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Reference number:	Erf 19374
Date:	06 April 2023

Enquiries:

M Geyer 044 801 9268

ATTENTION: MR H SCHOLTZ

CHEL Building and Civil Services (Pty) Ltd George 6530

ERF 19374: PROPOSED DEVELOPMENT

AVAILABILITY OF BULK WATER AND SEWER INFRASTRUCTURE & ASSOCIATED COSTS AND CHARGES

Your request dated 27 January 2023 to accommodate the proposed development in the George Municipal water and sewer system refers.

The George Municipality confirms that the proposed development is included in the general growth and development infrastructure planning of the George Municipality. This pertains to water (raw water and potable), sewage and roads infrastructure.

A technical report was prepared by GLS dated 24 February 2023 and revised on 20 March 2023, attached to this letter as annexure A, B and C.

Proposed Development

The proposed implementation plan of the development, received as part of the technical report, is as follows:

Phase	Short Description	Implementation Date / Connection Date	
1	T2: Single Storey residential	26 April 2024	
	T4: Double storey residential	5 of 18 units	20 April 2024
2	T2: Single Storey residential	25 of 31 units (cumulative)	30 November 2024
2	T3: Single Storey residential	50 NOVEITIBEI 2024	
	T2: Single Storey residential	31 of 31 units (cumulative)	
3	T3: Single Storey residential	28 of 28 units (cumulative)	30 May 2025
	T4: Double storey residential	18 of 18 units (cumulative)	
4	T1: 2-bedroom flats	40 of 40 units	01 December 2025

Table 1: Proposed implementation plan of development

Water and Sewer Bulk Infrastructure Capacity

In line with general growth and demand, new supporting bulk infrastructure must be constructed, and existing infrastructure upgraded where necessary to accommodate the services demand of all new developments in George.

The capacity of the treatment works is discussed below.



Erf 19374, GEORGE DEVELOPMENT: AVAILABILITY OF BULK WATER AND SEWER INFRASTRUCTURE & ASSOCIATED COSTS AND CHARGES

a) <u>Wastewater Treatment:</u>

- The Gwaiing Wastewater Treatment works is currently operating under constraint.
- Upgrades are currently underway at the treatment works, a ±3.5Ml/day capacity upgrade of the treatment works is in progress with an estimated completion date of August 2023.
- The treatment works will have sufficient capacity for the development in its entirety once the ±3.5Ml/day capacity upgrade is commissioned.

b) <u>Water Treatment:</u>

- The Water Treatment Works (old and new) is currently operating under constraint.
- A ±4.5MI/day capacity upgrade of the old treatment works is in progress with an estimated completion date of August 2023.
- The treatment works will have sufficient capacity for the development in its entirety once the ±4.5Ml/day capacity upgrade is commissioned.

Commencement of Development

The development, in its entirety or in phases, is subject to confirmation by the Director: Civil Engineering Services regarding the availability of water supply & treatment capacity and sanitation bulk conveyance and treatment capacity at the time of the development implementation, or if developed in phases before the commencement of each phase.

A development/implementation programme is to be provided by the Developer when requesting confirmation of the capacity from the Director: Civil Engineering Services. If the Developer does not adhere to the programme provided and approved by the Director: Civil Engineering Services, the Director: Civil Engineering Services will be entitled to revise the availability of such bulk capacity.

No development (a portion thereof or an erf) may connect to the municipal water and sewer system unless the required bulk and link infrastructure is available.

Connection points

Sanitation:

The George Municipality is of the opinion that the entire development may not be possible to drain to point B, and two connection points must be considered for this development in draining the Northern and Southern parts ^A of the development successfully.

- a. Point B: Connection point by the George Municipality (costing included in Table 2 for this connection point)
- b. Point A and Point A interim: The Southern portion of the development shall drain through either of these connection points. (Costing for Point A included in table 2 for connection point)

^A All properties below the entrance to the development via Plantation Road.

Water:

a. Point A: Preferred connection point by the George Municipality (costing included in Table 2 for this connection point)

The Developer must kindly consider the water and sanitation connection points and consult with the Municipality on the final connection points during detail design stage and drafting of the services agreement.

Water and Sewer Bulk Infrastructure Upgrades

The summary of the technical report concludes that the total pro-rata cost for water and sewer infrastructure upgrades in support of the development amounts to R 3 345 000.00 excluding VAT.

Description	Water (excl. VAT)	Sewer (excl. VAT)	Total (excl. VAT)
General: Bulk water system	R 937 000.00	R 1 143 000.00	R 2 080 000.00
Development specific: Bulk water system	R 0.00	R 0.00	R 0.00



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Description	Water (excl. VAT)	Sewer (excl. VAT)	Total (excl. VAT)
General: Distribution / Conveyance	R 0.00	R 0.00	R 0.00
Development specific: Distribution / Conveyance	R 394 000.00	R 957 000.00 ^B	R 1 351 000.00
Total	R 1 331 000.00	R 2 100 000.00	R 3 431 000.00

^B Sum of Section 4.4.2 and 4.4.3 of the GLS technical report.

Reimbursement of expenditure

In term of section 66(4) of the Planning By-law, the Developer will be required to make a proportional contribution to municipal public expenditure according to the normal need arising from the approval. The Developer will be reimbursed for the actual expenditure incurred for any services provided by the Developer above the normal need, up to the maximum value equal to the applicable Development Charges calculated for the services as per the approval, subject to normal escalation. The developer is to consult with the Municipality prior to incurring any expenditure for the Municipality to verify that the costs are in line with current construction costs for similar works.

For this development, the development specific items required are confirmed in sections 3.5.2 for water and 4.3.2 for sanitation of the technical report.

The Bulk water and sewer system items are currently being addressed, i.e., the extension of the capacity of the Water Treatment Works and the Gwaing Wastewater Treatment Works. Development Contributions payable by the Developer will cover the cost of the pro-rated development contribution.

However, the remaining items (referred to as general items in the technical report) must be addressed to accommodate the development and are to be constructed by the Developer. The pro-rata amount more than the development specific demand will be credited against the Development Contributions payable. The Developer's appointed registered Engineer will be required to submit a motivational report, indicating the quantum of services provided.

Table 3: Items to be addressed by the Developer for which credits may be applicable

Description	Estimated Cost	Estimated Pro-rata Cost	Pro-rata %	DC Credit % of actual cost		
Water (refer to section 3.5.2)						
General items to address existing problems in the bulk water system	R 360 721 000	R 937 000	0.26%	99.74%		
Development Specific items required in the water distribution system (incl fire flow)	R 848 000	R 394 000	46.46%	N/A		
Sewer (refer to section 4.4.2)						
General items required to alleviate problems in the bulk sewer system	R 206 851 000	R 1 143 000	0.55%	99.45%		
Development Specific items required in the existing sewer system (point A and B)	R 1 807 000	R 957 000	52.96%	N/A		

Note that the above costs are indicative only and will vary according to actual cost of construction.

Link services requirements

The developer will not be entitled for any reimbursement relating to the provision of any link and/or internal services.

The Developer is requested to confirm the connection point for the water network from the two options as indicated in figure 1 of the technical report.

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Development Charges

The current total development charges relating to Civil Engineering Services in line with the water demand and sewer return flows as included in the technical report, and in accordance with the current guidelines, for the proposed development were calculated on 07 March 2023 and amount to R 5 535 911.64 excluding VAT. This amount includes for water, sanitation, and road development contributions applicable at the time of preparing this letter.

The Developer is reminded of the following Clause relating to the calculation of development charges: "Any amendments or additions to the proposed development which is not contained within the calculation sheet as stated in clause 2 above which might lead to an increase in the proportional contribution to municipal public expenditure, will result in the recalculation of the development charges and the amendment of these conditions of approval or the imposition of other relevant conditions of approval."

In addition, the amount is subject to amendment based on annual escalation and applicable at the time that development contributions are due for payment. The Council is in the process of finalizing a Development Contributions Policy for implementation on final approval by Council.

Kindly confirm your acceptance of the above in writing.

Yours faithfully,

Jannie Koegelenberg Director: Civil Engineering Services

ANNEXURES

- A Technical report by GLS (20 March 2023)
- B Figure 1 Required works Water: George Erf 19374
- C Figure 2 Required works Sewer: George Erf 19374





20 March 2023

Director: Civil and Technical Services George Municipality PO Box 19 GEORGE 6530

ATTENTION: Ms Lindsay Mooiman

Ma'am,

WATER AND SEWER MASTER PLANS: DEVELOPMENT OF PROPOSED TOWNSHIP/REZONING – GEORGE ERF 19374 (URBAN COUNTRY ESTATE)

The request from CHEL Building & Civil Services (Pty) Ltd. dated 27 January 2023 with regards to accommodating the proposed development in the George water and sewer systems has reference.

This report is a technical report stating upgrades required in the water and sewer networks in the vicinity of the proposed development. The George Municipal engineering professional (yourself) will make a final decision on works to be implemented by the proposed development.

GLS Consulting (Pty) Ltd

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1 INTRODUCTION

1.1 Brief

This report is a technical report stating upgrades required in the water and/or sewer networks in the vicinity of the proposed development. The George Municipal engineering professional (yourself) will make a final decision on works to be implemented by the proposed development.

The latest master plans used in this analysis were the m2022-12 master plans.

1.2 Disclaimer

The investigation has been performed and this report has been compiled based on the information made available to GLS. All efforts, within budget constraints, have been made during the gathering of information to ensure the highest degree of data integrity. The information supplied to GLS by George Municipality and other Consultants at the outset of this assessment is assumed to be the most accurate representation of the existing system up to date hereof.

GLS hereby confirms that any contributions of the developer to the required construction of infrastructure and/or the upgrading of existing infrastructure, whether it be in the form of a capital contribution or in the form of constructing sections of new infrastructure, is a matter to be discussed and agreed upon between the developer and the George Municipality.

All costs shown in this report are year 2022/23 Rand value <u>estimates</u> and <u>include</u> 50% surcharge for P&Gs, contingencies and fees but <u>exclude</u> VAT.

1.3 Version control

Issue Date	Туре	Version	Remarks
2023/02/24	Draft	1	Issued for comments and approval
2023/03/20	Revision	1	Add water and sewer alternatives
	Final		

2 WATER DEMAND & SEWER FLOWS

2.1 Impact of the proposed development

The proposed development was taken into consideration in the master plan as part of the George Erf 19374 development area.

The water demand and sewer return flow contribution of the proposed development is outlined in the table below:

	Land Use	Unit of	No. Units	UWD/unit	Sewer ratio	AADD	PDDWF					
		measure				Inc. UAW	Excl. Infilt.					
		(No/100m2/ha)	(No/100m2/ha)	(kL/unit/d)	(% x UWD)	(kL/d)	(kL/d)					
Phase	e 1	Estin	nated Start Date:	01-Aug-23	Estimated Occupation Date: 26-Apr-24							
Т2	Single Storey Residential (309m ² Ave Erf size)	unit	17	0.556	70%	9.44	6.61					
Τ4	Double Storey Residential (452m ² Ave Erf size)	unit	5	0.833	55%	4.17	2.29					
Sub-To	tal		22			13.61	8.90					
Phase	2	Estin	nated Start Date:	23-Jan-24	Estimated Oc	cupation Date:	30-Nov-24					
Т2	Single Storey Residential (309m ² Ave Erf size)	unit	8	0.556	70%	4.44	3.11					
Т3	Single Storey Residential (415m ² Ave Erf size)	unit	19	0.722	60%	13.72	8.23					
Sub-To	tal		27			18.17	11.34					
Phase	2 3	Estin	nated Start Date:	01-Jul-24	Estimated Oc	cupation Date:	30-May-25					
T 2	Single Storey Residential (309m ² Ave Erf size)	unit	6	0.556	70%	3.33	2.33					
Т3	Single Storey Residential (415m ² Ave Erf size)	unit	9	0.722	60%	6.50	3.90					
Т4	Double Storey Residential (452m ² Ave Erf size)	unit	13	0.833	55%	10.83	5.96					
Sub-To	tal		28			20.67	12.19					
Phase	e 4	Estin	nated Start Date:	13-Jan-25	Estimated Oc	cupation Date:	01-Dec-25					
Τ1	2 Bedroom Flats (70m ² Ave Floor size)	edroom Flats unit m² Ave Floor size)		0.278	90%	11.11	10.00					
Sub-To	tal		40			11.11	10.00					
Total			117			63.6	42.4					

2.2 Revised Water Demand

The combined AADD for the proposed development as originally calculated and used in the analysis of the water distribution network in the master plan was 52.3 kL/d (theoretical demand).

The revised AADD, peak flow and fire flow calculated for the proposed development and used in this re-analysis of the water distribution network is 63.6 kL/d.

•	Peak flow using a zone peak hour factor of 3.6‡	= 2.65 L/s
•	Fire flow (Cluster housing > 30 units/ha) using a peak hour factor of 2.0	= 20 L/s @ 10 m
	(Note: Flow provided at 1 fire hydrant)	

[‡] Higher peak flow factors might be applicable for internal networks.

2.3 **Revised Sewer Flow**

The combined peak day dry weather flow (PDDWF) for the proposed development as originally calculated and used in the analysis of the sewer system in the master plan was 42.7 kL/d (theoretical flow).

The revised PDDWF (excluding infiltration) calculated for the proposed development and used in the re-analysis of the sewer system is 42.4 kL/d. The design flow, or instantaneous peak wet weather flow (IPWWF), is 1.22 L/s.

3 WATER DISTRIBUTION NETWORK

3.1 Water Resources

Water Treatment Plant capacity

The master plan indicates that the proposed development falls in the George Main zone and supplied from the Old and New George WTPs.

The two graphs (below and) overleaf shows that the design capacity of the Old and New George WTPs (green line) has been exceeded by the average monthly required capacity (dark red line) a few times in the last decade. The WTPs are thus operating at risk and needs to be extended.



- Capacity -

George WTPs



Based on available information the capacity, present flow and projected short-term flow are as follows:

George WTPs	Capacity	Comment
Existing Capacity	42 200 kL/d	Design capacity 46 700 kL/d
Meas	sured Flow (incl. 1.35	5 factor)
Annual Average (2003-2022)	46 894 kL/d	Maximum 2016/17
	-4 694 kL/d	No spare capacity available
Annual Average (2021/22)	44 806 kL/d	Average for 2021/22
	-2 606 kL/d	No spare capacity available
Monthly Average (2003-2022)	58 176 kL/d	February 2009
	-15 976 kL/d	No spare capacity available
Monthly Average (2020/21)	48 955 kL/d	January 2022
	-6 755 kL/d	No spare capacity available
Modelled Flow	/ (incl. 10% water los	s and 1.35 factor)
T_AADD (existing)	42 784 kL/d	m2022-12 MP
	-584 kL/d	No spare capacity available
3yr Projection	56 487 kL/d	
	-14 287 kL/d	No spare capacity available
5yr Projection	65 623 kL/d	
	-23 423 kL/d	No spare capacity available

Note:

T_AADD: Theoretical Annual Average Daily Demand

The flow projections include all stands that are presently vacant but expected to be occupied over the next 5 years as well as all future areas likely to develop within the next 5 years

3.2 Distribution Zone

The master plan indicates that the proposed development falls in the Blanco Main zone as shown in **Figure 1 (Water)** attached.

An alternative connection was investigated to accommodate the proposed development in the exiting water system as indicated below.

3.3 Categorisation of required upgrades

The items are categorised as follows:

- General system specific MP Items required to address capacity issues and backlogs in the bulk and reticulation systems serving the proposed development, but not specifically required for the development per sé.
- Development specific MP Items new additions to (or deviations from) the existing Master Plan, required specifically for the proposed development, as a result of more accurate information relative to the original estimate of future development.

It is important to note that all proposed items are schematic in nature, final size and location is subject to a complete design by a suitably qualified engineer. The final locality in particular is subject to legislative requirements including but not limited to pipes not crossing private stands, no servitudes registered in private stands and no pipes in stands with an area less than 400m².

3.4 Bulk Water Supply

Reservoir storage capacity

One of the main considerations in bulk water supply is reservoir storage capacity and in the assessment of storage capacity, two demand scenarios are considered.

The first (Theoretical Current Demand) scenario represents the demand in the system as it is currently experienced, i.e. it only includes the demand for stands that are developed (vacant stands are ignored), and only due to land use rights currently being exercised. An allowance for 10% water losses is also included in the scenario.

The second (Theoretical Fully Occupied Demand) scenario is the planning scenario and represents the demand of all the existing stands, irrespective of whether they are developed or vacant. Most importantly, the demand is based on the zoning of each stand i.e. the maximum demand allowed for under existing land use rights (known as zoning rights). Ideally the existing system should have sufficient capacity for this scenario which represents all existing development rights. An allowance for 10% water losses is also included in this scenario.

The difference between the two demand scenarios becomes relevant when there is "perceived" spare storage capacity in the Theoretical Current Demand scenario and no storage capacity in the Theoretical Fully Occupied Demand scenario. This means that the storage capacity allotted to all existing stands (in the Theoretical Fully Occupied Demand scenario) is currently not utilised in the Theoretical Current Demand scenario, it is however still committed to the water demands derived from the zoning rights.

Reservoir capacity assessment (Theoretical Current Demand)

The current Blanco Main zone AADD plus 10% UAW (Theoretical Current Demand) in the m2022-12 water model is 3 947 kL/d. The capacity of the existing Blanco Main Reservoirs is 6 460 kL. The FCV is set at 91 L/s. Using these three input variables in a reservoir sizing analysis, it shows that the remaining spare capacity is 1 858 kL.



Reservoir capacity assessment (Theoretical Fully Occupied Demand)

The current Blanco Main zone AADD plus 10% UAW (Theoretical Fully Occupied Demand) in the m2022-12 water model is 5 071 kL/d. The capacity of the existing Blanco Main Reservoirs is 6 460 kL. The FCV is set at 117 L/s. Using these three input variables in a reservoir sizing analysis, it shows that the remaining spare capacity of 473 kL is sufficient to cater for the proposed development.

DETERMINATIO	ON OF RESERVO	IR BALANCI	NG VOLUME	and/or REQ	UIRE	D SUI	PPL	Y R	ATE	(The	eor	etic	al F	ully	00	up	ied	De	ma	nd)					-						
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Capacity		6 460	kL =	35.4	h x /)				Í																				
Required bala	ncing	1 611	kL =	8.8	h x /	AADD)														1				Ť						
Available volu	me	4 849	kL =	26.6	h x /	AADD)				Ē																				
Required emer	gency	4 377	kL =	24.0	h x /	4ADC)														1				Ť						
Spare capacity	/	473	kL =	2.6	h x /	4ADC)																								

3.4.1 Existing bulk water system considerations

Items presented here are for the attention of the George Municipal engineering professional (yourself) so as to highlight existing shortfalls or the imminent potential thereof.

ltem No	MP	Description	Extent	Size		Cost		Pro-rata Co	ost
Existing WTPs (O	Id WTP	and New WTP)							
GMR_B15.01 #1	MP	Water Treatment Facility to install:	4 500 m³/d @	306 m EGL	R	78 959 000	R	205 000	0.26%
		Old WTP							
GMR_B01.01	MP	Water Treatment Facility to install:	20 000 m³/d @	254 m EGL	R	279 600 000	R	726 000	0.26%
		New WTP							
GMR_B01.06	MP	Pipe to install	7 m x	500 mm Ø	R	630 000	R	2 000	0.26%
GMR_B01.07	MP	Pump Only to install:	160 L/s@	50 m	R	1 532 000	R	4 000	0.26%
		New WTP PS							
				Total	R	360 721 000	R	937 000	

General items required to alleviate existing problems in the bulk water system:

Notes: $\#^1$ Refurbish WTP to original design capacity of 25 000 m $^3/d$.

3.4.2 Accommodation of the proposed development in the bulk water system

Development specific items required in the bulk water system:

ltem No	MP	Description	Extent	Size	Cost	Pro-rata Cost
	Туре					
None						
				Total	R -	R -

3.5 Water Reticulation System

Accommodation of the proposed development, with its revised AADD, requires implementation of the following additions and adjustments to the *existing* water system as indicated in **Figure 1 (Water)**.

3.5.1 Existing water reticulation system considerations

Items presented here are for the attention of the George Municipal engineering professional (yourself) so as to highlight existing shortfalls or the imminent potential thereof.

General items required to alleviate existing problems in the water distribution system:

ltem No	ltem No		Description	Description Extent		Cost	Pro-rata Cost		ost
Existing exter	nal sy	stem							
BMR_31.01a	# ²	MP	Pipe with meter to install	1 x	400 mm Ø	R 780 000	R	-	0.0%
BMR_31.01b	# ²	MP	Valve to insert and close	1 x	450 mm Ø	R -	R	-	0.0%
					Total	R 780 000	R	-	

Notes: #² Implement / upgrade existing Blanco meter zone, install new zone meter.

3.5.2 Accommodation of the proposed development in the water reticulation system

Development specific items required in the water distribution system (including fire flow requirements):

Item No		MP	Description	Extent	Size	Cost	Р	ro-rata C	ost
		Туре							
Existing exter	nal sy	stem (from development to connection Point A)						
BMR_16.01		MP	Pipe to install	8 m x	200 mm Ø	R 74 000	R	7 000	8.2%
BMR_16.02		MP	Future connection	21 m x	200 mm Ø	n.a.		n.a.	
BMR_38.01	# ³	MP	Pipe to install	27 m x	160 mm Ø	R 83 000	R	25 000	29.5%
BMR_38.02	# ³	MP	Pipe to install	25 m x	160 mm Ø	R 161 000	R	48 000	29.5%
BMR_38.03	# ³	MP	Pipe to install	167 m x	160 mm Ø	R 307 000	R	91 000	29.5%
					Sub-Total	R 625 000	R	171 000	
Future extern	al sys	tem							
BMR_F13.01	# ³	FM	Pipe to install	28 m x	160 mm Ø	R 84 000	R	84 000	100.0%
					Sub-Total	R 84 000	R	84 000	
Future intern	al sys	tem							
BMR_F13.02	# ³	FM	Pipe to install	62 m x	160 mm Ø	R 139 000	R	139 000	100.0%
			•		Sub-Total	R 139 000	R	139 000	
					Total	R 848 000	R	394 000	

Notes: #³ Minimum diameter required for fire flow requirements.

The proposed connection point A to the existing water distribution system is shown in Figure 1 (Water).

3.5.3 Accommodation of the proposed development in the water reticulation system (alternative)

Development specific items required in the water distribution system (including fire flow requirements):

Item No		MP	Description	Extent	Size	Cost	Pro-	rata C	ost
		Туре							
Future extern	al sys	tem (f	rom development to connection Point B)						
BMR_39.00	# ³	MP	Pipe to install (link to 2 x 110 mm Ø)	34 m x	160 mm Ø	R 94 000	R 9	94 000	100.0%
					Sub-Total	R 94 000	R 9	4 000	
Future extern	al sys	tem (f	rom development to connection Point C)						
BMR_F13.04	# ³	FA	Pipe to install	41 m x	160 mm Ø	R 105 000	R 10)5 000	100.0%
					Sub-Total	R 105 000	R 10	5 000	
Future interna	al sys	tem							
BMR_F13.03	# ³	FM	Pipe to install	209 m x	160 mm Ø	R 374 000	R 37	74 000	100.0%
			· · ·		Sub-Total	R 374 000	R 37	4 000	
					Total	R 479 000	R 479	000	

The proposed connection point B and C to the existing water distribution system is shown in Figure 1 (Water).

3.6 Internal Reticulation

The internal network design on the property of the proposed development is beyond the scope of this report. However, the consulting engineer for the development is required to allow for the fire flow demand as listed in 2.2 above on the internal networks.

For internal network design purposes, the water distribution network provides the following energy gradelines (EGLs) at the proposed connection point (see **Figure 1 (Water)**).

	Sta	itic	Resi	dual	Fire	Flow	Ground Level			
Connection Point	EGL	Head	EGL	Head	EGL	Head	()			
	(m a.s.l.)	(m)	(m a.s.l.)	(m)	(m a.s.l.)	(m)	(m a.s.i.)			
Future system										
Point A	306.1	69.1	284.2	47.2	287.5	50.5	237.0			
Point B (Alternative)	306.1	67.3	280.6	41.8	273.8	35.0	238.8			
Point C (Alternative)	306.1	68.5	280.1	42.5	282.2	44.6	237.6			

4 SEWER CONVEYANCE NETWORK

4.1 Sewer Drainage Area

The master plan indicates that the proposed development falls in the Gwaiing PS and Rooiriver PS drainage areas as shown in **Figure 2 (Sewer)** attached. This drainage areas drains to the Gwaiing WWTW.

The proposed connections are based on the internal network design as received from the developer.

An interim option was investigated to accommodate the proposed development in the exiting sewer system as indicated below.

4.2 Categorisation of required upgrades

The items are categorised as follows:

- General system specific MP Items required to address capacity issues and backlogs in the bulk and reticulation systems serving the proposed development, but not specifically required for the development per sé.
- Development specific MP Items new additions to (or deviations from) the existing Master Plan, required specifically for the proposed development, as a result of more accurate information relative to the original estimate of future development.

It is important to note that all proposed items are schematic in nature, final size and location is subject to a complete design by a suitably qualified engineer. The final locality in particular is subject to legislative requirements including but not limited to pipes not crossing private stands, no servitudes registered in private stands and no pipes in stands with an area less than 400m².

4.3 Bulk Sewer Drainage

Accommodation of the proposed development, with its revised PDDWF, requires implementation of the following additions and adjustments to the existing sewer system as indicated in **Figure 2 (Sewer)**.

Wastewater Treatment Works capacity

The graphs below shows that the design capacity of the Gwaiing WWTW (green line) has been exceeded by the Average Monthly Flow (light red shaded area) a few times in the last decade. The WWTW is thus operating at risk and needs to be extended.



Based on available information the capacity, present flow and projected short-term flow are a	as
follows:	

Gwaiing WWTW	Сара	city	Comment
Existing Capacity	7 500	kL/d	Design capacity 11 000 kL/d
		Measur	ed Flow
Annual Average (2001-2022)	8 128	kL/d	Maximum 2021/22
	-628	kL/d	No spare capacity available
Annual Dry Average (2021/22)	6 801	kL/d	Average for 4 driest months 2021/22
	699	kL/d	Spare capacity available
Monthly Average (2001-2022)	16 467	kL/d	November 2007
	-8 967	kL/d	No spare capacity available
Monthly Average (2021/22)	10 358	kL/d	December 2022
	-2 858	kL/d	No spare capacity available
		Modell	ed Flow
T_PDDWF (existing)	6 455	kL/d	m2022-12 MP
	1045	kL/d	Spare capacity available
3yr Projection	9 665	kL/d	
	-2 165	kL/d	No spare capacity available
5yr Projection	11 806	kL/d	
	-4 306	kL/d	No spare capacity available

 Note:
 T_PDDWF: Theoretical Peak Daily Dry Weather Flow (Total Wastewater Flow, Peak day in week)

 The flow projections include all stands that are presently vacant but expected to be occupied over the next 5 years as well as all future areas likely to develop within the next 5 years

4.3.1 Existing bulk sewer system considerations

Items presented here are for the attention of the George Municipal engineering professional (yourself) so as to highlight existing shortfalls or the imminent potential thereof.

Genera	l items	required	to al	leviate	existing	prob	<u>lems in</u>	the	bull	k sewer s	ystem:	
					-							

Item No	MP	Description	Existing	New	Length	Design Flow	Cost		Pro-rata C	ost
	Туре		Diam	Diam	(m)					
			(mm)	(mm)						
Existing bulk syste	em (fro	m connection Point A via Gwaiing PS and con	nection P	oint B v	/ia Rooir	ivier PS to Gwa	iing WWTW)			
GW_06.01 # ²	MPi	Downsize existing Pumps (Investigate first):	-	-	-	98.7 L/s	R 1 170 000	R	4 000	0.32%
		Gwaiing PS								
GW_11.01 # ³	MP	Downsize existing Pumps: Rooiriver PS	-	-	-	108.7 L/s	R 1 313 000	R	11 000	0.83%
					Sub-Total	R 2 483 000	R	15 000		
Existing WWTW (Gwaiin	g WWTW)								
GW_17.00 #1	MP	Upgrade existing Treatment Plant: Gwaiing	-	-	-	3.50 ML/d	R 93 851 000	R	518 000	0.55%
		WWTW								
GW_17.01a	MP	Upgrade existing Flow Diversion	-	-	-	845.1 L/s	R 690 000	R	4 000	0.55%
GW_17.01b	MP	New Gravity	-	355	21	101.4 L/s	R 161 000	R	1 000	0.55%
GW_17.01c	MP	New Treatment Plant: Gwaiing WWTW	-	-	-	4.20 ML/d	R 109 666 000	R	605 000	0.55%
	Sub-Total R							R	1 128 000	
						Total	R 206 851 000	R	1 143 000	

Notes:

#² In the master plan an investigation of this pump station is proposed implying that not all information on capacity, pump settings etc. was available. The pump station should therefore first be investigated through field inspections and flow measurement to verify that upgrading is in fact required.

The downsize of pump capacity is only required if the gravity pipe downstream of the rising main overflows during operation.

^{#&}lt;sup>1</sup> Refurbish WWTW to original design capacity of 11.0 ML/d.

4.3.2 Accommodation of the proposed development in the bulk sewer system

Development specific items required in the bulk sewer system:

ltem No	MP	Description	Existing	New	Length	Design Flow	C	ost	Pro-rata Cost
	Туре		Diam	Diam	(m)				
			(mm)	(mm)					
None									
		R	-	R -					

4.4 Sewer reticulation system

Accommodation of the proposed development, with its revised PDDWF, requires implementation of the following additions and adjustments to the *existing* sewer system as indicated in **Figure 2 (Sewer)**.

4.4.1 Existing sewer reticulation system considerations

Items presented here are for the attention of the George Municipal engineering professional (yourself) so as to highlight existing shortfalls or the imminent potential thereof.

General items required to alleviate existing problems in the existing sewer system:

ltem No	MP	Description	Existing	New	Length	Design Flow	Cos	t	Pro-rata Cost
	Туре		Diam	Diam	(m)				
			(mm)	(mm)					
None									
						Total	R	-	R -

4.4.2 Accommodation of the proposed development in the sewer reticulation system

Development specific items required in the existing sewer system:

Item No	MP	Description	Existing	New	Length	Design Flow		Cost		Pro-rata (Cost		
	Туре		Diam	Diam	(m)								
			(mm)	(mm)									
Future collector sy	stem	(from proposed development to connection Pe	oint A)										
GW_F03.01 #4	FM	New Gravity	-	160	106	0.3 L/s	R	270 000	R	270 000	100.00%		
GW_F03.02 #4	FM	New Gravity	-	160	212	1.1 L/s	R	488 000	R	148 000	30.19%		
GW_F03.03 #4	FM	New Gravity	-	160	120	2.2 L/s	R	300 000	R	45 000	14.88%		
	Sub-Tot.						R	1 058 000	R	463 000			
Future collector sy	stem	(from proposed development to connection Pe	oint B)										
GW_F37.01	FM	New Gravity	-	160	49	0.9 L/s	R	153 000	R	153 000	100.00%		
GW_F37.02 #⁵	FM	New Gravity	-	160	265	2.1 L/s	R	596 000	R	255 000	42.65%		
						Sub-Total	R	749 000	R	408 000			
						Total	R	1 807 000	R	871 000			
Note: #4	Refer to	o paragraph 4.4.3 for interim connection prior to the develop	oment of Ge	eorge Erf 1	19001.		lote: # ⁴ Refer to paragraph 4.4.3 for interim connection prior to the development of George Erf 19001.						

Refer to paragraph 4.4.4 for alternative connection.

#⁵

The proposed connection points to the existing sewer system are shown in Figure 2 (Sewer).

4.4.3 Accommodation of the proposed development in the sewer reticulation system (interim period)

Development specific items required in the existing sewer system for the interim connection prior to the development of George Erf 19001:

Item No	MP	Description	Existing	New	Length	Design Flow		Cost	Pro	Pro-rata Cost		
	Туре		Diam	Diam	(m)							
			(mm)	(mm)								
Future collector system (from proposed development to interim connection Point A)												
GW_F03.04	FA	Future Flow Diversion to Item GW_F03.01	-	-	-	0.3 L/s	R	-	R	-	100.00%	
		(Alternative)										
GW_F03.05	FA	New Gravity (Alternative)	-	160	16	0.3 L/s	R	86 000	R 8	36 000	100.00%	
						Total	R	86 000	R 8	36 000		

This interim connection is on a 110mmØ sewer pipe, which hydraulically would work, but would require your approval.

4.4.4 Accommodation of the proposed development in the sewer reticulation system (alternative)

Development specific items required in the existing sewer system:

ltem No	MP	Description	Existing	New	Length	Design Flow	Cost		Pro-rata Cost		ost
	Туре		Diam	Diam	(m)						
			(mm)	(mm)							
Future collector system (from proposed development to interim connection Point A)											
GW_F37.03 #⁵	FA	New Gravity (Alternative)	-	160	40	2.1 L/s	R	135 000	R	58 000	42.65%
						Total	R	135 000	R	58 000	

Note: #⁵ Alternative to Item GW_F37.02. The connection is not recommended as it connects to a midblock sewer.

4.5 Internal Reticulation

The internal network design on the property of the proposed development is beyond the scope of this report.

The proposed connection points to the existing sewer system are shown in Figure 2 (Sewer).

Connection Point	Design Flow (L/s)					
Point A	0.32					
Point B / C	0.90					

In Figure 2 (Sewer) pipes in future development areas are indicated schematically.

As the Design Flow already accommodates stormwater ingress, the pipes can be designed to flow 100% full with the Design Flows provided above.

5 SUMMARY

Water supply:

Summary of costing:		Cost	Pro-rata Cost	
General items required to alleviate existing problems in the bulk water system	R	360 721 000	R 937 000	
Development specific items required in the bulk water system	R	-	R -	
General items required to alleviate existing problems in the water distribution system	R	780 000	R -	
Development specific items required in the water distribution system (including fire flow requirements)	R	848 000	R 394 000	
Tota	I R	362 349 000	R 1331000	

Note: Excluded cost for the alternative option

Sewer drainage:

Summary of costing		Cost	Pro	o-rata Cost
General items required to alleviate problems in the bulk sewer system:	R 20	06 851 000	R	1 143 000
Development specific items required in the bulk sewer system:	R	-	R	-
General items required to alleviate problems in the existing sewer system:	R	-	R	-
Development specific items required in the existing sewer system:	R	1 807 000	R	871 000
Total	R 2	08 658 000	R	2 014 000

Note: Excluded cost for the interim and alternative options

Yours sincerely,

amplie of

Per: A Vienings (Pr. Eng.) GLS Consulting

(Report done by: JJ van der Merwe)

REQUEST FROM CONSULTANT TO GLS



Good Morning Jurie.

I trust that you are well. A very blessed and prosperous new year to you and your family.

Please find attached the Bulk Services Engineering Report for your perusal.

As discussed with Ricus Fivas this morning, from George Municipality.

Please can you review our proposed bulk service connections to the municipal network and indicate if there are any potential system conflicts or restrictions hindering these connections?

Please could you provide us with written confirmation of the acceptance hereof in order for us to move forward?

Please feel free to contact me should there be any questions?

Thank You & Kind Regards

Henco Scholtz

Director CHEL Building & Civil Services (Pty) Ltd. George South Africa +27 82 881 5456 <u>henco.chel@email.com</u> "Lord Jesus Christ, my Life and my work will be a Living Worship unto You"

DEVELOPMENT ROLL OUT - SUMMARY

Section	Civil Infrastructure (Start)	Building Construction (Start)	No Units	Occupation Date.		
Phase 1	1st August 2023	20 th November 2023	22	26 th April 2024		
Phase 2	23 rd January 2024	29 th May 2024	27	30 th November 2023		
Phase 3	O1st July 2024	21 st November 2024	28	30 th May 2025		
Phase 4	13 th January 2025	19 th May 2025	40	01 st December 2025		



PRELIMINARY COMBINED SERVICES LAYOUT







