Appendix U: External Services Report

CENTURY PROPERTY DEVELOPMENTS

Proposed Development of Meander Lifestyle Apartments on Erf 28005, Platinum Drive George



Bulk Engineering Services Report

Revision 3

November 2026

ELEMENT Consulting Engineers
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Revision	Description	Date Issued	Revision By:
0	Draft for Comment	Jun 2023	HL
1	Revised SDP	Apr 2026	HL
2	Revised Parking	Sep 2026	HL
3	Revised SDP	Nov 2026	HL

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Proposed Development of Meander Lifestyle Apartments on Erf 28005, Platinum Drive George

Bulk Engineering Services Report (Revision 3)

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1 INTRODUCTION AND BACKGROUND

Element Consulting Engineers have been appointed by Century Property Developments for the compilation of the external and bulk engineering services report for the proposed development of the new Meander Lifestyle Apartments on Erf 28005, George.

Erf 28005 is part of the larger Eden Meander precinct of which a significant percentage of development has successfully been completed over the past decade.

The project proposes the development of 680 residential apartments, complete with a gatehouse and leasing office, clubhouse, gym facility, multi-purpose sports fields, parklands and communal laundry.

A number of pre-application meetings have been held with officials of the local municipality to discuss the development as well as the requirements for the application submission.

This report will detail and discuss the results of the investigation and discussions held in terms of the external and bulk engineering services for the proposed development.

All the solutions provided are based on preliminary discussions and are subject to final approval by the George Municipality's Civil and Electrical Departments as well as further project detail design development.

2 PROPOSED LAND USE

The project proposes the development of 680 residential apartments, complete with a gatehouse and leasing office, clubhouse, gym facility, multi-purpose sports fields, parklands and communal laundry.

The proposed Site Development Plan (SDP) is shown in the diagram below.

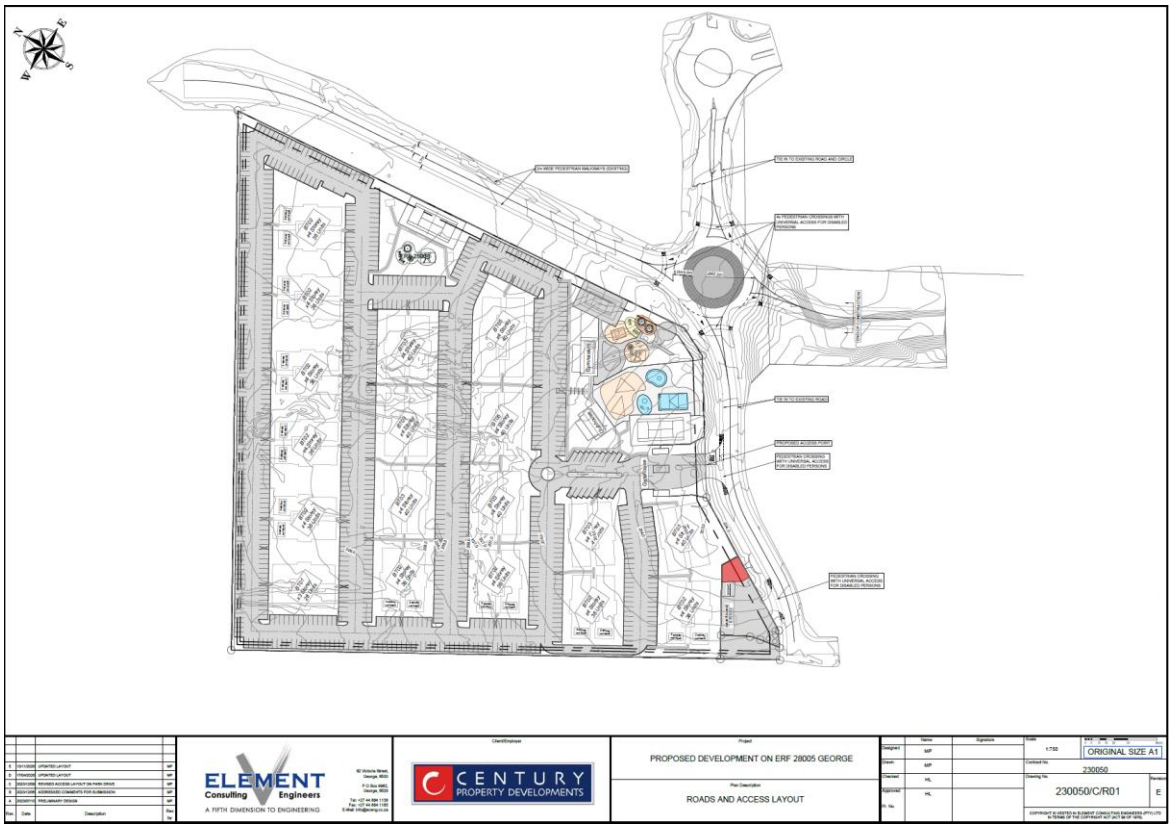


Figure 1: Site Development Plan (SDP)

3 LOCALITY

The proposed development is located on Erf 28005, George. The site is bound to the south by Platinum Drive, to the east by Park Road and to the north and west by existing residential development. Access to the proposed development is obtained from the south from Platinum Drive.

The locality of the site is depicted on the diagram below:



Figure 2: Locality plan

4 BULK ENGINEERING SERVICES

This chapter will discuss the external and bulk engineering services design of the proposed development. A set of bulk and external engineering services drawings is available for reference and discussion purposes and should be consulted in parallel to the discussions below.

4.1 Existing services agreement

The proposed development will be performed in line with an existing services agreement with the George Municipality in terms of the external and bulk services. The existing services agreement is available upon request. All external and bulk services discussed in this report are- or will be provided and designed in line with the services agreement.

4.2 Infill development

The proposed development is classified from an engineering bulk services perspective as an infill development. Infill development is desirous from a bulk engineering services perspective as all, or most bulk municipal services are normally already available and in place. Such infill development will improve the holistic financial sustainability of the local municipality due to additional rates and taxes being generated without the burden of additional capital outlay. The proposed infill development will subsequently not trigger unaffordable capital cost burdens to the local municipality but will in fact strengthen the financial sustainability of the municipality in both the short- and longer term.

4.3 Water

4.3.1 Water Demand

The Average Annual Daily Demand (AADD) for this proposed development in line with accepted design consumptions, assumptions, criteria and standards, is calculated and estimated at approximately 127.5kl/day. Peak factors will be considered during the detail design stage of the project.

4.3.2 Bulk Availability

Bulk water is available for this development in accordance with the existing services agreement and new discussions with the local municipality. Letters of confirmation from George Municipality, as well as GLS, are attached as addendum.

4.3.3 Connection Point

An existing municipal bulk water connection for this erf has been provided on Platinum Drive on the southern boundary of the site on the existing 160mm uPVC class 12 bulk

line. The locality of this existing bulk water connection in relation to the proposed development site is indicated in the diagram below.

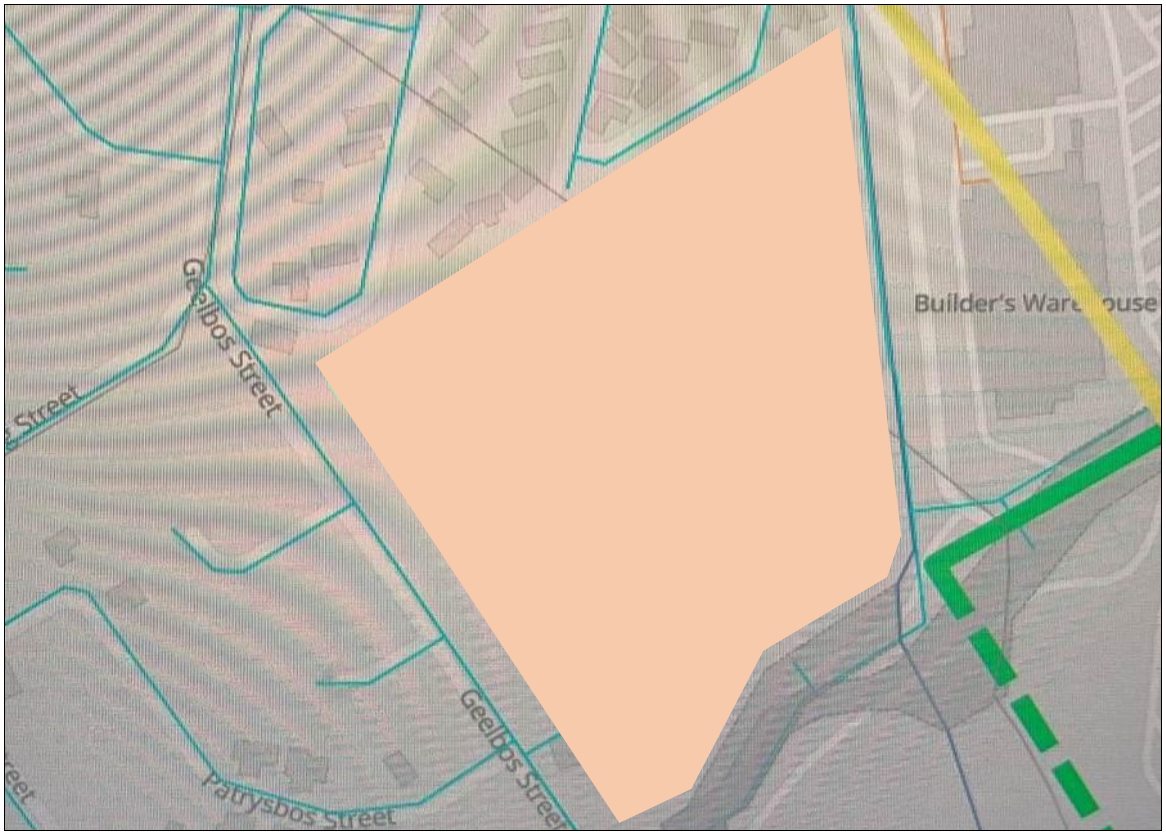


Figure 3: Existing bulk water network servicing the site

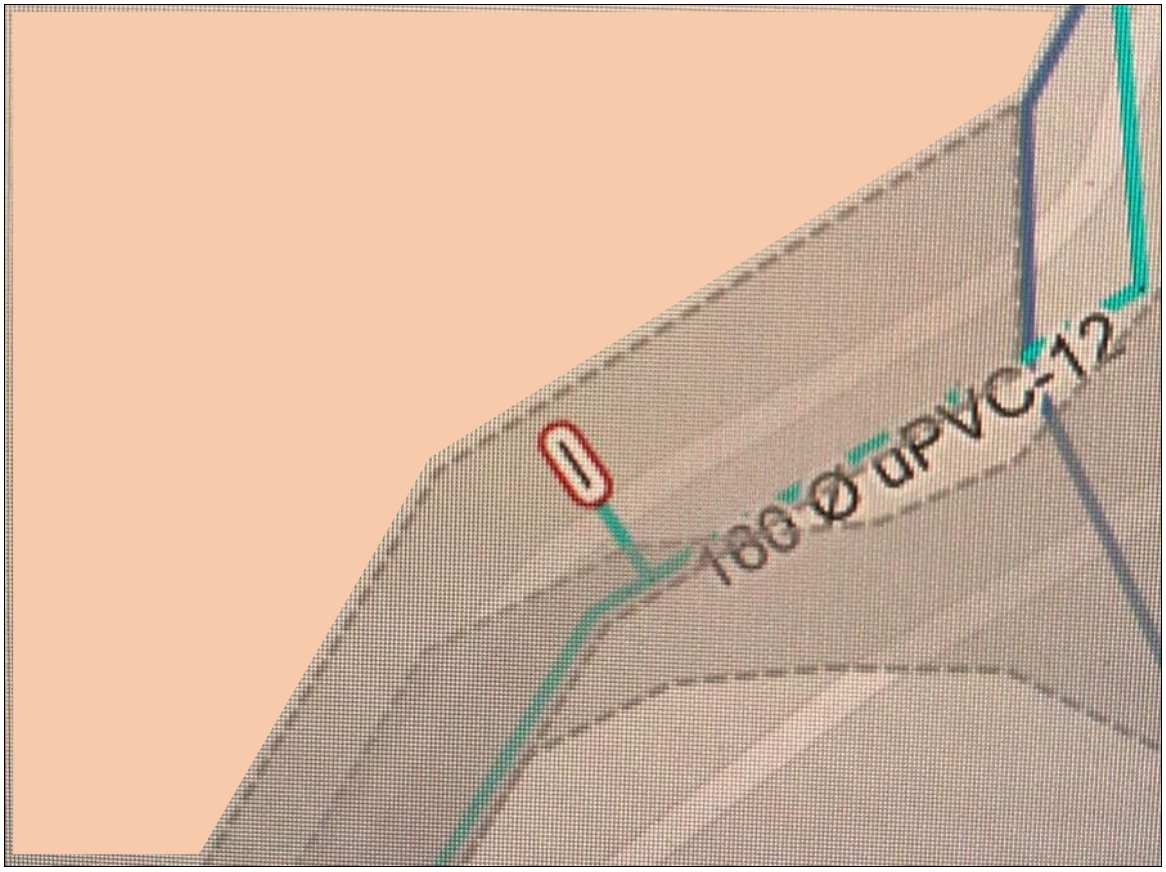


Figure 4: Existing bulk water connection servicing the site

4.3.4 Design Criteria and Standard of Engineering Services

- Design consumption: 127.5kl/day
- Peak factors as prescribed.
- Minimum pressures for the network are calculated for a fire flow 30l/sec and peak demand at the point of lowest pressure under peak conditions.
- Maximum of 4 valves to isolate a pipe section.
- Maximum length of 600m of main pipe per isolated section.
- Air valves to be provided where applicable.
- Minimum cover to pipes to be 900mm.
- Pipe type and class to be uPVC class 6 to 12, depending on existing network pressure.
- Fire hydrants to be provided in accordance with relevant guidelines and legislation.

4.3.5 Preliminary design

The preliminary design is presented in the following diagram and is attached as addendum to the report.

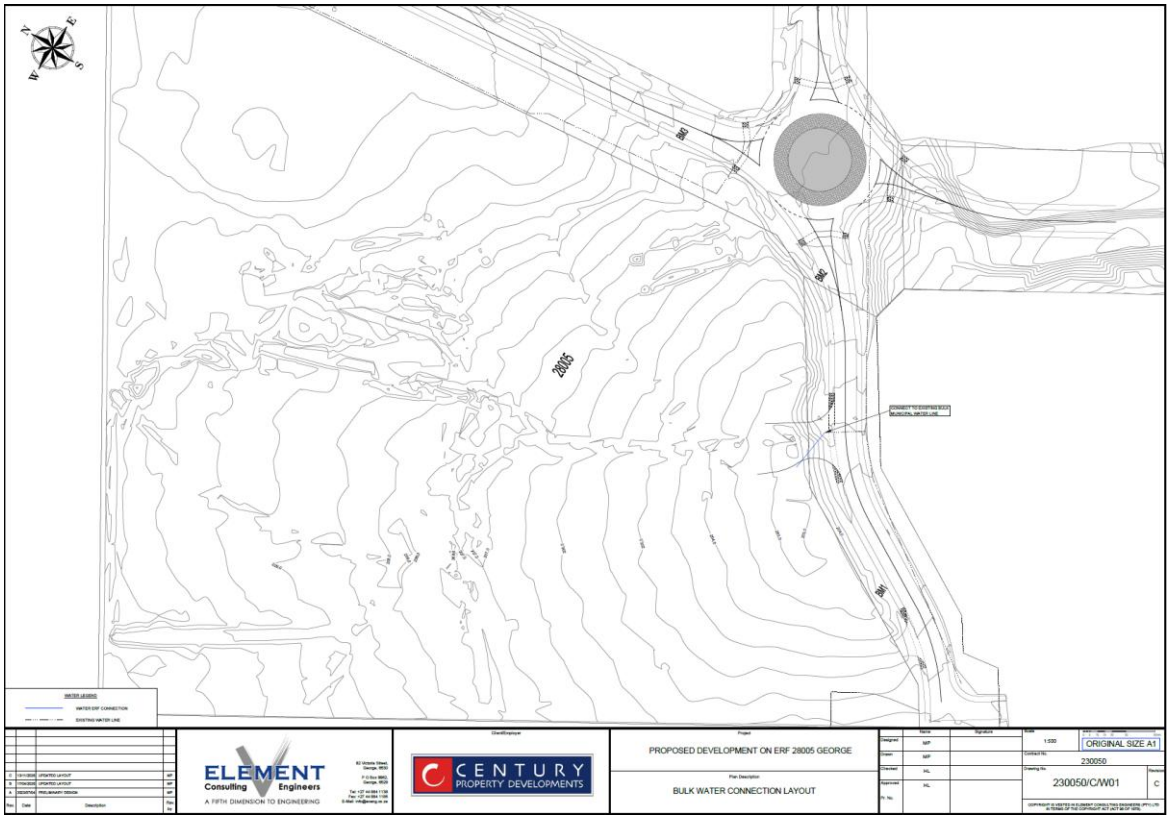


Figure 5: Preliminary design drawing: Bulk water connection

4.3.6 Upgrades required to municipal bulk water network

No upgrades will be required to the municipal bulk water network, as confirmed in the letters of both George Municipality and GLS.

4.4 Sewer

4.4.1 Site layout considerations

The proposed development site drains to the middle of the southern boundary on Platinum Drive. The drainage is indicated diagrammatically on the figure below:

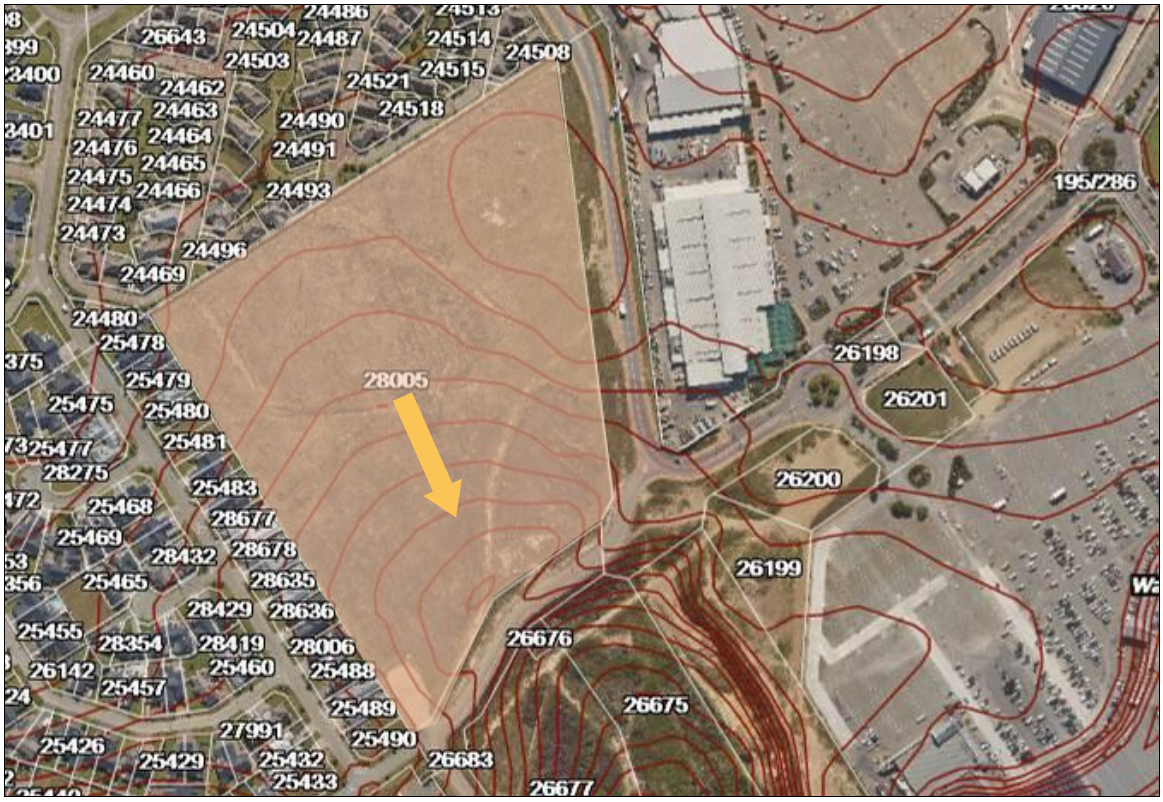


Figure 6: Sewer drainage

4.4.2 Design flow

The Average Dry Weather Flow (ADWF) of the development, in line with accepted design criteria and standards, can be calculated and estimated as 102.0kl/day. The design peak flow, inclusive of a specified peak factor of 3.5 and 15% extraneous flow, will be calculated during detail design stage.

4.4.3 Bulk Capacity

Bulk WWTW treatment capacity is available for this development in accordance with the existing services agreement and new discussions with the local municipality. Capacity in the bulk network is mostly available; a number of upgrades are required and specified in the approval letters. Letters of confirmation from George Municipality, as well as GLS, are attached as addendum.

4.4.4 Connection point

The site is serviced by an existing 160mm municipal sewer connection on the lowest point of the erf on the southern boundary of the site on Platinum Drive.

The locality of this existing sewer connection in relation to the proposed development site is indicated in the diagram below.



Figure 7: Existing bulk sewer network and erf connection servicing the site

4.4.5 Design Criteria and Standards of Engineering Services

- Design flow: 102.0kl/day
- Specified peak factor of 3.5
- Allowance for 15% extraneous flow
- Conventional waterborne sewerage system.
- Minimum flow velocities of 0.7m/s.
- Minimum cover to all pipes to be 800mm.
- Pipe diameters of generally 110mm for all service connections and minor lines and 160mm and above for main lines, as required per the detailed designs.
- Minimum design gradients to be as follows:

Dwelling Units	Grade
1 (House connection)	1:60
1-5	1:80
6-10	1:100
11-80	1:120
81-110	1:150
>110	1:180

- Precast concrete rings manholes with concrete floor and premanufactured concrete lid.
- Manhole covers and frames to be Polymer Concrete.
- Manholes to be central over main pipe on downstream side.
- Manhole spacing to be maximum 80m.
- All concrete, mortar or screed used with manholes to be from dolomite aggregate and low alkali sulphate resistant cement to SABS 471.
- Pipelines to be uPVC class 34 and to be laid on Class C bedding.

4.4.6 Preliminary design

The preliminary design is presented in the following diagram and is attached as addendum to the report.

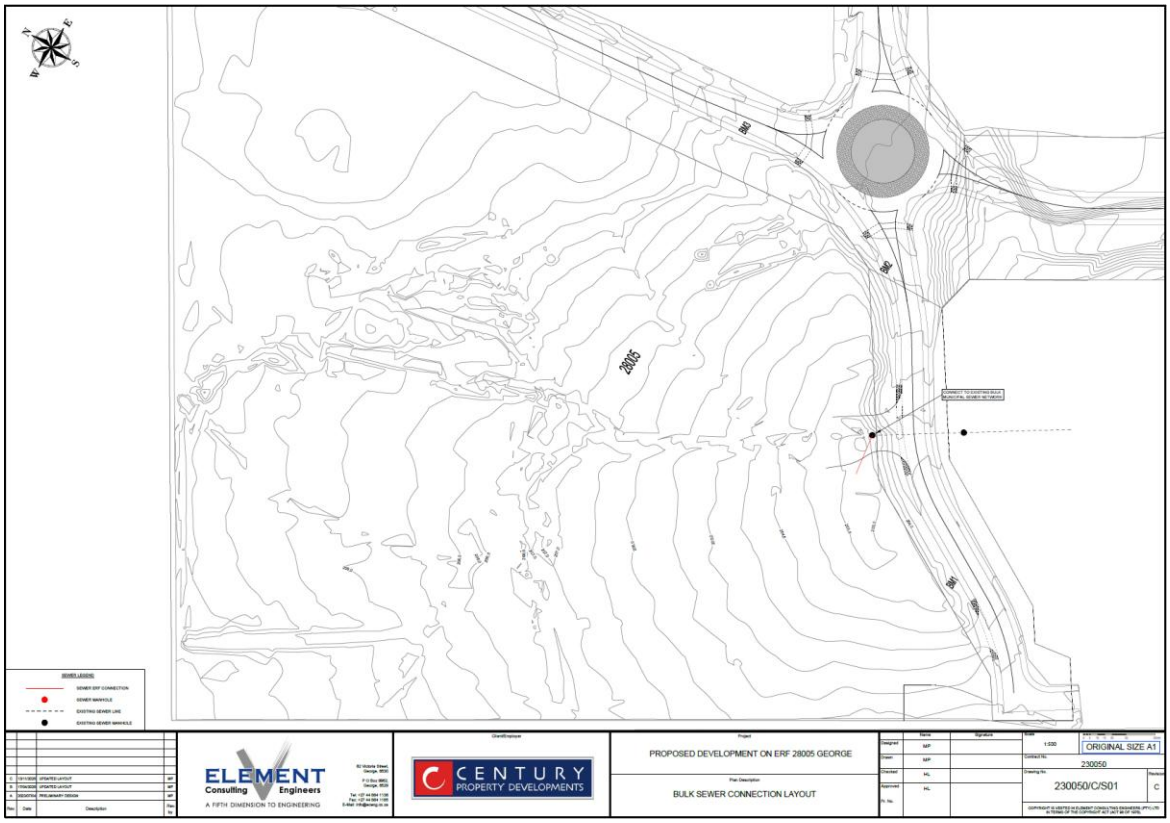


Figure 8: Preliminary design drawing: Bulk sewer

4.4.7 Upgrades required to municipal bulk sewer network

The following upgrades will be required to the municipal bulk sewer network, as per the letters from the George Municipality and GLS:

Bulk pipelines and pump stations:

The following upgrades are required in the bulk sanitation conveyancing system to support the development (extract from municipal approval letter):

<u>Items OT_09.01 to OT_09.04:</u>

- The Developer will be required to upgrade the pipeline from the Schaapkop pump station (point X on figure) across, and just east of, Nelson Mandela Boulevard (point Y on figure 2) to a 1,050mm diameter pipeline (Refer to figure below).
- The Developer will be required to construct the above-mentioned items to service the development.
- The cost will be offset against Development Contribution's (DC's) payable by the developer.



Figure 9: Upgrading required: OT_09.01 to OT_09.04

Reticulation system:

The following upgrades are required in the municipal reticulation system to support the development (extract from municipal approval letter):

Item OT_V06.05:

- Upgrade the gravity sewer as indicated from point A to E from a 160mm diameter to a 200mm diameter as per the figure below.
- The transfer structure located at point A in the figure requires repositioning (currently within a residential property driveway) and revised design to ensure the structure is operating adequately.



Figure 10: Upgrading required: OT_V06.05

Item OT_26.01 and OT_47.01:

- Upgrade both pump stations to 11l/s each.
- The upgrades of the pump stations are not a requirement or need of the Municipality, and the full cost shall be borne by the Developer with no off setting against Development Contributions.

4.5 Roads, access & parking

4.5.1 Traffic Impact Assessment

An updated Traffic Impact Assessment (TIA) has been performed by ITS (November 2026) and shall be studied in parallel to this report. Conclusions concerning access- and other road network upgrades are based on this TIA.

4.5.2 Access

Access to the development is proposed from the south from Platinum Drive. The access point is indicated on the SDP.

Sight distances at the proposed access point are satisfactory for development purposes in both the vertical and horizontal alignments. An array of photographs below indicates sight distances at the access point.



Figure 11: Eastern view along Platinum Drive at the proposed access point.



Figure 12: Western view along Platinum Drive at the proposed access point.

4.5.3 Access configuration

In accordance with the TIA, the access configuration for the access on Platinum Drive shall be a full access with stop control from the development. The concept design below depicts the access configuration and is also provided as addendum.

4.5.4 Park Road upgrades and roundabout

In accordance with the TIA, the intersection of Park Road and Platinum Drive shall be upgraded to a single lane roundabout to replace the current substandard T-junction as illustrated on the photograph below.

A layout drawing of the proposed upgrade is presented in the concept design below and provides for the construction of the inner circulatory lane of the roundabout with a single lane per direction on each of the three existing approach roads.

The design of the roundabout shall allow for the future upgrading of the roundabout to provide an additional outer circulatory lane, as well as future dual lanes in both directions on all three approach roads and the construction of the future fourth approach to and from the N2.



Figure 13: Existing intersection of Platinum Drive and Park Road, future roundabout

4.5.5 Standards and Design Criteria

Standards and design criteria for the access point and other road upgrades required are as follows:

- Lane widths of between 2.6m and 3.7m, depending on road class
- External roads: Asphalt surfacing 30mm;
- Internal roads: Block paving 60mm;
- Pavement structural materials to be imported from commercial sources;
- Pavement structural design in line with municipal requirements and to be finalised during detail design stage;
- External roads: Minimum radii at bellmouths to be 12m;
- Internal Roads: Minimum radii at bellmouths to be 7m;
- Minimum road grade of 0.4% and camber of 2%.
- Road design life of 20 years.
- Delivery truck and emergency vehicle manoeuvres to be accommodated into access gate layout and internal roads design.

4.5.6 Concept design

The concept design is presented in the following diagram and is attached as addendum to the report. All designs will be workshopped with the municipality up to approval.

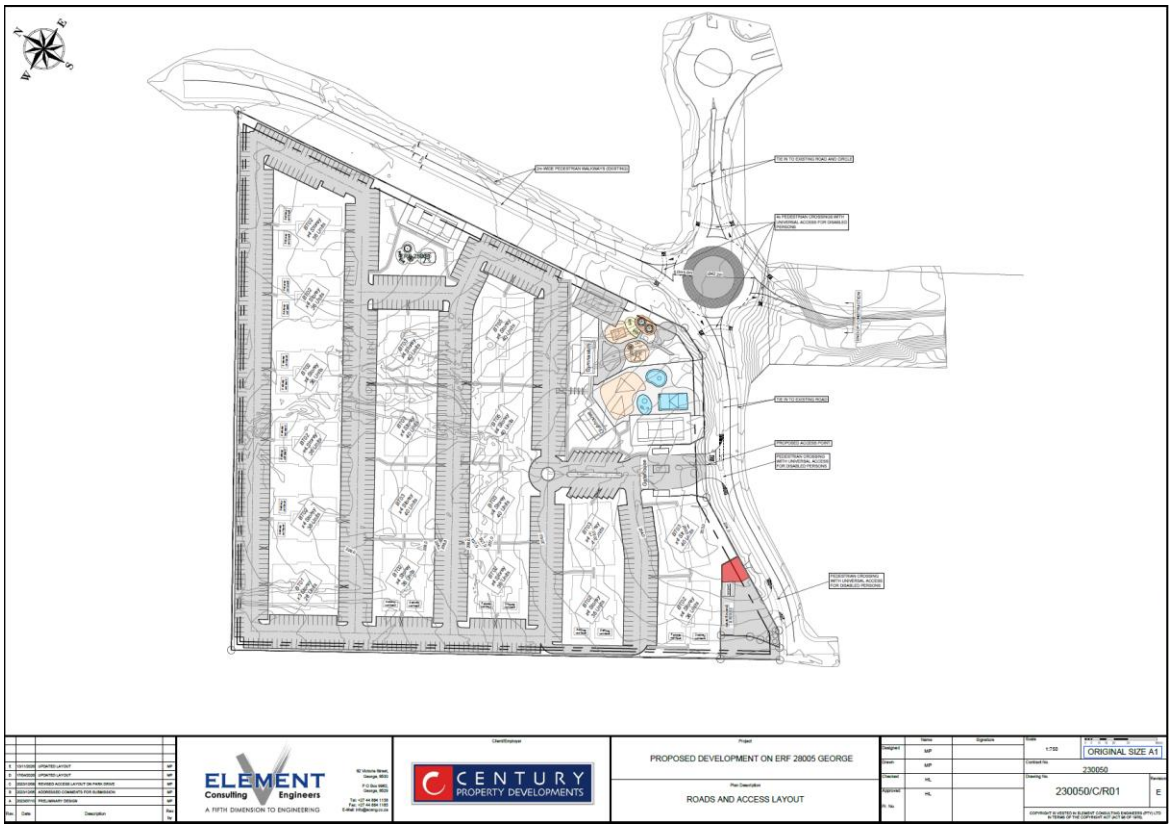


Figure 14: Concept design drawing: Roads and access

4.5.7 Parking

As discussed in the TIA, based on the George Integrated Zoning Scheme By-Law (2023), the following parking rates are proposed for apartments and flats:

Land Use	Normal Areas	PT1 Areas
Apartments and Flats	- 1.25 bays per dwelling unit with 2 habitable rooms or less - 1.75 bays per dwelling unit with 3 or more habitable rooms - 0.25 bays per unit for visitors	- 1 bay per dwelling unit with 2 habitable rooms or less - 1.25 bays per dwelling unit with 3 or more habitable rooms - 0.25 bays per unit for visitors

Figure 15: Parking requirements

The site falls in a PT1 zone and is only 220m away from the major bus stop next to the Garden Route mall and a Go-George bus stop. Based on the By-Law, the parking requirements for Erf 28005 (PT1 Zone) are summarised in the table below for the proposed land uses:

Unit Type	No. of Units	Parking Required for Residents	Parking Required for Visitors	Total Parking Required
2 habitable rooms or less	244	244 bays (1 bay/du)	61 bays (0.25 bay/du)	305 bays
3 habitable rooms or more	436	545 (1.25 bays/du)	109 (0.25 bays/du)	654 bays
			TOTAL	**959 bays**

Figure 16A: Parking required

Based on the above, the by-law requires 959 parking bays, which gives a rate of 1.41 bays/unit.

Based on the SDP, the following parking bays are currently provided:

Number of Units	680 units
Parking Bays Provided	893 bays
Parking Rate	1.31 bays/unit

Figure 16B: Parking provided

A total of 893 parking bays is provided on the SDP, which results in a rate of 1.31 bays/unit.

Based on the above, there is a shortfall of 66 bays.

However, to confirm the sufficiency of the parking provision for the proposed site, further parking demand surveys were undertaken at comparable residential developments, namely Crowthorne Luxury Apartments and Carlswald Luxury Apartments. Both of which are similar in nature and scale. The observed parking rates are summarized as follows per unit:

		Rate		
Development	**No. of units occupied**	**Maximum**	**Average**	**85th Percentile**
Crowthorne Luxury Apartments	200	1.59	1.03	1.25
Carlswald Luxury Apartments	464	1.35	0.90	1.24

Figure 16C: Parking survey summary

Based on the above parking survey summary, the provided parking rate of 1.31 bays/unit for Erf 28005 will be sufficient because it:

- Exceeds the observed average demand at similar developments,
- Exceeds the 85th percentile rate at similar developments.

The TIA concludes that the number of parking bays as indicated on the SDP meets the parking requirements for this specific development type based on the surveys at similar developments.

The TIA recommends that a parking provision rate of 1.31 bays per unit be accepted in lieu of the 1.41 bays per unit required by the By-Law. This reduced parking provision is further supported by the development's location within a PT1 zone and its proximity, approximately 220 m, to the major public transport interchange adjacent to the Garden Route Mall and a GoGeorge bus stop.

A letter with motivation was included in the TIA addenda.

4.6 Public transport & non-motorized transport facilities

The Go George bus service has a major terminal along the Mall Access Road. This terminal is serviced by six bus routes. No additional public transport facilities are required for the proposed development.

The proposed development shall allow for safe and dedicated external pedestrian walkways from the proposed development to link to the bus terminal at the Mall Access Road. Both Platinum Drive and Park Road have existing pedestrian walkways on both sides. This shall be replicated in the new roundabout.

4.7 Stormwater

4.7.1 Stormwater management plan

An existing municipal stormwater management plan is in existence for the precinct. The proposed development will be performed in line with the existing stormwater management plan. All stormwater bulk services will be provided and designed in line with the stormwater management plan.

4.7.2 Site layout considerations

The proposed development site drains to the middle of the southern boundary on Platinum Drive. The drainage is indicated diagrammatically on the figure below:



Figure 17: Stormwater drainage

4.7.3 External stormwater drainage

An existing 1250mm pipe culvert has been provided at the lowest point under Platinum Drive. Drainage from the development site will be through this culvert from where it will follow the municipal drainage line (erf 26675) as per the municipal stormwater management plan for the precinct. Drainage will be accumulated into the existing attenuation pond at the bottom of erf 26675. Drainage from the attenuation pond will be into the Meul River.



Figure 18: External stormwater drainage

4.7.4 Design background, standards and criteria

A formal stormwater reticulation system will be required and will be provided by a combination of surfaced parking areas, roadways, kerbs, channels, cut-off drains, strormwater pipes and various minor structures. Energy dissipation will be performed as standard practice with gabion mattresses at all outlets. All pipe outlets will be standard concrete headwalls.

The integrated stormwater and road system form an integral part of layout planning. The system rests on three legs, namely the minor system, the major system and the emergency system. Minor storms and normal flowoff are catered for in the normal road prism and piped system. Major storms are routed through a linked system of road prisms and public open spaces, using attenuation techniques. The emergency system recognizes failure of the minor and major systems and provides for emergency runoff by providing continuous overland flow routes to minimize flooding of residential areas.

The following standards and design criteria are envisaged:

- Minor system designed for 2-year return period and conveyed in a combination of maximum 200m aboveground in the road prism and underground piped system.
- Major system designed for 50-year return period. Difference between the 50 year and 2-year flood to be conveyed in the road prism with depths not exceeding 150mm and into designated public open spaces, using attenuation techniques.
- Minimum gradients for pipelines to allow minimum flow speeds of 0.7m/s at full flow.
- Maximum pipeline flow velocities to be 3.5m/s.

- Stormwater pipes to be 100D as required by specific loadings or installation conditions.
- Bedding to be Class C.
- Minimum cover on pipes to be 800mm.
- Minimum pipe diameter to be 450mm.
- Gabion mattresses to be provided at all outlets for energy dissipation.
- Outlets to be standard concrete headwalls.

All designs will be confirmed with the municipality during the detail design stage.

4.7.5 Concept design

The concept design is presented in the following diagram and is attached as addendum to the report.

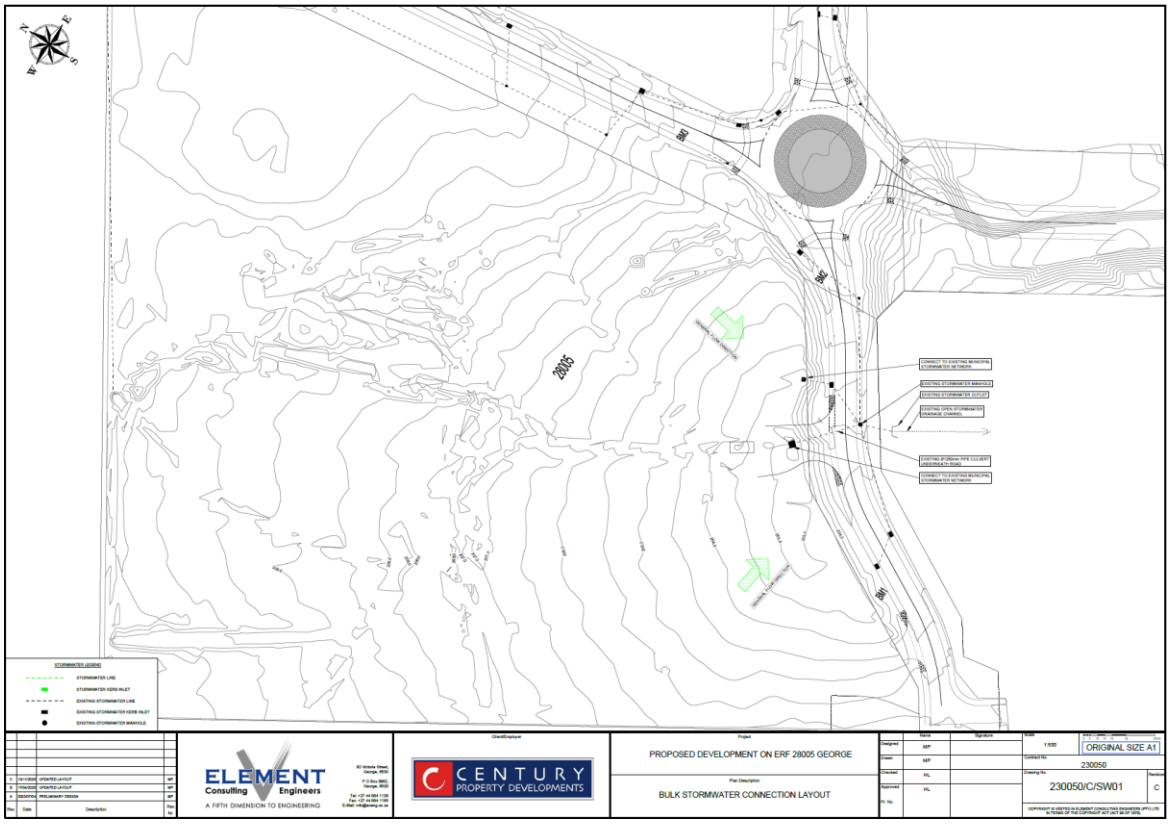


Figure 19: Concept design drawing: Stormwater

4.8 Solid Waste

A formal solid waste collection area is provided on the SDP in line with municipal technical- and public health guidelines. Solid waste will be removed by the George Municipality in line with the services agreement.



Figure 20: Solid waste collection area

4.9 Bulk Electrical Supply

4.9.1 Existing Electrical Infrastructure

Investigations on site and discussions with the George Municipality indicated that the property will be supplied from the existing 11kV electrical reticulation network, installed on the northern side of Park Road and west of Platinum Drive, between R/S Eden Meander 1 (Ring-Main-Unit) and MS Park Road 3 (minisub). As can be seen from the Network Diagram (presented in the figure below), the existing infrastructure consists of an 11kV, 300mm^2, PILC, Aluminium underground cable (rated for 335A, 6.4 MVA @11kV).

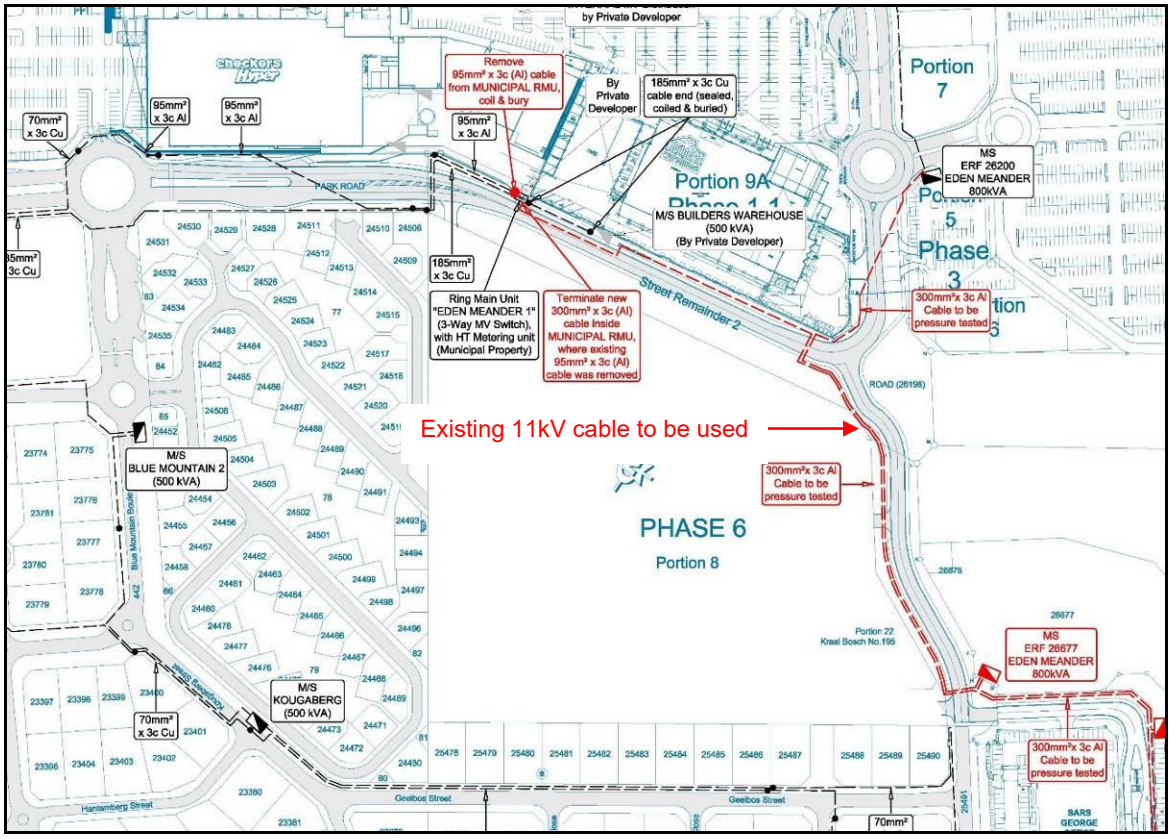


Figure 21: Geographical Layout of Electrical Network in Area

Discussions with municipal officials indicated that the existing medium voltage (MV) infrastructure would be able to accommodate the additional demand of the new development, from a capacity perspective, and that no network strengthening will be required at the supply substation or on the existing MV underground cable network. This statement was confirmed by GLS Infrastructure Planning as documented in their Bulk Power Capacity Assessment Report (see Addendum 3).

A Single Line Diagram of the applicable portion of the electrical network infrastructure has been included in the figure below to indicate how the development will be supplied. The new RMU and minisub, which will be installed as part of the new development, will

tie into the existing 11kV ring network between M/S Platinum Drive 1 (800kVA) and M/S Platinum Drive 2 (800kVA).

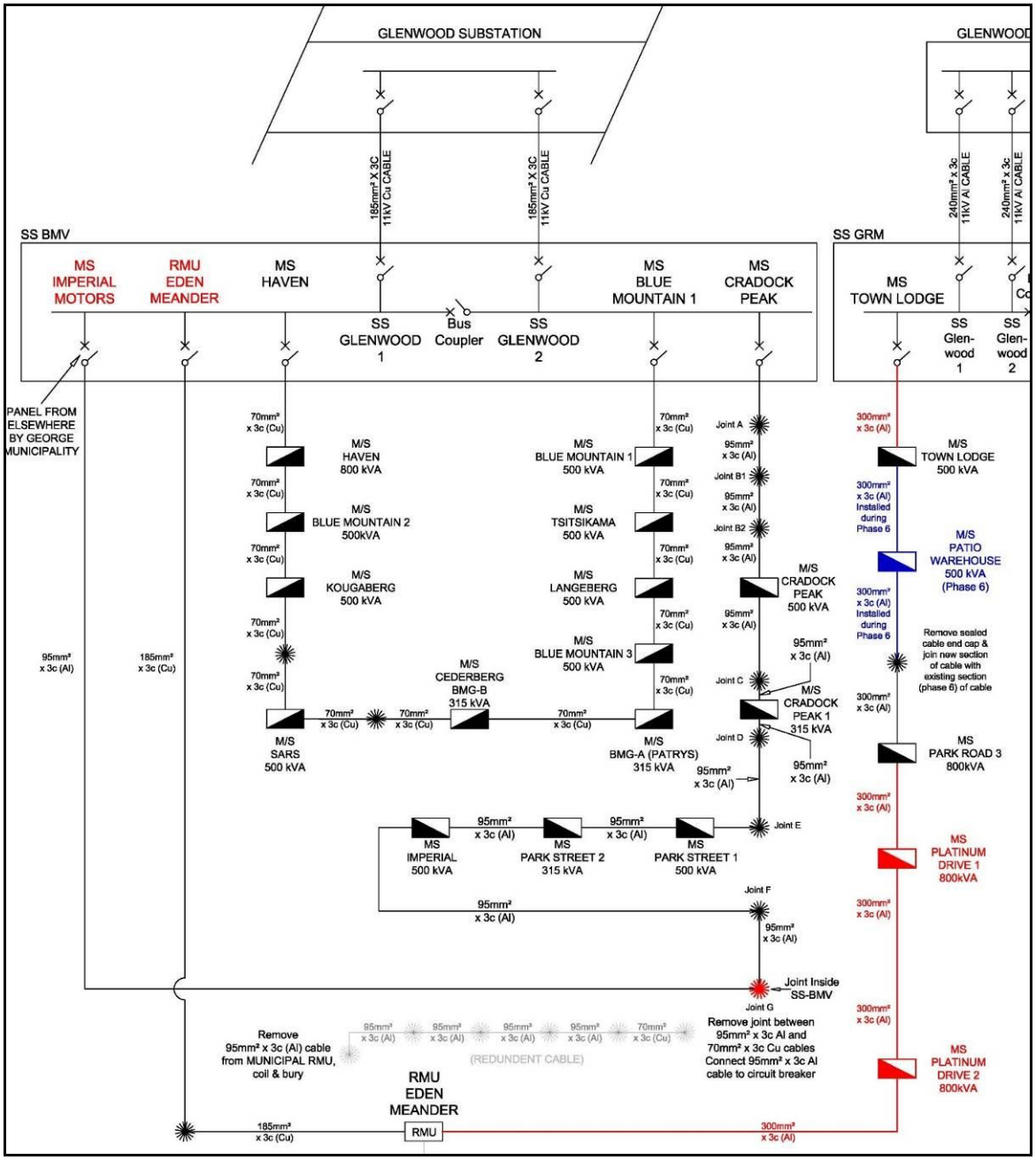


Figure 22: Electrical Network Single Line Diagram

4.9.2 Load Forecast

Based on the proposed Site Development Plan, the following table provides an estimate of the number of units as well as the estimated load per category, based on the area allocated.

The proposed development envisages the development of 680 apartments. Based on load estimates used for other similar developments, the demand for each of the apartments is estimated to be 1.25 kVA/unit. It is very important to note that the

proposed residential development will include a fully incorporated rooftop PV solar and battery energy storage system, as well as an energy efficient design, which will result in these lower than expected energy demand values.

By adding the estimated load for the public facilities, the After Diversification Maximum Demand (ADMD) for the overall development is calculated to be 935 kVA.

Description	No. of Units	Load/unit (kVA)	Total Load (kVA)
High Density Apartments	680	1.25	850
Open Space (Parklands)	1	2	2
Gatehouse & Offices	1	15	15
Clubhouse & Gym	1	50	50
Swimming Pool	1	3	3
Laundry	1	15	15
TOTAL			**935**

Table 4-1: Estimated Load per Category

4.9.3 Medium Voltage (MV) Equipment

Based on the electrical load calculations (as calculated in the previous paragraph), it is estimated that an ADMD of 935 kVA will be required for this development. Since this connection is greater than 500 kVA for a single point load, it qualifies as a Bulk MV Connection Point with the George Municipality and would require the installation of a new 11kV RMU (CCMV configuration). A typical RMU arrangement that will be required is shown in the figure below.

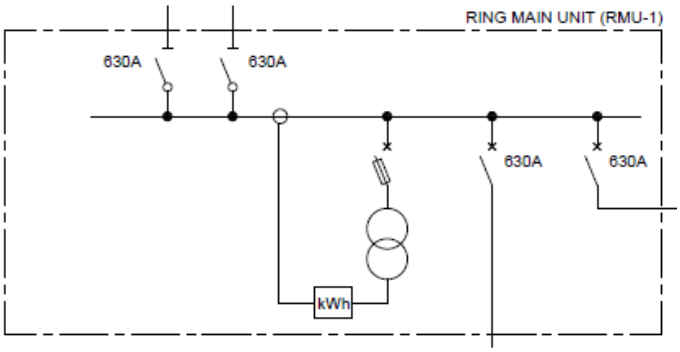


Figure 23: Typical RMU Arrangement (CCMVV)

The proposed new 11kV Ring Main Unit (RMU) for the Meander Lifestyle Apartments development will have to be installed on the boundary of the development with easy access to municipal maintenance personnel. The geographical location of the RMU (relative to the overall development) and other electrical infrastructure will have to be agreed with the Client, to ensure that it provides an optimal solution in terms of the rest of the Site Development Plan.

As can be seen from Figure 23 above, it is important to note that the existing 11kV, 300mm^2, underground cable is installed on the western side of Platinum Drive, which means that if the new RMU for the Meander Lifestyle Apartments will be positioned on the same side of the road no road-drilling and crossing would be required. If the minisub, however, is positioned along the southern side of Park Road, a road crossing and 11kV cable extension (in-out arrangement) will be required, as the existing cable is installed along the northern side of the road.

4.9.4 Battery Limits

The “battery limits” in terms of responsibility will be the outgoing terminals of the 11kV circuit breaker inside the RMU. The new 11kV cable from the RMU into the development, as well as the 1000 kVA, 11/0.4 kV step-down transformer will form part of the internal electrical works and is not seen as part of the Bulk MV Connection from the municipality.

The developer will be responsible for all costs, inter alia:

1. Engineering, supply, installation and commissioning of the complete electrical network as per the agreed Bulk Services Report.
2. Capital contributions and deposits are payable by the developer as per the George Guidelines.
3. Any, and all, costs directly related to the development remain the developers’ responsibility.

Once fully installed and commissioned, the new 11kV RMU and associated 11kV cables will be taken over by the George Municipality’s Electrical Department (as part of their MV network infrastructure) for operation and maintenance purposes. All downstream MV and LV infrastructure, will remain the property and responsibility of the Client (Meander Lifestyle Apartments).

4.9.5 Installation and Earthing

The RMU will have to be installed on a brick-built plinth, complying with George Municipality standards. An equipotential platform earthing arrangement will be required at the RMU as per the details provided below.

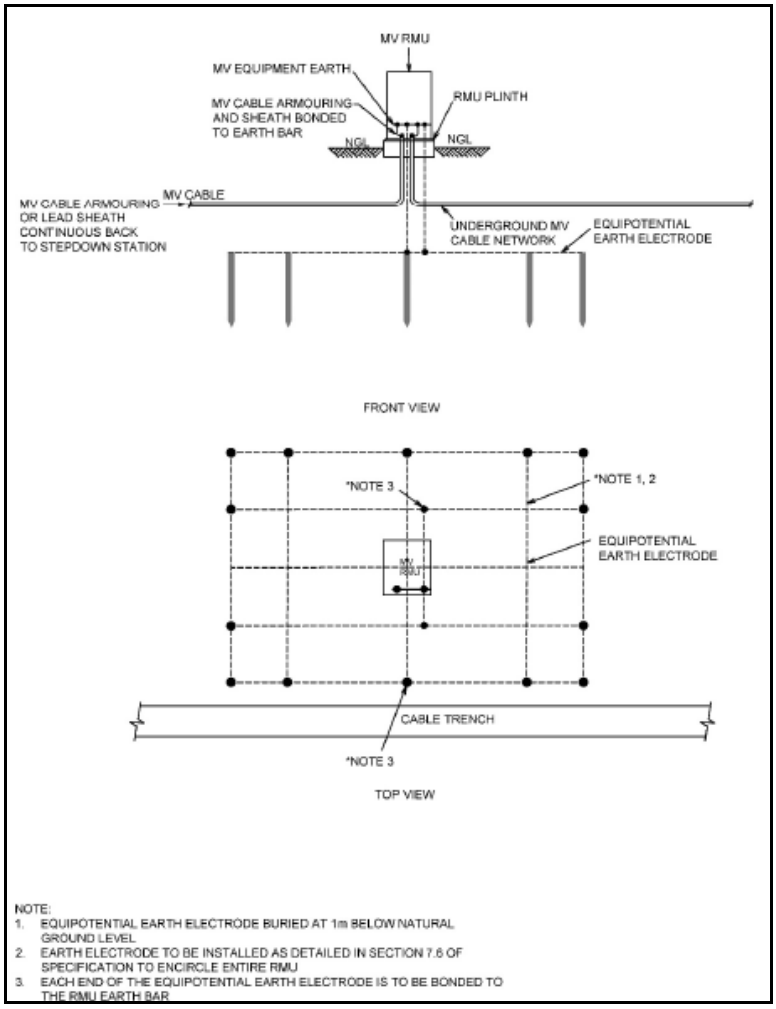


Figure 24: Earthing of RMU

4.9.6 Metering Equipment

A 4-quadrant, 4-wire energy meter (as per the municipality's standards) will be installed as part of the RMU's metering compartment, complete with AMR functionality. Metering CTs used shall be multi-ratio, with an accuracy class of 0.2 and a secondary rating of 5A.

The costs associated with the supply and installation of this meter will be carried by the Developer. Based on the load requirements, the new development will be treated as a Bulk MV Customer and a TOU Tariff structure will be applied.

4.9.7 Small Scale Embedded Generation

It should be noted that the George Municipality has an SSEG Policy that is strictly enforced, should the developer consider the installation of any form of own generation, such as PV Solar and/or Battery Energy Storage on site. A separate application and approval process will have to be completed as part of this installation.

4.9.8 Municipal Approval

The proposed project was presented to the George Municipality's Electrical Department and their Pre-Tech Planning Meeting. During this meeting all of the high-level planning concepts for the electrical supply to the project were discussed and agreed upon. Discussions with municipal officials indicated that the existing medium voltage (MV) infrastructure would be able to accommodate the additional demand of the new development, from a capacity perspective, and that no network strengthening will be required at the supply substation or on the existing MV underground cable network. This statement was confirmed by GLS Infrastructure Planning as documented in their Bulk Power Capacity Assessment Report (see Addendum).

The outcome of this meeting concluded that the George Municipality's Electrical Department agrees that the required capacity is available on their existing MV network infrastructure and that no additional network strengthening would be required to accommodate this development.

A copy of this Bulk Services Report will need to be submitted to the Municipality's Electrical Department for formal approval.

5 CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

The following conclusions can be reached from the bulk engineering services report for the proposed development of the new Meander Lifestyle Apartments on Erf 28005, George:

1. Erf 28005 is part of the larger Eden Meander precinct of which a significant percentage of development has successfully been completed over the past decade.
2. The project proposes the development of 680 residential apartments, complete with a gatehouse and leasing office, clubhouse, gym facility, multi-purpose sports fields, parklands and communal laundry.
3. The proposed development is located on Erf 28005, George. The site is bound to the south by Platinum Drive, to the east by Park Road and to the north and west by existing residential development. Access to the proposed development is obtained from the south from Platinum Drive.
4. The proposed development will be performed in line with an existing services agreement with the George Municipality in terms of the external and bulk services. All external and bulk services is or will be provided and designed in line with the services agreement.
5. Water:
    a. The Average Annual Daily Demand (AADD) for this proposed development is estimated at approximately 127.5kl/day. Peak factors will be considered during the detail design stage of the project.
    b. Bulk water is available for this development in accordance with the existing services agreement and new discussions with the local municipality. Letters of confirmation from George Municipality, as well as GLS, are attached as addendum.
    c. An existing municipal bulk water connection for this erf has been provided on Platinum Drive on the southern boundary of the site on the existing 160mm uPVC class 12 bulk line.
    d. No upgrades will be required to the municipal bulk water network, as confirmed in the letters of both George Municipality and GLS.
6. Sewer:
    a. The proposed development site drains to the middle of the southern boundary on Platinum Drive.
    b. The Average Dry Weather Flow (ADWF) of the development, in line with accepted design criteria and standards, can be calculated and estimated as 102.0kl/day. The design peak flow, inclusive of a specified peak factor

of 3.5 and 15% extraneous flow, will be calculated during detail design stage.

c. Bulk WWTW treatment capacity is available for this development in accordance with the existing services agreement and new discussions with the local municipality.
d. Capacity in the bulk network is mostly available; a number of upgrades are required and specified in the approval letters (and discussed in the report). Letters of confirmation from George Municipality, as well as GLS, are attached as addendum.
e. The site is serviced by an existing 160mm municipal sewer connection on the lowest point of the erf on the southern boundary of the site on Platinum Drive.

7. Roads, access & parking:
    a. An updated Traffic Impact Assessment (TIA) has been performed by ITS (ITS – November 2026). Conclusions concerning access- and other road network upgrades are based on this TIA.
    b. Access to the development is proposed from the south from Platinum Drive. The access point is indicated on the SDP. A concept design is provided.
    c. Sight distances at the proposed access point are satisfactory for development purposes in both the vertical and horizontal alignments.
    d. A single lane roundabout shall be provided at the intersection of Park Road and Platinum Drive.
    e. The site falls in a PT1 zone and is only 220m away from the major bus stop next to the Garden Route Mall.
    f. Based on the By-Law, the parking requirements for Erf 28005 (PT1 Zone) amount to 959 parking bays, which gives a rate of 1.41 bays/unit.
    g. A total of 893 parking bays is provided on the SDP, which results in a rate of 1.31 bays/unit.
    h. To confirm the sufficiency of the parking provision for the proposed site, the TIA motivated the rate by discussing a detailed parking demand survey that was undertaken, which concluded that the rate of 1.31 bays/unit is sufficient.
    i. The TIA recommended that a parking provision rate of 1.31 bays per unit be accepted in lieu of the 1.41 bays per unit required by the By-Law. This is further supported by the development's location within a PT1 zone and its proximity (220m), to the major public transport interchange adjacent to the Garden Route Mall and a GoGeorge bus stop.
    j. The Go George bus service has a major terminal along the Mall Access Road. This terminal is serviced by six bus routes. No additional public transport facilities are required for the proposed development.
    k. The proposed development shall allow for safe and dedicated external pedestrian walkways from the proposed development to link to the bus terminal at the Mall Access Road. Both Platinum Drive and Park Road

have existing pedestrian walkways on both sides. This shall be replicated in the new roundabout.

8. Stormwater:
    a. An existing municipal stormwater management plan is in existence for the precinct. The proposed development will be performed in line with the existing stormwater management plan. All stormwater bulk services will be provided and designed in line with the stormwater management plan.
    b. The proposed development site drains to the middle of the southern boundary on Platinum Drive.
    c. An existing 1250mm pipe culvert has been provided at the lowest point under Platinum Drive. Drainage from the development site will be through this culvert from where it will follow the municipal drainage line (erf 26675) as per the municipal stormwater management plan for the precinct. Drainage will be accumulated into the existing detention pond at the bottom of erf 26675. Drainage from the detention pond will be into the Meul River.
9. Solid Waste:
    a. A formal solid waste collection area is provided on the SDP in line with municipal technical- and public health guidelines. Solid waste will be removed by the George Municipality in line with the services agreement.
10. Bulk Electrical Supply
    a. It has been confirmed with the George Municipality's Electrical Department that sufficient capacity is available on the existing 11kV reticulation network infrastructure from the George Municipality to supply the estimated load of 935 kVA demand for the Meander Lifestyle Apartments development.
    b. A new 11kV Ring Main Unit and bulk energy metering unit will have to be provided on the erf boundary and will be dedicated for this development. The new RMU will be cut into the existing 11kV cable network, running along the northern side of Park Road.
    c. All of the required new bulk infrastructure will be for the developer's cost but will be taken over by the George Municipality, after the completion of the project, to form part of their existing MV infrastructure in terms of future operations and maintenance. For this reason, the design of the electrical network equipment will be such that it complies with the standards and specifications prescribed by the George Municipality.

With reference to all of the conclusions above, it can holistically be concluded that the proposed development can be designed and constructed to acceptable specifications and standards from an external and bulk engineering services design perspective.

5.2 Recommendations

With reference to the conclusions above, the following are recommended:

1. That the proposed development be approved from an external and bulk engineering services design perspective
2. That all conceptual and preliminary engineering design specifications and standards be accepted and approved.
3. That all detail designs be performed to the satisfaction of the local municipality in line with the proposals contained in the report.
4. That all designs be performed, supervised and signed off by a suitably qualified, experienced and registered professional engineer.

6 ADDENDA

6.1 Addendum 1 – Site Development Plan

6.2 Addendum 2 – Concept design drawings

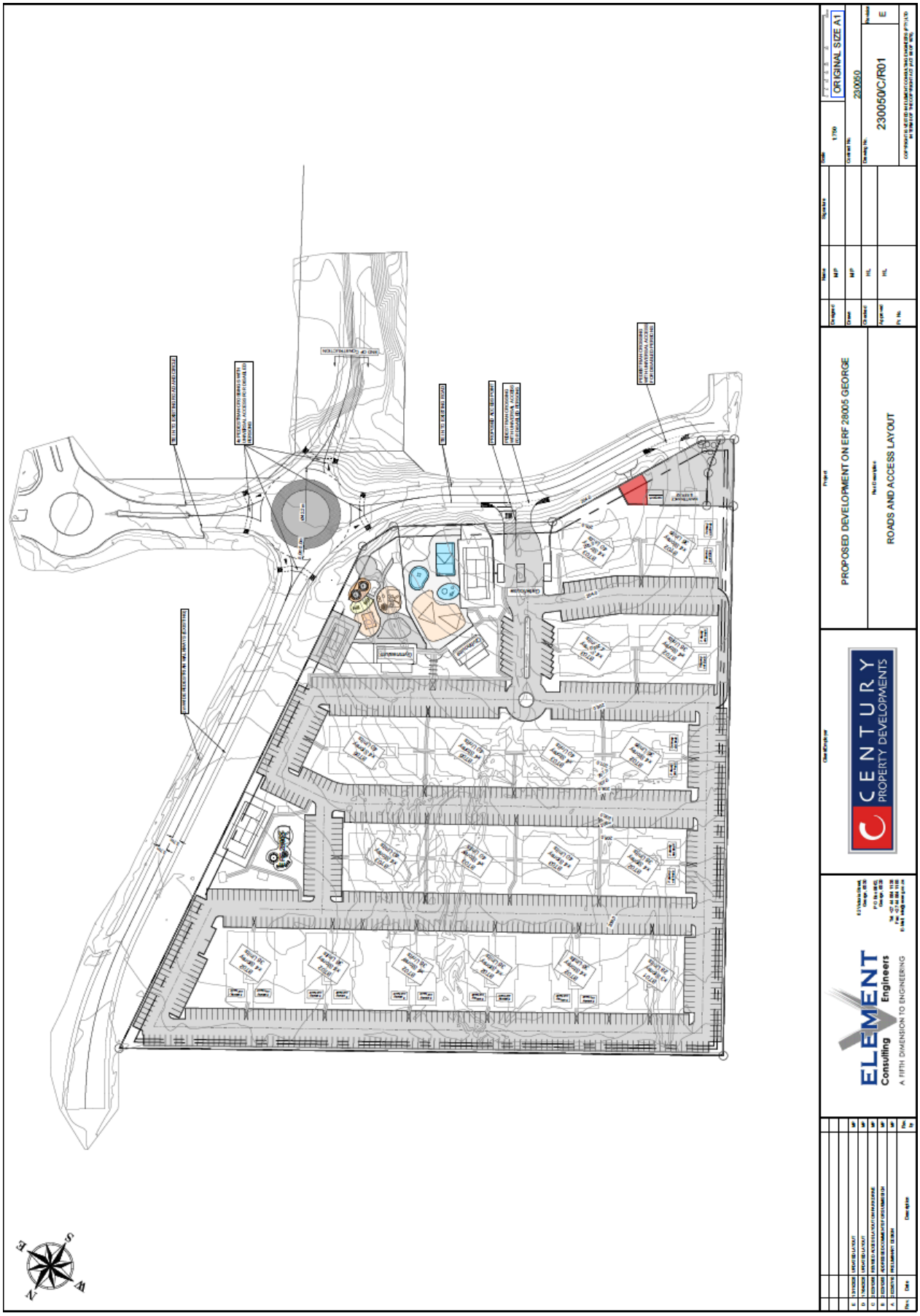
6.3 Addendum 3 – Bulk Water & Sewer Letter (GLS)

6.4 Addendum 4 – Bulk Power Capacity Assessment Report (GLS)

6.5 Addendum 5 – Confirmation Letters: George Municipality

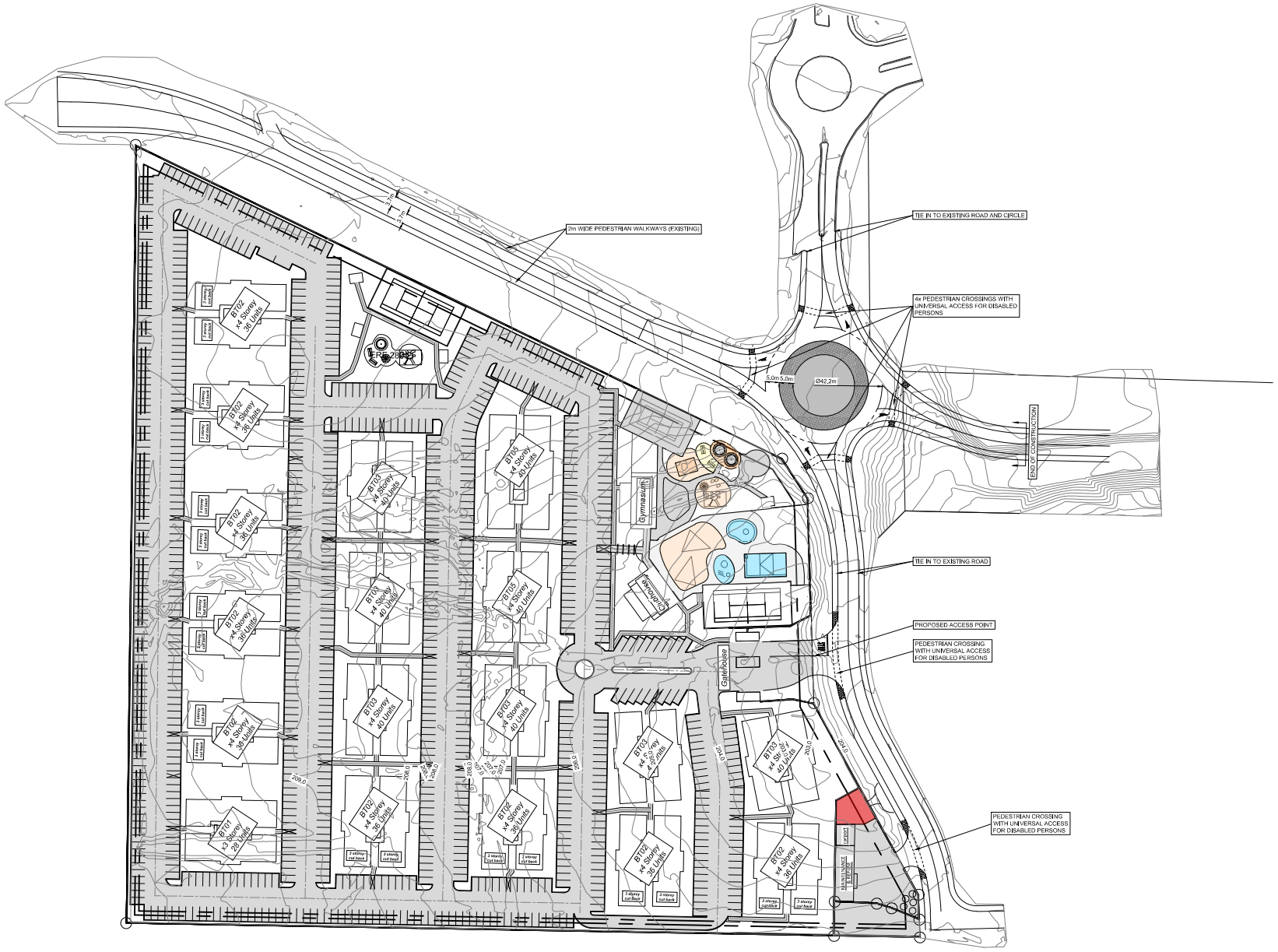
ADDENDUM 1

SITE DEVELOPMENT PLAN


PROPOSED DEVELOPMENT ON ERF 28005 GEORGE
ROADS AND ACCESS LAYOUT
ORIGINAL SIZE A1
1:750
230050
230050/C/R01
E
CENTURY
PROPERTY DEVELOPMENTS
ELEMENT
Consulting Engineers
A FIFTH DIMENSION TO ENGINEERING

ADDENDUM 2

CONCEPT DESIGN DRAWINGS



Rev.	Date	Description	Rev. by
E	13/11/2026	UPDATED LAYOUT	MP
D	17/04/2026	UPDATED LAYOUT	MP
C	2023/12/08	REVISED ACCESS LAYOUT ON PARK DRIVE	MP
B	2023/12/05	ADDRESSED COMMENTS FOR SUBMISSION	MP
A	2023/07/10	PRELIMINARY DESIGN	MP

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Fax: +27 44 884 1195
E-Mail: info@eceng.co.za

Client/Employer: CENTURY PROPERTY DEVELOPMENTS

Project: PROPOSED DEVELOPMENT ON ERF 28005 GEORGE

Plan Description: ROADS AND ACCESS LAYOUT

	Name	Signature
Designed	MP	
Drawn	MP	
Checked	HL	
Approved	HL	
Pr. No.		

Scale: 1:750
ORIGINAL SIZE A1
Contract No.: 230050
Drawing No.: 230050/C/R01
Revision: E

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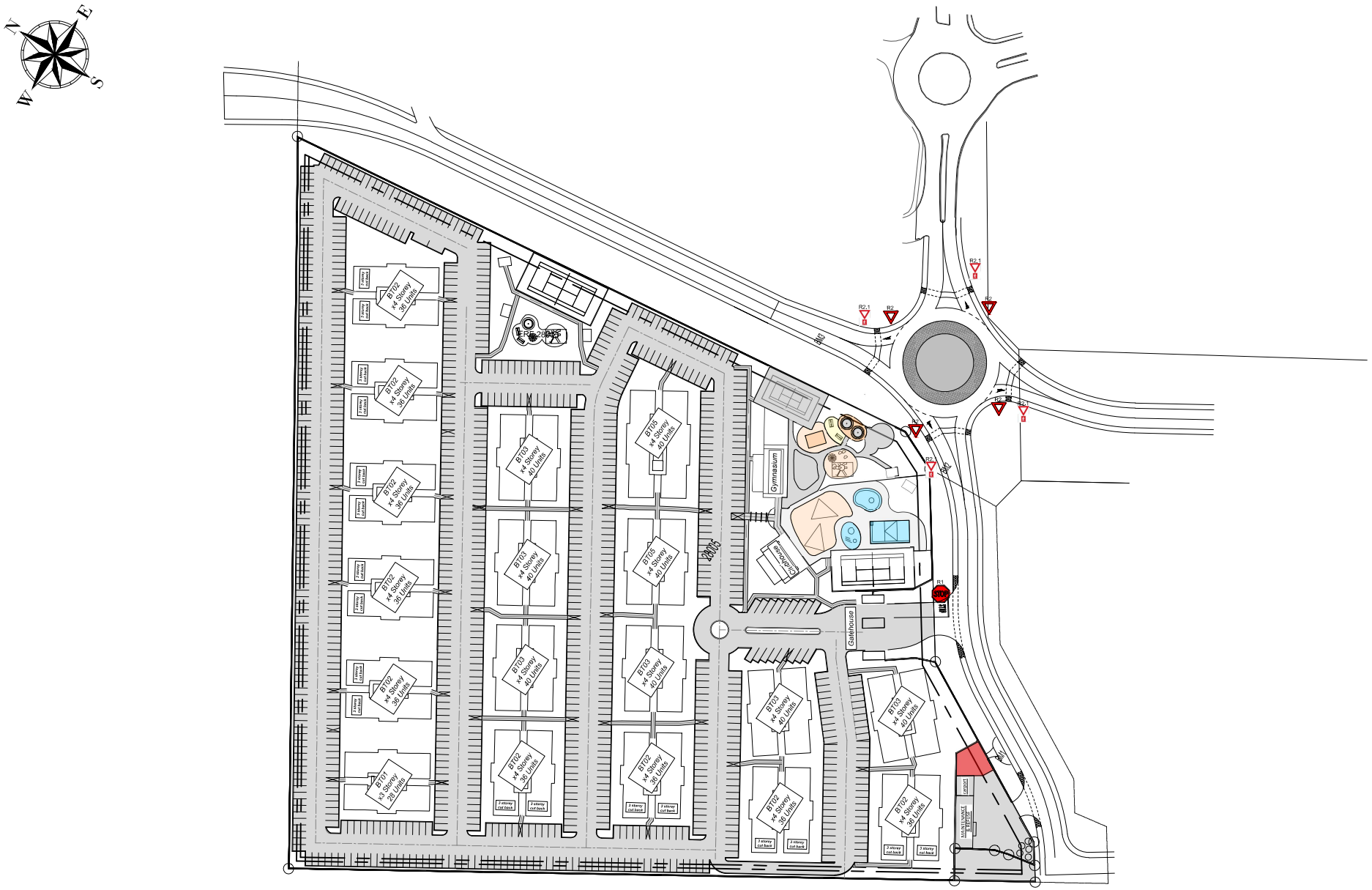

Rev.	Date	Description	Rev. by
D	13/11/2026	UPDATED LAYOUT	MP
C	17/04/2026	UPDATED LAYOUT	WVDM
B	2023/12/08	REVISED ACCESS LAYOUT ON PARK DRIVE	MP
A	2023/12/05	FOR APPROVAL	MP

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Client/Employer

CENTURY PROPERTY DEVELOPMENTS

Project

MAKRO GEORGE

Plan Description

ROAD SIGNAGE LAYOUT

	Name	Signature
Designed	MP	
Drawn	MP	
Checked	HL	
Approved	HL	
Pr. No.		

Scale 1:750

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ORIGINAL SIZE A1

Contract No. 230050

Drawing No. 230050/C/R02

Revision D

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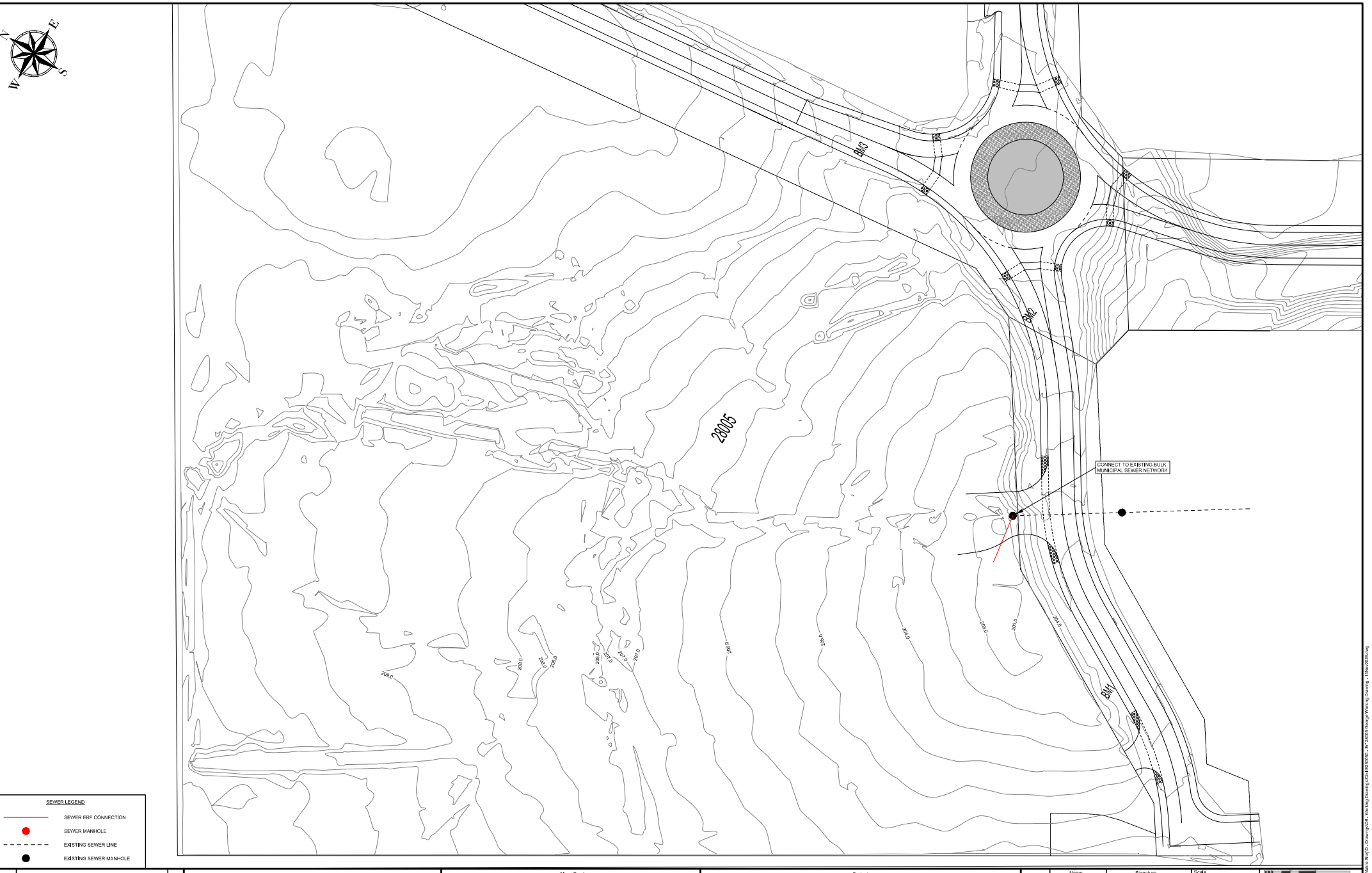

SEWER LEGEND

- SEWER ERF CONNECTION
- SEWER MANHOLE
- EXISTING SEWER LINE
- EXISTING SEWER MANHOLE

Rev.	Date	Description	Rev. by
C	13/11/2026	UPDATED LAYOUT	MP
B	17/04/2026	UPDATED LAYOUT	MP
A	2023/07/04	PRELIMINARY DESIGN	MP

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Client/Employer

CENTURY PROPERTY DEVELOPMENTS

Project

PROPOSED DEVELOPMENT ON ERF 28005 GEORGE

Plan Description

BULK SEWER CONNECTION LAYOUT

	Name	Signature
Designed	MP	
Drawn	MP	
Checked	HL	
Approved	HL	
Pr. No.		

Scale: 1:500

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ORIGINAL SIZE A1

Contract No.: 230050

Drawing No.: 230050/C/S01

Revision: C

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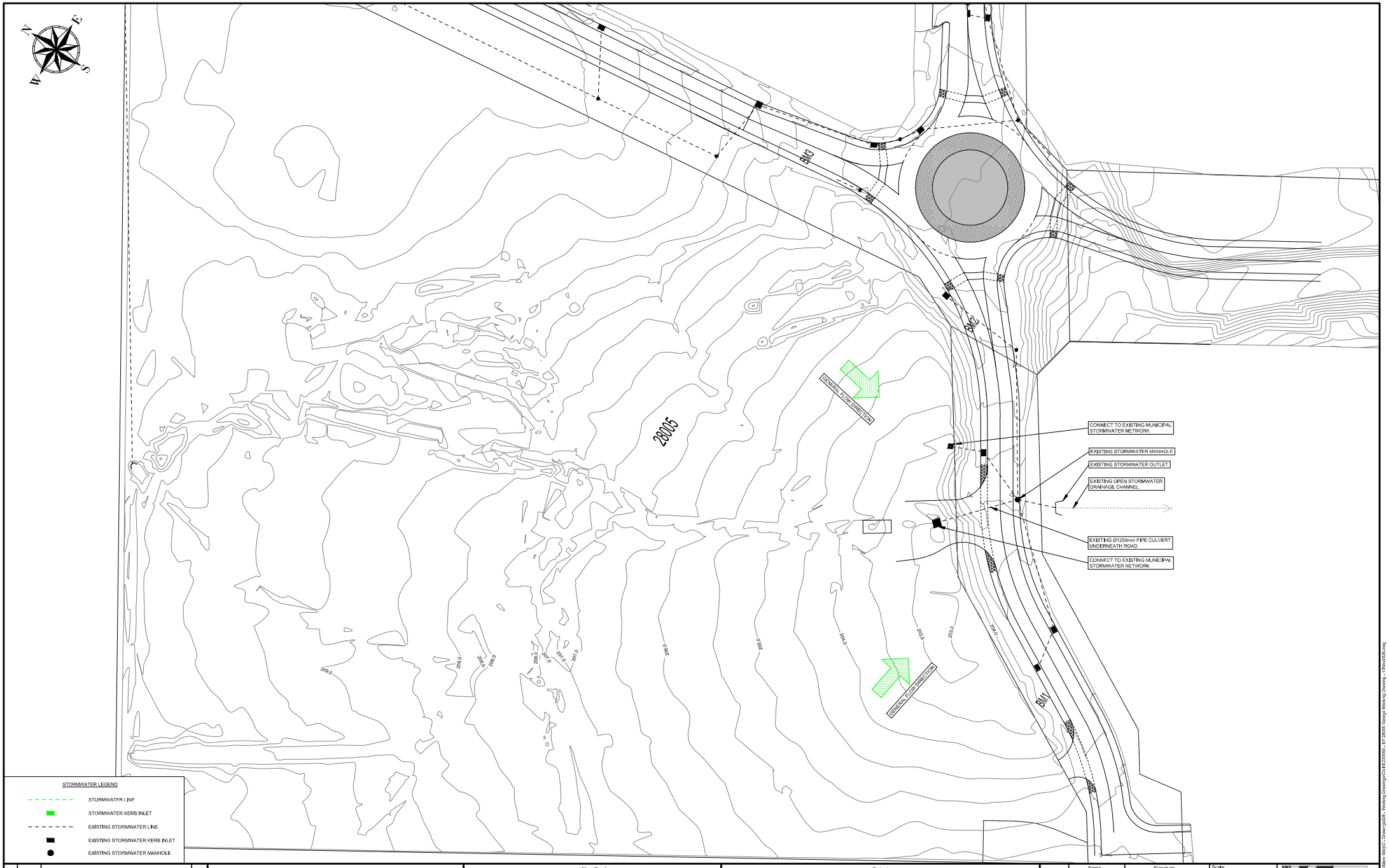

Rev.	Date	Description	Rev. by
C	13/11/2026	UPDATED LAYOUT	MP
B	17/04/2026	UPDATED LAYOUT	MP
A	2023/07/04	PRELIMINARY DESIGN	MP

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Client/Employer

CENTURY PROPERTY DEVELOPMENTS

Project

PROPOSED DEVELOPMENT ON ERF 28005 GEORGE

Plan Description

BULK STORMWATER CONNECTION LAYOUT

	Name	Signature
Designed	MP	
Drawn	MP	
Checked	HL	
Approved	HL	
Pr. No.		

Scale: 1:500

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ORIGINAL SIZE A1

Contract No.: 230050

Drawing No.: 230050/C/SW01

Revision: C

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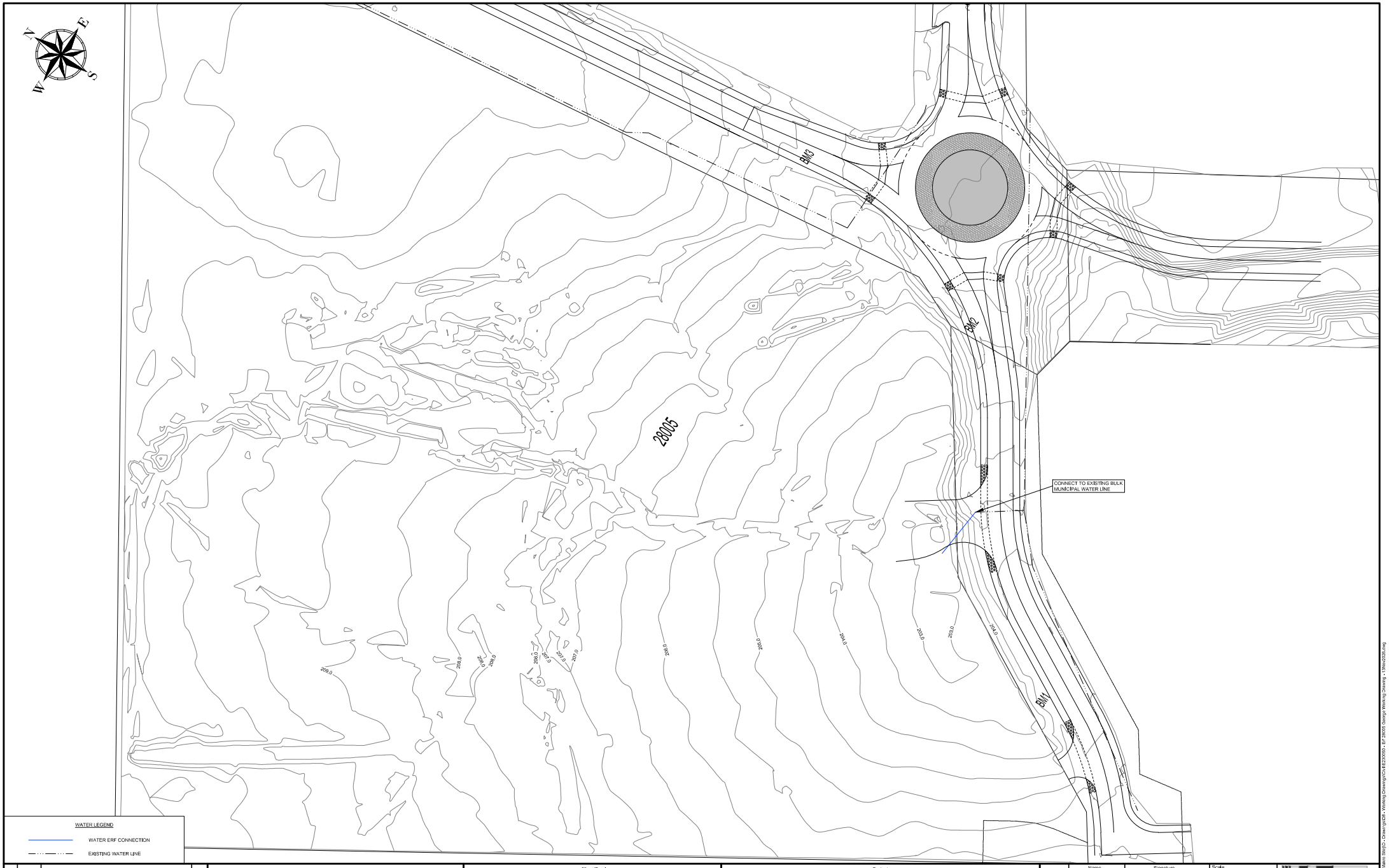

WATER LEGEND

WATER ERF CONNECTION

EXISTING WATER LINE

Rev.	Date	Description	Rev. by
C	13/11/2026	UPDATED LAYOUT	MP
B	17/04/2026	UPDATED LAYOUT	MP
A	2023/07/04	PRELIMINARY DESIGN	MP

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Client/Employer

CENTURY PROPERTY DEVELOPMENTS

Project

PROPOSED DEVELOPMENT ON ERF 28005 GEORGE

Plan Description

BULK WATER CONNECTION LAYOUT

	Name	Signature
Designed	MP	
Drawn	MP	
Checked	HL	
Approved	HL	
Pr. No.		

Scale: 1:500

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ORIGINAL SIZE A1

Contract No.: 230050

Drawing No.: 230050/C/W01

Revision: C

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ADDENDUM 3

BULK WATER & SEWER LETTER (GLS)

GLS

Infrastructure planning

13 November 2026

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 28005

The request from Element Consulting Engineers (Hannes Lourens) dated 10 June 2025 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
Reg no: 2007/003039/07

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Head office: 15 Termo Lane, Techno Park, Stellenbosch, 7600, ZA | PO Box 814, Stellenbosch, 7599, ZA
Gauteng office: Hilda Chambers Building, Suite 1, 339 Hilda Street, Hatfield, Pretoria, 0083, ZA

Directors: Flip du Plessis, Tsolane Mokoena

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 m2026-06 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.

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^2.

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 2025/26 Rand value **estimates** and **include** 50% surcharge for P&Gs, contingencies and fees but **exclude** VAT

1.3 Version control

Issue Date	*Type*	*Version*	*Remarks*
2025/10/22	Draft	1	Issued for comments and approval
2025/11/19	Revision	2	Removed bulk pump for water. Added a scenario for sewer bulk.
2026/11/13	Revision	3	Unit sewer demand update and revision of items required

2 WATER DEMAND & SEWER FLOWS

2.1 *Impact of the proposed development*

The proposed development was taken into consideration in the water master plan as part of the Blue Mountain Village A future development area.

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

Land Use	Unit of measure (No/100m2/ha…)	No. Units (No/100m2/ha…)	UWD/unit (kL/unit/d)	Sewer ratio (% x UWD)	AADD Inc. UAW (kL/d)	PDDWF Excl. Infilt. (kL/d)
Flats (George & Wilderness) - Very High density Flat units up to 50 m² (Footprint=0.6 and Storeys=2)	unit	680	0.188	95%	127.5	121.1
Total		**680**			**127.5**	**121.1**

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 56.3 kL/d.

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 127.5 kL/d.

- Peak flow using a zone peak hour factor of: 3.0[1] = 4.4 L/s
- Fire flow for type: Moderate Risk 1: High rise flats ≥ four storeys[2] = 50.0 L/s @ 10 m

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 51.9 kL/d.

The revised PDDWF (excluding infiltration) calculated for the proposed development and used in the re-analysis of the sewer system is 121.1 kL/d. The design flow, or instantaneous peak wet weather flow (IPWWF), is 3.6 L/s.

[1] Higher peak flow factors might be applicable for internal networks.
[2] As per Table J17 from Section J - Water Supply of "The Neighbourhood Planning and Design Guide" (so called "Red book"). For fire flows > 20 L/s, i.e. the High risk, Moderate risk 1 and Moderate risk 2 categories, lower flows may be allowed on the basis of a fire specialist report.

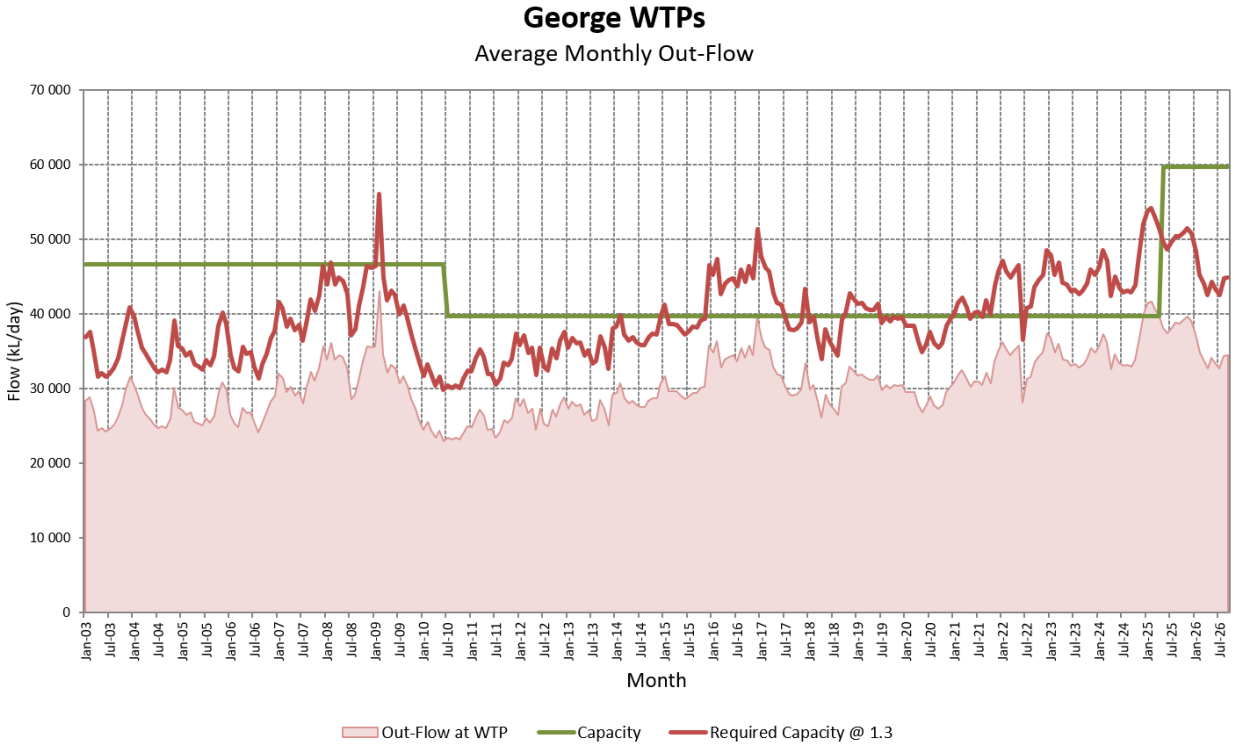
3 WATER DISTRIBUTION NETWORK

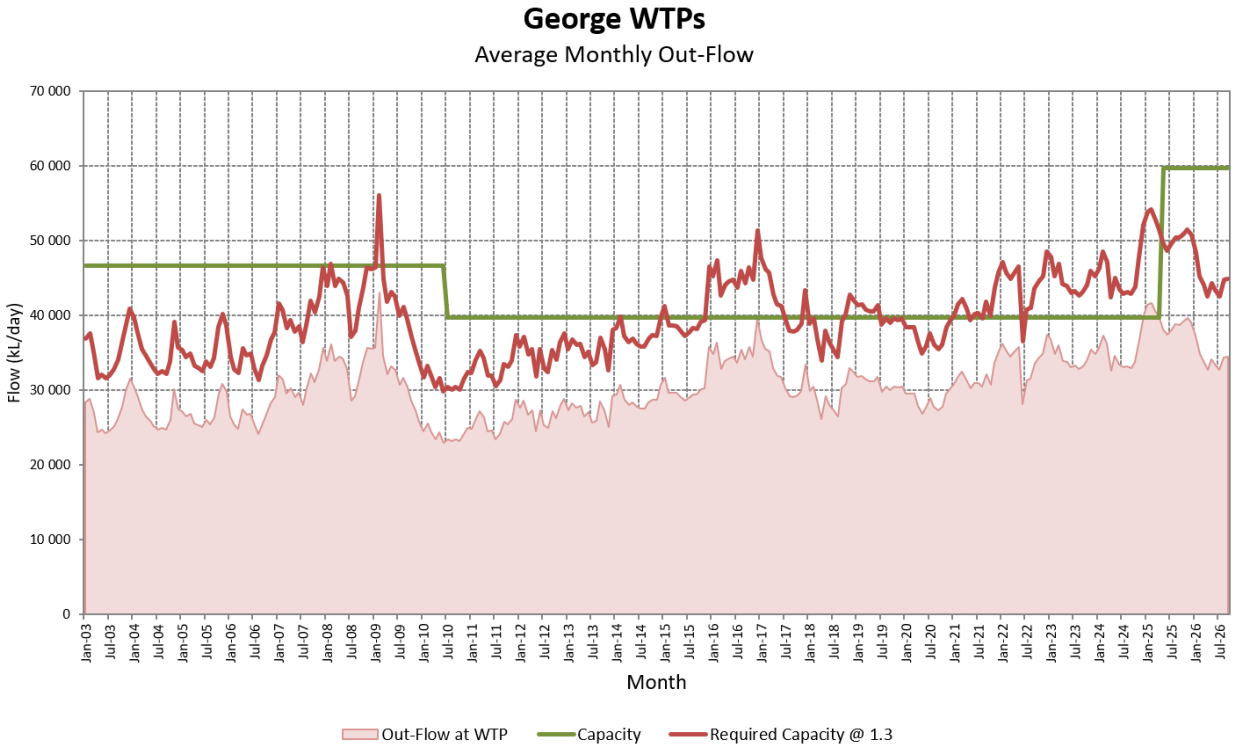
3.1 Water Resources

Water Treatment Plant capacity

The master plan indicates that the proposed development falls in the George Old WTP reservoirs (George Main) zone and supplied from the George water treatment plants (WTPs).

The two graph overleaf shows that the design capacity of the George WTPs (green line) has been exceeded by the average monthly required capacity (dark red line) a few times in the last decade but has since been upgraded. The WTPs are thus not operating at risk.





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

George WTPs	Capacity	Comment
Existing Capacity	59 700 kL/d	Design capacity 59 700 kL/d
Capacity at measured flow (incl. 1.3 factor)		
Highest Annual Average (2003-2025)	38 686 kL/d	2025/26
	9 408 kL/d	Spare capacity available
Annual Average (2025/26)	38 686 kL/d	Average for 2025/26
	9 408 kL/d	Spare capacity available
Highest Monthly Average (2003-2025)	43 094 kL/d	February 2009
	3 678 kL/d	Spare capacity available
Highest Monthly Average (2025/26)	41 697 kL/d	February 2025
	5 494 kL/d	Spare capacity available
Capacity at modelled demand (incl. 20% water loss and 1.3 factor)		
T_AADD (existing)	36 781 kL/d	m2026-06 MP
	11 885 kL/d	Spare capacity available
3yr Projection	44 360 kL/d	
	2 032 kL/d	Spare capacity available
5yr Projection	49 412 kL/d	
	-4 536 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 George Old WTP reservoirs (George Main) zone as shown in **Figure 1 (Water)** attached.

- ↓ George Old & New WTP.
- ↓ 500/900 mm Ø supply line.
- ↓ George WTP reservoirs.
- ↓ 900 mm Ø distribution line.
- ↓ 800 mm Ø distribution line.
- ↓ 700 mm Ø distribution line.
- ↓ 600 mm Ø distribution line.
- ↓ 160 mm Ø reticulation line (Platinum Drive).

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 – required specifically for the proposed development, as a result of more accurate information relative to the original estimate of future development. This includes items required to accommodate the development now, but form part of great master plan. Also included are link services required solely for the development.
- Short term planning MP items – items not required to address existing capacity issues but requiring lead time in providing sufficient capacity of strategic infrastructure (WTPs, WWTWs, reservoirs, etc.) in meeting demand growth (of which the development forms part) in the short to medium term.

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 20% water losses is also included in the scenario.

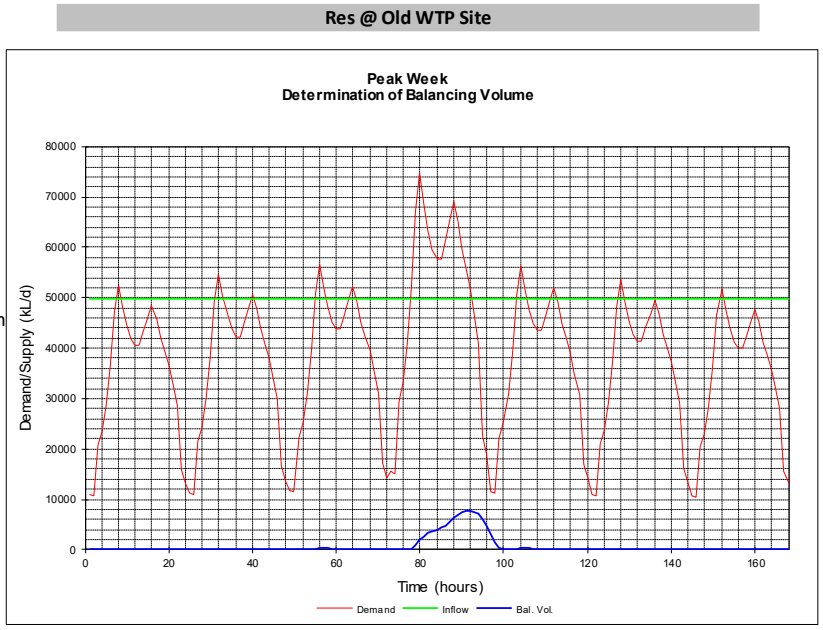
The second (Theoretical Fully Occupied Demand) scenario is the planning scenario and represents the demand of all the existing stands, irrespective of whether they are developed or vacant. Most importantly, the demand is based on the zoning of each stand i.e. the maximum demand allowed for under existing 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 20% 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 Old WTP reservoirs AADD (Theoretical Current Demand) in the m2026-06 water model is 29 235 kL/d. The capacity of the existing George Old WTP reservoir is 36 120 kL. The required supply rate is 575 L/s. Using these three input variables in a reservoir sizing analysis, it shows that the remaining spare capacity is 6 269 kL.

Type in values in shaded cells			
Full zone	29 235	kL/d	
Direct zone	22 163	kL/d	
AADD	**29 235**	kL/d	
PDF	**1.70**	* AADD	
PWF	**1.30**	* AADD	
P3DF	1.42	* AADD	
Supply	**1.70**	* AADD	
=	49 699	kL/d	
=	575	L/s	Pipe @ 1.8m/s
			638 mm
Bal.Vol.	7 688	kL/d	
=	6.3	h*AADD	
			%
Pattern 1	Large zone	Large	**75.8%**
Pattern 2	Small zone	Medium	**0.0%**
Pattern 3	LC Housing	Small	**0.0%**
Pattern 4			**0.0%**
Pattern 5			**0.0%**
Pattern 6			**0.0%**
Pattern 7	Even	To a res.	**24.2%**
Must add up to 100 --> check			100.0%



VOLUME ANALYSIS (applies only to area directly supplied, I.e. not to the Pattern 7 supply)

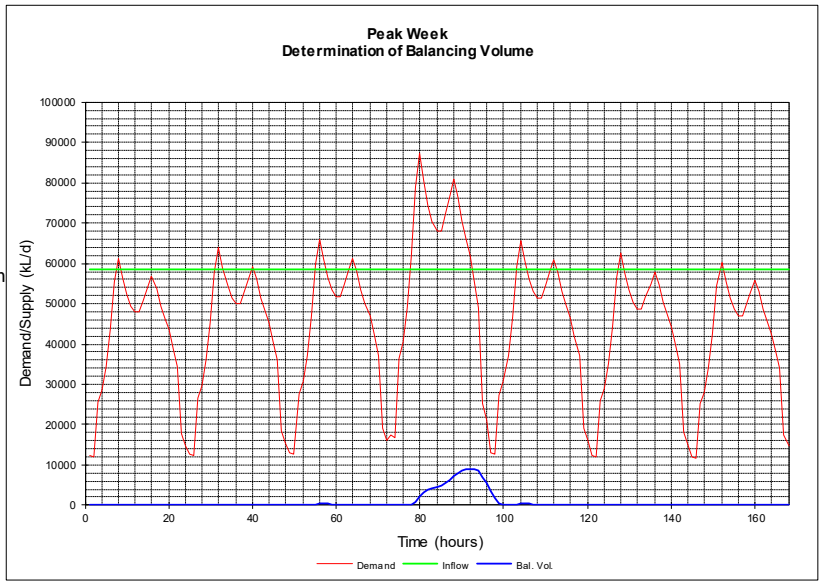
Capacity	**36 120**	kL	=	39.1 h x AADD
Required balancing	7 688	kL	=	8.3 h x AADD
Available volume	28 432	kL	=	30.8 h x AADD
Required emergency	22 163	kL	=	**24.00** h x AADD
Spare capacity	6 269	kL	=	6.8 h x AADD

Reservoir capacity assessment (Theoretical Fully Occupied Demand)

The current George Old WTP reservoirs AADD (Theoretical Fully Occupied Demand) in the m2026-06 water model is 34 456 kL/d. The capacity of the existing George Old WTP reservoir is 36 120 kL. The required supply rate is 678 L/s. Using these three input variables in a reservoir sizing analysis, it shows that the remaining spare capacity of 2 245 kL is sufficient to cater for the proposed development.

Type in values in shaded cells			
Full zone	34 456	kL/d	
Direct zone	24 896	kL/d	
AADD	**34 456**	kL/d	
PDF	**1.70**	* AADD	
PWF	**1.30**	* AADD	
P3DF	1.42	* AADD	
Supply	**1.70**	* AADD	
=	58 575	kL/d	
=	678	L/s	Pipe @ 1.8m/s
			693 mm
Bal.Vol.	8 980	kL/d	
=	6.3	h*AADD	
			%
Pattern 1	Large zone	Large	**72.3%**
Pattern 2	Small zone	Medium	**0.0%**
Pattern 3	LC Housing	Small	**0.0%**
Pattern 4			**0.0%**
Pattern 5			**0.0%**
Pattern 6			**0.0%**
Pattern 7	Even	To a res.	**27.7%**
Must add up to 100 --> check			100.0%

Res @ Old WTP Site



VOLUME ANALYSIS (applies only to area directly supplied, I.e. not to the Pattern 7 supply)

Capacity	**36 120**	kL	=	34.8 h x AADD
Required balancing	8 980	kL	=	8.7 h x AADD
Available volume	27 140	kL	=	26.2 h x AADD
Required emergency	24 896	kL	=	**24.00** h x AADD
Spare capacity	2 245	kL	=	2.2 h x AADD

Bulk water supply status quo

The existing bulk system has sufficient capacity to accommodate the proposed development.

Although there is capacity in the existing bulk water system, rapid development is being experienced in the greater George Main zone. This requires prioritised implementation of additional storage capacity at the George Old WTP reservoir site. It is therefore recommended that the municipality prioritise the provision of additional storage capacity at the Old WTP reservoir site in the short to medium term.

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.

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

Item No	Description	Extent	Size	Cost	Pro-rata Cost
None	-	- -	- -	-	- -
			Total	**R -**	**R - R -**

3.4.2 Accommodation of the proposed development in the bulk water system

Development specific items required in the bulk water system:

Item No	Description	Extent	Size	Cost	Pro-rata Cost
None	-	- -	- -	-	- -
			Total	**R -**	**R - R -**

3.4.3 Short-to-medium term planning for the bulk water system

Short-to-medium term planning items required in the bulk water system:

Item No	Description	Extent	Size	Cost	Pro-rata Cost
GMR_B10.01	Pipe to install	324 m x	1 100 mm Ø	R 19 777 000	R 46 696 0.2%
GMR_B10.04	Reservoir to construct: Res @ Old WTP - Res 5	16 500 m³ @	295 m TWL	R 53 038 000	R 125 229 0.2%
GMR_01.01c	Pipe to install	318 m x	1 100 mm Ø	R 16 253 000	R 114 103 0.7%
			Total	**R 89 068 000**	**R 286 028**

3.5 *Water Reticulation System*

Water reticulation system status quo

The existing water reticulation system has sufficient capacity to accommodate the proposed development. It is proposed that the development connects to the existing 160 mm Ø reticulation pipeline in Platinum Drive, as indicated in **Figure 1 (Water)**.

Accommodation of the proposed development, with its revised AADD, requires implementation of the following additions and adjustments to the *existing* water system.

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:

Item No	Description	Extent	Size	Cost	Pro-rata Cost
None	-	- -	- -	-	- -
			Total	**R -**	**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):

Item No	Description	Extent	Size	Cost	Pro-rata Cost
None	-	- -	- -	-	- -
			Total	**R -**	**R - R -**

The proposed connection point 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)**).

Connection Point	**Static**		**Residual**		**Fire Flow**		**Ground Level**
	EGL (m a.s.l.)	Head (m)	EGL (m a.s.l.)	Head (m)	EGL (m a.s.l.)	Head (m)	(m a.s.l.)
Point A	295.0	91.2	286.5	82.7	275.0	71.2	203.8

4 SEWER CONVEYANCE NETWORK

4.1 Sewer Drainage Area

The master plan indicates that the proposed development falls in the Blue Mountain 1 PS drainage area as shown in **Figure 2 (Sewer)** attached. This drainage area drains to the Outeniqua WWTW.

A 160 mm Ø sewer main drains from the proposed connection to the Outeniqua WWTW. The drainage path to the Outeniqua WWTW is as follows:

↓ 160 mm Ø gravity main.
↓ Blue Mountain PS 1
↓ 110 mm Ø rising main.
↓ 160 mm Ø gravity main.
↓ Blue Mountain PS 2
↓ 110 mm Ø rising main.
↓ 160 mm Ø gravity main.
↓ 355 mm Ø gravity main.
↓ 355 mm Ø inverted siphon under the Meul River.
↓ 600/750 mm Ø gravity main.
↓ Meul PS
↓ 630 mm Ø rising main.
↓ 600/630/700 mm Ø gravity main.
↓ Schaapkop PS
↓ 800 mm Ø rising main.
↓ Outeniqua wastewater treatment works (WWTW)

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 – required specifically for the proposed development, as a result of more accurate information relative to the original estimate of future development. This includes items required to accommodate the development now, but form part of great master plan. Also included are link services required solely for the development.
- Short term planning MP items – items not required to address existing capacity issues but requiring lead time in providing sufficient capacity of strategic infrastructure (WTPs, WWTWs, reservoirs, etc.) in meeting demand growth (of which the development forms part) in the short to medium term.

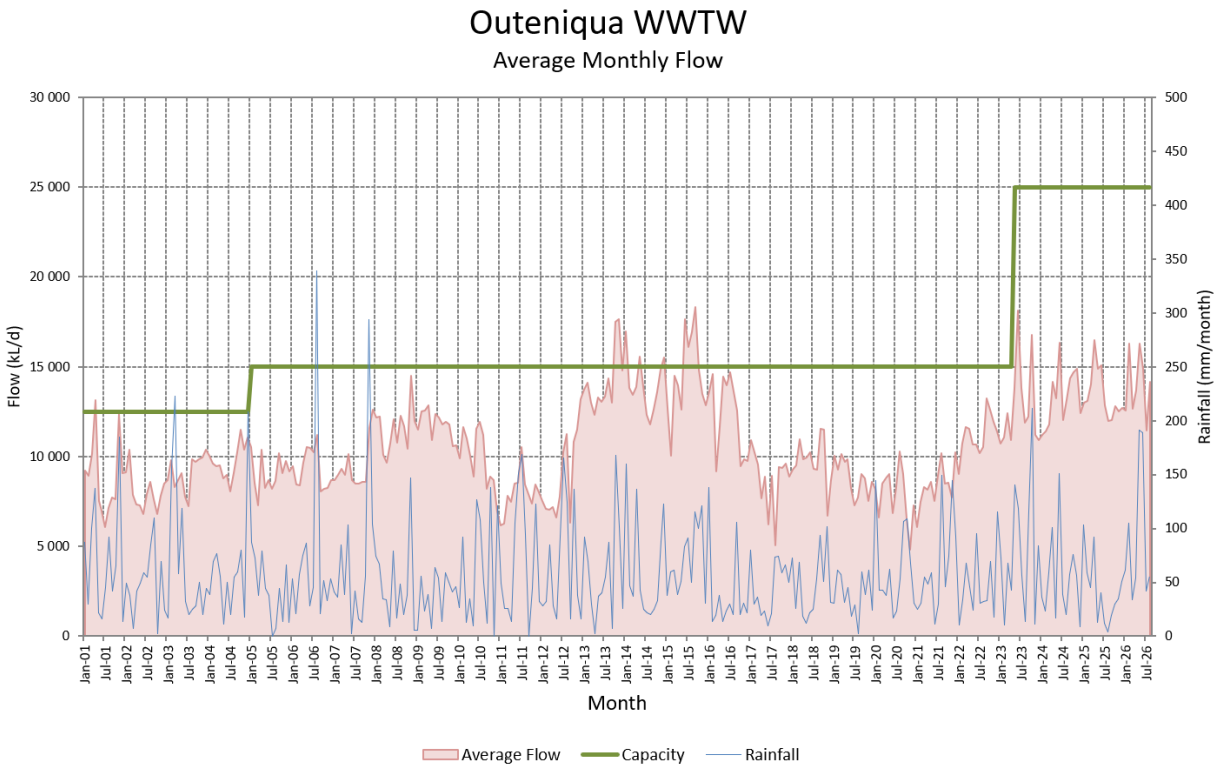
It is important to note that all proposed items are schematic in nature, final size and location is subject to a complete design by a suitably qualified engineer. The final locality in particular is subject to legislative requirements including but not limited to pipes not crossing private stands, no servitudes registered in private stands and no pipes in stands with an area less than 400m^2.

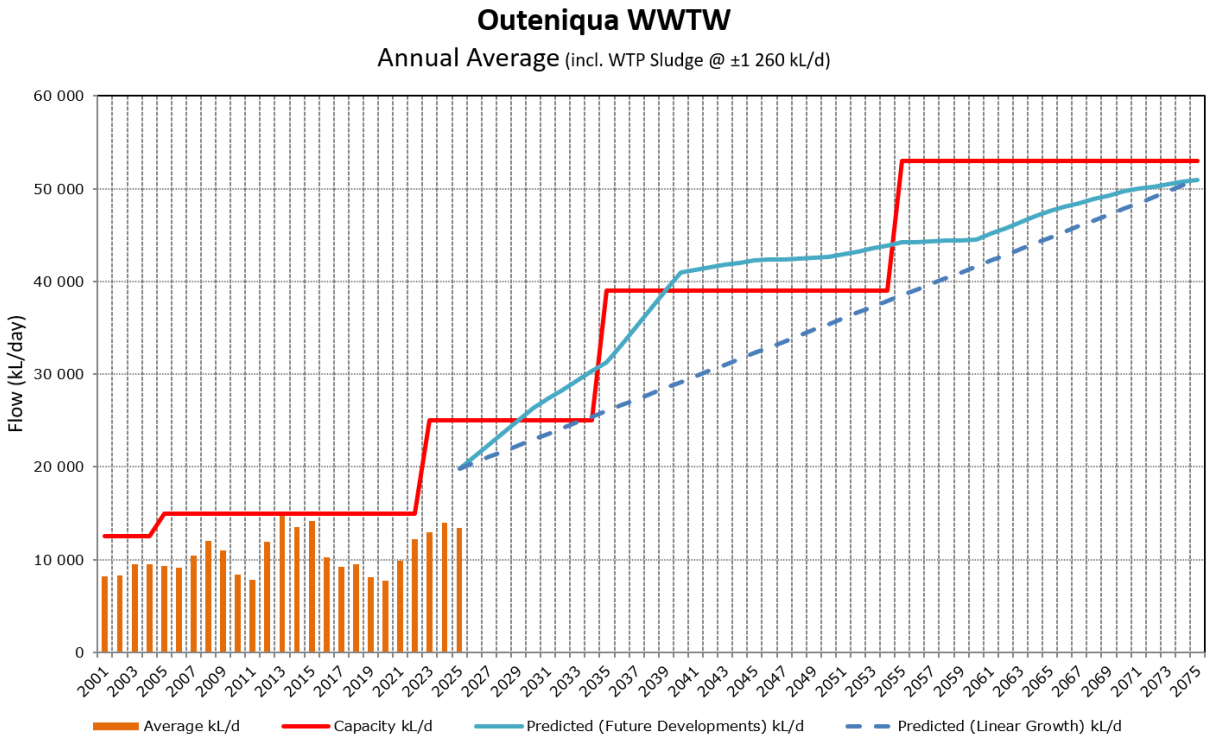
4.3 Bulk Sewer Drainage

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 but has since been upgraded. The WWTW is thus not operating at risk.





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

Outeniqua WWTW	Capacity	Comment
Existing Capacity	25 000 kL/d	Design capacity 25 000 kL/d
Measured Flow		
Annual Average (2001-2026)	14 846 kL/d	Maximum 2013/14
	10 154 kL/d	Spare capacity available
Annual Dry Average (2025/26)	12 287 kL/d	Average for 4 driest months 2025/26
	12 713 kL/d	Spare capacity available
Monthly Average (2001-2026)	18 333 kL/d	September 2015
	6 667 kL/d	Spare capacity available
Monthly Average (2025/26)	16 291 kL/d	February 2026
	8 709 kL/d	Spare capacity available
Modelled Flow		
T_PDDWF (existing)	19 821 kL/d	m2026-06 MP - Incl. WTP sludge flow = 1 260 kL/d
	5 179 kL/d	Spare capacity available
3yr Projection	21 067 kL/d	
	3 933 kL/d	Spare capacity available
5yr Projection	22 312 kL/d	
	2 688 kL/d	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

Bulk sewer system status quo

Saasveld 6 PS

The Saasveld 6 PS serves the Nelson Mandela University's (NMU) Saasveld Campus and has a capacity of ± 11 L/s.

In future, the Saasveld 6 PS is anticipated to be decommissioned and by-passed to the future Woodfield, Thembalethu and Pacaltsdorp pumping systems. However, this is subject to development in the Kraaibosch 195 and Kaaimans farm areas, which is not anticipated for the foreseeable future.

Development that is anticipated, is the densification of the NMU Saasveld campus. With the by-pass to Woodfields pumping system not being feasible for the foreseeable future, any additional flow will require upgrading of the Saasveld 6 PS and this will have a cascading effect on the capacity required at the downstream sewer systems (from Welgelegen PS to Schaapkop PS).

A capacity increase from 11 L/s to ± 15 L/s is anticipated. This can be avoided by construction of the Woodfields pumping system (at considerable capital cost) or partly mitigated by reconfiguring the pump starts at Saasveld 6 to pump at 11 L/s, but for longer (requiring detailed investigation and active monitoring).

Welgelegen PS

The Welgelegen PS has a capacity of 37 L/s and receives pumped flow of ± 11 L/s from the Saasveld 6 PS. The aforementioned densification of the NMU Saasveld campus and local drainage area development could in future require a capacity increase from 37 L/s to 51 L/s.

Kraaibosch PS

The Kraaibosch PS has a capacity of 102 – 107 L/s and apart from its own drainage area, receives inflow of 37 L/s from the Welgelegen PS. The increased flow from Saasveld 6 PS to Welgelegen PS would require Kraaibosch PS to operate at the upper rate of its capacity.

Blue Mountain PSs

The Blue Mountain PSs 1 and 2 services the Blue Mountain Estate and surrounding areas. The pump capacities are estimated to be ± 5 L/s (based on a minimum self-cleansing velocity of 0.6 m/s in the respective 110 mm Ø rising mains).

Considering the zoning contributions of existing consumers and the proposed development, the instantaneous peak wet weather capacity of Blue Mountain PSs would need to match or exceed 7,3 L/s (inclusive of a 50% relative spare capacity for stormwater ingress).

It is therefore recommended that the capacity of the pump stations should be confirmed and increased to ± 12 L/s as per the master plan, if the current capacity is determined to be insufficient.

Kraaibosch inverted siphon

The Kraaibosch and Blue Mountain pump stations discharge into a 355 mm Ø siphon, which in turn discharges directly at the Meul PS.

The current capacity of the siphon is roughly 121 L/s when assessed against a water level of 183.7 m a.s.l. at the inlet (thus a water level in the discharging manhole up to the crown of the inlet pipe) and a water level of 180.5 m a.s.l. at the Meul PS inlet structure (up to the design freeboard level).

Therefore, the Kraaibosch inverted siphon has sufficient capacity to accommodate the development.

Eden George PS

The Eden George PS was recently upgraded and can discharge 90 – 100 L/s under typical dry weather peak flows. Under wet weather conditions the Eden George PS can discharge 190 – 200 L/s.

The Eden George drainage area receives sludge discharge from the Goerge WTPs and also has considerable ingress during wet weather conditions. Thus, the Eden George PS discharges at its maximum capacity more frequently.

Operational interventions can be considered at the Eden George PS to reduce inflow into the downstream sewer systems. First and foremost, onsite handling and management of sludge at the WTPs will eliminate the impact of sludge discharge. Furthermore, sources of excessive ingress should be investigated and addressed.

Meul PS

The Meul PS has a pump capacity of ± 405 L/s and receives inflow from the southern and eastern suburbs of George (Ballotsview, Blue Mountain Estate, Conville, George East, George Industrial, Loerie Park, Parkdene, Rosemoore, etc). The instantaneous peak wet weather flow (IPWWF) generated from its direct drainage area (under the fully occupied zoning rights scenario) is ± 116 L/s.

In addition to flow contribution from its own drainage area, Meul PS also receives pumped flow from the following five upstream pump stations:

- Blue Mountain PS 2 contributes roughly 5 L/s (increased to ± 12 L/s for this development).
- Eden George PS contributes 90 – 100 L/s but can deliver 190 – 200 L/s under wet weather conditions.
- Glenwood PS can contribute 28 – 54 L/s.
- Kraaibosch PS can contribute 102 – 105 L/s.
- Parkdene PS 1 can contribute 11 – 45 L/s.

From a theoretical flow perspective, it can be concluded that Meul PS inflow (IPWWF) can vary from 352 to 525 L/s. However, the operational section have confirmed that the Meul PS sump is able to attenuate the inflow without overflow at present.

Should capacity constraints become an occurrence in the near future, measures can be investigated to mitigate the risk of overflow at Meul PS. This relates mostly to the Eden George PS, with emphasis on addressing sludge discharge and ingress reduction. Alternatively, upgrading of the Meul PS and the construction of an additional rising main would be required.

Schaapkop outfall

Further downstream, the existing Schaapkop outfall sewer system consists of 400 mm Ø to 700 mm Ø pipes that were constructed in the 1970s.

Available information indicates that several sections of the outfall are at capacity, this is corroborated by the operational team. Reports indicate that the outfall system is currently unable to convey flow under peak wet weather conditions.

It is recommended that the sections in question should be investigated to confirm their condition and slope.

Schaapkop PS

From available information, indications are that Schaapkop PS was recently upgraded to 564 L/s (and its rising main upgraded to 800 mm Ø). Its direct drainage area consists of George CBD, George South, George Industrial, Borchards, Ballotsview and Lawaaikamp. This direct drainage area contributes an instantaneous wet weather peak of 106 L/s.

Upstream pump station flow contributions are as follows:

- Meul PS contributes 405 L/s.
- Parkdene PS 2 can contribute 9 – 12 L/s.
- Parkdene PS 3 can contribute 10 – 16 L/s.
- Tamsui PS contributes 35 L/s.
- Thembalethu PS 1 contributes 35 L/s (estimated).

From a theoretical flow perspective, the information indicates that inflow to Schaapkop PS can vary from 600 to 609 L/s. However, recent correspondence with municipal staff indicates that the Schaapkop PS sump is able to attenuate the current inflow without overflow.

Should capacity constraints become an occurrence in the near future, the master plan proposes the by-pass and decommissioning of Parkdene PS 2, Parkdene PS 3 and Thembalethu PS 1 to the proposed Thembalethu East PS. Tamsui PS is to be by-passed and decommissioned for a gravity collector to Pacaltsdorp PS 1.

In the event that upgrading of Meul PS is required to meet its wet weather inflow, the cascading effects could mean that upgrading of Schaapkop PS may be necessary regardless of the decommissioning of the Parkdene and Thembalethu PSs.

Outeniqua WWTW outfall

Downstream of the Schaapkop PS rising main there are several sections of pipe that require investigation to confirm whether these sections are in fact gravity mains or indeed still part of the Schaapkop rising main.

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.

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

Item No	MP Type	Description	Existing Diam (mm)	New Diam (mm)	Length (m)	Design Flow	Cost	Pro-rata Cost	
Investigate and upgrade Schaapkop outfall sewer									
OT_09.01	MPi	Upgrade existing Gravity (Investigate first)	700	1 050	18	567.5 L/s	R 1 015 000	R 6 421	0.63%
OT_09.02	MPi	Upgrade existing Gravity (Investigate first)	700	1 200	26	568.1 L/s	R 1 508 000	R 9 530	0.63%
OT_09.04	MPi	Upgrade existing Gravity (Investigate first)	700	900	317	576.3 L/s	R 7 465 000	R 46 502	0.62%
						Sub-Total	**R 1 015 000**	**R 6 421**	
Investigate Outeniqua WWTW outfall sewer									
OT_10.03	MPs	Investigate existing Gravity	850	850	317	733.1 L/s	R 5 000	R 24	0.49%
						Sub-Total	**R 5 000**	**R 24**	
						Total	**R 1 020 000**	**R 6 445**	

4.3.2 *Accommodation of the proposed development in the bulk sewer system.*

Development specific items required in the bulk sewer system:

Item No	MP Type	Description	Existing Diam (mm)	New Diam (mm)	Length (m)	Design Flow	Cost	Pro-rata Cost	
Development specific MP items									
OT_26.01	MP	Upgrade existing Pump Station: Blue Mountain	-	-	-	12.0 L/s	R 1 772 000	R 530 123	29.92%
OT_47.01	MP	Upgrade existing Pump Station: Blue Mountain	-	-	-	11.7 L/s	R 1 764 000	R 541 262	30.68%
						Sub-Total	R 3 536 000	R 1 071 385	
Development specific link services									
None	-	-	-	-	-	- -	R -	R -	0.00%
						Sub-Total	R -	R -	
						Total	**R 3 536 000**	**R 1 071 385**	

4.3.3 *Short-to-medium term planning for the bulk sewer system.*

Short-to-medium term planning items required in the bulk sewer system:

Item No	MP Type	Description	Existing Diam (mm)	New Diam (mm)	Length (m)	Design Flow	Cost	Pro-rata Cost	
None	-	-	-	-	-	- -	R -	R -	0.00%
						Total	**R -**	**R -**	

4.4 *Sewer reticulation system*

Sewer reticulation system status quo

The existing sewer reticulation system has insufficient capacity to accommodate the proposed development. The existing 160 mm Ø gravity main in Patrysbos Street that conveys flow from the Blue Mountain PS 2 rising main to the 355 mm Ø inverted siphon, will have insufficient capacity once the Blue Mountain PS is upgraded to 12 L/s.

It is proposed that the development connect to the existing 160 mm Ø collector sewer in Platinum Drive, as indicated in **Figure 2 (Sewer)**.

Accommodation of the proposed development, with its revised PDDWF, requires implementation of the following additions and adjustments to the *existing* sewer system.

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 Type	Description	Existing Diam (mm)	New Diam (mm)	Length (m)	Design Flow	Cost	Pro-rata Cost
None	-	-	-	-	-	- -	R -	R - 0.00%
						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 Type	Description	Existing Diam (mm)	New Diam (mm)	Length (m)	Design Flow	Cost	Pro-rata Cost
Development specific MP items								
OT_V06.05	MP	Upgrade existing Gravity	160	200	41	13.0 L/s	R 295 000	R 81 465 27.62%
						Sub-Total	R 295 000	R 81 465
Development specific link services								
None	-	-	-	-	-	- -	R -	R - 0.00%
						Sub-Total	R -	R -
						Total	**R 295 000**	**R 81 465**

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

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

5 SUMMARY

Development water supply

Addressing existing issues (as per section 3.4.1 and 3.5.1) and accommodation of the proposed development area (as per section 3.4.2 and 3.5.2) does not require any works. However, in the short-to-medium term additional storage capacity at the George WTP reservoirs site will be required to meet growing demand.

Major works includes the following:

- For short-to-medium term planning and budget purposes (i.e not required for this development), the provision of an additional 16.5 ML storage at the George Old WTP reservoirs.

Summary of costing:	Cost	Pro-rata Cost
General items		
General items required to alleviate existing problems in the bulk water system	R -	R -
General items required to alleviate existing problems in the water distribution system	R -	R -
Sub-Total	R -	R -
Short-to-medium term planning items		
Short-to-medium term planning items required in the bulk water system	R 89 068 000	R 286 028
Sub-Total	R 89 068 000	R 286 028
Development specific items		
Development specific items required in the bulk water system	R -	R -
Development specific items required in the water distribution system (including fire flow requirements)	R -	R -
Sub-Total	R -	R -
Total	**R 89 068 000**	**R 286 028**

Development sewer drainage

Addressing existing issues (as per section 4.3.1 and 4.4.1) and accommodation of the proposed development area (as per section 4.3.2 and 4.4.2) requires upgrading of sections of the Schaapkop outfall sewer and investigation and upgrading of Blue Mountain PSs 1 & 2.

Major works required includes the following:

- 365 m x 900 - 1200 mm Ø Schaapkop outfall sewers.
- 12 L/s Blue Mountain 1 PS and 12 L/s Blue Mountain 2 PS.

Summary of costing	Cost	Pro-rata Cost
General items		
General items required to alleviate problems in the bulk sewer system:	R 1 020 000	R 6 445
General items required to alleviate problems in the existing sewer system:	R -	R -
Sub-Total	R 1 020 000	R 6 445
Short-to-medium term planning items		
Short-to-medium term planning items required in the bulk sewer system:	R -	R -
Sub-Total	R -	R -
Development specific items		
Development specific items required in the bulk sewer system:	R 3 536 000	R 1 071 385
Development specific items required in the existing sewer system:	R 295 000	R 81 465
Sub-Total	R 3 831 000	R 1 152 850
Total	**R 4 851 000**	**R 1 159 296**

Yours sincerely,

PCduPlessis

_____

Per: P.C. du Plessis (Pr. Eng.)
GLS Consulting

6 ANNEXURE A

REQUEST FROM CONSULTANT TO GLS

FW: Erf 28005, Platinum Drive, Blue Mountain: Sewer and water capacity allocation

Reply | Reply All | Forward

HL Hannes Lourens <hlourens@eceng.co.za>
To Johann Rudolph
Cc Mareé Pio; Lu-Anne Venter; Hannes Lourens
Tue 2025/06/10 14:58

You replied to this message on 2025/06/10 15:15.

E230050 George Makro External Engineering Services Report rev 0 Jun 2023 with addenda.pdf 5 MB

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Johann,

Goeie middag. Ek vertrou dit gaan goed. Ons telefoongesprek asook onderstaande reeks korrespondensie verwys. Soos bespreek is ons die konsultante op die ontwikkeling van Erf 28005, Platinum Drive, Blue Mountain, George. Ons kliënt oorweeg dit om die grondgebruik te verander na 680 hoë-digtheid woonstelle in plaas van die kommersiële ontwikkeling wat daar beplan was. Sien asseblief aangeheg die vorige diensteverslag wat ons vir die Makro gedoen het, net vir agtergrond (die verslag is nie meer relevant nie).

Ons sal ongeveer 'n Average Dry Weather Flow (ADWF) riool toewysing van 250 kl/dag benodig. Water ongeveer 270kl/dag. Kan jy asseblief bevestig of hierdie kapasiteit op die netwerk beskikbaar is? Indien wel, sal ons ons verslag opdateer en aan die munisipaliteit voorlê vir 'n amptelike toewysingsbrief. Indien nie, watter opgraderings sal benodig word?

Kontak my gerus indien jy enige verdere inligting of duidelikheid benodig. Vertrou om binnekort van jou te hoor.

Hartlike Groete / Warm Regards

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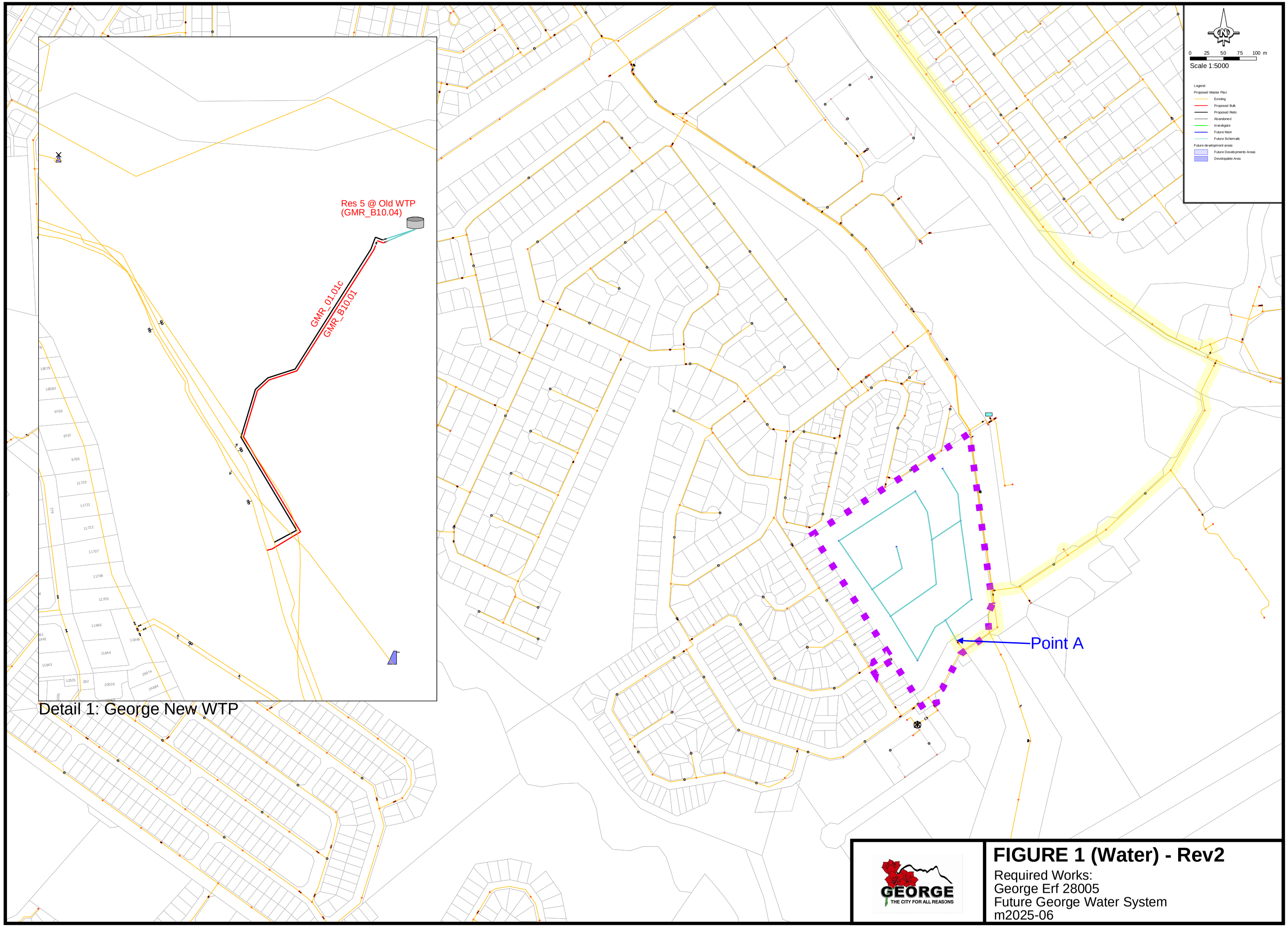

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FIGURE 1 (Water) - Rev2

Required Works:
George Erf 28005
Future George Water System
m2025-06

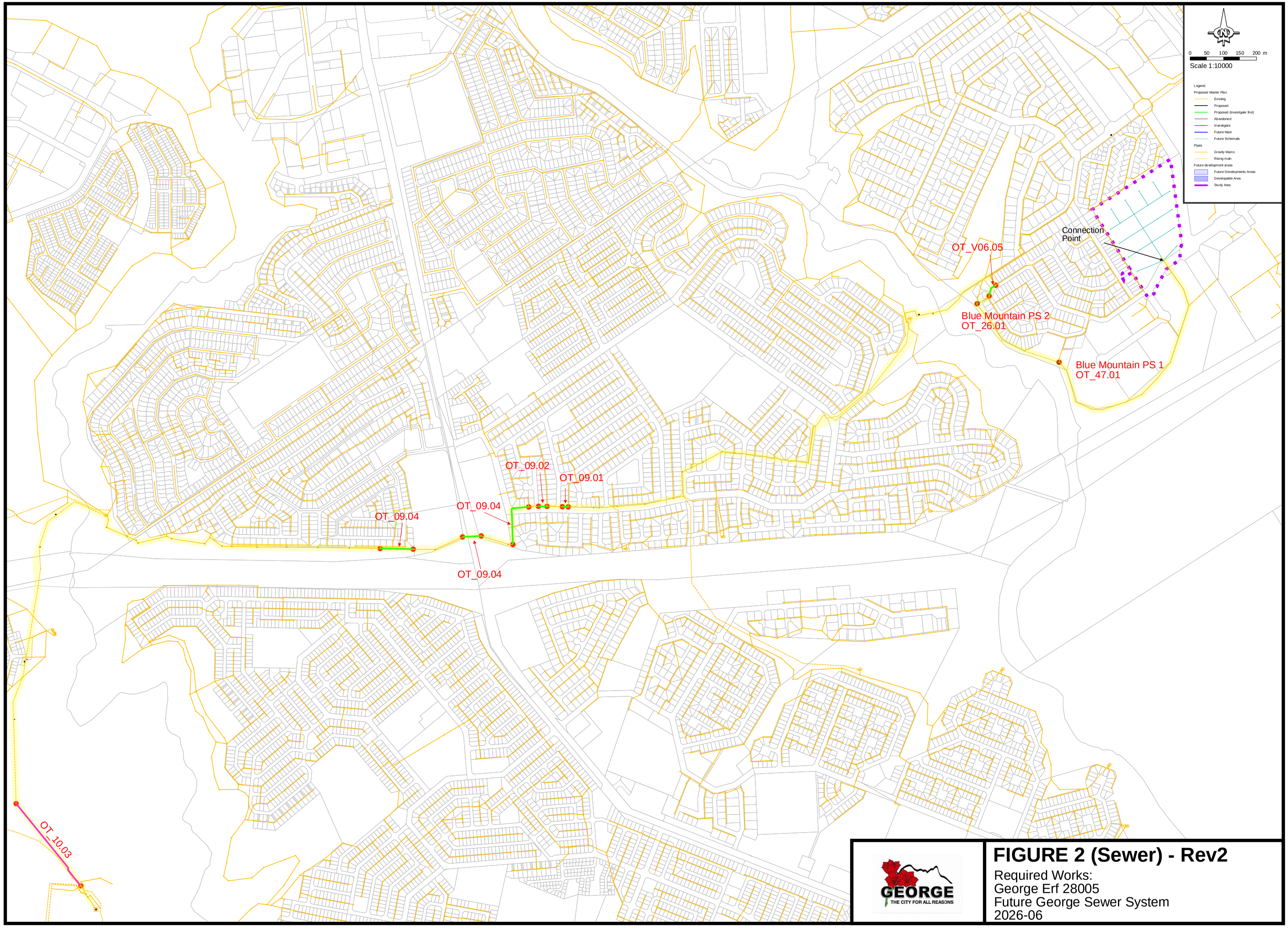
0 50 100 150 200 m
Scale 1:10000
Legend
Proposed Master Plan
Existing
Proposed
Proposed (investigate first)
Abandoned
Investigate
Future Main
Future Schematic
Pipes
Gravity Mains
Rising main
Future development areas
Future Developments Areas
Developable Area
Study Area
Connection Point
OT_V06.05
Blue Mountain PS 2
OT_26.01
Blue Mountain PS 1
OT_47.01
OT_09.02
OT_09.01
OT_09.04
OT_09.04
OT_09.04
OT_10.03
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FIGURE 2 (Sewer) - Rev2
Required Works:
George Erf 28005
Future George Sewer System
2026-06

ADDENDUM 4

BULK POWER CAPACITY ASSESSMENT REPORT (GLS)

24 November 2025

Mr. Jako Fourie
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RE: Bulk Power Capacity Assessment for the Proposed Blue Mountain Village A Development (Erf 28005), George

This Bulk Power Capacity Study evaluates the impact of the proposed Blue Mountain Village A (Erf 28005) development on the Glenwood 11 kV distribution network. The development forms part of the larger Blue Mountain residential expansion and introduces a saturated diversified demand of approximately 1.23 MVA to the area.

Existing Network Capacity

The Blue Mountain / Platinum Drive cluster is supplied from SS Glenwood (66/11 kV) via a combination of:

- Newer 6.35/11 kV 300 mm² Al PILC feeders in the local area, and
- Legacy 185 mm² Cu PILC municipal backbone feeders between SS Glenwood and SS Blue Mountain Village.

Under current loading conditions (2025):

- Local feeders operate between 7–79%, with some segments approaching 86% under certain load transfers.
- The Glenwood – Blue Mountain backbone feeder reaches 80%, placing it in the upper Green band.
- Voltage levels remain between 1.00–1.01 pu, fully compliant with NRS 048-2.

Development Impact

The development's full diversified load of ~1.23 MVA cannot be connected to MS Builders Warehouse, as this minisub does not have sufficient spare capacity. However, MS Builders Warehouse was used as a modelling placeholder to assess how the surrounding MV feeders respond to the additional load.

Load-flow results show:

- Under normal operating conditions, feeder utilisation increases slightly (up to ~92% on some local sections) but remains within allowable limits.
- Upstream backbone feeders increase to ~84.7% by 2043, still thermally acceptable under N conditions.
- Voltages remain stable and compliant across the network.

A new dedicated minisub will therefore be required to supply the development.

N–1 Network Performance

The network remains N–1 compliant up to approximately 2035. However, from 2040 onward, the remaining municipal backbone feeders supplying the area via the Garden Route corridor:

- SS Glenwood – SS Garden Route FD2, and
- SS Glenwood – SS Garden Route FD4

exceed **113–119%** loading under contingency conditions.

These overloads represent a loss of N–1 compliance but are not caused by the Erf 28005 development, they result from cumulative regional growth (Glenwood, Blue Mountain, Garden Route Mall, and surrounding developments).

Voltages remain acceptable (~1.00 pu), but thermal limits are exceeded on the long-term backbone.

Upgrade Requirements

To supply the development safely:

Install a new 1600 kVA minisub, or

2 × 800 kVA transformers operating in parallel,

located between the existing MV rings near the Blue Mountain / Platinum Drive interface.

No short-term reinforcement of existing MV feeders is required.

Long-Term Masterplan Considerations

To restore N–1 compliance beyond 2040, the municipality will need to implement strategic upgrades to the Glenwood – Garden Route backbone (FD2 and FD4). These reinforcements form part of the broader network strengthening strategy and are not triggered by this development.

Overall Conclusion

The Glenwood 11 kV network can accommodate the Blue Mountain Village A development, provided that a new dedicated 1600 kVA (or 2 × 800 kVA) minisub is installed. The development does not trigger immediate feeder upgrades, and the only long-term constraints relate to regional backbone utilisation, which must be addressed through future Masterplan-driven reinforcement projects.

Document Control

Rev	Date	Author(s)	Reviewer	Description
01	Nov 2025	T. Malemela J. Davids	T. Mokoena	Draft Issue
02	Nov 2025	T. Malemela J. Davids	T. Mokoena	Final

1. Introduction

1.1 Purpose and Scope

The purpose of this Electrical Capacity Study is to evaluate the ability of the existing George municipal 11 kV distribution network to accommodate the proposed **Blue Mountain Village A (Erf 28005)** development located within the Glenwood supply area.

The study determines:

- Whether sufficient spare capacity exists on nearby MV infrastructure,
- Whether thermal and voltage performance remains within NRS 048–2 limits,
- The most appropriate Point of Connection (PoC),
- The expected impact of the development's load on the surrounding feeders and switching stations.

The assessment evaluates **existing** and **future** network conditions, considers municipal load-growth trends sourced from the 2025 George MV Network Master Plan, and incorporates the calibrated ADMD values applicable to **UrbTwn_7l_8h** residential land-use within the Glenwood zone.

1.2 Objectives:

The specific objectives of the study are to:

1. **Capacity Verification**
   Determine whether the Glenwood 11 kV network has sufficient spare thermal and voltage capacity to supply the proposed development on Erf 28005.

2. **Development Demand Verification**
   Confirm the load estimate for the development using calibrated ADMD values from the Masterplan and the updated load-class correction (UrbTwn_7l_8h).

3. **Point of Connection Identification**
   Evaluate and compare the suitability of the following candidate PoCs:
   - MS BMG B
   - MS Blue Mountain Village
   - MS Platinum Drive 1
   - MS Builders Warehouse

   The evaluation includes feeder loading, voltage performance, and N-1 availability.

4. **Network Performance Assessment**
   Assess:
   - Voltage regulation,
   - Thermal loading of cables and overhead lines,
   - Transformer utilisation and feeder margin,
   - Compliance with NRS 048-2 voltage limits and municipal planning standards.

5. **Long-Term Network Readiness**
   Review forecasted growth trends in the Glenwood supply area to ensure the development's load does not compound future constraints. Masterplan projections show Glenwood growing from 16.52 MVA (2023) to 41.26 MVA (2042).

1.3 Study Area and Description of the Proposed Development

The proposed development, Blue Mountain Village A (Erf 28005), is located within the Glenwood 11 kV supply area of the George municipal distribution network as seen on Figure 1-1 below. The development lies approximately 0.43 km west of Garden Route Mall and falls within an established urban growth corridor characterised by medium-to-high-density residential expansion.

1.3.1 Surrounding Electrical Network

The supply to the area is derived from SS Glenwood (66/11 kV, 2 × 20 MVA), which distributes power via a combination of PILC underground feeders and overhead Mullberry conductors routed through intermediate switching stations. These include:

- SS Blue Mountain Village Switching Station
- MS BMG B
- MS Blue Mountain Village
- MS Platinum Drive 1
- MS Builders Warehouse

The Glenwood network in this area consists predominantly of legacy 11 kV PILC underground cables, many of which are operating below modern thermal ratings and have increased susceptibility to ageing, moisture ingress, and insulation degradation.

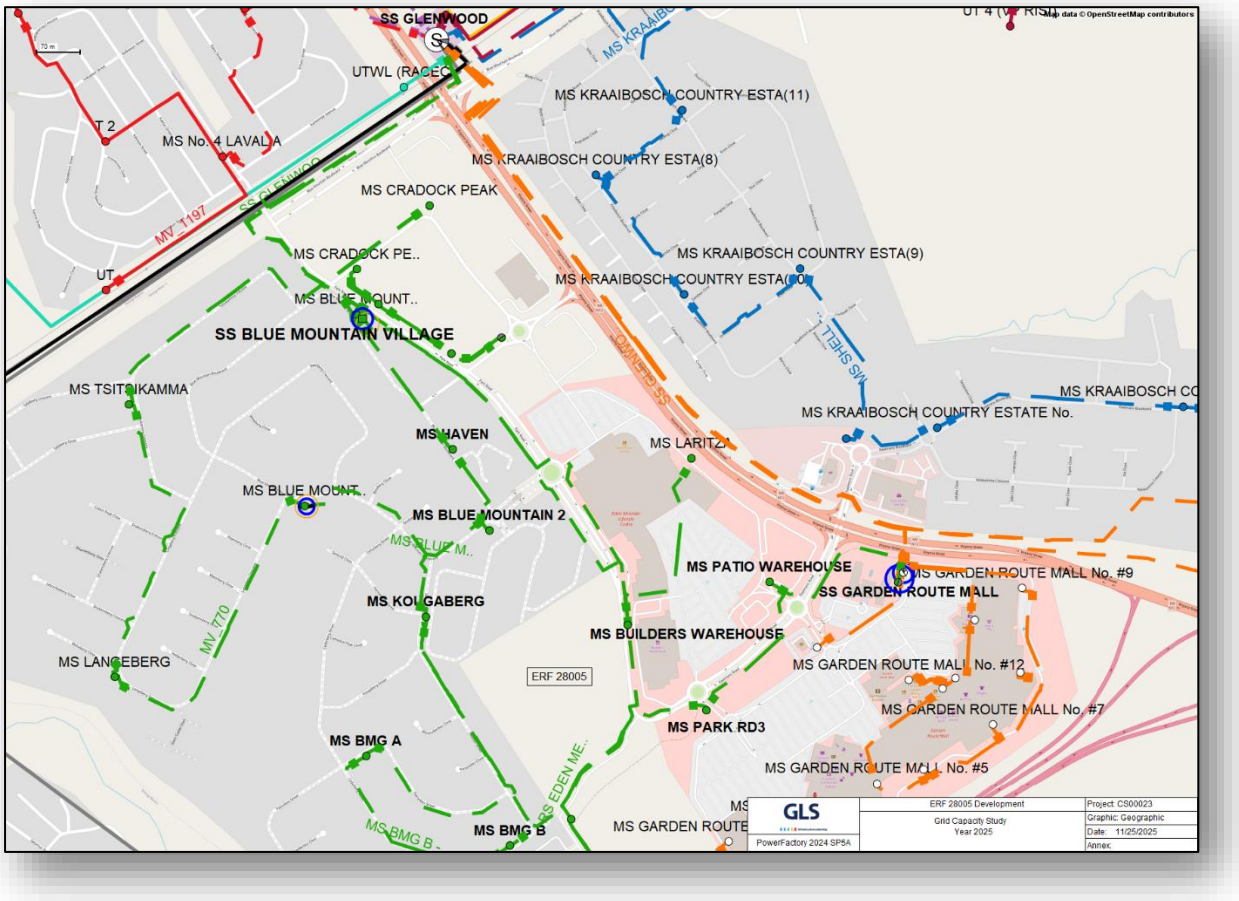

Figure 1-1: Geospatial Network Model of Bluemountain Feeder Zone, Glenwood Supply Area

As such, the use of PILC infrastructure influences the thermal margins, allowable loading, and the long-term security-of-supply for new developments. These characteristics are considered in the scenario modelling and capacity assessment sections of this report.

1.3.2 Development Description

The proposed development consists of:

- **680 × 2-bedroom residential units**
- **Land use:** Group Housing / High-Density Cluster Housing
- **Load Class:** *Corrected to* **UrbTwn_7l_8h**
- **Estimated ADMD (per unit):** 2.0–2.5 kVA, consistent with Glenwood residential calibration
- **Estimated total diversified load:** Additional 1227kVA
- **Connection voltage:** 11 kV

The development was previously inaccurately categorised under the **Township_5_6** load class along with lower number of units at 150, which understated the expected demand (≈1.5 kVA/unit). This study rectifies the load classification and updates the forecast based on the correct urban townhouse density class and number of units for the Glenwood zone.

2. Methodology

The methodology for this Electrical Capacity Study is designed to thoroughly evaluate the effects of the future loads of the proposed development on the existing electrical network. The study involves data collection, simulation and modelling, and analysis of the electrical network.

The following steps outline the detailed approach used in this study:

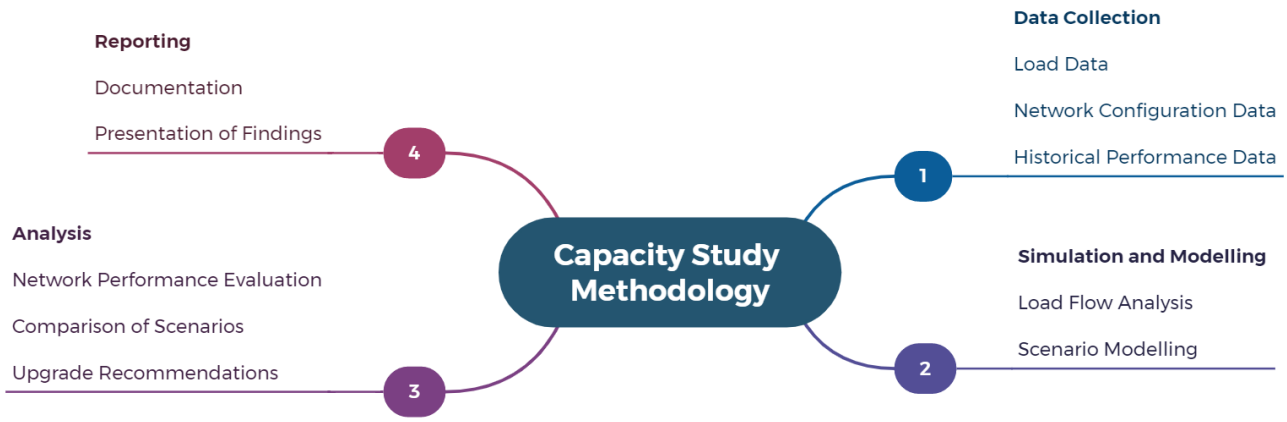

Figure 2-1: Capacity Investigation Methodology

2.1 Data Collection

2.1.1 Glenwood Load Data

- Gather detailed specifications and operational data for the development.
- Obtain current and historical load profiles to understand peak and average demand patterns.

2.1.2 Network Configuration Data

- Collect network diagrams, including the layout of the SS-Glenwood, and the main and ring feed supply routes.
- Gather details on existing network components such as transformers, switchgear, and conductors.

2.1.3 Historical Performance Data

- Retrieve historical performance data of the electrical network, including voltage levels, power quality metrics, and incident reports.

- Analyse past instances of bottlenecks or reliability issues.

2.2 Simulation and Modelling

2.2.1 Load Flow Analysis

- Identify potential point of delivery (POD).
- Utilize advanced load flow analysis software to model the electrical network.
- Input the collected data, including load profiles and network configuration, into the simulation tool.

2.2.2 Scenario Modelling

- Scenario 1: Existing Installation (All Feeders):
  Model the current load conditions with a combined approximate demand at the point of delivery.
  Simulate the load impact on both the main and/or ring feed supplies.
- Scenario 2: Future Installation (All feeder ±additional 1227kVA Future Load):
  Model the future load conditions with a combined load of approximately 1230kVA for the proposed development.
  Simulate the future load impact on the electrical network.
- Scenario 3: N-1 Contingency analysis (Existing Load)
  Model the current load conditions with a combined approximate demand at the point of delivery under N-1.
  Simulate the load impact on both the main and/or ring feed supplies.
- Scenario 4: N-1 Contingency analysis (Future Load)
  Model the future load conditions at the point of delivery under N-1.
  Simulate the load impact on both the main and/or ring feed supplies.

2.3 Analysis

2.3.1 Network Performance Evaluation

- Assess the impact of the future loads on network performance metrics, including voltage levels, power losses, and reliability.
- Identify any existing or potential bottlenecks, shortcomings, and areas requiring immediate attention or upgrades.

2.3.2 Technical Assessment Criteria: Limits and Regulation

Voltage

- The study assesses the system voltage profiles as per NRS 048-2, see Table 2-1 below.

Table 2-1: Voltage Limits

Voltage Range	Limits	Description
Voltages >500 V	0.95 p.u < V < 1.05 p.u	Municipal voltages must be between 95% and 105%
Voltages < 500 V	0.9 p.u < V < 1.1 p.u	Customer voltages must be between 90% and 110%

- For 500 V and above (e.g., HV and MV systems):
  Voltage must be within ±5% of the nominal voltage, or between 0.95 p.u. and 1.05 p.u.
- For below 500 V (e.g., LV systems):
  Voltage must be within ±10% of the nominal voltage, or between 0.9 p.u. and 1.1 p.u.

Thermal Loading

- Thermal ratings of equipment should not be exceeded. The study assesses the thermal loading of transformers and conductors in the system with a limit of 100%.

- Table 2-2 uses colour coding to highlight constrained networks requiring strengthening under normal conditions.

Table 2-2: The distribution network constraints

Criteria	Red	Orange	Green
MV Voltage	≤ 90% and > 105%	> 90% and < 95%	≥ 95% and < 105%
Maximum thermal line loading	≥ 100%	> 80% and < 100%	< 80%

- Red indicates that the voltage and/or thermal limits have been violated and that no additional load can be connected on these networks.
- Orange indicates that a limited amount of load can be connected before limits are reached, however measures need to be put in place to avoid the limits being violated.
- Green indicates that the network is capable of supplying load and that the limits have not been reached.

2.3.3 Comparison of Scenarios:

- Compare the results of the load flow analysis for the existing and future load scenarios.
- Evaluate the differences in network performance and identify the additional strain imposed by the increased load.

2.3.4 Upgrade Recommendations:

- Based on the analysis, determine the necessary upgrading measures for both the main and ring feed supplies.
- Prioritize the recommended upgrades and improvements to ensure a reliable and high-quality supply of electricity to the POD.

2.4 Reporting

2.4.1 Documentation:

- Compile the findings, analysis, and recommendations into a comprehensive report.
- Include detailed simulation results, network diagrams, and supporting data in the appendices.

2.4.2 Presentation of Findings:

- Present the results and recommendations to relevant stakeholders, including the Municipality and other concerned parties.
- Provide a clear and concise summary of the impact study and the proposed solutions to address any identified issues.

This methodology ensures a thorough and accurate assessment of the impact of proposed new development on the electrical network, facilitating informed decision-making for future upgrades and improvements.

3. Existing Network Analysis

3.1 Overview of the Existing 11 kV Network

The development area is supplied from SS Glenwood (66/11 kV, 2 × 20 MVA) via the Blue Mountain / Platinum Drive / Park Road feeder cluster. Power is distributed predominantly through 11 kV PILC underground feeders, with:

- Newer 6.35/11 kV 3C PILC PVC SWA PVC Al 300 mm² cables on the lower parts of the network (Platinum Drive / Park Road / Patio Warehouse area); and
- Legacy 11 kV 185 mm² Cu PILC 3-core cables on the municipal backbone sections between SS Glenwood – SS Blue Mountain Village FD1 – RS Eden Meander.

The closest minisub to Erf 28005 is the Builders Warehouse minisub. Although this minisub may currently operate as a dedicated supply point to Builders Warehouse, the development's demand is modelled on this minisub for interim capacity assessment, consistent with the approach used in the George MV Master Plan for this area.

3.2 Existing Feeder Loading (2025)

Table 3-1 summarises the relevant feeder segments in the Blue Mountain / Platinum Drive / Park Road cluster supplying the area around MS Builders Warehouse.

Table 3-1: Existing feeder loading (2025)

Name	Current Type	Inom [kA]	Length [km]	Loading (%) 2025
MS PATIO WAREHOUSE - MS TOWN LODGE	6.35/11kV 3C PILC PVC SWA PVC Al 300	0.345	0.308	**7**
MS PARK RD3 - MS PATIO WAREHOUSE	6.35/11kV 3C PILC PVC SWA PVC Al 300	0.345	0.286	**15**
MS PLATINUM DRIVE 1 - MS PLATINUM DRIVE	6.35/11kV 3C PILC PVC SWA PVC Al 300	0.345	0.124	**29**
MS PLATINUM DRIVE 1 - MS PARK RD3	6.35/11kV 3C PILC PVC SWA PVC Al 300	0.345	0.374	**22**
MS PLATINUM DRIVE 2 - MS PLATINUM DRIVE	6.35/11kV 3C PILC PVC SWA PVC Al 300	0.345	0.136	**36**
RS EDEN MEANDE - MS PLATINUM DRIVE 3	6.35/11kV 3C PILC PVC SWA PVC Al 300	0.345	0.683	**43**
SS BLUE MOUNTAIN - RS EDEN MEANDOR	11 kV 185mm2 Cu PILC 3Core (Eskom) Under	0.400	0.6875	**74**
SS BLUE MOUNTAIN - RS EDEN MEANDOR S1	11 kV 185mm2 Cu PILC 3Core (Eskom) Under	0.400	0.012	**74**
SS GLENWOOD - SS BLUE MOUNTAIN VILL FD1	11 kV 185mm2 Cu PILC 3Core (Eskom) Under	0.400	0.791	**80**

3.3 Interpretation of Feeder Conditions

3.3.1 New 300 mm² Al PILC Sections (Platinum / Park / Patio Cluster)

- These feeders remain well below thermal limits, with utilisation between 7-43%.
- They continue to operate firmly in the Green (<80%) loading band.
- Likely as a result of their recent installation ensures good thermal performance and low degradation risk. Thus, these feeders have ample spare capacity.

3.3.2 Legacy 185 mm² Cu PILC Municipal Backbone (SS Glenwood – Blue Mountain Village)

- Backbone loading now reaches 74-80% under 2025 conditions.
- These feeders operate in the upper Green / approaching Orange band.
- While still acceptable, they represent the most constrained elements in the supply corridor.
- These backbone feeders should be monitored, particularly under future N-1 conditions or high-growth scenarios.

3.4 Voltage Performance

Voltage results across the Glenwood / Blue Mountain feeder cluster show stable and compliant MV voltage conditions, with all nodes operating between 1.00 and 1.01 pu under existing (2025) loading.

Table 3-2: Voltage Results (2025)

Name	Busbar	Vnom [kV]	Voltage [p.u] 2025
SS GLENWOOD	11_BB2	11	**1.01**
MS BLUE MOUNTAIN 2	MS BLUE MOUNTAIN 2 11_BB	11	**1.01**
MS BMG A	MS BMG A 11_BB	11	**1.01**
MS BMG B	MS BMG B 11_BB	11	**1.01**
MS BUILDERS WAREHOUSE	MS BUILDERS WAREHOUSE 11_BB	11	**1.00**
MS HAVEN	MS HAVEN 11_BB	11	**1.01**
MS IMPERIAL	MS IMPERIAL 11_BB	11	**1.00**
MS KOUGABERG	MS KOUGABERG 11_BB	11	**1.01**
MS LARITZA	MS LARITZA 11_BB	11	**1.00**
MS PARK RD3	MS PARK RD3_11_BB	11	**1.00**
MS PATIO WAREHOUSE	MS PATIO WAREHOUSE_11_BB	11	**1.00**
MS PLATINUM DRIVE 1	MS PLATINUM DRIVE 1_11_BB	11	**1.00**
MS PLATINUM DRIVE 2	MS PLATINUM DRIVE 2_11_BB	11	**1.00**
MS PLATINUM DRIVE 3	MS PLATINUM DRIVE 3_11_BB	11	**1.00**
MS TOWN LODGE	MS TOWN LODGE_11_BB	11	**1.00**
SS BLUE MOUNTAIN VILLAGE	SS BLUE MOUNTAIN VILLAGE 11 BB2	11	**1.01**

3.5 Interpretation of Voltage Results

- The entire MV network in the study area operates between 1.00-1.01 pu, well within the NRS 048-2 limit of 0.95 - 1.05 pu.
- MS Builders Warehouse, the nearest minisub to Erf 28005 and the interim PoC for this assessment, operates at 1.00 pu, indicating no voltage depression at the local level.
- The upstream SS Blue Mountain Village and SS Glenwood nodes maintain strong voltage support at 1.01 pu, confirming robust primary supply.
- The consistent 1.00 - 1.01 pu voltage spread indicates:
    - low impedance paths,
    - minimal voltage drop,
    - healthy headroom before reaching lower allowable voltage limits,
    - no immediate need for voltage reinforcement.

3.6 Constraint Summary (Existing Network)

Table 3-3: Constraint summary Table

Component	Status	Comment
New 300 mm² Al PILC feeders	**Green (7–43%)**	Very healthy utilisation, no constraints.

Component	Status	Comment
RS Eden Meander 185 mm² Cu PILC	**Upper Green (74%)**	Approaching Orange, monitor long-term.
SS Glenwood – Blue Mountain FD1 185 mm² Cu PILC	**80%**	Upper Green / borderline Orange, most constrained segment.

4. Load Forecast and Development Demand

4.1 Development Demand Calculation

The proposed Blue Mountain Village A (Erf 28005) development consists of 680 residential units classified under UrbTwn_7l_8h, which aligns with medium-to-high-density townhouse/cluster housing.

The calibrated ADMD value for this load class in the Glenwood supply zone is:

- **ADMD per unit: 2.12 kVA/unit**

Using this value:

- **Saturation Load Calculation**

$$\mathbf{680\ units \times 2.12\ kVA/unit = 1441.6\ kVA}$$

However, after applying diversity, coincidence factors, and the municipal residential saturation methodology used in the Masterplan:

Calculated Saturation Load for Erf 28005:

$$\boxed{1227\ \text{kVA}}$$

This 1227 kVA value represents the expected peak diversified demand once the development reaches full occupancy.

4.2 Integration With Existing Base Load

The Builders Warehouse minisub currently has a base load of 3.80 kVA (2023), indicating minimal local residential loading and strong headroom for expansion.

Once the development is added, the MS demand increases significantly, as shown in the forecast table.

4.3 Demand Growth Forecast (2023–2042)

The table below presents the projected load growth on MS Builders Warehouse, incorporating the development's 1227 kVA demand and the Glenwood-area growth factors from the George Master Plan.

Table 4-1: Demand Growth Table

Year	Total Demand (kVA)
2023	3.33
2024	829.58
2025	1224

Year	Total Demand (kVA)
2026	1229
2027–2042	1230 (stabilises)

Interpretation:

- Demand rises sharply between 2024–2025 due to development build-out.
- After reaching ≈1230 kVA, demand remains stable, which is typical for saturated residential areas.

4.4 Capacity Assessment With 500 kVA Mini-Substation

- Mini-sub rating: **500 kVA**
- Forecast demand (peak): **~1230 kVA**

4.4.1 Utilisation Ratio

$$\frac{1230}{500} = 2.46 \Rightarrow 246\%$$

This is within the **Red zone (≥100%)**.

4.4.2 Conclusion:

Although MS Builders Warehouse was used as the interim Point of Connection for modelling purposes, this minisub does not have sufficient spare capacity to supply the full diversified load of the proposed development. Its use in the simulations served only as a convenient placeholder to evaluate the behaviour and loading of the upstream feeder network under the expected development demand.

To supply the development safely and reliably, a new transformer or minisub will be required within the Blue Mountain/Platinum Drive area. The recommended installation capacity is:

- 1 × 1600 kVA, or
- 2 × 800 kVA units operating in parallel,

Installed between the existing MV rings to provide adequate capacity, redundancy, and future growth allowance.

4.5 Alignment With Glenwood Growth Forecast

The Glenwood supply area is expected to grow from:

- 16.52 MVA (2023) – 41.26 MVA (2042)

The addition of ~1230 kVA to the Builders Warehouse cluster aligns well with the Masterplan's load allocation for the Blue Mountain expansion corridor and reflects the expected residential densification trend.

4.6 Summary of Development Demand

Table 4-2:Summary of Development Demand

Item	Value
Number of units	680
ADMD	2.12 kVA/unit
Calculated Saturation Load	1227 kVA
Mini-substation capacity	500 kVA
Forecast Max Demand	1230 kVA
Utilisation (2042)	≈246%

Item	Value
Capacity Status	Red – Inadequate capacity available

5. Scenario Modelling and results

Scenario modelling was performed using the Glenwood MV network model, focusing on the feeder path supplying MS Builders Warehouse, the interim PoC for Erf 28005. The results reflect base year (2025) loading and future demand growth for 2035, 2040 and 2043.

All simulations include the proposed 1230 kVA diversified development load.

5.1 Thermal Loading Results

5.1.1 Lower Network (Newer 300 mm² Al PILC)

Name	Inom [kA]	Length [km]	Loading (%)			
			2025	2035	2040	2043
MS PATIO WAREHOUSE - MS TOWN LODGE	0.345	0.308	**7**	**7.3**	**7.3**	**7.3**
MS PARK RD3 - MS PATIO WAREHOUSE	0.345	0.286	**15**	**14.5**	**14.6**	**14.7**
MS PLATINUM DRIVE 1 - MS PLATINUM DRIVE	0.345	0.124	**29**	**29.1**	**29.2**	**29.3**
MS PLATINUM DRIVE 1 - MS PARK RD3	0.345	0.374	**22**	**21.8**	**21.9**	**22**
MS PLATINUM DRIVE 2 - MS PLATINUM DRIVE	0.345	0.136	**36**	**36.3**	**36.5**	**36.7**
RS EDEN MEANDE - MS PLATINUM DRIVE 3	0.345	0.683	**43**	**43.6**	**43.8**	**44**
SS BLUE MOUNTAIN - RS EDEN MEANDOR	0.400	0.6875	**74**	**75.6**	**76.2**	**76.9**
SS BLUE MOUNTAIN - RS EDEN MEANDOR S1	0.400	0.012	**74**	**75.6**	**76.2**	**76.9**
SS GLENWOOD - SS BLUE MOUNTAIN VILL FD1	0.400	0.791	**80**	**82.8**	**83.8**	**84.7**

Interpretation:

Scenario 1

Under normal operating conditions in 2025:

- Local 300 mm² Al PILC feeders operate at 7–43%, well within thermal limits.
- The intermediate Blue Mountain backbone feeders operate at 74%.
- The SS Glenwood – SS Blue Mountain Village FD1 backbone operates at 80%.
- Status: Green (acceptable but approaching Orange on the backbone).

Scenario 2 – Existing Network + Development Load

- The development load increases upstream utilisation as follows:
- Local Al PILC feeders increase slightly to 7 - 44% across the horizon.
- Blue Mountain backbone feeders increase from 74% – 76.9% by 2043.
- SS Glenwood – SS Blue Mountain FD1 increases from 80% – 84.7% by 2043.

5.2 Voltage Results

Name	Busbar	Vnom [kV]	Voltage [p.u]			
			2025	2035	2040	2043
SS GLENWOOD	11_BB2	11	**1.01**	**1.02**	**1.02**	**1.01**
MS BLUE MOUNTAIN 2	MS BLUE MOUNTAIN 2 11_BB	11	**1.01**	**1.02**	**1.01**	**1.01**
MS BMG A	MS BMG A 11_BB	11	**1.01**	**1.01**	**1.01**	**1.01**

Name	Busbar	Vnom [kV]	Voltage [p.u]			
			2025	2035	2040	2043
MS BMG B	MS BMG B 11_BB	11	**1.01**	**1.01**	**1.01**	**1.01**
MS BUILDERS WAREHOUSE	MS BUILDERS WAREHOUSE 11_BB	11	**1.00**	**1.01**	**1.01**	**1.00**
MS HAVEN	MS HAVEN 11_BB	11	**1.01**	**1.02**	**1.01**	**1.01**
MS IMPERIAL	MS IMPERIAL 11_BB	11	**1.00**	**1.01**	**1.01**	**1.00**
MS KOUGABERG	MS KOUGABERG 11_BB	11	**1.01**	**1.01**	**1.01**	**1.01**
MS LARITZA	MS LARITZA 11_BB	11	**1.00**	**1.01**	**1.01**	**1.00**
MS PARK RD3	MS PARK RD3_11_BB	11	**1.00**	**1.01**	**1.00**	**1.00**
MS PATIO WAREHOUSE	MS PATIO WAREHOUSE_11_BB	11	**1.00**	**1.01**	**1.00**	**1.00**
MS PLATINUM DRIVE 1	MS PLATINUM DRIVE 1_11_BB	11	**1.00**	**1.01**	**1.00**	**1.00**
MS PLATINUM DRIVE 2	MS PLATINUM DRIVE 2_11_BB	11	**1.00**	**1.01**	**1.00**	**1.00**
MS PLATINUM DRIVE 3	MS PLATINUM DRIVE 3_11_BB	11	**1.00**	**1.01**	**1.01**	**1.00**
MS TOWN LODGE	MS TOWN LODGE_11_BB	11	**1.00**	**1.01**	**1.00**	**1.00**
SS BLUE MOUNTAIN VILLAGE	SS BLUE MOUNTAIN VILLAGE 11 BB2	11	**1.01**	**1.02**	**1.01**	**1.01**

Interpretation:

- Voltages remain extremely healthy across all years.
- All nodes are between 1.00–1.02 pu, far above the NRS 048-2 minimum (0.95 pu).
- The development load has no material impact on voltage quality.
- Even in 2043, MS Builders Warehouse sits at 1.00 pu, indicating strong voltage support.

5.3 N–1 Contingency Analysis

5.3.1 Interpretation of N-1 Scenarios:

Scenario 3 – N-1 (Base Case)

(Loss of SS Glenwood – SS Blue Mountain Village FD1)

The load is transferred to:

SS Glenwood – SS Garden Route FD2 and FD4.

Under this condition:

- Local feeder loading ranges from 50–93%.
- Several 300 mm² Al PILC segments exceed 80%, entering the Orange band.
- FD2 and FD4 remain below 65% until 2035.

Status: Green/Orange (acceptable short term). Voltage remains around 1.00 pu.

Scenario 4 – N–1 + Development Load

This is the most critical case.

With the development load included:

- Local feeder utilisation ranges between 50–93%.
- MS Town Lodge – SS Garden Route Mall reaches 99.5%.
- FD2 and FD4 increase from 61% – 113–119% by 2040–2043.

Short-term (2025–2035):

- All feeders remain below 85% under N–1 – acceptable.

Long-term (2040–2043):

- FD2 and FD4 exceed 113–119% – thermal overload under N–1.

Status: Green (2025–2035) – Red (2040–2043).

Voltage remains acceptable (~1.00 pu) but thermal overload dominates.

These XLPE backbone circuits pick up the diverted load.

5.3.2 Thermal Performance Under N–1

Below is the actual N-1 feeder loading:

Name	Inom [kA]	Length [km]	Loading (%)			
			2025	2035	2040	2043
MS PATIO WAREHOUSE - MS TOWN LODGE	0.345	0.308	**86.1**	**88.4**	**91**	**92.2**
MS TOWN LODGE - SS GARDEN ROUTE MALL	0.345	0.022	**93.3**	**95.6**	**98.3**	**99.5**
MS PARK RD3 - MS PATIO WAREHOUSE	0.345	0.286	**78.9**	**81.2**	**83.7**	**84.8**
MS PLATINUM DRIVE 1 - MS PLATINUM DRIVE	0.345	0.124	**64.5**	**66.7**	**69**	**70**
MS PLATINUM DRIVE 1 - MS PARK RD3	0.345	0.374	**71.7**	**73.9**	**76.3**	**77.4**
MS PLATINUM DRIVE 2 - MS PLATINUM DRIVE	0.345	0.136	**57.2**	**59.4**	**61.6**	**62.6**
RS EDEN MEANDE - MS PLATINUM DRIVE 3	0.345	0.683	**50**	**52.2**	**54.3**	**55.2**
SS GLENWOOD - SS GARDEN ROUTE FD4	0.37	1.27	**61.6**	**63.1**	**113.6**	**119.4**
SS GLENWOOD - SS GARDEN ROUTE FD2	0.37	1.277	**61.3**	**62.8**	**113**	**118.7**

5.3.3 N–1 Conclusion

Under N–1 conditions, specifically the loss of the SS Glenwood – SS Blue Mountain Village FD1 backbone feeder, supply to the Blue Mountain / Platinum Drive / Garden Route Mall cluster is routed through the SS Glenwood – SS Garden Route FD2 and FD4 11 kV backbone feeders.

The N–1 results indicate the following:

Short Term (2025–2035)

Local 300 mm² Al PILC feeder segments operate between 50-88%, remaining within acceptable thermal limits.

- FD2 and FD4 operate below 65%, indicating adequate redundancy.
- All MV voltages remain around 1.00 pu, fully compliant with NRS 048-2.

- The network is N–1 compliant in the short to medium term.

Long Term (2040–2043)

- Local feeder loading increases only modestly (up to ~92%), but remains below 100%.
- FD2 and FD4 exceed 113–119% loading, violating thermal limits and operating outside acceptable design conditions.
- Voltages remain acceptable (~1.00 pu), but thermal overloads dominate the constraint.
- The network is not N–1 compliant from 2040 onward due to backbone feeder overloading.

Key Takeaway

- The long-term N–1 constraint is not caused by the Erf 28005 development. It results from cumulative Glenwood, Blue Mountain, Garden Route Mall, and regional load growth projected in the Masterplan.
- The development contributes only marginally to this overload, and the network would exceed N–1 limits even without this project.

5.4 Scenario Summary

Scenario	Thermal Loading	Voltage Performance	Overall Status
Scenario 1 Existing Network (Base Case)	• Local feeders: 7-79% • Backbone (SS Glenwood – SS Blue Mtn FD1): 80% (upper Green)	1.00–1.01 pu, NRS-compliant	**Green** (Monitor backbone loading)
Scenario 2 Existing + Development Load	• Local feeders: 7-92% • Backbone rises to 84.7% by 2043	≈1.00 pu, stable	**Orange** (Acceptable, monitor long term)
Scenario 3 N–1 (Base Case)	• Local feeders: 50-93% (several in Orange) • FD2 & FD4: <65% up to 2035	≈1.00 pu, compliant	**Green/Orange** (N–1 compliant to 2035)
Scenario 4 N–1 + Development Load	• Local feeders: 50-93% (similar to base) • FD2 & FD4: 113–119% by 2040–2043 (exceeds thermal limit)	≈1.00 pu, compliant	**Green (2025–2035)** **Red (2040–2043)** N–1 non-compliant

5.5 Overall Conclusion from Scenario Modelling

- The development load can be accommodated under normal conditions with no immediate thermal or voltage violations.
- The network remains N-1 compliant up to approximately 2035.
- Long-term (2040+), the area becomes N-1 non-compliant due to regional backbone loading, not because of the Erf 28005 development.

6. Upgrade Recommendations & Preferred Point of Connection

This section summarises the required network reinforcements (if any) and identifies the most suitable Point of Connection (PoC) for the proposed development on Erf 28005 (Blue Mountain Village A), based on the thermal, voltage and long-term performance results.

6.1 Preferred Point of Connection (PoC)

Although MS Builders Warehouse was used as the nearest electrical node for modelling purposes, this minisub does not have sufficient spare capacity to supply the development. Its utilisation in the simulations served solely to evaluate how the surrounding feeder network responds to the expected additional demand.

To support the development safely and reliably, a new minisub must be provided within the Blue Mountain / Platinum Drive area. The recommended transformer capacity is:

- 1 × 1600 kVA, or
- 2 × 800 kVA operating in parallel,

installed at a suitable point between the existing 11 kV rings. This will ensure adequate firm capacity for the development and provide allowance for future growth.

Figure 6-1 below represents breaking the cable between MS PLATINUM DRIVE 1 - MS PARK RD3 to install a suitable Minisub to supply the development.



Figure 6-1: Proposed PoC

This PoC provides the most practical, shortest and most electrically favourable connection point for the development.

6.2 Short-Term (0–5 Year) Upgrade Requirements

No immediate reinforcement of the existing MV feeder infrastructure is required in the short term. This is supported by:

- Local 300 mm² Al PILC feeder utilisation remaining below 93%, and mainly between 50–80% under both normal and N–1 operations.
- The Glenwood – Blue Mountain backbone feeder loading remaining below 85% under normal conditions.
- Voltage performance remaining between 1.00–1.01 pu, compliant with NRS 048-2.

Short-term conclusion:

- No MV feeder upgrades required immediately.
- Only the new dedicated Minisub for the development is required.

6.3 Medium-Term (5–10 Year) Considerations

By 2035–2040:

- Local feeder loading increases slightly but remains below 95%, still acceptable for modern PILC construction.
- The Glenwood – Blue Mountain FD1 feeder approaches 85%, entering the Orange planning band.
- Under N–1, several local feeders enter the 70–90% range but remain below firm capacity.

Medium-term conclusion:

- No mandatory upgrades triggered by the development.
- Continue monitoring backbone utilisation as it approaches planning thresholds.

6.4 Long-Term (10–20 Year) Considerations

The N–1 analysis shows that from 2040 onward, the municipal backbone feeders:

- SS Glenwood – SS Garden Route FD2, and
- SS Glenwood – SS Garden Route FD4

exceed 113–119% loading under contingency conditions.

This thermal overload indicates loss of N–1 compliance on the Glenwood/Garden Route supply corridor.

It is important to note:

This constraint is NOT caused by the proposed Erf 28005 development.

It is driven by cumulative Glenwood, Blue Mountain, Garden Route Mall, and surrounding load growth identified in the Masterplan.

6.5 Long-Term Reinforcement Requirements

To restore N–1 compliance beyond 2040, the following strategic reinforcements will be required by the municipality:

1. Backbone strengthening of the Glenwood – Garden Route corridor, including reconductoring or upgrading FD2 and FD4.
2. Additional 11 kV feeder capacity towards Blue Mountain Village / Platinum Drive to reduce dependency on the existing dual-backbone configuration.
3. Potential future looping or sectionalisation to improve flexibility and load sharing in the Platinum Drive and Garden Route Mall zone.

These upgrades fall under long-term Masterplan implementation and are not development-triggered.

6.6 Overall Recommendations

The following actions are recommended:

Required for the Development

- Install a new 1600 kVA (or 2 × 800 kVA) minisub to supply Blue Mountain Village A.
- Connect the new MS between the existing MV rings feeding the Blue Mountain/Platinum Drive cluster.

Not Required (Short Term)

- No reinforcement of existing feeders is required to accommodate the development.

Required (Long Term, Masterplan-Driven)

- Strengthen the Glenwood backbone by 2040 to address regional N–1 overloads (113–119%).

7. Conclusions and Recommendations

This Bulk Power Capacity Study assessed the impact of the proposed Blue Mountain Village A (Erf 28005) development on the Glenwood 11 kV network. The assessment incorporated updated feeder loadings, development demand forecasts, and both normal and N–1 operating conditions, aligned with the latest George Electricity Masterplan assumptions.

The development introduces a saturated diversified load of approximately 1.23 MVA, which cannot be accommodated by the existing MS Builders Warehouse minisub. This minisub was therefore used only as a modelling placeholder to evaluate the loading behaviour of the surrounding feeders. The study confirms that a new dedicated minisub is required to supply the development.

Network Performance Under Normal Conditions

Under normal operating conditions, the existing 11 kV feeders supplying the Blue Mountain / Platinum Drive area operate within acceptable thermal and voltage limits. Local 300 mm² Al PILC feeders remain below 93%, and backbone feeders remain below 85% through 2043. Voltage performance stays between 1.00–1.01 pu, fully compliant with NRS 048-2.

N–1 Contingency Conditions

The network remains N–1 compliant up to approximately 2035. However, from 2040 onward, the municipal backbone feeders SS Glenwood – SS Garden Route FD2 and FD4 exceed 113–119% loading under contingency. This results in loss of N–1 compliance on the Glenwood/Garden Route supply corridor. Importantly, this constraint is not caused by the proposed development, but by cumulative regional load growth.

Development Trigger Requirements

To accommodate the development safely:

- A new 1600 kVA transformer, or
- 2 × 800 kVA transformers operating in parallel,

must be installed as a new minisub positioned between the existing Blue Mountain / Platinum Drive MV rings.

No additional feeder upgrades are required in the short or medium term.

Long-Term Considerations

Long-term reinforcement of the Glenwood backbone is required by 2040–2043 to restore full N–1 compliance. These upgrades form part of the municipality’s broader network strengthening strategy and are not triggered by this development.

Overall Conclusion

The Glenwood 11 kV network can accommodate the proposed Blue Mountain Village A (Erf 28005) development provided that a new 1600 kVA (or 2 × 800 kVA) minisub is installed. With this supply point in place, the development can be connected without immediate reinforcement of the existing MV feeders, and voltage and thermal performance remain compliant. Long-term N–1 constraint relate to regional growth and must be addressed through Masterplan-driven backbone upgrades in future planning cycles.

Yours sincerely,

GLS CONSULTING (PTY) LTD REG. NO.: 2007/003039/07

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ADDENDUM 5

CONFIRMATION LETTERS: GEORGE MUNICIPALITY

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Date: 12 December 2025

Enquiries: M Geyer
Tel: 044 801 9268

Element Consulting Engineers
82 Victoria Street
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6529

Attention: Mr Hannes Lourens

ERF 28005, GEORGE: WATER AND SANITATION CAPACITY FOR PROPOSED DEVELOPMENT

The accommodation of the proposed development in the George Municipal water and sanitation system refers.

The Civil Engineering Services (CES) Directorate confirms that the proposed development was taken into consideration in the future development area of the Blue Mountain Village as part of the water and sanitation master plans.

The water demand and sewer outflow for the proposed development as originally calculated and included in the master plan as 56.3kL/d and 51.9 kL/d respectively. The revised water demand and sewer outflow was determined for the proposed development, and the details are included in section 1.2.

Upon conclusion of the above, the appointed master planning consultant, GLS, provided the required technical details to confirm the water and sanitation system upgrades required and the associated estimated costs to support the development in the existing water and sewer network.

1. DEVELOPMENT

1.1. Development footprint

The proposed development is situated at Erf 28005, positioned along Park Road and Platinum Drive, George. The proposed development is surrounded by the Garden Route Mall and the Blue Mountain Residential Village. Refer to figure 1 below for the locality map.

The proposed development will consist of 680 units, very high-density flats.

1.2. Demand

The proposed development places the following demand on the water and sanitation system as captured in table 1 below.



Figure 1: Locality of Erf 28005, George

Table 1: Theoretically revised calculated water demand and sewer flow contribution

Land use	AADD incl UAW (kL/day)	Water level of service	ADWF (kL/day)	Sewer level of service
High density residential flats	127.50	Municipal connection with a meter	102.00	Municipal connection

The above figures were incorporated into the water and sewer masterplan to verify capacity within the existing bulk and reticulation water and sewer networks.

2. BULK INFRASTRUCTURE CAPACITY

2.1. TREATMENT CAPACITY

a) Water Treatment

- The proposed development falls within the George Water Treatment Works (WTW) service area.
- The WTW has sufficient capacity to service this development.

b) Wastewater Treatment

- The proposed development falls within the Outeniqua Wastewater Treatment works (WWTW) drainage area.
- The WWTW has sufficient capacity to support the development.

2.2. BULK PIPELINES AND PUMP STATIONS

a) Water

- The proposed development falls within the George Main Zone (George Old WTW reservoir) supply area.
- The reservoirs have sufficient capacity to service the proposed development.

b) Sanitation

The following upgrades are required in the bulk sanitation conveyancing system to support the development:

- Items OT_09.01 to OT_09.04:
  - Portions of the gravity sewer draining to the Schaapkop pump station is operating at capacity.
  - The Developer will be required to upgrade the pipeline from the Schaapkop pump station (point X on figure 2) across, and just east of, Nelson Mandela Boulevard (point Y on figure 2) to a 1 050mm diameter pipeline. Refer to figure 2 below.
  - The Developer will be required to construct the above-mentioned items to service the development. The cost, over and above the pro-rata cost contribution to service the development, will be offset against Development Contribution's (DC's) payable by the developer. Refer to section 4.2.

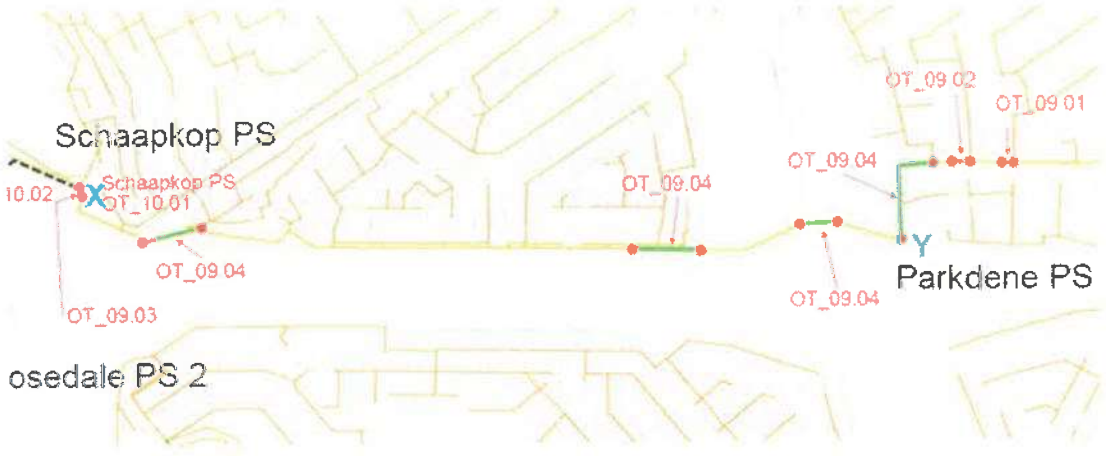

Figure 2: Upgrading of bulk gravity sewer

- Items OT 10.01 and OT_10.02: These upgrades are underway and are estimated to be completed by June 2026. The infrastructure will have sufficient capacity to service the development once completed.
- Items OT_10.03 to OT_10.05: These items are earmarked for an upgrade in the short to medium term. The infrastructure currently has sufficient capacity to service the development.

2.3. RETICULATION SYSTEM

a) Water

- No upgrades are envisaged to the existing water reticulation network to service this development.

b) Sanitation

The following upgrades are required in the bulk sanitation conveyancing system to support the development:

- Item OT_V06.05:
  - Upgrade the gravity sewer as indicated from point A to E from a 160mm diameter to a 200mm diameter as per figure 3 below.
  - The transfer structure located at point A in figure 3 requires repositioning (currently within a residential property driveway) and revised design to ensure the structure is operating adequately.



Figure 2: Upgrading of gravity sewers

- Item OT_26.01 and OT_47.01:
  - Upgrade both pump stations to 11l/s each.
  - The Developer will be required to construct the above-mentioned items to service the development.
  - The upgrade of the pump stations is not a requirement or need of the Municipality, and the full cost shall be borne by the Developer with no off setting against Development Contributions.

3. CONCLUSION

In conclusion, the existing water infrastructure can accommodate the proposed development, but the existing sanitation infrastructure cannot accommodate the development and the infrastructure as listed under section 2 requires implementation to service the development.

4. COST

4.1. Cost Contribution

The estimated cost (excluding VAT) for water and sanitation infrastructure upgrades in addition to that stated in section 2 in support of the development is captured in table 2 below.

Table 2: Associated cost of water and sewer services

Description	Bulk System	Reticulation System	Total
Water (pro-rata cost)	R1 944 834.00	R0	**R1 944 834.00**
Sewer (pro-rata cost)	R96 576.00	R0	**R96 576.00**
Sewer (full cost)	R12 098 000.00 [4.2]	R3 596 000.00	**R15 694 000.00**
Total (excluding VAT)			**R17 735 410.00**

Notes:
1. It should be noted that the unit cost for the water and sanitation infrastructure included in the water and sanitation master plan is under review. The cost and pro-rata cost indicated by GLS and captured in this letter are therefore subject to change and is furthermore subject to change based on actual construction cost.
2. All off-set calculations will be determined in drafting the Services Agreement, an example of a typical off-set is included in section 4.2.
3. [4.2] refer to section 4.2 for offsetting example.

4.2. Development Specific Infrastructure

General:

All infrastructure beyond the extent of the current infrastructure (bulk and link services) as well as the reticulation internal to the development is considered development specific and is for the full cost of the developer (design and implementation and associated environmental cost, etc.).

All such required link and internal infrastructure will require the necessary maintenance and operation by the Developer or subsequent HOA/POA and utility company, except where agreed/stated otherwise.

Bulk services over and above the requirements of the development:

The alignment of these services will have to be coordinated and agreed to between the Developer and the George Municipality.

The Services Agreement should include these costs and services for the offsetting of development contributions as applicable.

Explanation of principle of setting off cost against Development Contributions: The cost for the upgrading of the bulk gravity sewer required to service the development over and above the Developer's pro-rata contribution, can be off set against the Development Contributions payable for sewer services, resulting in a balance of R6 440 126.84 excluding VAT as a contribution due by the George Municipality, subject to any other off set that may also be applicable. Refer to table 3 below.

Table 3: Off-set of Development Contributions example

Item	**Amount (excluding VAT)**
(A) Estimated total cost to upgrade:	
a. Bulk gravity sewer (item OT_09.03 & 09.04)	R12 098 000.00
(B) Pro-rata contribution to upgrade:	
a. Bulk gravity sewer (item OT_09.03 & 09.04)	R61 494.00
Balance (A – B)	**R12 036 506.00**
Development contributions: Sewer services only (see section 5)	R5 596 379.16
Balance (contribution by the George Municipality)	**R6 440 126.84**

Note:
- Estimated and subject to annual escalation.
- The above is an example of such a scenario and does not provide a full indication of the costs that could be offset against Development Contributions. This will be resolved as part of the drafting of the Services Agreement.

5. DEVELOPMENT CONTRIBUTIONS

The current total Development Contributions (DC's) relating to Civil Engineering Services, and in accordance with the current guidelines, for the proposed development were calculated on 10 December 2025 for water and sanitation services, only based on the site development plan, and amounts to R11 296 019.86, excluding VAT.

The above amount is made up as follows:

- Water: R5 699 640.70
- Sewer: R5 596 379.16

The Developer is reminded of the following Clause relating to the calculation of Development Contributions:
"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 Contributions and the amendment of these conditions of approval or the imposition of other relevant conditions of approval."

The DC's included in this letter is an indication of the contributions due and are not confirmed as the final amount payable.

In addition, the DC's 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 DC's.

6. BULK INFRASTRUCTURE IMPLEMENTATION

The Developer will be required to perform the necessary project management services from commencement to close out for implementation of the bulk infrastructure.

The deliverables per stage shall be submitted to the Civil Engineering Services Directorate for approval and who shall be invited to attend all construction progress meetings.

7. COMMENCEMENT OF DEVELOPMENT

This letter confirms the status of the infrastructure at the time of writing this letter. Capacity is not reserved for any development. Confirmation of availability of services is valid for a **period of 6 months** from the date of letter, after which the Developer must again request confirmation from the Municipality.

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/Memorandum of agreement (if applicable) is signed between the Developer and the Municipality.

Yours faithfully,

LINDSAY MOOIMAN
DEPUTY DIRECTOR: INFRASTRUCTURE PLANNING & PROJECT MANAGEMENT

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Date: 11 December 2025

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Element Consulting Engineers
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By E-Mail

Attention: Mr. Jako Fourie

ERF 28005 GEORGE: PROPOSED DEVELOPMENT OF RESIDENTIAL APARTMENTS: ELECTRICAL SUPPLY

Your email request on 26 November 2025 for confirmation of capacity has reference.

We hereby take note of the specialist technical report and the estimated demand to the proposed development. The technical details of the installation will be determined once an approved Site Development Plan is finalised and the Services Agreement is compiled.

We can confirm that there is adequate spare capacity available on the George Municipal network to accommodate the proposed development.

The Development will, however, have to make a contribution for the additional capacity of approximately 1200kVA required. This will be finalised during the final approval process.

We trust that the above information is sufficient for the statutory approval process to be concluded.

Yours faithfully



_____
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