structural damage due to differential settlement beneath foundations. Differential movements will be exaggerated due to heave and shrinkage when moisture conditions change beneath structures. The granitic soils encountered across the site are prone to erosion. Perched groundwater seepage was observed across the site, generally with slow to moderate flow. Ferruginous material indicates seasonal fluctuating groundwater or excessive soil moisture movement.

Recommended mitigation measures by Geotechnical specialist:
- Due to the variable and organic nature of the upper transported material across the site, it is recommended to remove it to a depth of at least 300 mm beyond the perimeter of the proposed developments. Variations in this depth should be assessed during planned earthworks.
- Foundation Recommendations:
    - For single- and double-storey structures, reinforced concrete strip/pad foundations are recommended.
    - The foundation medium should achieve a minimum of 95% Mod AASHTO density or less than 20 mm penetration per blow of a Dynamic Cone Penetrometer (DCP).
    - A recommended founding depth of 1 meter below the natural ground level (NGL) or below the transported soils ensures stability.
    - Bearing pressures should not exceed 150 kPa to limit settlement.
    - For heavier structures, consider deeper foundations (to weathered granite) or introduce imported structural fill.
    - Light reinforced concrete rafts may also be suitable.
- Backfill should match the compaction of surrounding soil to avoid up-slope groundwater diversion and tunnel erosion.
- Slope Stability and Temporary Cuttings:
    - In general, safe battering to 45° is proposed as a safe cut-back for deep excavations.
    - Long-term stability decreases due to reduced cohesion and increased friction (safe cut slopes as low as 25°).
    - Reworked residual granite remains stable if dry but can slump when subjected to standing water.
- Implement dewatering measures for open unsupported excavations prone to flooding. Safety precautions are crucial for excavations deeper than 1.5 meters.

However, these characteristics do not disqualify the site from being used for the proposed development but rather require the implementation of site-specific precautionary measures.

2.	List the impact management measures that were identified by all Specialist that will be included in the EMPr

Recommended mitigation measures by Groundwater specialist:

Routine groundwater monitoring and sampling of the newly installed monitoring boreholes should include the following:

- On-site monitoring of water levels in the monitoring boreholes, including the date and time of the measurement taken. A manual water level device (dipmeter) is recommended.
- Groundwater sampling and analyses of groundwater quality, including the date and time of each sample taken. Sampling methods include the following:
-
    - RECOMMENDED: Sampling utilising disposable bailers to avoid cross contamination.

Or

    - Water-bearing monitoring boreholes can be purged using a <0.1 litre per second (l/s) pump to remove groundwater, until either three times of the volume of groundwater contained within the monitoring boreholes have been removed, or until the monitoring boreholes are pumped dry. This will aid in the removal of any stagnant water introduced into the boreholes. The sample should be collected prior to the end of pumping. Care should be taken to ensure that all equipment be de-contaminated between boreholes.

Recommended mitigation measures by Freshwater specialist:

- A construction method statement must be compiled and available on site. It must consider the no go area and include methods to avoid unnecessary disturbance and prevent material being washed downslope into the wetland.
- Any contractor found working within No-Go areas must be fined as per fining schedule/system setup for the project.
- It is the contractor's responsibility to continuously monitor the area for newly established alien species during the contract and establishment period, which if present must be removed. Removal of these species shall be undertaken in a way which prevents any damage to the remaining indigenous species and inhibits the reinfestation of the cleaned areas. Any use of herbicides in removing alien plant species is required to be investigated by the ECO before use.
- Where vegetation has been cleared in the buffer and open ground in the riparian area has resulted it is recommended that cover components be reinstated appropriately. Only indigenous species are to be considered.
- Monitoring by an independent ECO during construction in the outlet area.
- Habitat Restoration: Restoring and protecting natural habitats can enhance the river's resilience to changes in water flow and quality.
- Efficient site stormwater management
- Stabilise any erosion features upslope of watercourses and do not concentrate flows into wetland
- Prevent erosion at outlet and design upgraded structure accordingly
- Do not encroach into wetland habitat with excavations or drains
- The volume and velocity of water must be reduced through discharging the surface flow at multiple locations surrounding the WWTWs. Effective stormwater management must include effective stabilisation of exposed soil.
- Sedimentation must be minimised with appropriate measures. Any construction causing bare slopes and surfaces to be exposed to the elements must include measures to protect against erosion using covers, silt fences, sandbags, earthen berms etc.
- Habitat restoration of the HGM 2 wetland through alien plant eradication and halting erosion.
- The Department of Water Affairs regional office should be notified, as soon as possible, of any significant chemical spill or leakage to the environment where there is the potential to contaminate surface water or groundwater.
- Implement continuous monitoring systems to regularly check the quality of the treated effluent
- Establish strict maintenance protocols to ensure that all treatment equipment and infrastructure are functioning optimally, preventing any bypass or failure in the treatment process.

- Develop and implement emergency response plans to address accidental discharges or treatment failures. This includes having backup systems in place and protocols for immediate action to contain and mitigate any potential impacts on the river.
- Improve sludge management to reduce the amount of sludge stockpiles on unlined ground.
- Implement rehabilitation efforts in nearby aquatic habitat to compensate for loss of artificial depression.
- Appropriate stormwater management and prevention of hillslope erosion surrounding the facility

Key rehabilitation measures recommended by the Freshwater specialist:

- Including the recommended rehabilitation in the project scope
- Provision of financial resources for rehabilitation efforts
- Appointment of a qualified engineer to design and implement interventions to rehabilitate the eroded channel
- Stabilisation of the erosion at the discharge outlet in the reach of the HGM2 wetland indicated in the maps below
- Compile a method statement for the removal of alien invasive plant species in the indicated rehabilitation area.
- Provide for the financial resources required for the alien plant clearing as part of this project
- Appoint and monitor the alien plant clearing activities
- Consult with an ecologist throughout regarding rehabilitation

The best practice guidelines recommended by the Faunal, Botanical and terrestrial Biodiversity specialist will be included in the Construction EMPr.

3.	List the specialist investigations and the impact management measures that will **not** be implemented and provide an explanation as to why these measures will not be implemented.

The following mitigation measures from the Aquatic Biodiversity Impact Assessment, prepared by Debbie Fordham will not be included in the EMPr.

Proposed mitigation measure to be excluded	**Reason for exclusion**
Effluent from the Gwaing WWTW can in future be pumped to neighbouring industries or golf courses for non-potable use. Alternatively, it can be further treated together with the effluent from Outeniqua WWTW before it is pumped to the Garden Route Dam as part of an indirect potable reuse scheme.	This mitigation measure is outside the proposed scope of works and could require additional infrastructure upgrades which could require an Environmental Authorisation. This could likely be explored by the municipality at a later stage if practically possible.
Ensure that the WWTW complies with all relevant water quality standards and regulations. Regular inspections and audits by regulatory authorities can enforce compliance and identify any areas needing improvement.	The GM has indicated that not all water quality parameters can be met. The only deviation of the WUL is that E Coli is limited to 150 cfu/ 100 ml instead of the 1000 cfu/100 ml prescribed by the General Limit. Generally, the standard is achievable with a conventional BNR activated sludge plant including disinfection. RA will conduct their inspections in accordance with their mandate.
Effluent Standards: Enforcing stricter effluent discharge standards and regular monitoring can ensure that only high-quality effluent is released into SWSAs, minimizing negative impacts on water quality and ecosystem health.	The upgrades will result in compliance with the GA standards for discharging treated wastewater. It will be the responsibility of BOCMA to indicate appropriate standards in the WULA.
Provide incentives for WWTWs that consistently meet or exceed water quality standards.	This is not possible to monitor by an ECO.
Require industrial facilities to pretreat their wastewater before discharging it into municipal systems, reducing the load of contaminants entering the WWTW.	This mitigation measure is outside the proposed scope of works and therefore not achievable through this process. An ECO will not be able to monitor all inputs into the facility.

Using the recommended settled UCT system from Concept Design Report, as this process produces much lower orthophosphate levels.	All upgrades and phases leading up to the Master Plan design are designed with the option of operating it as a UCT or MLE process. Additional process configurations such as the modified UCT process and the Johannesburg process will also be included without the need for more equipment or infrastructure.
Controlled Discharges: Regulating the timing and volume of discharges can help mimic natural flow regimes and reduce hydrological disruptions, especially during flood events.	This is not possible to monitor by an ECO.
Upgrading the treatment processes. For example, the use of ultraviolet (UV) disinfection, as recommended in Concept Design report, will assist with effluent water quality management.	UV disinfection will not be used as it is to costly.

4.	Explain how the proposed development will impact the surrounding communities.

The Gwaing WWTW is not located in a residential area, therefore during the construction phase the surrounding community will not be inconvenienced by the construction noise and activities. The communities will be used as labourers during the construction phase; therefore communities will benefit directly from the construction and directly from the operational phase when the capacity has increased.

5.	Explain how the risk of climate change may influence the proposed activity or development and how has the potential impacts of climate change been considered and addressed.

The additional stress from effluent discharge exacerbates the challenges posed by climate change, such as altered precipitation patterns and increased evaporation rates, making water resources even more precarious. Addressing these challenges requires a combination of advanced treatment technologies, stricter regulations, pollution prevention strategies, and public engagement. Therefor it is important to regulate the timing and volume of discharges to help mimic natural flow regimes and reduce hydrological disruptions, especially during flood events.

6.	Explain whether there are any conflicting recommendations between the specialists. If so, explain how these have been addressed and resolved.

There were conflicting results between Debbie Fordham (Upstream Consulting) and Jackie Dabrowski (Confluent). Jackie concluded (in a different project, the Gwayang Precinct Development) that the artificial wetland on the BBF site is of medium sensitivity. Debbie concluded that it does not support sensitive aquatic biodiversity, and the significance is negligible at both local and broader ecological scales. This was addressed and resolved as Confluent did not ground-truth the artificial wetland and Upstream Consulting did. Please refer to Section 6.3 of The Aquatic Biodiversity Impact Assessment for the BBF, compiled by Debbie Fordham (Appendix G3).

7.	Explain how the findings and recommendations of the different specialist studies have been integrated to inform the most appropriate mitigation measures that should be implemented to manage the potential impacts of the proposed activity or development.

All impact management measures that were identified by all the Specialists have been included in the EMPr, apart from the ones highlighted that are not appropriate for the EMPr. The proposed best practise guidelines will also be included in the EMPr.

8.	Explain how the mitigation hierarchy has been applied to arrive at the best practicable environmental option.

All mitigation measures have been incorporated into the EMPr apart from the ones highlighted that are not appropriate for the EMPr.

Table 8: Mitigation Hierarchy

MITIGATION HIERARCHY		
1	AVOID IMPACTS	As the proposal is to upgrade an existing facility the impacts cannot be avoided at this location. The one impact identified on the BBF site can also not be avoided, but the George Municipality has agreed to compensation for the loss of the artificial wetland that does not support sensitive aquatic biodiversity and has a significance of negligible at both local and broader ecological scales.
2	MINIMISE IMPACTS	The implementation of the EMPr during the construction phase will minimise the impacts associated with the construction phase.

3	RECTIFY	The disturbances created by the construction phase will be rehabilitated in accordance with the EMPr. The one impact identified on the BBF site can also not be avoided, but the George Municipality has agreed to compensation for the loss of the artificial wetland that does not support sensitive aquatic biodiversity and has a significance of negligible at both local and broader ecological scales.
4	REDUCE	The disturbances created by the construction phase will be rehabilitated in accordance with the EMPr.
5	OFFSET	NONE NECESSARY

SECTION J: GENERAL

1. Environmental Impact Statement

1.1. Provide a summary of the key findings of the EIA.

Table 9 below summarises the potential Impacts associated with the proposal. Please refer to the Section I (2) for the proposed mitigation measures to ensure the corresponding rating post mitigation. The findings of the Specialists have been taken into consideration in this BAR and the impact management measures identified by all the Specialists have been incorporated into the EMPr and will thus ensure that, through the implementation of the EMPr that the potential impacts are mitigated to the significance ratings as shown in Table 12 and that impacts to the environment for the proposal are minimised and that the proposal is undertaken in a sustainable manner.

Table 9: Impact significance after mitigation

Impact	Preferred Alternative	No-Go Alternative
Construction Phase		
Noise	Negligible (-)	No impact
Temporary job creation	Medium (+)	No impact
Capital expenditure	Medium (+)	No impact
Changes to water quality	Low (-)	No impact
Sedimentation and erosion	Low (-)	No impact
Disturbance of aquatic habitat biota	Low (-)	No impact
Loss of artificial depression wetland for the BBF	Low (-)	No impact
Operational Phase		
Change to water quality	Low (-)	No impact
Sedimentation and erosion	Low (-)	No impact
Changes to hydrological regime	Low (-)	No impact

Groundwater Assessment Conclusion, Appendix G5:
The monitoring boreholes at the George WWTWs were drilled via conventional air percussion methods and constructed to ensure integrity as monitoring boreholes. The boreholes were subjected to a baseline groundwater monitoring and sampling event and the laboratory results returned indicated long term seepage into the clayey weathered granites that underlies both the George WWTWs process and containment facilities.

Groundwater at the sites flows in a south, south-easterly and south-westerly direction toward the Skaapkop River for Outeniqua WWTW and in a mainly south-westerly direction towards the Gwaing River for Gwaing WWTW. The calculated groundwater flow gradient for the aquifers across both sites ranged between 0.02 and 0.023.

Parsons (2017) noted, from hydrocensus information, the absence of boreholes actively being used by neighbouring properties in the vicinities of both George WWTWs. The closest boreholes where north of the current site, while groundwater flows to the south.

Therefore, no groundwater users exist downstream of the sites that can be impacted. The main environmental impact from the GWWTWs remains the long-term seepage from the facilities into the sub-surface and discharge in the weathered zone of the nearby rivers. The groundwater monitoring programme should be implemented on a quarterly basis and scheduled accordingly to ensure regular intervals.

Aquatic Assessment for the Gwaing WWTW site Conclusion, Appendix G4:
Five watercourses were identified and mapped within a 500m radius of the proposed development. Due to the topography of the site resulting in surface runoff in a south westerly direction, and location of the WWTW outlet, it was determined that only the southern watercourse (mapped as HGM 2) has potential to be directly impacted by the upgrades. However, there is also potential for the downstream section of the Gwaing River (mapped as HGM 1) to be indirectly impacted by the project. The other watercourses identified within the 500m radius of the site are unlikely to be impacted by any of the proposed activities and were therefore not assessed further. It was determined that the unnamed watercourse south of the WWTW outlet (referred to as HGM 2), can be classified as a channelled valley bottom wetland. And although the Gwaing River would have supported vast wetland habitat in its natural state, it has been significantly modified from the reference condition and is presently typical of a riparian ecosystem.

After reviewing the proposed activities and locations for upgrading the WWTW, and conducting in-field assessment, it was determined that the only realistic potential impacts from the project are associated with the construction at the outlet structure (as it is near the HGM 2 wetland) and the increase in effluent to be discharged from the WWTW in the operational phase. There are no immediate impacts associated with the No Go Alternative. However, it is highly likely that, should the plant not receive upgrades, the effluent will become non-compliant due to the expected population growth and result in negative impacts upon aquatic biodiversity.

It was determined that, after mitigation, the project is of Low negative significance to aquatic biodiversity. There is potential for positive impacts and risk avoidance. Therefore, from an aquatic perspective, the proposed project is deemed as acceptable. Any potential risks must be managed and mitigated to ensure that no deterioration to the water resource takes place. Monitoring should focus on adherence to the No-Go area, preventing erosion and pollution.

Aquatic Assessment for the BBF site Conclusion, Appendix G3:
The proposed BBF development will result in the loss of a small, artificial wetland that has formed within an old excavation. This feature is not considered a natural wetland and does not support sensitive aquatic biodiversity. While its loss represents a direct impact, the significance is negligible at both local and broader ecological scales.

Crucially, the BBF will reduce ongoing pollution risks from unlined sludge stockpiles, thereby improving water quality protection for the Gwaing River. No formal wetland offsets are required; however, voluntary compensation through rehabilitation of the eroded wetland area downstream of the WWTW discharge outlet is strongly recommended and will result in a net ecological gain.

From an aquatic biodiversity perspective, the BBF project is considered environmentally acceptable, provided that the recommended mitigation and rehabilitation measures are implemented.

Faunal Assessment conclusion, Appendix G1:
After the site visit and fauna surveys, it is determined that the site sensitivity for the terrestrial animal theme of the project area is LOW. This differs from the HIGH and MEDIUM sensitivities assigned by the DFFE Screening tool for the site.

No SCC were found during the site visit, and none have a high likelihood of occurrence. General recommendations and best practice guidelines should be followed for all animal species encountered (regardless of whether they are SCC or not) during any stage of construction at the site.

Botanical and Terrestrial Biodiversity Conclusion, Appendix G2:
The proposed BBF location is highly transformed, within a municipal service zone and directly adjacent to the WWTW and landfill of George. Taking the BSP priority areas, and SEI into consideration, the terrestrial sensitivity is Low. The historical imagery, evidence of past and ongoing disturbance, and long term degradation of the site supports this finding.

The botanical theme sensitivity is confirmed to be Low. No SCC were found during the site visit, and no SCC are likely to occur here. Furthermore, no habitat for SCC are expected here in the future either (i.e., this site does not have the potential to act as a potential range expansion for some species under climate change, given the transformed state where no natural habitat remains).

Based on field observations, the project site comprises primarily disturbed or previously cultivated land, with no significant presence of threatened, endemic, or protected plant species. Minor ecological concerns such as soil compaction, temporary vegetation clearance, or introduction of non-native species can be effectively managed through standard mitigation measures, and ensuring the project remains within the defined footprint only.

Geotechnical Assessment Conclusion, Appendix G6:
The results of this study reveal that the site exhibits geotechnical characteristics that may require the implementation of specific design and precautionary measures to reduce the risk of structural damage due to adverse geotechnical conditions.

- **Transported Material Removal:** Due to the variable and organic nature of the upper transported material across the site, it is recommended to remove it to a depth of at least 300 mm beyond the perimeter of the proposed developments. Variations in this depth should be assessed during planned earthworks.
- **Heave and Consolidation**: The soils covering the site may experience heave and/or consolidation (volume loss and gain) under loading or when saturated. Adequate strengthening of structures is necessary to prevent structural damage due to differential settlement beneath foundations.
- **Moisture-Induced Differential Movements**: Differential movements will be exaggerated due to heave and shrinkage when moisture conditions change beneath structures.
- **Foundation Recommendations:**
    - For single- and double-storey structures, reinforced concrete strip/pad foundations are recommended.
    - The foundation medium should achieve a minimum of 95% Mod AASHTO density or less than 20 mm penetration per blow of a Dynamic Cone Penetrometer (DCP).
    - A recommended founding depth of 1 meter below the natural ground level (NGL) or below the transported soils ensures stability.
    - Bearing pressures should not exceed 150 kPa to limit settlement.
    - For heavier structures, consider deeper foundations (to weathered granite) or introduce imported structural fill.
    - Light reinforced concrete rafts may also be suitable.
- **Erodibility of Material:** The granitic soils encountered across the site are prone to erosion.
- **Dispersive Soils:** Backfill should match the compaction of surrounding soil to avoid up-slope groundwater diversion and tunnel erosion.
- **Slope Stability and Temporary Cuttings:**
    - In general safe battering to 45° is proposed as a safe cut-back for deep excavations.
    - Long-term stability decreases due to reduced cohesion and increased friction (safe cut slopes as low as 25°).
    - Reworked residual granite remains stable if dry but can slump when subjected to standing water.

- **Dewatering Measures:** Implement dewatering measures for open unsupported excavations prone to flooding. Safety precautions are crucial for excavations deeper than 1.5 meters.
- **Groundwater Occurrence:** Perched groundwater seepage was observed across the site, generally with slow to moderate flow. Ferruginous material indicates seasonal fluctuating groundwater or excessive soil moisture movement.

However, these characteristics do not disqualify the site from being used for the proposed development, but rather require the implementation of site-specific precautionary measures.

1.2.	Provide a map that that superimposes the preferred activity and its associated structures and infrastructure on the environmental sensitivities of the preferred site indicating any areas that should be avoided, including buffers. (Attach map to this BAR as Appendix B2)

Figure 56 shows that the site is not located upon any biodiversity priority areas, CBA nor ESAs. However, the watercourse downslope of the WWTW outlet structure is classified as CBA 1 wetland habitat, as is the Gwaing River downstream.

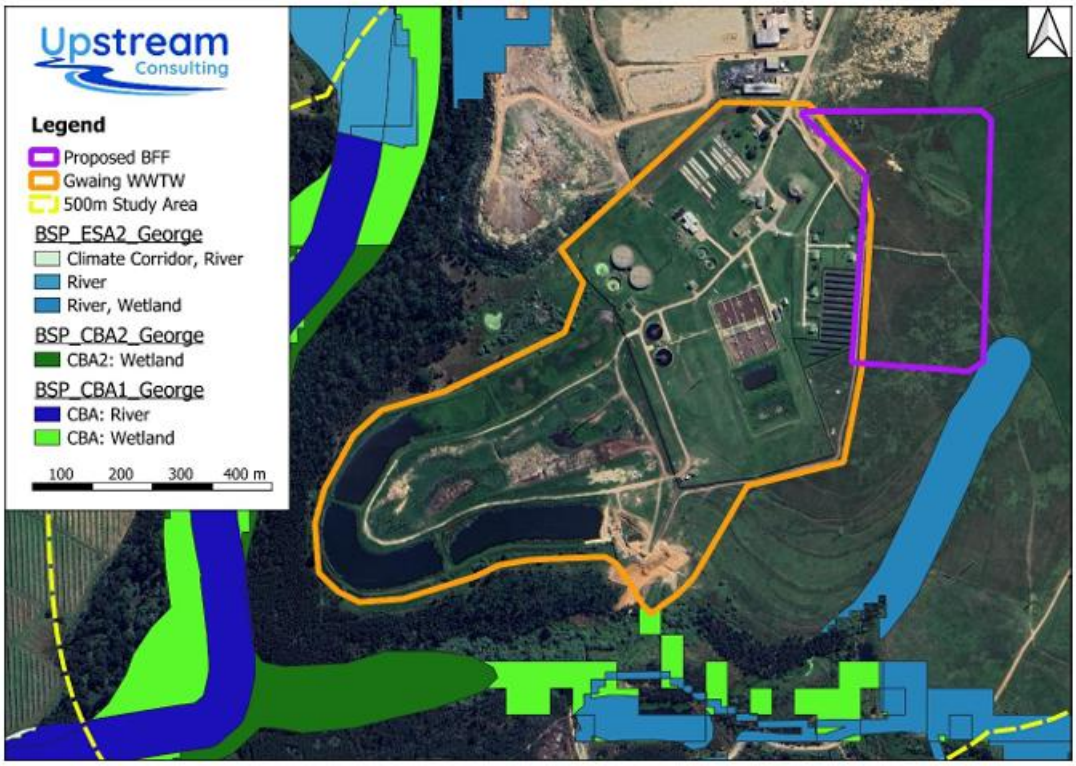


Figure 56 The BFF site in relation to the national river and wetland inventories

As seen from Figure 57 the no-go area is the wetland which could be impacted by this proposal. Mitigation, such as demarcating a no-go area during construction, can prevent any direct impacts to aquatic habitat. It is also important that other eroded areas in this vicinity be repaired, and stormwater is managed appropriately in future to prevent further erosion on this hill slope.

For this project aquatic buffer zones are not applicable. The upgrades are confined to existing infrastructure or transformed land within the current boundary of the Gwaing WWTW. Therefore, determining an aquatic buffer zone is unnecessary. The only potential for physical habitat disturbance is at the outlet structure. It is recommended that any upgrades to this infrastructure avoid encroaching further into the wetland, unless specified in a rehabilitation plan. Since the outlet is already on the wetland boundary, establishing a buffer zone would not be practical. It is more practical to adopt a No-Go Area around the wetland habitat by the outlet structure.

The designated no-go area applies specifically to the outlet construction works and the immediate surrounding area required to protect sensitive environmental features associated with the outlet.

The proposed voluntary compensation through rehabilitation measures will be implemented across the broader project footprint where disturbances to the environment may occur. These

measures will serve to minimise potential environmental impacts, ensure that disturbance is limited in extent and duration, and promote the rehabilitation of affected areas to a stable and functional condition post-construction.

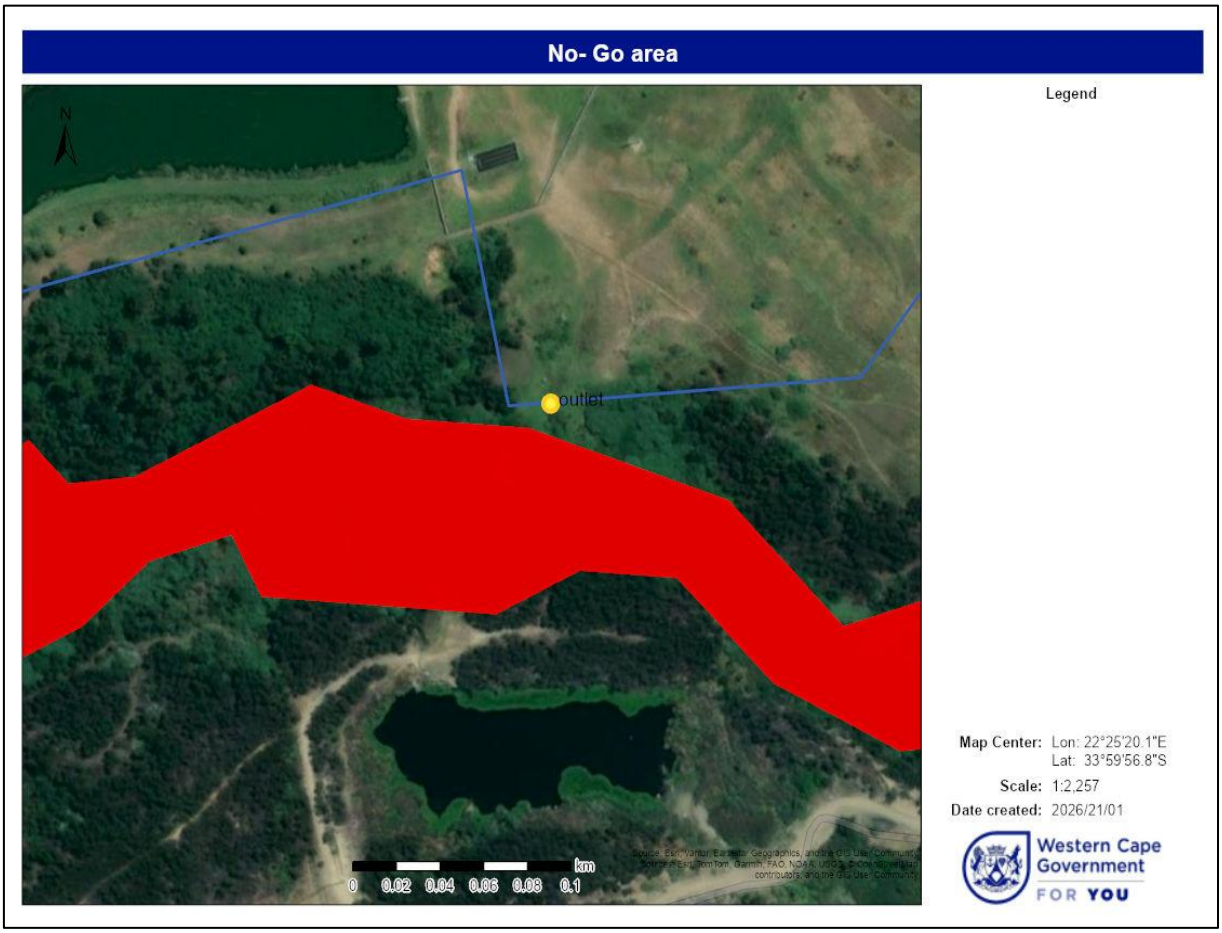


Figure 57: no-go map

1.3.	Provide a summary of the positive and negative impacts and risks that the proposed activity or development and alternatives will have on the environment and community.

Positive:

- Temporary job opportunities during the construction phase
- Increased WWTW capacity to handle effluent
- Increased capacity will lead to more development proposal for George
- Reduced chance of being overloaded
- Delivery of safe, secure wastewater system for citizens
- Capital expenditure in George
- After mitigation, the project is of Low negative significance to aquatic biodiversity
- Increasing the water supply to a river from a wastewater treatment plant can dilute pollutants and improving overall water quality
- In dry periods or in rivers with reduced flow, increased discharge from WWTPs can help maintain adequate flow levels, supporting aquatic habitats and species.
- Higher flows can increase aeration, raising dissolved oxygen levels and benefiting fish and other aquatic organisms that require oxygenated water.
- Increased water flow can create new or enhance existing habitats, supporting a greater diversity.

Negative:

- Temporary noise and construction related inconveniences.
- Temporary disturbance and impacts to the environment
- Hydrological alterations may lead to flow regime changes and erosion.

- Significant increases in water discharge can alter the natural flow regime, potentially disrupting the life cycles of aquatic organisms adapted to specific flow conditions.
- Loss of artificial depression wetland for the BBF

2. Recommendation of the Environmental Assessment Practitioner ("EAP")

2.1.	Provide Impact management outcomes (based on the assessment and where applicable, specialist assessments) for the proposed activity or development for inclusion in the EMPr

In order to obtain/reach the impact management objects the corresponding mitigation measures prescribed in the BAR and EMPr must be implemented.

The Impact monitoring will be undertaken by an appointed and independent ECO.

The impact management outcomes will be monitored by the appointed ECO, in addition to the implementation of mitigation measures during the duration of the development, if all management mitigation measures are implemented successfully the resulting impact management outcomes will mean that the develop was undertaken with no significant or avoidable impacts to the environment.

Impact management objectives and impact management outcomes included in the EMPr

PRE-CONSTRUCTION PHASE	
IMPACT MANAGEMENT OBJECTIVES	**IMPACT MANAGEMENT OUTCOMES**
To appoint a suitably qualified and experienced Environmental Control Officer	The conditions of Environmental Authorisation and the requirements of the EMPr are implemented and monitored during all phases of the development, which will promote sound environmental management on site.
Identify and demarcate no-go areas, working areas and site facilities	Future construction activities will be restricted to within the designated areas & environmentally sensitive areas (no-go areas) will be protected from disturbance
To set up and equip the site camp and associated site facilities in a manner that will promote good environmental management.	Site camp facilities do not impact significantly on environment. The equipment required to implement the provisions of the EMPr are provided on site.
Environmental Control Officer to conduct an inspection prior to the commencement of construction activities on site	Good environmental management is promoted and enforced by the ECO during the full pre-construction and construction phases. Site facilities are appropriately located on site. Construction workers receive environmental awareness training before commencing work on site
CONSTRUCTION PHASE	
To prevent deterioration of aquatic ecosystem integrity and a reduction/loss of habitat for flora & fauna due to concentrated and altered stormwater flow paths	Efficient site stormwater management is in place
To prevent erosion and sedimentation	Only the approved footprint and a reasonable working corridor is disturbed by construction activities.
To limit the disturbance aquatic habitat biota from clearance of vegetation, earthworks, and further invasive alien plant infestation,	Construction machinery is maintained within the development footprint and the water freshwater ecosystem is not impaired.

To prevent the increase in water inputs resulting in changes to hydrological form and function	Freshwater ecosystem water quality remains the same.
To prevent water contamination of wetland during outlet upgrades in construction phase.	Wetland water is not contaminated during construction.
To limit noise generated by construction activities	No avoidable noise impacts emanate from the site during the construction phase
To create employment opportunities with potential for skills transfer, for members of the local community	The local community benefits from the employment opportunities created during the construction phase.
To compensate for the loss of an artificial wetland	The recommended compensation area has been rehabilitated.
POST CONSTRUCTION REHABILITATION PHASE	
To rehabilitate all areas disturbed by construction activities in an environmentally sensitive manner	The site is neat and tidy, and all exposed surfaces are suitably covered/ stabilised. There is no construction-related waste or pollution remaining on site.
To prevent changes to the hydrological regime	The volume of water entering the drainage network from the WWTW is controlled and reduced.
To prevent alien vegetation establishment on the site	No increase in alien species on site
Prevent sedimentation and erosion due to Concentrated stormwater flow paths and altered flow patterns	Disturbed soils are not carried down the slope by unmanaged surface runoff.

2.2.	Provide a description of any aspects that were conditional to the findings of the assessment either by the EAP or specialist that must be included as conditions of the authorisation.

The EMPr must be implemented, this is however a standard condition of Environmental Authorisation.

All mitigation measures from the specialists have been incorporated into the EMPr apart from those highlighted on Section I.3 and as such are conditional to the environmental authorisation.

The compensation for the loss of the artificial wetland will be implemented along with either the BBF phase or Phase A, whichever Phase is commenced with first.

2.3.	Provide a reasoned opinion as to whether the proposed activity or development should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be included in the authorisation.

The proposed activity should be authorized.

As seen in the body of this Basic Assessment Report, the negative impacts associated with the construction phase and operational phase can be mitigated to that of a negligible and low significance. Given that the Gwaing WWTW is operating at the edge of its capacity, it is imperative to accelerate the implementation of at least Phase A. Doing so will ensure that the effluent from the works remains compliant. Similarly, the detail design and planning for Phase B should not be delayed ensuring that this phase can be commissioned before 2029 when the load on the plant is projected to exceed the capacity created by the implementation of Phase A. It would make sense to procure Phases A and B simultaneously, but to prioritize the scope of Phase A during implementation of this project.

The negative impacts associated with the proposal are far outweighed by the positive impact of providing basic services to George.

Proposed Conditions of Authorisation:

- The EMPr must be implemented.
- An ECO must be appointed to monitor compliance with the EMPr
- The compensation proposed by Debbie Fordham should be implemented with the Phase A or the BBF Phase, whichever phase starts first.

2.4.	Provide a description of any assumptions, uncertainties and gaps in knowledge that relate to the assessment and mitigation measures proposed.
	It is assumed that the proposed mitigation measures as listed in this report and the EMPr (Appendix H1) will be implemented and adhered to as the significance of impacts ratings are conditional on implementation of the mitigation measures. **The following limitations and assumptions apply to the Groundwater Impact Assessment:** This report shall not be reproduced except in full without prior written approval of the laboratory. Results in this report relate only to the samples as taken, and the condition received by the laboratory. Any opinions and interpretations expressed in this report are outside the scope of SANAS accreditation. The decision rule applicable to this laboratory is available on request. Sample preparation may require filtration, dilution, digestion or similar. Final results are reported accordingly. Where the laboratory has undertaken the sampling, the location of sampling and sampling plan are available on request. Talbot Laboratories is guided by the National Standards SANS 5667-3:2006 Part 3 Guidance on the Preservation and Handling of Water Samples; SANS 5667-1:2008 Part 1 Guidance on the Design of Sampling Programmes and Sampling Techniques and SANS 5667-2:1991 Part 2: Guidance on Sampling Techniques. **The following limitations and assumptions apply to the Aquatic Assessment for the Gwaing WWTW Site study:** Within the realm of EIA specialist assessments, there are often assumptions and limitations, which can influence the determination of specialist outcomes. Sometimes these can result in the project being fatally flawed, however frequently these are simply gaps of knowledge that will not have a significant impact on the findings of the specialist report. Therefore, specialists proceed and list the known assumptions and limitations associated with the project, such as these outlined below: • Aquatic ecosystems vary both temporally and spatially. Once-off surveys such as this can miss certain ecological information due to seasonality, thus limiting accuracy and confidence. • Layouts and designs were provided by the client. • While disturbance and transformation of habitats can lead to shifts in the type and extent of aquatic ecosystems, it is important to note that the current extent is reported on here. • All soil/vegetation/terrain sampling points were recorded using a Garmin Montana Global Positioning System (GPS) and captured using Geographical Information Systems (GIS) for further processing. • Conditions on the day were clear and sunny, and no significant rainfall had been recently recorded in the area. The full extent of the site was walked, and a detailed inspection of the wetland near the outlet structure was undertaken. Access to the Gwaing River was across difficult terrain in terms of gradient and dense vegetation, however the riparian zone was sufficiently delineated beyond the river channel. • Infield soil and vegetation sampling was only undertaken within a specific focal area around the proposed activities, while the remaining watercourses were delineated at a desktop level with limited accuracy. • No detailed assessment of aquatic fauna/biota (e.g. fish, invertebrates, microphytes, etc.) was undertaken, and not deemed necessary. • The vegetation information provided is based on observation not formal vegetation plots. As such species documented in this report should be considered as a list of dominant and/or indicator wetland/riparian species. • The scope of work did not include water quality sampling and the water quality characteristics were inferred from data provided. • The assessment of impacts and recommendation of mitigation measures was informed by the site-specific ecological concerns arising from the field survey and based on the assessor's working knowledge and experience with similar projects. The degree of confidence is considered high.

The following limitations and assumptions apply to the Aquatic Assessment for the BBF Site study:
The same assumptions and limitations from the previous report apply. The site assessment for the BFF site was undertaken on the 25th of April 2025, following significant rainfall, and the confidence level is deemed as high.

The following limitations and assumptions apply to the Faunal Assessment:

- While the public platforms mentioned in Section 3.4 are excellent sources of additional information for animal species occurring in an area, these results require some expert interpretation to determine which of the SCC are relevant to include in the faunal assessment of the project area. For example, the coarse spatial scale of reporting within the Virtual Museum platforms (Quarter Degree Square level (27km x 27km) or SABAP2 pentad level (9km x 7 km)) can result in species records from habitats quite different to those present on site. Additionally, these platforms include sightings of vagrant or transient animals upon which an assessment cannot reasonably be based. Expert interpretation is therefore applied to the full list of SCC identified by the various public platforms (see Appendix 1) and some species are then excluded from further assessment due to the project area clearly lacking suitable habitat or the species clearly representing a vagrant or transient animal outside its normal range. The SCC assessed in this report therefore represent those which may reasonably occur on site. However, there is always the possibility that some SCC (although highly unlikely to occur on site) are overlooked in this process.
- Two field visits (13/03/2025 and 25/03/2025) took place to the site for the faunal assessment. The detectability of animal species increases with more visits. This assessment therefore only represents a "snap-shot" in time and it is possible that SCC occurring on site were not observed during the visit. These results should therefore be interpreted with this in mind and not be treated as an exhaustive list of species occurring on site.
- Site visits took place during daylight hours so the likelihood of encountering nocturnal species was limited.
- The site visit coincided with early autumn. This may be of consequence for some species showing seasonal variation in breeding and activity patterns.
- Evidence of animals in the form of tracks, scats, and signs always brings with it a level of uncertainty, but best efforts were made in this regard, and uncertainties are highlighted in the report.
- There were security concerns at the site due to it being used as throughfare for pedestrians to the municipal dump. The maintenance of high vigilance may have led to some tracks, scats, and signs being overlooked.

The following limitations and assumptions apply to the Botanical and Terrestrial Biodiversity Assessment:

- Seasonal and time constraints always play a role in limiting the findings of a terrestrial specialist report.
- Rare and threatened plant species are difficult to locate and easily overlooked in the field.
- The current state of the site is transformed. While some idea of the original ecosystem here is apparent, the results of this assessment cannot accurately convey what the conditions might have been like prior to transformation, nor is that the purpose of this assessment.
- The species observed is limited to those present on the site in its current form, which is to say no-natural-remaining vegetation.
- Effort was made to identify no-go areas and possible impacts for the layout and design phase of the project, especially given the studies that have taken place for the Gwayang mixed-use development. Despite this, it is always possible that some impacts were missed or neglected that relate specifically to a BBF. The exclusion of important impacts does

	not mean that they do not exist, and the development team always has a duty of care to mitigate negative impacts to the environment. **The following limitations and assumptions apply to the Geotechnical Investigation:** The extent of the investigations undertaken is deemed adequate, within the time and budget constraints, to present an overview of the geotechnical conditions across the investigation site. It must be borne in mind that the overall interpretation of geotechnical conditions is based upon point information derived from the respective test positions and that conditions intermediate to these have been inferred by interpolation, extrapolation and professional judgement. The foundation solutions will vary dependant on the final founding horizon and anticipated effective loads of each structure. These were not known during the reporting phase, as such, this should be discussed with the geotechnical specialist when the data becomes available. It is recommended the author be appointed to inspect the earthworks and foundation excavations during the development of the site to confirm founding depths and validate the recommendations provided in this report.
2.5.	The period for which the EA is required, the date the activity will be concluded and when the post construction monitoring requirements should be finalised.

The commissioning dates for each phase were selected based on a population growth of 4%. The exact dates of implementation will be determined as time progresses and as the demand increase becomes more apparent with actual figures. The 4% growth selected is the worst-case scenario and is used for illustration purposes.

Table 10: Summary of phasing capacities

Phase	Date of commissioning based on 4% population growth	Additional Capacity (MLD)	Total Capacity UCT (MLD)	Total Capacity MLE (MLD)
Existing Plant			8.6	10.4
Phase A	2026	4.6	13.2	17
Phase B	2029	8.8	22	28
Phase C	2041	11	33	42
Phase D	2051	17	50	68

The EA should therefore be issues for 30 years to allow enough time for the proposed upgrades to be undertaken as required to match population growth, the rehabilitation of the site and also allow for the defect liability period to complete.

3. Water

Since the Western Cape is a water scarce area explain what measures will be implemented to avoid the use of potable water during the development and operational phase and what measures will be implemented to reduce your water demand, save water and measures to reuse or recycle water.
The proposal will use water for compaction and other construction related activities, these are unavoidable.

4. Waste

Explain what measures have been taken to reduce, reuse or recycle waste.
Packaging and construction waste will be generated by materials brought to site. Waste from demolition work will also be generated. An integrated waste management system must be adopted on site in accordance with the EMPr. Unrecyclable items will be taken to the George landfill.

5. Energy Efficiency

8.1.	Explain what design measures have been taken to ensure that the development proposal will be energy efficient.

The vision for Gwaing WWTW extends beyond waste management. It aims to transform the facility into a Water Resource Recovery Facility (WRRF), emphasizing resource recovery. Key strategies include:

- Regional grit processing facilities to enable reuse of grit as part of composting or fill material.
- Regional screenings processing facility to minimise volume, odours, pathogens and vecto attraction of screenings.
- Sludge beneficiation in the form of composting or fertilizer production is envisaged.
- The methane gas produced from anaerobic digestion will be used for generating heat and power (as part of Phase D).
- Effluent from the Gwaing WWTW can in future be pumped to neighbouring industries or gol courses for non-potable use. Alternatively, it can be further treated together with the effluen from Outeniqua WWTW before it is pumped to the Garden Route Dam as part of an indirec potable reuse scheme.
- Effluent will be recycled and pressurized on site in a wash water ring main for various uses including irrigation, reducing the potable water demand of the WWTW.
- Energy efficient design principles will be used to reduce the power consumption of the plant while a solar PV plant will both provide backup power during loadshedding events and shift the plant's reliance from the national grid to renewable energy sources.

SECTION K: DECLARATIONS

DECLARATION OF THE APPLICANT

Note: Duplicate this section where there is more than one Applicant.

I, JOHANNES FRANCISCUS KOEGELENBERG, ID number 790608 5048 081, in my personal capacity or duly authorised thereto hereby declare/affirm that all the information submitted or to be submitted as part of this application form is true and correct, and that:

- I am fully aware of my responsibilities in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) ("NEMA"), the Environmental Impact Assessment ("EIA") Regulations, and any relevant Specific Environmental Management Act and that failure to comply with these requirements may constitute an offence in terms of relevant environmental legislation;
- I am aware of my general duty of care in terms of Section 28 of the NEMA;

- I am aware that it is an offence in terms of Section 24F of the NEMA should I commence with a listed activity prior to obtaining an Environmental Authorisation;

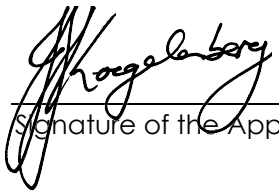
- I appointed the Environmental Assessment Practitioner ("EAP") (if not exempted from this requirement) which:
  - meets all the requirements in terms of Regulation 13 of the NEMA EIA Regulations; or
  - meets all the requirements other than the requirement to be independent in terms of Regulation 13 of the NEMA EIA Regulations, but a review EAP has been appointed who does meet all the requirements of Regulation 13 of the NEMA EIA Regulations;

- I will provide the EAP and any specialist, where applicable, and the Competent Authority with access to all information at my disposal that is relevant to the application;

- I will be responsible for the costs incurred in complying with the NEMA EIA Regulations and other environmental legislation including but not limited to –
  - costs incurred for the appointment of the EAP or any legitimately person contracted by the EAP;
  - costs in respect of any fee prescribed by the Minister or MEC in respect of the NEMA EIA Regulations;
  - Legitimate costs in respect of specialist(s) reviews; and
  - the provision of security to ensure compliance with applicable management and mitigation measures;

- I am responsible for complying with conditions that may be attached to any decision(s) issued by the Competent Authority, hereby indemnify, the government of the Republic, the Competent Authority and all its officers, agents and employees, from any liability arising out of the content of any report, any procedure or any action for which I or the EAP is responsible in terms of the NEMA EIA Regulations and any Specific Environmental Management Act.

Note: If acting in a representative capacity, a certified copy of the resolution or power of attorney must be attached.



2026/01/30

Signature of the Applicant: Date:

GEORGE MUNICIPALITY

Name of company (if applicable):

DECLARATION OF THE ENVIRONMENTAL ASSESSMENT PRACTITIONER ("EAP")

I Michael Bennett..., EAP Registration number .....2021/3163..... as the appointed EAP hereby declare/affirm the correctness of the:

- Information provided in this BAR and any other documents/reports submitted in support of this BAR;
- The inclusion of comments and inputs from stakeholders and I&APs;
- The inclusion of inputs and recommendations from the specialist reports where relevant; and
- Any information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested and affected parties, and that:
- In terms of the general requirement to be independent:
  - other than fair remuneration for work performed in terms of this application, have no business, financial, personal or other interest in the activity or application and that there are no circumstances that may compromise my objectivity; or
  - am not independent, but another EAP that meets the general requirements set out in Regulation 13 of NEMA EIA Regulations has been appointed to review my work (Note: a declaration by the review EAP must be submitted);
- In terms of the remainder of the general requirements for an EAP, am fully aware of and meet all of the requirements and that failure to comply with any the requirements may result in disqualification;
- I have disclosed, to the Applicant, the specialist (if any), the Competent Authority and registered interested and affected parties, all material information that have or may have the potential to influence the decision of the Competent Authority or the objectivity of any report, plan or document prepared or to be prepared as part of this application;
- I have ensured that information containing all relevant facts in respect of the application was distributed or was made available to registered interested and affected parties and that participation will be facilitated in such a manner that all interested and affected parties were provided with a reasonable opportunity to participate and to provide comments;
- I have ensured that the comments of all interested and affected parties were considered, recorded, responded to and submitted to the Competent Authority in respect of this application;
- I have ensured the inclusion of inputs and recommendations from the specialist reports in respect of the application, where relevant;
- I have kept a register of all interested and affected parties that participated in the public participation process; and
- I am aware that a false declaration is an offence in terms of Regulation 48 of the NEMA EIA Regulations;

Signature of ~~the~~ EAP: Date: 2 February 2026

Sharples Environmental Services

Name of company (if applicable):

DECLARATION OF THE REVIEW EAP

I ……, EAP Registration number …….. as the appointed Review EAP hereby declare/affirm that:

- I have reviewed all the work produced by the EAP;
- I have reviewed the correctness of the information provided as part of this Report;
- I meet all of the general requirements of EAPs as set out in Regulation 13 of the NEMA EIA Regulations;
- I have disclosed to the applicant, the EAP, the specialist (if any), the review specialist (if any), the Department and I&APs, all material information that has or may have the potential to influence the decision of the Department or the objectivity of any Report, plan or document prepared as part of the application; and
- I am aware that a false declaration is an offence in terms of Regulation 48 of the NEMA EIA Regulations.

Signature of the EAP: Date:

Name of company (if applicable):

DECLARATION OF THE SPECIALIST

Note: Duplicate this section where there is more than one specialist.

I ……, as the appointed Specialist hereby declare/affirm the correctness of the information provided or to be provided as part of the application, and that:

- In terms of the general requirement to be independent:
  - other than fair remuneration for work performed in terms of this application, have no business, financial, personal or other interest in the development proposal or application and that there are no circumstances that may compromise my objectivity; or

  - am not independent, but another specialist (the "Review Specialist") that meets the general requirements set out in Regulation 13 of the NEMA EIA Regulations has been appointed to review my work (Note: a declaration by the review specialist must be submitted);

- In terms of the remainder of the general requirements for a specialist, have throughout this EIA process met all of the requirements;

- I have disclosed to the applicant, the EAP, the Review EAP (if applicable), the Department and I&APs all material information that has or may have the potential to influence the decision of the Department or the objectivity of any Report, plan or document prepared or to be prepared as part of the application; and

- I am aware that a false declaration is an offence in terms of Regulation 48 of the EIA Regulations.

Signature of the EAP: Date:

Name of company (if applicable):

DECLARATION OF THE REVIEW SPECIALIST

I ……., as the appointed Review Specialist hereby declare/affirm that:

- I have reviewed all the work produced by the Specialist(s):
- I have reviewed the correctness of the specialist information provided as part of this Report;
- I meet all of the general requirements of specialists as set out in Regulation 13 of the NEMA EIA Regulations;
- I have disclosed to the applicant, the EAP, the review EAP (if applicable), the Specialist(s), the Department and I&APs, all material information that has or may have the potential to influence the decision of the Department or the objectivity of any Report, plan or document prepared as part of the application; and
- I am aware that a false declaration is an offence in terms of Regulation 48 of the NEMA EIA Regulations.

Signature of the EAP: Date:

Name of company (if applicable):