

66 Victoria Street P O Box 458 George 6530

Tel: +27 44 874 2177

Fax: +27 44 874 1364

07 December 2023

Our Ref: G5215BA Your Ref:

Pieterkoen Development Company (Pty) Limited PO Box 92 George 6530

Attention: Justin Branford

PER e-mail: justin.branford@igen.co.za

Dear Sir

#### APPLICATION FOR REZONING AND SUBDIVISION OF THE FARM PIETER KOEN (KRAAIBOSCH 195/21), GEORGE: EIA AND TOWN PLANNING – AVAILABILITY OF CIVIL SERVICES FOR PROPOSED RESIDENTIAL DEVELOPMENT REV 1

On behalf of the developer, we have prepared a services report highlighting the available civil services for this development based on the Architects layout - SUB/003 (6 December 2023). It is envisaged that the development implementation will be phased over a period of six years commencing in 2024. The service requirements are estimated as follows.

- Portion 1&2 (Townhouse and Flats):
  - $\circ$  44 Townhouse units 114,5 m<sup>2</sup> 2 bedroom
  - o 9 Flats (74m<sup>2</sup>) 2 bedroom
  - 22 Flats (68m<sup>2</sup>) 2 bedroom
  - o 22 Flats (72m<sup>2</sup>) 2 bedroom
  - 22 Flats (68m<sup>2</sup>) 2 bedroom
  - 9 Flats (48m<sup>2</sup>) 1 bedroom
- Portion 6 (Business & Flats):
  - Supermarket @ 560m<sup>2</sup>
  - $\circ$   $\:$  Line shops @ 340m^2
  - Creche @ 225m<sup>2</sup>
  - Flats on first Floor: 9 x 2 Bedroom @ 720m<sup>2</sup> total
- Portion 7 (Hotel):
  - Restaurant, coffee shop and small meeting rooms @ 500m<sup>2</sup>
  - Gym and Spa @ 420m<sup>2</sup>
  - Existing house (offices, lounges) @ 320m<sup>2</sup>
  - Existing store (Meeting and storage) @ 240m<sup>2</sup>

-	Portion 8	Group Housing (Cottages):	18
		Group Housing:	40
		Single Residential Erven:	33
-	Portion 9	Single Residential Erven:	28
-	Portion 10	Group Housing:	5
-	Portion 11	Group Housing (Cottages):	18
		Group Housing:	24
		Single Residential Erven:	18
		-	

Total Residential Opportunities:

#### 1. Water

Water demand for the proposed housing units with an average annual daily consumption of 800 l/unit/day for the 3-bedroom units, 560 l/unit/day for the 2-bedroom units, 400 l/unit/day for the 1-

321

bedroom units and the flats at 400 l/unit/day is 170,58 k $\ell$ /day. George Municipality have confirmed that they will have sufficient supply of treated potable water to provide this proposed development with an on-site connection, considering the implementation program of six years commencing in 2024 - letter attached as Annexure A. The bulk and link service upgrades required is as per the attached GLS report. Final requirements will have to be recorded in a Services Agreement to be concluded between the developer and the Local Authority.

The developer will be responsible to connect to the existing municipal network which is in close proximity to the proposed development (to the south of the site).

#### 2. Sewage disposal

The sewage master plan of the Local Authority does allow for this development in terms of bulk disposal and treatment of the sewage outfall. The Local Authority has confirmed the availability of this service - letter attached as Annexure A. The bulk and link service upgrades required is as per the attached GLS report. Final requirements will have to be recorded in a Services Agreement to be concluded between the developer and the Local Authority.

The estimated sewerage effluent quantity produced for the development and based on the water demand will be 136,46 kl/day. This equates to a peak flow of 4,90 l/s. The developer will be responsible to deliver sewage by gravity or by pumping to an existing outfall sewer which is in close proximity to the proposed development (to the west and east of the site).

Two temporary pumpstations will be required to pump effluent from the east to the west side of the development – see attached Annexure B - G5215BA-CE-101-A. These temporary measures will be constructed and maintained by the developer. Once the developments to the east have been implemented the temporary measures will be substituted by connecting the pump stations to the gravity system to the east - see attached Annexure B - G5215BA-CE-102-A. This gravity system will be transferred to and maintained by the Local Authority.

#### 3. Road Access

Road access will be provided via the existing roads network within the Kraaibosch development area. The development fall within the Kraaibosch Roads Cost Model area (C1736 Kraaibosch Cost Model Rev 5.2 20220413) and road contributions will be calculated/negotiated according to the model.

The development form part of the Kraaibosch Roads Cost Model and a revision of the TIA information has been done, considering the current usage and trip generations. This could/will affect the cost contribution for roads, of this development, but will not have major implications for access which will still be from Glenwood Avenue.

The width of internal roads will be 5,5m average. The roads will have concrete block paving as the final wearing surface with gravel layerworks beneath.

#### 4. Telkom

The developer will install cable ducts and junction boxes to all properties. Erf connections will be installed by a service provider who will be appointed at a later stage.

#### 5. Stormwater Disposal and Management Plan

Stormwater infrastructure is envisaged to be provided by the developer – see drawing G5215BA-CE-102-A, G5215BA-CE-110-A and G5215BA-CE-111-A. All necessary precautions will be taken to prevent erosion.

#### Design Philosophy

Stormwater management will be according to recommendations contained in the Red Book i.e., Guidelines for Human Settlement Planning and Design as compiled by the CSIR. The principals of SuDS will further be considered to minimise the amount and impact of stormwater leaving the site.

A dual drainage system will be adopted. Source control of the minor flood with 1:5 year or less recurrence intervals will be provided by the utilisation of roof water collection rainwater tanks to collect runoff from roofs for later use in irrigation of gardens etc. Local control will be facilitated by the use of catchment structures and will, where possible, be constructed per erf pockets as required. This will to some extent facilitate infiltration of water at source.

The major flood with 1:50 year recurrence interval will be carried in the streets and the formal system (as per Guidelines) and only where the above minor system's capacity is exceeded, then in overland open or piped channels to the natural watercourses.

During the detail design phase, storm runoff from catchment areas will be calculated and catchpit inlets will be positioned and sized to match runoff volumes. The capacity of road kerbs will also be checked against major runoff volumes. Stormwater servitudes will be provided between erven where necessary to accommodate overland open channels with sufficient capacity to carry major storm runoff from the edge of the road to the nearest natural watercourse.

#### Specific Considerations

Runoff from the land will increase because of the development, but this will be accommodated in the design of the minor and major stormwater system. The increased runoff will not affect any existing or proposed properties, since all properties are well above the 1:100 year flood lines for the major natural watercourse (Swart River).

#### Increased overland flow velocities

Various measures will be incorporated to mitigate increased flow velocities like:

- Energy dissipaters and stilling basins at stormwater pipe outlets. Reno mattress aprons with stilling basins where appropriate will be provided at all culvert outlets. Large rocks will be effective as energy dissipaters and will contribute to the landscaping.
- Lining of open channels with grass (swales) and or stone pitching where required.
- Utilisation of invader tree logs to act as flow speed calming structures placed across flow paths and anchored properly.
- Utilisation of Gabion type structures to act as flow speed calming elements placed across flow paths and anchored properly.

#### Quality of water

Long term contamination of stormwater run-off is not a concern as the development consists mostly of commercial and housing development. In line with the SuDS principals pipe culvert outlets will be provided with Gabion and Reno mattress structures to facilitate slowing of minor storm flows and to provide infiltration areas to augment subsurface flow. Possible pollutants will be trapped in these structures and can be cleaned out as part of a regular maintenance schedule.

The site is most vulnerable during the construction phase, and it will be necessary to utilize silt screens and onion bags to trap silt before the run-off joins the natural watercourses. Once vegetation in all the disturbed areas of the development is well established and ground surfaces have consolidated, no further measures will be required. These measures will be the subject of the Environmental Management Plan (EMP) which will be issued to the contractor at construction stage. The Environmental Control Officer (ECO) will be responsible for enforcing the EMP.

#### Protection of slopes that occur on the property

Natural slopes that have been disturbed and where sheet flow occurs will be landscaped and revegetated. Where flow is concentrated, measures will be incorporated as proposed above.

Where stormwater is channelled towards the river and tributary streams, outlets have been spaced at intervals along the stream edge to avoid concentration of large flows. Stormwater will thus be fed into the streams and river system along a wide front allowing dissipated flow and seepage to all areas.

#### Watercourse/River Crossings

It is not anticipated at this stage to have any road river crossings constructed.

#### Preliminary High level Flow Estimation

The figures provided below should be considered as estimated quantities only.

Flow estimation has been done according to the Rational Method for the 1:5 years return period nl. stormwater accommodated in the underground piped system and stormwater accommodated as overland sheet flow per the existing topography. Flow is indicated for the east side contributing to the existing stream as follows.

Pre-development flows:

- 202,63 l/s

Post-development flows:

- 399,18 l/s

As can be seen the expected increase in flow is 196,55 l/s.

#### 6. Solid Waste disposal

The Local Authority will dispose of the solid waste. Collection of the waste will be by mutual agreement between the Developer and the Local Authority.

We trust you find the above in order. Please let us know if anything is unclear or if you require further information.

Yours faithfully KANTEY & TEMPLER

N

C G AGENBAG Pr Eng

Z:\G5215-Dev Koen\Admin\Let-Pieter Koen Kraaibosch Civil Services Report rev 2.docx

Annexure A – Municipal Services Available

Annexure B

Drawings:

G5215BA-CE-101-A G5215BA-CE-102-A G5215BA-CE-110-A G5215BA-CE-111-A G5215BA-CE-112-A



J Koegelenberg Director: Civil Engineering Services Directorate: Civil Engineering Services E-mail: jkoegelenberg@george.gov.za Tel: +27 (0)44 801 9278

Reference number:Erf 21/195, GeorgeDate:7/25/2023

Enquiries:

M Geyer

044 801 9278

#### ATTENTION: MR N AGENBAG

Kantey & Templer Pty Ltd PO Box 458 George 6530

#### ERF 21/195, KRAAIBOSCH GEORGE: PROPOSED DEVELOPMENT

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

Your request dated 17 March 2023 to accommodate the proposed development in the George Municipal water and sewer system refers.

The George Municipality confirms that the proposed development was taken into consideration in the current water and sanitation master plans as part of the Kraaibosch development area.

A technical report was prepared by GLS dated 13 June 2023, attached to this letter as annexure A, B and C to confirm water and sanitation system upgrades required to support the proposed development.

#### PROPOSED DEVELOPMENT

The proposed implementation plan of the development, received as part of the technical report is included in Annexure A.

#### 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, and bulk infrastructure is discussed below.

#### **Treatment Works**

#### a) Water Treatment:

- 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. A 20MI/day capacity upgrade of the new treatment works is in progress with an estimated completion date in the first part of 2025.
- The treatment works will have sufficient capacity for the development in its entirety once the ±20Ml/day capacity upgrade is commissioned.

Should a phased development be proposed, the Municipality will consider the demand per phase vs availability at the time.



Erf 195/53, GEORGE DEVELOPMENT: AVAILABILITY OF BULK WATER AND SEWER INFRASTRUCTURE &ASSOCIATED COSTS AND CHARGES

#### b) <u>Wastewater Treatment:</u>

- The Outeniqua Wastewater Treatment works has sufficient capacity to support the development.

#### **Bulk Pipelines and Pump Stations**

#### a) <u>Water</u>

- <u>Kraaibosch reservoir and tower reservoirs</u>: The development falls within the George Main Zone that supplies the Kraaibosch reservoir and tower zone. Sufficient spare capacity exists within the zones.

#### b) Sanitation

- <u>Meul Pump Station and Rising Main</u>: The pump station and a portion of the rising main is currently under development, with an anticipated commissioning date of October 2024. The pump station and rising main is operating near capacity. The pump station and associated rising main will have sufficient capacity for the development in its entirety once the upgrade to the pump station and rising main is commissioned.
- <u>Schaapkop Pump Station and Rising Main</u>: The pump station and a portion of the rising main is currently
  under development, with an anticipated commissioning date of June 2025. The pump station and rising
  main is operating near capacity. The pump station and associated rising main will have sufficient capacity
  for the development in its entirety once the upgrade to the pump station and rising main is commissioned.
- <u>Kraaibosch Pump Station:</u> The pump station has sufficient capacity to support the development. The upgrading of the pump station is not planned for implementation until 2036.

Should a phased development be proposed, the Municipality will consider the demand per phase vs availability at the time.

#### 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 & treatment capacity at the time of the development implementation, or if developed in phases before the commencement of each phase.

A development/implementation program 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 program 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 may connect to the municipal water and sewer system unless the required bulk and link infrastructure is available, and a services agreement is signed between the Developer and the Municipality.

#### Water and Sewer Bulk Infrastructure Upgrades Required

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 11 850 000.00 excluding VAT.

It should be noted that upgrades to the bulk sanitation infrastructure <u>includes interim arrangements (section 4.4.3 of</u> the technical report) until such time that the infrastructure of the neighbouring development to the East, Erf 3/195 is <u>in place to allow drainage of the development</u>. The interim infrastructure requirements are considered development specific and will be for the full account of the developmer.

Description	Report reference	Water (excl. VAT)	Sewer (excl. VAT)	Total (excl. VAT)
General items to address existing problems: Bulk System	3.4.1	R 2 409 000.00	R 2 879 000.00	R 5 288 000.00
Development Specific items: Distribution / Reticulation System	-	R 0.00	R 0.00	R 0.00

f y APP

Erf 195/53, GEORGE DEVELOPMENT: AVAILABILITY OF BULK WATER AND SEWER INFRASTRUCTURE & ASSOCIATED COSTS AND CHARGES

Description	Report reference	Water (excl. VAT)	Sewer (excl. VAT)	Total (excl. VAT)
General items to address existing problems: Distribution / Reticulation System	4.4.1	R 0.00	R 9 000.00	R 9 000.00
Development Specific items: Distribution / Reticulation System	3.5.2 4.4.2	R 1 756 000.00	R 4 797 000.00	R 6 553 000.00
Total		R 4 165 000.00	R 7 685 000.00	R 11 850 000.00

#### 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.

For this development, the development specific items required are confirmed in sections 3.5.2, 4.4.2 and 4.4.3 (interim requirements) of the technical report.

#### Availability of bulk services

Some of the bulk water and sewer system items are currently being addressed, i.e., the extension of the capacity of the Water Treatment Works, the Meul and Schaapkop pump stations and associated rising mains. Development Contributions payable by the Developer will cover the cost of the pro-rated development contribution of these infrastructure items.

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.

Description	Estimated Cost Estimated Pro- rata Cost		Pro-rata %	DC Credit % of actual cost					
Water (refer to section 3.5.1 and 3.5.2	)								
General items to address existing problems: Bulk Water System <sup>A</sup>	R 360 721 000	R 2 409 000	0.67%	99.33%					
Development Specific items: Water Distribution System	R 1 756 000	R 1 756 000	100%	0%					
Sewer (refer to section 4.3.1, 4.4.1 and	Sewer (refer to section 4.3.1, 4.4.1 and 4.4.2)								
General items to address existing problems: Bulk Sewer System <sup>A</sup>	R 264 873 000	R 2 879 000	1.09%	98.91%					
General items to address existing problems: Sewer System	R 423 000	R 9 000	2.13%	97.87%					
Development specific items: Sewer System	R 14 855 000	R 4 797 000	32.29%	0%					

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

#### Notes:

The above costs are indicative only and will vary according to actual cost of construction.

<sup>A</sup> Under construction by George Municipality

#### Link services requirements

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

www.george.gov.za

🛉 🅑 APP

Erf 195/53, GEORGE DEVELOPMENT: AVAILABILITY OF BULK WATER AND SEWER INFRASTRUCTURE &ASSOCIATED COSTS AND CHARGES

A portion of the sanitation infrastructure of the development is dependent on the neighbouring development to the East, Erf 3/195. The Developer will be required to construct, operate, and maintain such interim sanitation infrastructure at own cost until such time that the sanitation infrastructure of Erf 3/195 is commissioned. The interim infrastructure requirements and those ultimate infrastructure requirements to connect to Erf 3/195 and Erf 88/195 are considered development specific and will be for the account of the developer.

#### **Development Charges**

The current total development charges (DCs) relating to Civil Engineering Services (roads, water, and sanitation services only), and in accordance with the current guidelines, for the proposed development were calculated on 26 October 2022 and amount to R 8 762 098.73 excluding VAT. This amount includes for water, sanitation, and road development contributions applicable at the time of approval of the development.

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 chargers and the amendment of these conditions of approval or the imposition of other relevant conditions of approval."

In addition, the development charges amount is subject to amendment based on annual escalation and applicable at the time that development contributions are due for payment. The Council has an approved Development Contributions Policy and guidelines for the calculation of DCs.

Kindly confirm your acceptance of the above in writing.

Yours faithfully,

JANNIE KOÈGELENBERG DIRECTOR: CIVIL ENGINEERING SERVICES

#### ANNEXURES

- A Technical report by GLS (13 June 2023)
- B Figure 1 Required works Water: George Erf 195 Portion 21
- C Figure 2 Required works Sewer: George Erf 195 Portion 21

f y APP

13 June 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 – KRAAIBOSCH 195 PORTION 21

The request from Kantey & Templer Consulting Engineers dated 23 May 2023 with regards to accommodating the proposed development in the George water system 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

T +27 21 880 0388

E info@gls.co.za

W gls.co.za

Walker Creek Office Park 90 Florence Ribeiro Ave Brooklyn, Pretoria, 0181 PO Box 814 Stellenbosch, 7599 South Africa

# **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 m2023-03 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
2023/06/13	Draft	1	Issued for comments and approval
	Revision		
	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 Kraaibosch 195/21 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 1		Estin	nated Start Date:	Early 2024		Duration:	2 years
A1 Apartments (ground floor) - 3 Bedroom Flats @ 100m <sup>2</sup>	19190 m <sup>2</sup> erf size	unit	22	0.333	85%	7.33	6.23
A2 Apartments (ground floor)- 2 Bedroom Flats @ 70m <sup>2</sup>	19190 m <sup>2</sup> erf size	unit	22	0.222	90%	4.89	4.40
A3 Apartments (first floor) - 2 Bedroom Flats @ 80m <sup>2</sup>	19190 m <sup>2</sup> erf size	unit	22	0.278	90%	6.11	5.50
A4 Apartments (first floor)- 2 Bedroom Flats @ 70m <sup>2</sup>	19190 m <sup>2</sup> erf size	unit	22	0.222	90%	4.89	4.40
A5 Apartments (second floor) - 2 Bedroom Flats @ 70m <sup>2</sup>	19190 m <sup>2</sup> erf size	unit	40	0.222	90%	8.89	8.00
B1 Commercial (ground level) - Supermarket	560 m <sup>2</sup> floor area	100m <sup>2</sup>	6	0.667	70%	4.00	2.80
B2 Commercial (ground level) - Line shops	340 m <sup>2</sup> floor area	100m <sup>2</sup>	3	0.667	70%	2.00	1.40
B3 Commercial (ground level) - Creche	225 m <sup>2</sup> floor area	100m <sup>2</sup>	2	0.667	65%	1.33	0.87
B4 Commercial (above) - 2 Bedroom Flats	720 m <sup>2</sup> floor area	unit	9	0.222	90%	2.00	1.80
C1 Historic Presinct - Restaurant, Coffee Shop & Meeting	500 m <sup>2</sup> floor area	100m <sup>2</sup>	5	0.889	70%	4.44	3.11
C2 Historic Presinct - Gym & Spa	420 m <sup>2</sup> floor area	100m <sup>2</sup>	4	0.889	70%	3.56	2.49
C3 Existing house - Offices & Lounges	320 m <sup>2</sup> floor area	100m <sup>2</sup>	3	0.889	70%	2.67	1.87
C4 Existing house - Meeting & Storage	240 m <sup>2</sup> floor area	100m <sup>2</sup>	2	0.889	70%	1.78	1.24
G Entrance Control		unit	1	0.333	100%	0.33	0.33
H Entrance off Glenwood Drive		unit	0	0.333	100%	0.00	0.00
Sub-Total			163			54.22	44.44
Phase 2		Estimated Start Date: Early 2026 Duration: 2 v					2 years
D High Density Group Housing - Cottages	±230 m <sup>2</sup> erf size	unit	36	0.407	80%	14.67	11.73
E Medium Density Group Housing	±280 m <sup>2</sup> erf size	unit	64	0.556	70%	35.56	24.89
Sub-Total			100			50.22	36.62
Phase 3	Estin	nated Start Date:	Early 2028		Duration:	2 years	
F1 Single Residential	±500 m <sup>2</sup> erf size	unit	79	0.722	60%	57.06	34.23
F2 Group Housing - 2 Bedroom units	4967 m <sup>2</sup> erf size	unit	6	0.333	85%	2.00	1.70
Sub-Total			85			59.06	35.93
Total						163.5	117.0

#### 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 138.9 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 163.5 kL/d.

•	Peak flow using a zone peak hour factor of 3.00‡	= 5.68 L/s
•	Fire flow (Business: Low risk) using a peak hour factor of 2.0	= 20 L/s @ 10 m
•	Fire flow (Low rise flats <= 3 storeys) using a peak hour factor of 2.0	= 20 L/s @ 10 m
•	Fire flow (Residential) using a peak hour factor of 2.0	= 15 L/s @ 10 m

(Note: Flow provided at 1 fire hydrant)

<sup>&</sup>lt;sup>‡</sup> 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 115.2 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 117.0 kL/d. The design flow, or instantaneous peak wet weather flow (IPWWF), is 3.97 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 graph 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.



George WTPs Annual Average 160 000 140 000 120 000 100 000 Flow (kL/day) 80 000 50 000 40 000 20 000 n 2003 2017 2015 Out Flow at WTP Capacity Future Developments Linear Growth --- Required Capacity --- Future Developments (Capacity) ---- Linear Growth (Capacity)

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	ured Flow (incl. 1.35	factor)
Annual Average (2003-2021)	46 894 kL/d	Maximum 2016/17
	-4 694 kL/d	No spare capacity available
Annual Average (2021-2022)	44 806 kL/d	Average for 2021/22
	-2 606 kL/d	No spare capacity available
Monthly Average (2003-2021)	58 176 kL/d	February 2009
	-15 976 kL/d	No spare capacity available
Monthly Average (2021/22)	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	m2022-06 MP
	-584 kL/d	No spare capacity available
3yr Projection	48 539 kL/d	
	-6 339 kL/d	No spare capacity available
5yr Projection	52 376 kL/d	
	-10 176 kL/d	No spare capacity available

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

Note:

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

#### 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 400m<sup>2</sup>.

#### 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 George Main zone AADD plus 10% UAW (Theoretical Current Demand) in the m2023-03 water model is 25 520 kL/d. The capacity of the existing Reservoirs @ Old WTP is 36 120 kL. The FCV is set at 469 L/s. Using these three input variables in a reservoir sizing analysis, it shows that the remaining spare capacity is 9 741 kL.



#### Reservoir capacity assessment (Theoretical Fully Occupied Demand)

The current George Main zone AADD plus 10% UAW (Theoretical Fully Occupied Demand) in the m2023-03 water model is 35 321 kL/d. The capacity of the existing Reservoirs @ Old WPT is 36 120 kL. The FCV is set at 700 L/s. Using these three input variables in a reservoir sizing analysis, it shows that the remaining spare capacity of 2 361 kL is sufficient to cater for the proposed development.



#### 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	м	P Description	Extent	Size		Cost		Pro-rata Co	ost	
	Тур	be la								
Existing WTPs (C	xisting WTPs (Old WTP and New WTP)									
GMR_B15.01 #	<sup>1</sup> MP	Water Treatment Facility to install:	4 500 m³/d @	306 m EGL	R	78 959 000	R	527 000	0.67%	
		Old WTP								
GMR_B01.01	MP	Water Treatment Facility to install:	20 000 m³/d @	254 m EGL	R	279 600 000	R	1 866 000	0.67%	
		New WTP								
GMR_B01.06	MP	Pipe to install	7 m x	500 mm Ø	R	630 000	R	5 000	0.67%	
GMR_B01.07	MP	Pump Only to install:	160 L/s@	50 m	R	1 532 000	R	11 000	0.67%	
		New WTP PS								
				Total	R	360 721 000	R	2 409 000		
Notes: #	1 Refu	rbish WTP to original design capacity of 25 000 m $^{3}/d$ .								

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

Refurbish WTP to original design capacity of 25 000 m <sup>3</sup>/d.

Construct the pump station building in accordance to the ultimate flow, install only phase 1 pump equipment (minimum pump capacity).

#### 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						
		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).

#### Existing water reticulation system considerations 3.5.1

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	MP Description Extent Size		Size Cost		Pro-rata Cost	
	Туре					
None						
		R -	R -			

#### 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):

ltem No	MP	Description	Extent	Size	Cost	Pro-rata Cost
	Туре					
Future external sy	stem					
GMR_F11.01	FM	Pipe to install	15 m x	160 mm Ø	R 64 000	R 64 000 100.0%
GMR_F11.02a	FM	Pressure Reducing Valve to install	260 m EGL	100 mm Ø	R 304 000	R 304 000 100.0%
GMR_F11.02b	FM	Pipe with meter to install	1 x	100 mmØ	R 133 000	R 133 000 100.0%
				Sub-Total	R 501 000	R 501 000
Future internal sy	stem					
GMR_F11.03a	FM	Pipe to install	205 m x	160 mm Ø	R 367 000	R 367 000 100.0%
GMR_F11.03b	FM	Pipe to install	275 m x	160 mm Ø	R 480 000	R 480 000 100.0%
GMR_F11.03c	FM	Pipe to install	230 m x	160 mm Ø	R 408 000	R 408 000 100.0%
GMR_F11.04	FM	Pipe to install (redundancy)	55 m x	160 mm Ø	n.a.	n.a.
				Sub-Total	R 1 255 000	R 1 255 000
				Total	R 1 756 000	R 1756000

The proposed connection point A 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 points (see **Figure 1 (Water)**).

	Sta	ntic	Resi	dual	Fire	Flow	Ground Level				
<b>Connection Point</b>	EGL	Head	EGL	Head	EGL	Head	(120001)				
	(m a.s.l.)	(m)	(m a.s.l.)	(m)	(m a.s.l.)	(m)	(m a.s.i.)				
Future system - George Main zone											
Point A	295.0	79.1	251.5	35.6	255.9	40.0	215.9				

### **4 SEWER CONVEYANCE NETWORK**

#### 4.1 Sewer Drainage Area

The master plan indicates that the proposed development falls in the existing Glenwood PS, existing Welgelegen PS and future Kraaibosch 195/62 PS F1 drainage areas as shown in **Figure 2 (Sewer)** attached. This drainage areas drains to the Outeniqua WWTW.

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 400m<sup>2</sup>.

#### 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 graph overleaf shows that the design capacity of the Outeniqua 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 as follows:

Outeniqua WWTW	Сара	city	Comment
Existing Capacity	15 000	kL/d	
	Measure	d Flow	
Annual Average (2001-2021)	14 846	kL/d	Maximum 2013/14
	154	kL/d	Spare capacity available
Monthly Average (2001-2021)	18 333	kL/d	September 2015
	-3 333	kL/d	No spare capacity available
Monthly Average (2020/21)	10 290	kL/d	August 2020
	4 710	kL/d	Spare capacity available
	Modelle	d Flow	
T_PDDWF (existing)	17 701	kL/d	m2022-06 MP
	-2 701	kL/d	No spare capacity available
3yr Projection	20 045	kL/d	
	-5 045	kL/d	No spare capacity available
5yr Projection	23 171	kL/d	
	-8 171	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.

Item No		MP	Description	Existing	New	Length	Design Flow		Cost		Pro-rata Co	st
		Туре		Diam	Diam	(m)						
				(mm)	(mm)							
Existing bulk	syste	em (fr	om Meul PS to Outeniqua WWTW)									
OT_03.01	#1	MP	Upgrade existing Pump Station: Meul PS	-	-	-	401.6 L/s	R	8 499 000	R	50 000	0.59%
OT_03.02	#²	MPi	Upgrade existing Rising (Investigate first)	450	600	484	401.6 L/s	R	7 060 000	R	42 000	0.59%
OT_09.01	#²	MPi	Upgrade existing Gravity (Investigate first)	700	900	18	406.7 L/s	R	621 000	R	4 000	0.58%
OT_09.02	#1	MPi	Upgrade existing Gravity (Investigate first)	700	1 000	26	407.1 L/s	R	881 000	R	6 000	0.58%
OT_09.04		MPi	Upgrade existing Gravity (Investigate first)	700	750	161	410.8 L/s	R	2 591 000	R	15 000	0.57%
OT_09.03	#²	MPi	Upgrade existing Gravity (Investigate first)	600	825	14	424.2 L/s	R	477 000	R	3 000	0.55%
OT_10.01		MP	Upgrade existing Pump Station: Schaapkop PS	-	-	-	492.3 L/s	R	9 925 000	R	48 000	0.48%
OT_10.02		MP	Upgrade existing Rising	500	650	154	492.3 L/s	R	4 423 000	R	22 000	0.48%
OT_10.03	#1	MPi	Upgrade existing Gravity (Investigate first)	999	1 000	316	492.5 L/s	R	-	R	-	0.48%
OT_10.04	#1	MPi	Upgrade existing Gravity (Investigate first)	999	1 000	32	679.7 L/s	R	-	R	-	0.35%
OT_10.05	#1	MPi	Upgrade existing Gravity (Investigate first)	999	1 000	9	1 224.9 L/s	R	-	R	-	0.19%
					_		Sub-Total	R	34 477 000	R	190 000	
Existing WW	TW (	Outen	iqua WWTW)		-			-				
OT_24.01a		MP	Upgrade existing Flow Diversion	-	-	-	1 225.0 L/s	R	818 000	R	3 000	0.32%
OT_24.01b		MP	New Gravity	-	450	20	269.7 L/s	R	202 000	R	2 000	0.87%
OT_24.01c		MP	New Treatment Plant: Outeniqua WWTW	-	-	-	10.0 ML/d	R	229 376 000	R	2 684 000	1.17%
							Sub-Total	R	230 396 000	R	2 689 000	
							Total	R	264 873 000	R	2 879 000	

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

Notes:

#1 In the master plan an investigation of this pipe is proposed implying that not all information on slopes, inverts etc. was available. The pipe should therefore first be investigated through field inspections and surveys to verify that uparading is in fact required. #<sup>2</sup> Not required (dynamic wave routing analysis).

#### 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 Type	Description	Existing Diam (mm)	New Diam (mm)	Length (m)	Design Flow	Cost	Pro-rata Cost
None								
Total							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:

Item No	MP	Description	Existing	New	Length	Design Flow	Cost	Pro	-rata Cos	st	
	Туре		Diam	Diam	(m)						
			(mm)	(mm)							
Existing collector system (from proposed connection - Point A & C via Glenwood PS to Meul PS)											
None											
						Sub-Total	R -	R	-		
Existing collector	system	n (from proposed connection - Point B & D via W	/elgelegen	PS to N	/leul PS)						
OT_34.03 #1	MPi	Upgrade existing Gravity (Investigate first)	315	450	42	80.5 L/s	R 423 000	R	9 000	2.01%	
						Sub-Total	R 423 000	R	9 000		
						Total	R 423 000	R	9 000		

Notes:

#1 In the master plan an investigation of this pipe is proposed implying that not all information on slopes, inverts etc. was available. The pipe should therefore first be investigated through field inspections and surveys to verify that upgrading is in fact required.

### 4.4.2 Accommodation of the proposed development in the sewer reticulation system

ltem No	MP	Description	Existing	New	Length	Design Flow		Cost	Pro-rata Cost		
	Туре		Diam	Diam	(m)						
			(mm)	(mm)							
Existing collecto	r syste	m (from proposed connection - Point A & C vi	a Glenwo	od PS t	o Meul I	PS)					
None											
						Sub-Total	R	-	R	-	
Future collector	syster	n (from proposed connection - Point A & C via	Glenwoo	d PS to	Meul P	5)					
OT_F02.01	FM	New Gravity	-	160	39	2.0 L/s	R	134 000	R	131 000	97.50%
OT_F02.02	FM	New Gravity	-	160	311	2.7 L/s	R	691 000	R	500 000	72.22%
OT_F02.03	FM	New Gravity	-	160	322	5.8 L/s	R	713 000	R	289 000	40.52%
OT_F02.04	FM	New Gravity	-	160	23	5.8 L/s	R	145 000	R	59 000	40.52%
OT_F02.05	FM	New Gravity	-	160	425	5.9 L/s	R	924 000	R	369 000	39.83%
OT_F02.06	FM	New Gravity	-	160	36	5.9 L/s	R	200 000	R	80 000	39.83%
OT_F03.01	FM	New Gravity	-	160	323	1.1 L/s	R	715 000	R	260 000	36.36%
						Sub-Total	R	3 522 000	R	1 688 000	
Existing collector system (from proposed connection - Point B & D via Welgelegen PS to Meul PS)											
None											
						Sub-Total	R	-	R	-	
Future collector	syster	n (from proposed connection - Point B & D via	Welgele	gen PS t	to Meul	PS)					
OT_F123.01	FM	New Gravity	-	160	145	0.9 L/s	R	349 000	R	318 000	91.11%
OT_F123.02	FM	New Gravity	-	160	44	0.9 L/s	R	144 000	R	132 000	91.11%
OT_F123.03	FM	New Gravity	-	160	438	2.8 L/s	R	950 000	R	279 000	29.29%
OT_F123.04	FM	New Gravity	-	160	486	4.1 L/s	R	1 049 000	R	210 000	20.00%
OT_F123.05	FM	New Gravity	-	160	58	5.3 L/s	R	172 000	R	27 000	15.47%
OT_F123.06	FM	New Gravity	-	160	332	6.1 L/s	R	734 000	R	99 000	13.44%
OT_F123.07	FM	New Gravity	-	160	414	6.9 L/s	R	901 000	R	108 000	11.88%
OT_F123.08	FM	New Gravity	-	160	113	7.3 L/s	R	285 000	R	33 000	11.23%
OT_F124.01	FM	New Pump Station: Kraaibosch 195/62 PS F1	-	-	-	7.3 L/s	R	1 704 000	R	192 000	11.23%
OT_F124.02	FM	New Rising	-	110	404	7.3 L/s	R	480 000	R	54 000	11.23%
OT_F125.01	FM	New Gravity	-	160	464	8.2 L/s	R	1 004 000	R	101 000	10.00%
OT_F125.02	FM	New Gravity	-	160	64	11.1 L/s	R	184 000	R	27 000	14.59%
OT_F125.03	FM	New Gravity	-	200	112	12.5 L/s	R	575 000	R	75 000	12.96%
OT_F126.01	FM	New Gravity (future connection)	-	160	42	0.1 L/s		n.a.		n.a.	80.00%
OT_F126.02	FM	New Gravity	-	160	242	0.5 L/s	R	548 000	R	527 000	96.00%
OT_F126.03	FM	New Gravity	-	160	27	0.8 L/s	R	109 000	R	109 000	100.00%
OT_F126.04	FM	New Gravity	-	160	504	1.8 L/s	R	1 085 000	R	483 000	44.44%
OT_F126.05	FM	New Gravity	-	160	238	2.4 L/s	R	540 000	R	180 000	33.33%
OT_F126.06	FM	New Gravity	-	160	86	2.4 L/s	R	229 000	R	77 000	33.33%
OT_F126.07	FM	New Gravity	-	160	116	3.0 L/s	R	291 000	R	78 000	26.67%
						Sub-Total	R	11 333 000	R	3 109 000	
	Total R 14 855 000 R 4 797 000										

## Development specific items required in the existing sewer system:

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

Connection Point	Design Flow (L/s)
Point A	0.40
Point B	0.80
Point C	1.95
Point D	0.82

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

The above Design Flows (or IPWWF) and thus pipe sizes were calculated taking cognizance of future developments upstream of the proposed development. In this regard, sewer pipes within the proposed development must be designed (layout and sizing) to receive a Design Flow from the following future connection point (see Figure 2 (Sewer)).

Connection Point	Design Flow (L/s)
Point E	0.02

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

# **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 Kraaibosch 195/3:

Item No	MP	Description	Existing	New	Length	Design Flow		Cost		Pro-rata Co	ost
	Туре		Diam	Diam	(m)						
			(mm)	(mm)							
Future collector	system	(from proposed connection - Point B & D via Gle	enwood P	S to Me	ul PS)						
OT_F130.01	FA	New Flow Diversion (Alternative)	-	-	-	0.8 L/s	R	-	R	-	100.00%
OT_F130.02	FA	New Gravity (Alternative)	-	160	6	0.8 L/s	R	65 000	R	65 000	100.00%
OT_F131.01	FA	New Pump Station (Alternative): Kraaibosch	-	-	-	4.0 L/s	R	1 305 000	R	1 305 000	100.00%
		195/21 PS F1									
OT_F131.02	FA	New Rising (Alternative)	-	90	333	4.0 L/s	R	366 000	R	366 000	100.00%
OT_F128.01	FM	New Gravity (excl. upstream PS flow)	-	160	115	0.2 L/s	R	289 000	R	289 000	100.00%
OT_F128.02	FM	New Gravity (excl. upstream PS flow)	-	160	30	0.4 L/s	R	115 000	R	115 000	100.00%
OT_F132.01	FA	New Flow Diversion (Alternative)	-	-	-	0.9 L/s	R	-	R	-	100.00%
OT_F132.02	FA	New Gravity (Alternative)	-	160	6	0.9 L/s	R	65 000	R	65 000	100.00%
OT_F133.01	FA	New Pump Station (Alternative): Kraaibosch	-	-	-	4.0 L/s	R	1 305 000	R	1 305 000	100.00%
		195/21 PS F2									
OT_F133.02	FA	New Rising (Alternative)	-	90	130	4.0 L/s	R	150 000	R	150 000	100.00%
OT_F132.01	FA	New Flow Diversion (Alternative)	-	-	-	0.9 L/s	R	-	R	-	100.00%
OT_F129.01	FM	New Gravity (excl. upstream PS flow)	-	160	122	1.0 L/s	R	304 000	R	304 000	100.00%
OT_F129.02	FM	New Gravity (excl. upstream PS flow)	-	160	26	2.0 L/s	R	107 000	R	107 000	100.00%
						Total	R	4 071 000	R	4 071 000	

# 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	2 409 000	
Development specific items required in the bulk water system	R	-	R	-	
General items required to alleviate existing problems in the water distribution system	R	-	R	-	
Development specific items required in the water distribution system (including fire flow requirements)	R	1 756 000	R	1 756 000	
Total	R	362 477 000	R	4 165 000	

#### Sewer drainage:

Summary of costing	Cost	Pro	Pro-rata Cost		
General items required to alleviate problems in the bulk sewer system:	R 264 873 000	R	2 879 000		
Development specific items required in the bulk sewer system:	R -	R	-		
General items required to alleviate problems in the existing sewer system:	R 423 000	R	9 000		
Development specific items required in the existing sewer system:	R 14 855 000	R	4 797 000		
Total	R 280 151 000	R	7 685 000		

Note: Excluded costs for interim period

Yours sincerely,

Mha

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

(Report done by: JJ van der Merwe)

#### **REQUEST FROM CONSULTANT TO GLS**

From: Nelius Agenbag <<u>neliusa@gr.kanteys.co.za</u>> Sent: Tuesday, May 23, 2023 9:37 AM To: Jurie Van Der Merwe <<u>Jurie.vdMerwe@gls.co.za</u>> Subject: G5215BA: GeorgeIMQS: Kraaibosch 195 Ptn 21

Hallo Jurie

Aangeheg vind die getekende aanstelling soos versoek.

- Aangeheg vind die nuutste uitleg. Neem asb. kennis dat daar vir 6 twee-bed eenhede toegelaat moet word op die groot erf langs erf F46 tot F56 (groeps behuising).
- Fasering tydsduur is nie duidelik op die oomblik nie. Voorlopig sal die ontwikkeling geskied volgens die area name dus A, dan B, dan C ens. Projek sal oor n 5-6 jaar dydperk uitgerol word. Heel moontlik vanaf ± begin 2024.

Laat weet as enigiets onduidelik is. Hoop om gou van jou te hoor rakende die verslag.

Groete



Nelius Agenbag ASSOSIAAT DIREKTEUR PrEng MSAICE PrCPM

KANTEY & TEMPLER CONSULTING ENGINEERS ESTABLISHED 1993

Epos: neliusa@gr.kanteys.co.za Tel: +27 44 874 2177, Sel: +27 82 879 5771 www.kanteys.co.za









	Portion 409 Vlei $il = 2127669il = 211.62$	Parties 409 Batter 26012 Dotion 56	
Rev No A	PIETER KOEN TRUST PIETER KOEN ESTATE DEVELOPMENT Tile INTERNAL SERVICES LAYOUT PLAN WITH TEMPORARY SEWER OPTION G5215BA-CE-101	N         FOR APPROVAL         CAL         28-06-23         MA           N         Description         CAL         28-06-23         MA           N         Description         CAL         28-06-23         MA           Polact Eng         KAL         28-06-23         MA           Project Eng         KAL         28-06-23         MA           Approvad         KAL         28-06-23         MA           SCALE 1: 750         SCALE 1: 750         SCALE 1: 750           SCANTEY & TENEPLER         KANTEY ENGINEERS         SCALE 3: 750           FORMATIONAL UNITING ENGINEERS         SCALE 3: 750         SCALE 3: 750           FORMATER ANALYTICAL UNITING ENGINEERS         SCALE 3: 750         SCALE 3: 750	COPYRIGHT THIS DRAWING AND DESIGN ARE CONFIDENTIAL AND THE PROPERTY OF KANTEY & TEMPLER AND MAY NOT BE DISCLOSED TO A THIRD PARTY, COPIED/REPRODUCED IN WHOLE OR IN PART, WITHOUT THE WRITTEN PERMISSION OF KANTEY & TEMPLER. 2. ALL DIMENSIONS TO BE CHECKED ON SITE BEFORE ANY WORK IS PUT IN HAND. 2. ALL MATERIALS AND WORKMANSHIP ARE TO BE IN ACCORDANCE WITH THE LATEST EDITION OF THE STANDARDIZED SPECIFICATION, SABS 1200 AND THE STANDARDS REFERRED TO THEREIN.



27669 il = 211.62	Portion 409 gate	
Approved SCALE 1 SCALE	A FOR APPROVAL No Description REVISIC Designed Drawn Project Eng	COPYRIGHT THIS DRAWING AND DESIGN ARE PROPERTY OF KANTEY & TEMPLE DISCLOSED TO A THIRD PARTY, UT OF KANTEY & TEMPLER, WITHOUT TI OF KANTEY & TEMPLER, WITHOUT SE CHECKING BUT IN HAND. 2. ALL MATERIALS AND WORK SAND WORK OF THE STANDARDIZE WITH THE WORKMARK STANDARDIZE SEFERTED SECLIFICATION, STANDARDIZ REFERRED TO THE
RVICE RVICE	NA CAL CAL 28	ED ON SITE I
A     TION     T     T     T     EEER     28-06-2	-06-23 N ate Ap 28-06-2 28-06-2	AND THE AN SIG







· - - - - ·

 $\triangle$ 

Α

FIELD INLET



1 : 20 TYPICAL SECTION THROUGH STORMWATE

<u>200</u>	COPYRIGHT THIS DRAWING AND DESIGN ARE O PROPERTY OF KANTEY & TEMPLER DISCLOSED TO A THIRD PARTY, CO WHOLE OR IN PART, WITHOUT THE OF KANTEY & TEMPLER.	CONFIDEN R AND MAY OPIED/REP E WRITTEN	TIAL AND THE ' NOT BE 'RODUCED IN I PERMISSION
CRETE TO BE 25MPa MASS CONCRETE 2200)/2 LL TO BE FOUNDED ON INSITU MATERIAL TED TO AT LEAST 90% MOD AASHTO DENSITY MENTS TO BE PROTECTED AS DIRECTED ON SITE	GENERAL NOTES  1. ALL DIMENSIONS TO BE CHECKED WORK IS PUT IN HAND.  2. ALL MATERIALS AND WORKMANS ACCORDANCE WITH THE LATEST STANDARDIZED SPECIFICATION, S STANDARDS REFERRED TO THER	) ON SITE I HIP ARE TO EDITION O 3ABS 1200 J EIN.	BEFORE ANY O BE IN F THE AND THE
MENTS TO BE PROTECTED AS ID ON SITE ITILE BIDIM A3 UNDERNEATH ATRESS AND GABIONS AS ED. AL STEP HEIGHTS OF ITS TO BE DETERMINED ON TH THE ENGINEER			
) SMARTSTONE KERB	A FOR INFORMATION	CAL 29- Drw D	-06-23 NA
∠ KERB MIX	REVISION	VS	
25MPa CONCRETE 25MPa CONCRETE WITH Y10 REINFORCING AT 100mm		Initiala	Data
	Designed	CAL	29-06-23
σ	Drawn	CAL	29-06-23
	Approved	NA	29-06-23
Some a concrete with Mesh Ref. 395 COVER AND FRAME NYMER CONCRETE YPE 2A IN ROAD COTHERWISE TYPE 4A 	SCALE 1 : SCALE 1 :	500 EMF Devel +27 44 874 21 TRUS	PLER IEERS lopment
AS INDICATED	Title STORMWA DETAILS		
	Drawing No G5215BA-CE	E-110 Rev No	









![](_page_33_Figure_5.jpeg)

![](_page_34_Figure_0.jpeg)

Rev No A