

Proposed development of Tergniet Landgoed on Farm 136 Ptn 38, Tergniet, Mossel Bay



Bulk Engineering Services Report

Revision 0.2

March 2025



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1 INTRODUCTION AND BACKGROUND

Element Consulting Engineers has been appointed to compile the bulk engineering services report for the proposed development of Tergniet Landgoed, Tergniet, Mossel Bay.

The proposed development of the estate is on portion 38 of Farm 136, Tergniet, approximately 5km west of Great Brak River in the Mossel Bay Municipal area. The property is located inside the urban edge.

The proposed development envisages the development of 144 medium density residential erven.

This report will detail and discuss the bulk engineering services of the proposed development, touch on the internal engineering designs and comment on the engineering standards and technical design criteria applicable to the project.

2 LOCALITY AND ACCESS

The proposed development of Tergniet Landgoed, Tergniet, Mossel Bay, is on portion 38 of Farm 136, Tergniet, approximately 5km west of Great Brak River in the Mossel Bay Municipal area. The property is located inside the urban edge. The site is bound by the railway line to the south and existing residential erven on the other boundaries. The site is intersected by Impala Road, a municipal collector road. Figure 1 below indicates this locality in additional detail.



Figure 1: Locality plan

Access to both portions 1&2 is obtained from Impala Street intersecting the site, at a point approximately halfway between the railway crossing and Steenbras Street. Sight distance at the proposed access point is acceptable in both directions in both the horizontal and vertical alignments with the condition that the overgrown bush be trimmed for the complete road reserve width.



Figure 2: Access to development

3 GEOTECHNICAL INVESTIGATION

A formal geotechnical investigation has not been performed. A visual inspection of the site was conducted in order to assess conditions on site. A number of geotechnical reports of nearby sites were also consulted.

A brief summary of the combined results of the above and a discussion of several relevant issues is presented hereunder for discussion purposes only.

Holistically, the conclusion reached is that the residual sands and limited transported materials found on site are adequate for the construction of engineering services and residential development. A formal geotechnical investigation will be performed during the detail design stage if required.

General Soil Profile

Inspection of the site indicated relatively consistent soil horizons throughout with a light brown to grayish silty sand of significant depth present. Darker brown transported silty sand is evident in the lower lying areas. The materials appear dry overall but slightly moist in the lower lying areas. The materials are fairly loose. No perched water table is evident, and a low water retention rate is expected. Moderate gradients are evident.

Ground water

No ground water and/or perched water are evident. A low water retention rate is expected. Due to the moderate gradients on the site, lateral movement of stormwater can be fast and liquification of the silty sands and transported topsoil may occur.

Engineering Services

The following aspects are relevant for engineering services:

- A slope analysis was performed for the site and the following resulted:
 - The average slope of the complete site varies from undulating to moderate.
 - No areas are un-developable due to slope restrictions.
- Surface stormwater management needs to be implemented for drainage in the area due to the moderate gradients and high erosive nature of the silty sands.
- This will require a formal stormwater reticulation system comprising of a combination of paved roads, kerbing, lined channels, catchpits and stormwater pipes.
- A TLB will suffice for excavations in all silty sands on site.

- Although the possibility of rock is deemed extremely small, rock may be present at deeper depths. A formal geotechnical investigation will have to be conducted during detail design stage to determine the extent and depth thereof.

Foundations for residential development

The visual investigation indicated that the residual and transported materials are adequate to support residential dwellings. The following may be considered:

- Light raft foundations for the silty sand and moderate settlement anticipated.

There are some moderate slopes across the site to be developed, which will require cutting and filling for house platforms. This will result in some houses being sited on both cut and fill areas. Fill areas to be adequately compacted to a minimum specification to be determined from the formal geotechnical investigation.

Slope Stability

Although moderate slopes exist on portions of the site, no natural slope instability is present. Care should be taken for erosion at cut faces and a formal stormwater system should be provided.

Minerals, mining rights and borrow pits

A number of commercial borrow pits occur in the general vicinity (5 – 10 km radius) of the site. No activity is however located in the immediate locality of the site as the general area of the site is classified as residential.

Construction materials

A number of commercial operators are located in close proximity to the site for the provision of imported building aggregates and engineering construction materials.

4 PROPOSED LAND USE AND SITE DEVELOPMENT PLAN

The proposed development of Tergniet Landgoed, Tergniet, Mossel Bay, entails the proposed development of 144 medium density residential erven. This scenario can be viewed as the ultimate scenario as no additional development will be possible on the site when fully developed. A preliminary Site Development Plan (SDP), as prepared by Smuts De Kock Architects, is presented in the diagram below.



Figure 3: Site development plan (SDP)

5 BULK ENGINEERING SERVICES

This chapter will discuss the bulk engineering services of the proposed development, touch on the internal engineering designs and comment on the engineering standards and technical design criteria applicable to the project.

5.1 General

The proposed development is classified from an engineering bulk services perspective as an infill development with infill taking place between the existing developed portions of Tergniet. Infill development is desirable 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.

5.2 Water

5.2.1 Bulk Availability

Bulk water is available for this proposed development. A report from GLS has been requested and received confirming the availability of bulk water for the development, this report is attached as addendum. A letter has been requested from the Mossel Bay Municipality confirming the allocation and availability of bulk water for this development.

5.2.2 Connection Point

Although two existing bulk water lines are available in close proximity to the development site (at the intersection of Impala Road and Steenbras Street), according to discussions with the Mossel Bay Municipality and the report from GLS, a new 200mm bulk water line will be required to provide bulk water to the development. This new 200mm line will be constructed from (and tied into) the existing 200mm line at the intersection of Impala Road and Seester Street, in close proximity to the Tergniet reservoir. From there, the new line will follow Impala Road in an eastern direction, all the way to the boundary of the development property, a distance of approximately 1200m.

The locality of this bulk water line and connection point in relation to the proposed development site is indicated in the preliminary design drawings attached to the report as addendum and depicted in the diagram below.

5.2.3 Design Criteria and Standard of Internal Engineering Services

- Pipe diameters varying between 90mm and 110mm depending on pressure available and flow required.
- Pipe type and class to be uPVC class 9 or 12, depending on pressure.
- Erven to be serviced with a 20mm connection and Aqua-Loc box and meter.
- Fire hydrants to be provided according to the “Guidelines for engineering services and amenities”.
- The following design consumption is used:
 - Medium density erven – 450l/erf/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 at T-pieces where applicable.
- Minimum cover to pipes of 800mm.
- Erf connections to be polycop class 16.

5.2.4 Demand

The bulk water Average Annual Daily Demand (AADD) for this proposed development, in line with the above discussions, design consumptions, assumptions, criteria and standards, is calculated at approximately 65kl/day.

5.2.5 Preliminary Design Drawing

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

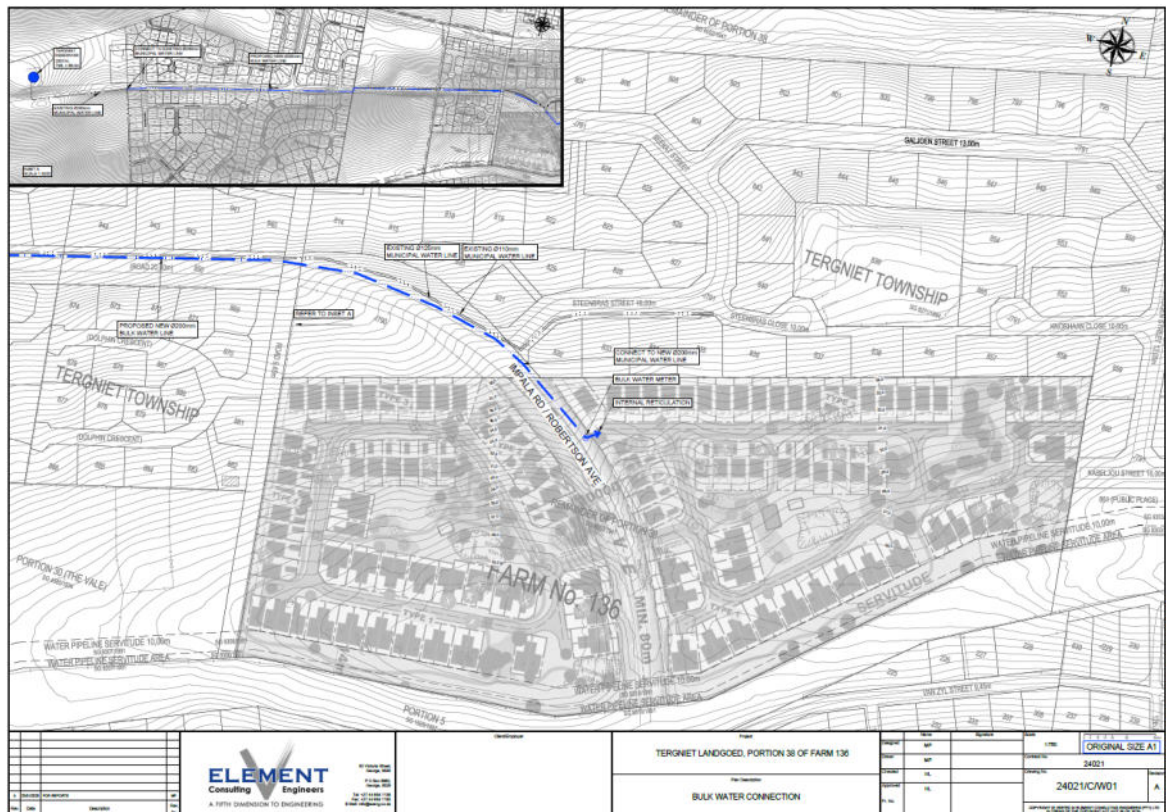


Figure 4: Preliminary bulk water design

5.3 Sewer

5.3.1 Municipal sewer network and bulk connection point

The Mossel Bay Municipality has recently commenced with the phased implementation of a sewer network for the study area. A number of phases have been completed. This new municipal sewer network provides a bulk 250mm sewer line on the northern and western boundaries of this development property (Farm 136, portion 38). A connection manhole is provided on the north-western boundary of this development property, adjacent to the Dolphin Crescent Sewer Pumpstation. The Dolphin Crescent Sewer Pumpstation is the lowest point on this section of the municipal network.

Sewer is pumped from the Dolphin Crescent Sewer Pumpstation to the Seester Street Sewer Pumpstation from where it is pumped to the Great Brak River WWTW.

The bulk sewer line servicing this development as well as the connection sewer manhole is presented in the diagram below and attached to the report as addendum.

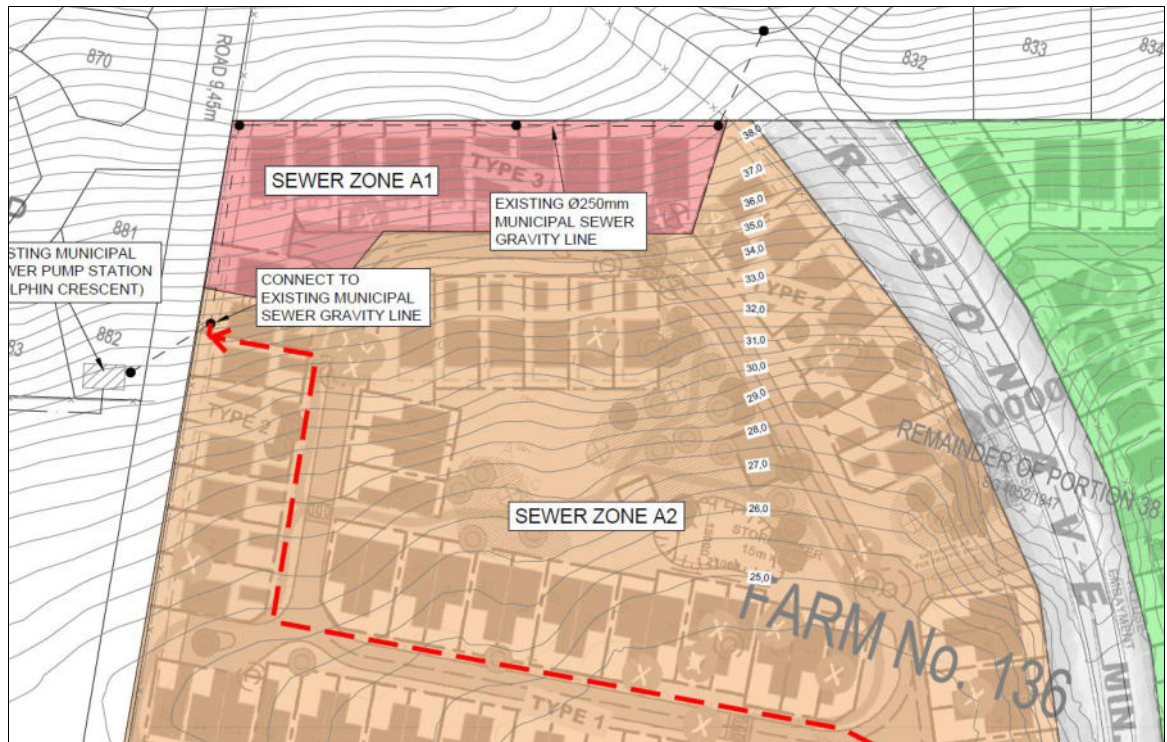


Figure 5: Bulk sewer connection

5.3.2 Internal sewer network

The internal sewer network for this development is divided by Impala Street cutting through the development. Portion 1 (drainage zone A) of the development is located west of Impala Street and portion 2 (drainage zone B) is located east of Impala Street.

A small section of zone A, designated zone A1, situated on the north-western corner of the development, can gravitate directly into the municipal connection point. The internal sewer reticulation network for the rest of zone A, namely zone A2, will be designed to gravitate to the south-eastern boundary of zone A where internal sewer pump station 1 (PS1) will be located. Sewer will be pumped from PS1 to the municipal connection point on the north-western boundary.

The internal sewer reticulation network for zone B of this development will be designed to gravitate to the south-eastern boundary of zone B where internal sewer pump station 2 (PS2) will be located. Sewer will be pumped from PS2 to PS1 underneath Impala Road.

All of the above are indicated on the diagram below and attached as addendum.



Figure 6: Internal sewer design zones and internal pump stations

5.3.3 Design Criteria and Standard of Internal Engineering Services

- A conventional waterborne sewerage system will be provided.
- Pipe diameters of generally 110mm for all house connections and 160mm and above for main lines, as required per the detailed designs.
- Pipe type and class to be uPVC class 34 and laid on class C bedding.
- Precast concrete rings manholes with concrete floor and premanufactured concrete lid.
- The following design flows will be utilized:
 - Medium density erven – 410l/erf/day
- Specified peak factor of 3.5
- Allowance for 15% extraneous flow
- Minimum flow velocities designed for as 0.7m/s.
- Minimum cover to all pipes to be 800mm.
- 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

- House connection depth to be minimum 1.0m and at least be able to drain 80% of the erf.

- 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.

5.3.4 Design Flow

The Average Dry Weather Flow (ADWF) created by the proposed development, in line with the above discussions, criteria and standards, is calculated at approximately 59kl/day.

The design peak flow, inclusive of a specified peak factor of 3.5, as well as extraneous flow, will be calculated during the detail design stage.

5.3.5 Capacity in municipal pump stations

The designs of the Seester Street and Dolphin Crescent pump stations were performed to accommodate the entire masterplan study area, inclusive of this portion of development land. Sufficient capacity is hence available in the Dolphin Crescent and Seester pump stations to accommodate this development.

5.4 Roads and access

5.4.1 Access

Access to both portions 1&2 of the development is proposed from Impala Street, a municipal minor collector road, intersecting the property. The specific access point proposed and discussed is located at a point approximately halfway between the railway crossing and Steenbras Street. This layout provides for an acceptably spaced intersection layout of 109m to the railway crossing and 109m to Steenbras Street, with a speed limit of 60km/h on Impala Road, a minor collector road.

Sight distance at the proposed access point is acceptable in both directions in both the horizontal and vertical alignments with the condition that the overgrown bush be trimmed for the complete road reserve width.

Emergency exits will be provided, as permanently locked gates as part of the perimeter fence, on the south-western corner of portion 1, as well as on the south-eastern corner of portion 2 (refer site development plan).

5.4.2 Traffic Impact Assessment

A Traffic Impact Assessment has been performed in a separate report by Element Consulting Engineers.

A brief discussion on the relevant traffic aspects is presented here for discussion purposes only:

Impala Street can be classified as a municipal minor collector road and carries a very slight traffic load. This low traffic volume can be attributed to the relatively small residential area of Tergniet it serves with no through-access to other areas. Although peaks can be observed during morning and evening peak hours as traffic from Tergniet towards Mossel Bay and George utilizes mainly this road, these peaks are extremely slight, compared to peaks in the urban environment. During the remainder of the day, the road is extremely slightly trafficked.

The proposed development, from a traffic engineering perspective, can be classified as a low-impact suburban residential estate with typical traffic movements during the peak hour of the adjacent road network expected.

Trip generation of the proposed development is minimal.

Trips generated from this development will have a low to insignificant impact on capacity and level of service on Impala Street and affected intersections during peak hours.

5.4.3 Internal Standards and Design Criteria

Internal standards and design criteria are specified as follows:

- Road width to be 6.0m on main access streets and 5.2m on minor internal streets.
- Pavement structural materials to be imported from commercial sources.
- All minimum radii at bellmouths to be 7m.
- Road design life of 20 years.
- Subgrade material CBR of 15-20.
- Subbase material CBR of minimum 45 – obtained from commercial sources.
- 25mm Asphalt surfacing, alternatively 80mm concrete block paving.
- Minimum road grade of 0.45% and crossfall of 2%.
- Design speed of 30km/h on all roads except main access road with design speed of 40km/h.

5.4.4 Preliminary Site Development Plan

The preliminary site development plan (SDP), depicting the access onto Impala Road and the internal streets layout, is presented in the following diagram and is attached to the report as addendum.



Figure 7: Site development plan (SDP) depicting access and internal streets layout

5.5 Stormwater

5.5.1 Design background, standards and criteria

Stormwater design on this proposed development is notable, not only from an engineering perspective, but also from an environmental perspective, due to the moderate gradients present. A formal stormwater reticulation system will be provided by a combination of surfaced roadways, kerbs, channels, cut-off drains, inlet structures, outlet structures, concrete stormwater 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. Litter traps will be provided at all stormwater outlets and will be cleaned on a regular basis by the estate's landscaping and maintenance teams.

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.
- 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.
- Gravel traps to be provided in manholes (where required on steeper slopes).
- Gabion mattresses to be provided at all outlets for energy dissipation.
- Litter traps to be provided at all outlets.
- Outlets to be standard concrete headwalls
- Rainwater tanks to be provided at each house

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

5.5.2 Site layout considerations

The proposed development spans over two portions, namely portion 1 (west of Impala Street) and portion 2 (east of Impala Street).

Stormwater drainage zones are designated as follows:

Zone A – Portion 1 (west of Impala Street)

Zone B – Portion 2 (east of Impala Street)

The drainage zones are indicated diagrammatically in the figure below:



Figure 8: Internal stormwater drainage zones

Both zones A and B abut against the Transnet railway line as well as a PetroSA pipeline servitude. Both of these parastatals will be contacted for comments during the environmental process, as well as during the design process, in order to obtain the necessary wayleaves.

5.5.3 Stormwater design

Zone A has an area of approximately 2.7ha with an estimated 1:2 year peak flow of 0.278m³/s and 1:50 year peak flow of 0.786m³/s. The internal stormwater network for Zone A will be designed to gravitate to the south-eastern boundary of the development property, adjacent to both the railway line, the PetroSA servitude and Impala Street. This point (the south eastern corner) is the lowest point on Zone A. The formal internal stormwater reticulation system for Zone A will discharge into a proposed internal

detention pond on the south-eastern corner of Zone A. This internal detention pond will have a volume of approximately 351m³ (refer SDP). [The detention pond may also be split into a detention pond system (more than one smaller pond, as indicated on the SDP) and will be discussed with the municipality during the detail design stage]. The detention pond will be a focus point in the development with ample landscaping and beautification. Water from the detention pond will leach into the sand bed which has a very high seepage rate. The flood outlet from the internal detention pond will drain into a new stormwater culvert underneath Impala Road to Zone B of the development.

Zone B has an area of approximately 3.1ha with an estimated 1:2 year peak flow of 0.321m³/s and 1:50 year peak flow of 0.897m³/s. The internal stormwater network for Zone B will be designed to gravitate to the south-eastern boundary of Zone B. This point (the south eastern corner) is the lowest point on Zone B. The formal internal stormwater reticulation system for Zone B will discharge into a proposed internal detention pond on the south-eastern corner of Zone B. This internal detention pond will have a volume of approximately 398m³ (refer SDP). [The detention pond may also be split into a detention pond system (more than one smaller pond, as indicated on the SDP) and will be discussed with the municipality during the detail design stage]. The detention pond will be a focus point in the development with ample landscaping and beautification. Water from the detention pond will leach into the sand bed which has a very high seepage rate. The outlet from the internal detention pond will drain into the existing natural drainage line towards the east along the railway line.

The preliminary site development plan (SDP) depicting the detention ponds, is presented in the following diagram and is attached to the report as addendum.

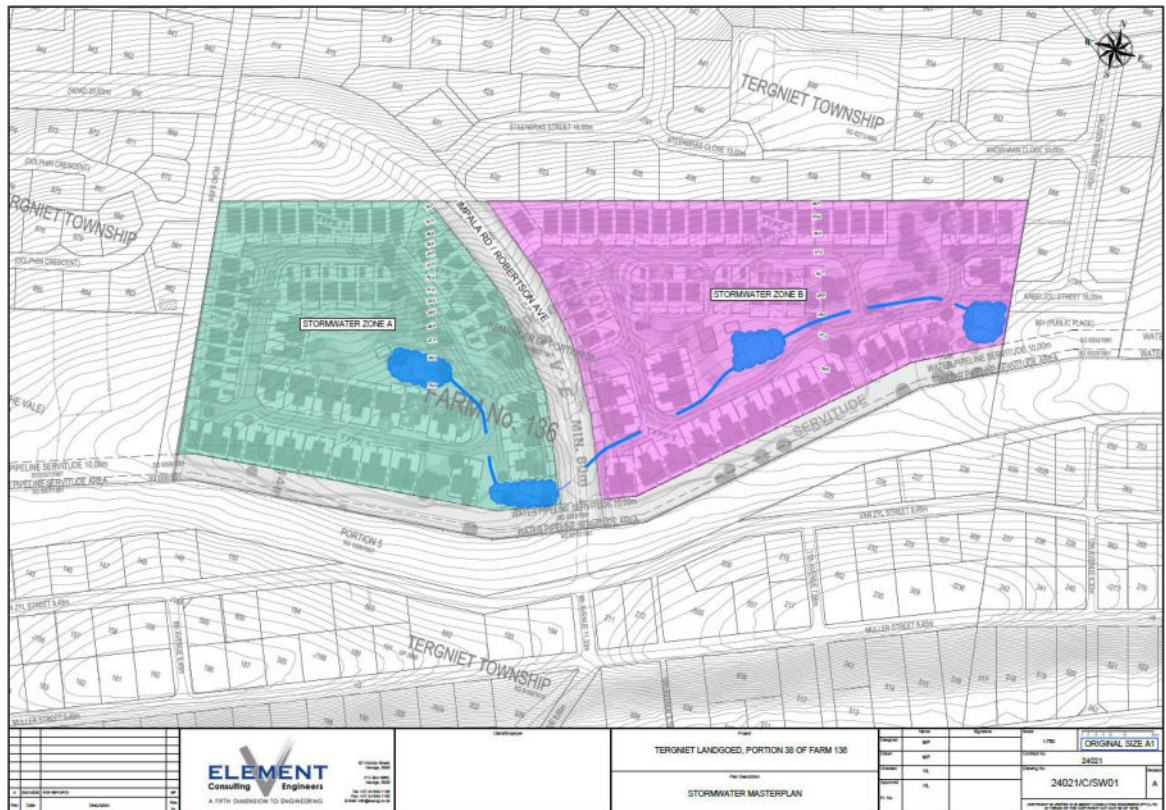


Figure 9: Bulk stormwater design with detention ponds

5.6 Solid Waste

A formal solid waste collection area is provided in the site development plan for each development portion. A formal arrangement for the removal of solid waste will be entered into with the Mossel Bay Municipality.

5.7 Electricity

Please refer to separate report.

6 CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusions

The following conclusions can be reached from the bulk engineering services report for the proposed development of Tergniet Landgoed, Tergniet, Mossel Bay.

1. The proposed development of the estate is on portion 38 of Farm 136, Tergniet, approximately 5km west of Great Brak River in the Mossel Bay Municipal area. The property is located inside the urban edge.
2. The proposed development envisages the development of 144 medium density residential erven.
3. Access to both portions 1&2 of the development is proposed from Impala Street, a municipal minor collector road, intersecting the property. The specific access point proposed and discussed is located at a point approximately halfway between the railway crossing and Steenbras Street. This layout provides for an acceptably spaced intersection layout of 109m to the railway crossing and 109m to Steenbras Street, with a speed limit of 60km/h on Impala Road, a minor collector road. Sight distance at the proposed access point is acceptable in both directions in both the horizontal and vertical alignments with the condition that the overgrown bush be trimmed for the complete road reserve width.
4. A formal geotechnical investigation has not been performed. A visual inspection of the site was conducted. Holistically, the conclusion reached is that the residual sands and limited transported materials found on site are adequate for the construction of engineering services and residential development. A formal geotechnical investigation will be performed during the detail design stage if deemed necessary, although this is not foreseen to be required:
 - a. General soil profile indicated relatively consistent soil horizons throughout with a light brown to grayish silty sand of significant depth present. Darker brown transported silty sand is evident in the lower lying areas.
 - b. The materials appear slightly moist to dry and are fairly loose.
 - c. No perched water table is evident and a low to moderate water retention rate is expected.
 - d. Due to the moderate gradients on the site, lateral movement of stormwater can be fast and liquification of the silty sands and transported topsoil may occur. A formal stormwater reticulation system is required.
 - e. The complete site is developable with regard to gradient.
 - f. The residual and transported sands are adequate for the construction of engineering services for residential development.
 - g. No natural slope instability is present. Care should be taken for erosion at cut faces and a formal stormwater system should be provided.

5. The proposed development is classified from an engineering bulk services perspective as an infill development with infill taking place between the existing developed portions of Tergniet. Infill development is desirable 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.
6. Water reticulation:
 - a. Bulk water is available for this proposed development.
 - b. A new 200mm bulk water line will be required to provide bulk water to the development. This new 200mm line will be constructed from (and tied into) the existing 200mm line at the intersection of Impala Road and Seester Street, in close proximity to the Tergniet reservoir. From there, the new line will follow Impala Road in an eastern direction, all the way to the boundary of the development property, a distance of approximately 1200m.
 - c. The demand for this proposed development is calculated at approximately 65kl/day.
7. Sewer reticulation:
 - a. The municipal sewer network provides a bulk 250mm sewer line on the northern and western boundaries of this development property (Farm 136, portion 38). A connection manhole is provided on the north-western boundary of this development property, adjacent to the Dolphin Crescent Sewer Pumpstation. The Dolphin Crescent Sewer Pumpstation is the lowest point on this section of the municipal network.
 - b. The internal sewer network for this development is divided by Impala Street cutting through the development. Portion 1 (drainage zone A) of the development is located west of Impala Street and portion 2 (drainage zone B) is located east of Impala Street.
 - c. A small section of zone A, designated zone A1, situated on the north-western corner of the development, can gravitate directly into the municipal connection point.
 - d. The internal sewer reticulation network for the rest of zone A, namely zone A2, will be designed to gravitate to the south-eastern boundary of zone A where internal sewer pump station 1 (PS1) will be located. Sewer will be pumped from PS1 to the municipal connection point on the north-western boundary.
 - e. The internal sewer reticulation network for zone B of this development will be designed to gravitate to the south-eastern boundary of zone B where

internal sewer pump station 2 (PS2) will be located. Sewer will be pumped from PS2 to PS1 underneath Impala Road.

- f. The Average Dry Weather Flow (ADWF) created by the proposed development is calculated at 59kl/day.
- g. The municipal network and pumpstations have sufficient capacity available to accommodate this development.

8. Roads and access

- a. Access to both portions 1&2 of the development is proposed from Impala Street, a municipal minor collector road, intersecting the property. The specific access point proposed and discussed is located at a point approximately halfway between the railway crossing and Steenbras Street. This layout provides for an acceptably spaced intersection layout of 109m to the railway crossing and 109m to Steenbras Street, with a speed limit of 60km/h on Impala Road, a minor collector road.
- b. Sight distance at the proposed access point is acceptable in both directions in both the horizontal and vertical alignments with the condition that the overgrown bush be trimmed for the complete road reserve width.
- c. A Traffic Impact Assessment has been performed in a separate report by Element Consulting Engineers. The development will have a low to insignificant impact on capacity and level of service on Impala Street and affected intersections.

9. Stormwater reticulation:

- a. Stormwater design on the proposed development is notable not only from an engineering perspective but also from an environmental perspective.
- b. A formal stormwater reticulation system will be provided by a combination of surfaced roadways, kerbs, channels, cut-off drains, inlet structures, outlet structures, concrete stormwater pipes and various minor structures. Energy dissipation will be performed as standard practice with gabion mattresses at all outlets. Litter traps will be provided at all stormwater outlets and will be cleaned on a regular basis by the estate's landscaping and maintenance teams.
- c. Two drainage zones are identified. The areas and peak flows of the drainage zones are as follows:
 - i. Zone A: 2.7ha; 1:2 peak 0.278m³/s; 1:50 peak 0.786m³/s.
 - ii. Zone B: 3.1ha; 1:2 peak 0.321m³/s; 1:50 peak 0.897m³/s.
- d. The formal internal stormwater reticulation system for Zone A will discharge into a proposed internal detention pond on the south-eastern corner of Zone A. This internal detention pond will have a volume of approximately 351m³ (refer SDP). [The detention pond may also be split into a detention pond system (more than one smaller pond, as indicated on the SDP) and will be discussed with the municipality during the detail design stage]. The detention pond will be a focus point in the development

with ample landscaping and beautification. Water from the detention pond will leach into the sand bed which has a very high seepage rate. The flood outlet from the internal detention pond will drain into a new stormwater culvert underneath Impala Road to Zone B of the development.

- e. The formal internal stormwater reticulation system for Zone B will discharge into a proposed internal detention pond on the south-eastern corner of Zone B. This internal detention pond will have a volume of approximately 398m³ (refer SDP). [The detention pond may also be split into a detention pond system (more than one smaller pond, as indicated on the SDP) and will be discussed with the municipality during the detail design stage]. The detention pond will be a focus point in the development with ample landscaping and beautification. Water from the detention pond will leach into the sand bed which has a very high seepage rate. The outlet from the internal detention pond will drain into the existing natural drainage line towards the east along the railway line.
10. A formal solid waste collection area is provided in the site development plan for each development portion. A formal arrangement for the removal of solid waste will be entered into with the Mossel Bay 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 engineering design perspective.

6.2 Recommendations

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

1. That all conceptual and preliminary bulk services design specifications and standards, as set out in this report, be accepted and approved.
2. That the proposed infrastructure be designed according to the satisfaction and approval of the Mossel Bay Municipality.
3. That a services agreement be entered into between the developer and the Mossel Bay Municipality for the rendering of bulk services in accordance with this report.

It is the holistic recommendation that the proposed development of Tergniet Landgoed be approved from an engineering design perspective.

7 ADDENDA

- 7.1 Addendum 1 – Site Development Plan (SDP)**
- 7.2 Addendum 2 – Preliminary bulk services designs**
- 7.3 Addendum 3 – GLS report**
- 7.4 Addendum 4 – Municipal confirmation letters**

ADDENDUM 1

SITE DEVELOPMENT PLAN

LEGEND:

- FARM 136, PORTION 38
- WESTERN SITE (A)
- EASTERN SITE (B)
- TYPE 1 (YELLOW)
- ERF SIZE
- BUILT AREA
- TYPE 2 (BLUE)
- ERF SIZE
- BUILT AREA
- TYPE 3 (ORANGE)
- ERF SIZE
- BUILT AREA
- TYPE 4 (ORANGE)
- ERF SIZE
- BUILT AREA
- TYPE 1
- TYPE 2
- TYPE 3
- TYPE 4
- TOTAL ERVEN

LEGEND:	
FARM 138, PORTION 38	
WESTERN SITE (A)	+/- 2.83 ha
EASTERN SITE (B)	+/- 3.13 ha
TYPE 1 (YELLOW)	
ERF SIZE	+/- 175m ²
BUILT AREA	147m ²
TYPE 2 (BLUE)	
ERF SIZE	+/- 245m ²
BUILT AREA	166m ²
TYPE 3 (ORANGE)	
ERF SIZE	+/- 228m ²
BUILT AREA	190m ²
TYPE 4 (ORANGE)	
ERF SIZE	+/- 237m ²
BUILT AREA	183m ²
TYPE 1	75
TYPE 2	35
TYPE 3	24
TYPE 4	10
TOTAL ERFEN	144

TERGNIET LANDGOED
003 SITE DEVELOPMENT PLAN

FARM 136. PORTION 38, TERGNIET, WESTERN CAPE
1:1250 @ A3
07-03-2025

Smuts
de Kock

TEL: 021 887 7678 boets@smutsdekock.co.za CEL: 083 457 2066

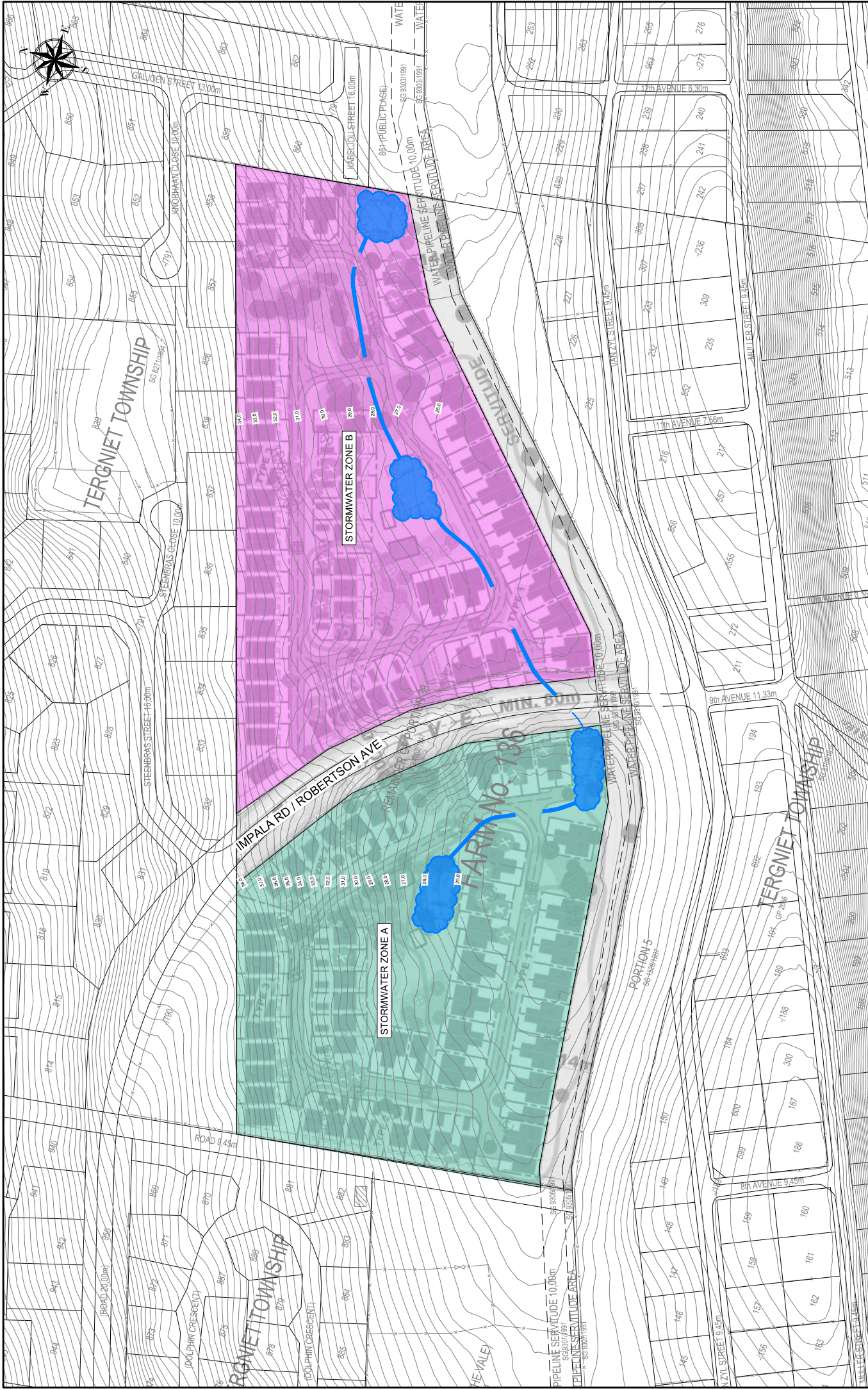
ADDENDUM 2

PRELIMINARY BULK SERVICES DESIGNS



PROPOSED ACCESS
POINTS TO DEVELOPMENT

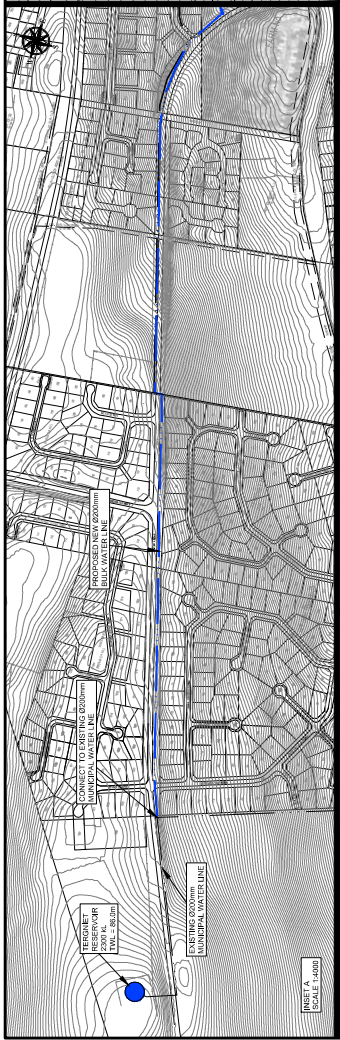
Project		TERGNIET LANDGOED, PORTION 38 OF FARM 136		Client/Engineer		62 Valsheid Street George 6520 P O Box 9802 George 6520 Tel: +27 44 884 1138 E-Mail: info@element.co.za		ELEMENT Consulting Engineers A FIFTH DIMENSION TO ENGINEERING		Rev. No. Date Description	
Name		MP		Signature		1:750		ORIGINAL SIZE A1		Rev. No. Date Description	
Designed		MP		Signature		1:750		ORIGINAL SIZE A1		Rev. No. Date Description	
Drawn		MP		Signature		1:750		ORIGINAL SIZE A1		Rev. No. Date Description	
Checked		HL		Signature		1:750		ORIGINAL SIZE A1		Rev. No. Date Description	
Approved		HL		Signature		1:750		ORIGINAL SIZE A1		Rev. No. Date Description	
Project		TERGNIET LANDGOED, PORTION 38 OF FARM 136		Client/Engineer		62 Valsheid Street George 6520 P O Box 9802 George 6520 Tel: +27 44 884 1138 E-Mail: info@element.co.za		ELEMENT Consulting Engineers A FIFTH DIMENSION TO ENGINEERING		Rev. No. Date Description	
Plan Description		ACCESS ONTO IMPALA ROAD		Client/Engineer		62 Valsheid Street George 6520 P O Box 9802 George 6520 Tel: +27 44 884 1138 E-Mail: info@element.co.za		ELEMENT Consulting Engineers A FIFTH DIMENSION TO ENGINEERING		Rev. No. Date Description	
Drawing No.		24021		Signature		1:750		ORIGINAL SIZE A1		Rev. No. Date Description	
Contract No.		24021		Signature		1:750		ORIGINAL SIZE A1		Rev. No. Date Description	
Revision		A		Signature		1:750		ORIGINAL SIZE A1		Rev. No. Date Description	



Project		TERGNIET LANDGOED, PORTION 38 OF FARM 136		Scale		1:750		ORIGINAL SIZE A1	
Client/Engineer		TERGNIET LANDGOED, PORTION 38 OF FARM 136		Name		MP		Contract No.	
Plan Description		STORMWATER MASTERPLAN		Checked		MP		Drawing No.	
Revision		A		Approved		HL		24021	
Description		STORMWATER MASTERPLAN		P1. No.		HL		24021/C/SW01	
Date		2024		Rev.		by		A	

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						Client/Engineer		Project		Scale		Original Size A1	
						B2 Veldhuis Street George 6520 P O Box 9802 George 6520 Tel: +27 44 884 1138 E-Mail: info@element.co.za		TERGNIET LANDGOED, PORTION 38 OF FARM 136		1:750		ORIGINAL SIZE A1	
						 A FIFTH DIMENSION TO ENGINEERING		BULK WATER CONNECTION		MP		24021	
								Plan Description		MP		24021/C/W01	
								Checked		HL		24021	
								Approved		HL		24021/C/W01	
								Pr. No.				A	
												COMPILED BY: VEDHUIS STREET ENGINEERS (PVT) LTD IN TERMS OF THE COMPROMISE ACT NO. OF 1976	

ADDENDUM 3

GLS REPORT

5 February 2025

KLS Consulting Engineers
13 Pasita Street
Rosenpark
Cape Town
7550

Attention: Mr Renier Basson

Dear Sir

PROPOSED DEVELOPMENT ON PORTION 38 OF FARM 136, MOSSEL BAY: CAPACITY ANALYSIS OF THE BULK WATER & SEWER SERVICES

Your request for GLS Consulting to investigate and comment on the bulk water supply and sewer discharge of the proposed development (Residential development on Farm 136/38, Mossel Bay), refers.

This document should inter alia be read in conjunction with the following reports:

- “Mossel Bay Municipality Water Master Plan”, dated April 2017.
- “Mossel Bay Municipality Sewer Master Plan”, dated April 2017.
- “Mossel Bay Municipality Existing Water System Assessment”, dated June 2024.
- “Mossel Bay Municipality Existing Sewer System Assessment”, dated June 2024.

Future development area U40 which includes the proposed development of Farm 136/38, was conceptually taken into consideration for the April 2017 master plans for the water and sewer networks.

GLS is currently in the process to update the April 2017 water and sewer master plans for Mossel Bay Municipality (existing water and sewer hydraulic models were updated during the 2023/24 financial year) and the result of this bulk water and sewer capacity investigation report for development on Farm 136/38 will be included in the updated master plans.

1 WATER DISTRIBUTION SYSTEM

1.1 Distribution zones

The proposed development is situated in Tergniet. It is proposed that the development is supplied with bulk water from the Tergniet reservoir water distribution zone. The reservoir capacity is 2,3 ML and has a Top Water Level (TWL) of 86 m above mean sea level (m a.s.l.).

The development is situated inside the water priority area.

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South Africa

1.2 Water demand

The latest water analysis for the master plan was performed with a total annual average daily demand (AADD) for development on Farm 136/38 (portion of future development area U40 in the April 2017 Master Plan) of 93,5 kL/d.

The AADD and required fire flow for the proposed development on Farm 136/38 were calculated as follows:

- 146 Group/cluster housing units @ 0,45 kL/d/unit ⁽¹⁾ = 65,7 kL/d

⁽¹⁾ As per Table J.2 from Section J - Water Supply of "The Neighbourhood Planning and Design Guide" (so called "Red book").

- Fire flow criteria (Moderate risk) = 25 L/s @ 10 m

The total potential AADD for the existing stands (fully occupied) as well as the proposed development in the Tergniet reservoir water distribution zone was calculated as follows:

- | | | |
|---------------------------------------|---|------------|
| • Tergniet supply zone fully occupied | = | 502,0 kL/d |
| • Proposed development | = | 65,7 kL/d |
| Total | = | 567,7 kL/d |

1.3 Present situation

1.3.1 Reticulation system

There is sufficient capacity in the existing water reticulation network to supply the domestic water demand during peak demand conditions to the proposed development. There is, however, insufficient capacity in the existing water reticulation network of the Tergniet reservoir water distribution zone to provide fire flow of more than 25 L/s @ 10 m to the proposed development.

The maximum fire flow that can be delivered to the proposed development at 10 m water pressure head is 5,3 L/s. The system cannot supply fire flow to the development due to high flow velocities in the existing 125 mm Ø and 75 mm Ø supply pipelines from Tergniet reservoir to the proposed development (which subsequently results in substantial energy losses through the pipeline).

To allow for sufficient fire flow to the development the implementation of master plan item 1 is proposed to augment supply to Farm 136/38. This upgrade will also be required to supply sufficient fire flow to other future development areas in the Tergniet reservoir water distribution zone.

Network upgrade:

- Item 1 : 1 200 m x 200 mm Ø upgrade supply pipeline R 3 805 000 *

* Including P & G, Contingencies and Fees, but excluding VAT - Year 2024/25 Rand Value. (This is a rough estimate, which does not include major unforeseen costs).

After the implementation of master plan item 1 the capacity of the existing system to supply fire flow to the proposed development will increase from 5,3 L/s @ 10 m to 46,5 L/s @ 10 m.

1.3.2 Bulk supply system

There is sufficient capacity in the existing main supply pipeline from the Sandhoogte Water Treatment Plant (WTP) GBR to Tergniet reservoir to accommodate the proposed development on Farm 136/38.

1.3.3 Reservoirs

The criteria for total reservoir volume used in the Mossel Bay Water Master Plan is 48 hours of the AADD (of the reservoir supply zone) for gravity and pumped supply to the reservoir.

According to the re-analysis of the fully occupied AADD scenario for the Tergniet reservoir water distribution zone, the AADD for the distribution zone can potentially increase to approximately 567,7 kL/d when the development has been fully developed. The storage capacity of the existing Tergniet reservoir is 2 300 kL, which results in a storage capacity of 97 hours of the AADD.

There is therefore sufficient capacity available at the Tergniet reservoir to accommodate the proposed development.

1.4 *Minimum requirements*

The minimum requirement to accommodate the proposed development on Farm 136/38 in the existing water system is master plan item 1 to be able to supply a fire flow of more than 25 L/s @ 10 m to Farm 136/38, as shown on Figure 1.

2 SEWER NETWORK

2.1 *Drainage area*

It is proposed that the development on Farm 136/38 is accommodated in the existing Dolphin Crecent Pump Station (PS) drainage area.

The proposed development should connect to the existing 160 mm Ø sewer pipeline to the west of Farm 136/38, as shown in Figure 2. From the proposed connection sewage will gravitate to the Dolphin Crecent PS. From the Dolphin Crecent PS sewage is pumped to the Seester PS drainage area from where it is pumped to the Great Brak Wastewater Treatment Plant (WWTP).

Alternatively, the development can connect directly to the 160 mm Ø outfall sewer of the Seester PS drainage area, as indicated on Figure 2.

(For this scenario it can be considered to decommission the existing Dolphin Crecent PS and re-direct sewage flow from the drainage area to the proposed PS for the development).

The development is inside the sewer priority area.

2.2 *Sewer flow*

In the original sewer master plan, the peak day dry weather flow (PDDWF) for development on Farm 136/38 (portion of future development area U40 in the April 2017 Master Plan) was calculated as 67,0 kL/d.

For this re-analysis of the master plan, the PDDWF for the proposed development on Farm 136/38 was calculated as 47,0 kL/d.

2.3 *Present situation*

2.3.1 Gravity sewers

There is sufficient capacity in the existing sewer reticulation system downstream of the proposed connection point in the Dolphin Crescent PS drainage area to accommodate the proposed development on Farm 136/38.

2.3.2 Pumping stations and rising mains

A private sewer pump station and rising main will be required for the proposed development to connect to the existing system, as shown in Figure 2.

The proposed private PS requires a minimum capacity of 3,8 L/s with an accompanying 90 mm Ø rising main to accommodate the proposed development on Farm 136/38.

Dolphin Crescent PS:

The existing Dolphin Crescent PS requires a minimum capacity of 5,7 L/s (based on the diameter of the accompanying 110 mm Ø rising main) to accommodate the proposed development on Farm 136/38. The capacity of the PS is assumed to be more than 5,7 L/s, but should be verified by Mossel Bay Municipality through flow readings at the PS.

Seester PS:

The existing Seester PS requires a minimum capacity of 18,8 L/s (based on the diameter of the accompanying 200 mm Ø rising main) to accommodate the proposed development on Farm 136/38. The capacity of the PS is assumed to be more than 18,8 L/s, but should be verified by Mossel Bay Municipality through flow readings at the PS.

Based on the information available the existing sewer system has sufficient capacity to accommodate the proposed development.

3 CONCLUSION

The developer of the proposed development on Farm 136/38 in Mossel Bay may be liable for the payment of a Development Contribution (as calculated by Mossel Bay Municipality) for bulk water and sewer infrastructure as per Council Policy.

The existing water reticulation system downstream of the Tergniet reservoir currently has insufficient capacity to supply fire flow of more than 25 L/s @ 10 m water head to Farm 136/38. The system does however have sufficient capacity to accommodate the domestic water demand of the proposed development. Implementation of master plan item 1 to upgrade of the existing 75 mm Ø & 125 mm Ø pipelines in Impala Street to 200 mm Ø is required to be able to supply fire flow of more than 25 L/s @ 10 m to the development.

There is sufficient capacity in the existing sewer reticulation systems to accommodate the proposed development in the Dolphin Crescent PS and Seester PS drainage areas. A private pump station and rising main is however required to connect to the existing infrastructure. It is proposed that flow measurements are taken at the Dolphin Crescent and Seester Sewage pumping stations to verify the duty points of the respective pump stations.

We trust you find this of value.

Yours sincerely,

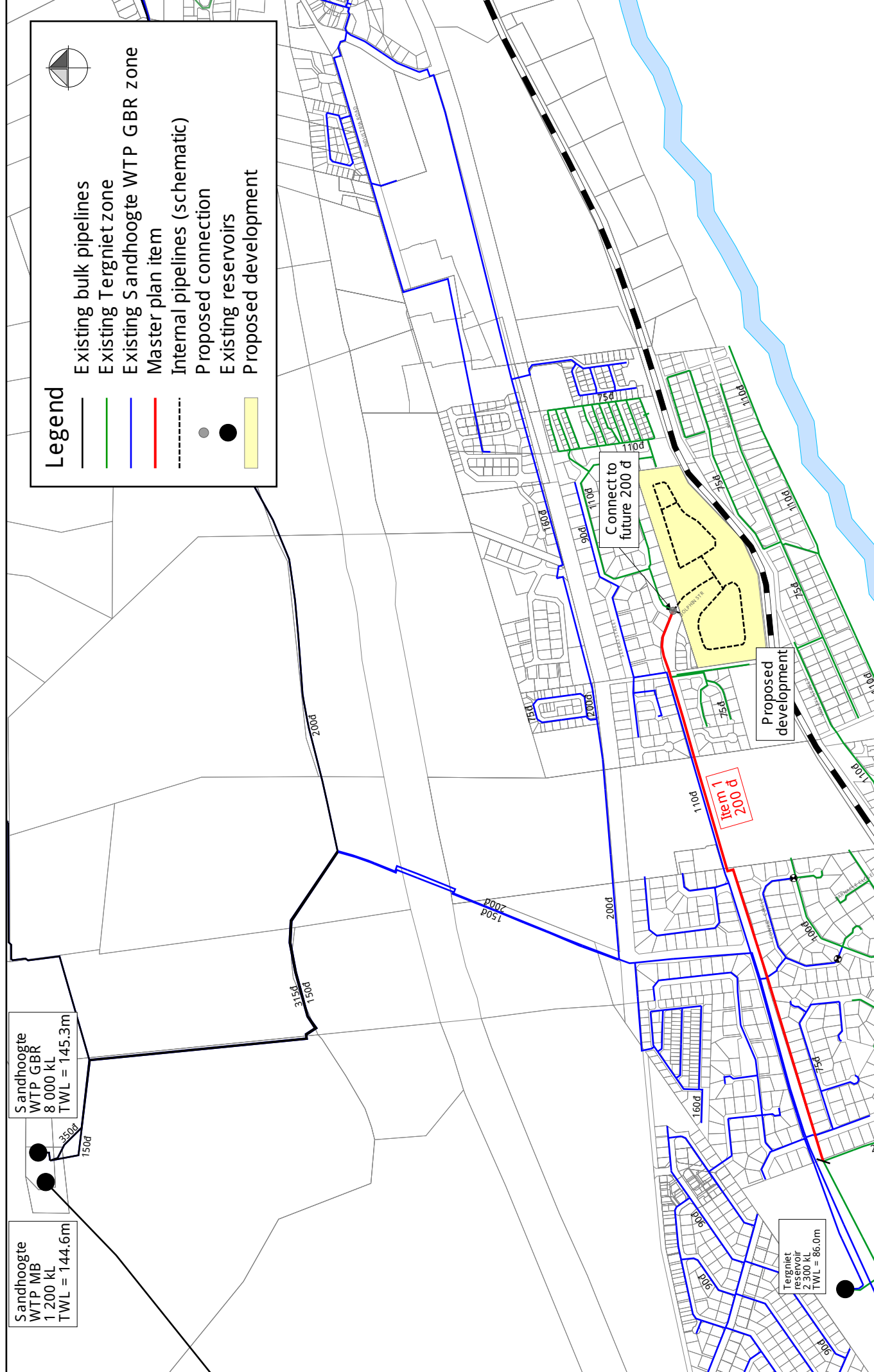
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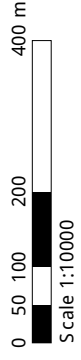
cc. The Manager: Civil Engineering Services
Mossel Bay Municipality
Private Bag X29
MOSSSEL BAY
6500

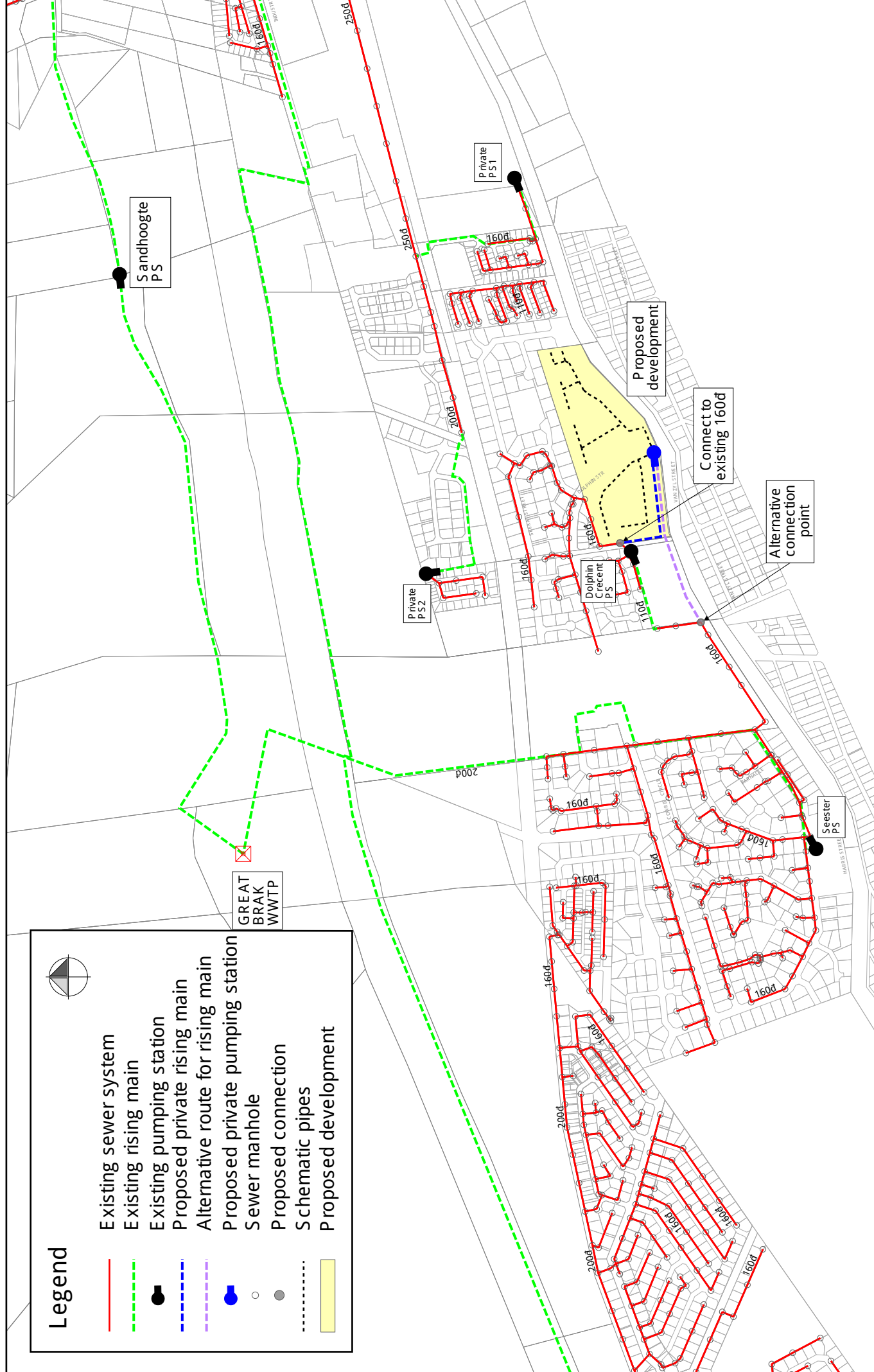
Attention: Eric Louw



Legend

- Existing bulk pipelines
- Existing Tergniet zone
- Existing Sandhoogte WTP GBR zone
- Master plan item
- Internal pipelines (schematic)
- Proposed connection
- Existing reservoirs
- Proposed development





Legend

Existing sewer system

Existing rising main

Existing pumping station

Proposed private rising main

Alternative route for rising main

Proposed private pumping station

Sewer manhole

Proposed connection

Schematic pipes

Proposed development

February 2025

Proposed development:
Farm 136/38 - Mossel Bay

Figure 2

Proposed Development
Farm 136/38 - Mossel Bay
Existing Sewer System

0 50 100 200 400 m

Scale 1:10000

ADDENDUM 4

MUNICIPAL CONFIRMATION LETTERS