URBAN ENGINEERING CONSULTANTS
CONSULTING CIVIL AND STRUCTURAL ENGINEERS

ENGINEERING SERVICES REPORT

PROPOSED NEW RESIDENTIAL DEVELOPMENT ON ERF 2833, MOSSEL BAY MUNICIPALITY

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on behalf of Urban Engineering (Pty) Ltd

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msl	Mean Sea Level
WCG	Western Cape Government
WGS	World Geodetic System
HDPE	High Density Polyethylene
uPVC	Unplasticised Polyvinyl Chloride
SDP	Site Development Plan
Mℓ	Mega Litre (1,000,000 litres)
NPDG	The Neighbourhood Planning and Design Guide
FAR	Floor Area Ratio

1 INTRODUCTION

Urban Engineering (Pty) Ltd was appointed by New Cape Innovations (Pty) Ltd to prepare a Civil Engineering Services Report pertaining to the proposed development of Erf 2833, Mossel Bay.

1.1 OBJECTIVE OF THIS REPORT

The purpose of this report is to determine the demand that the new proposed development will place on the existing municipal water, sewer and other services.

1.2 BACKGROUND

The site is currently zoned as Agricultural Zone I. The planning application proposal is to rezone and subdivide the erf for residential erven.

The Site Development Plan has been attached as **ANNEXURE A**, but for ease of reference an extract of the SDP has been included as **Figure 1-1** below.

Figure 1-1: Extract of Site Development Plan

1.3 DESCRIPTION OF THE DEVELOPMENT

Erf 2833 is approximately 6.04 ha in extend and the proposed development will consist of twelve single residential housing units and thirty-two general residential units, including internal roads and open spaces. The size of the single residential erven varies from 215 m^2 to 416 m^2, and the size of the general residential erven varies from 187 m^2 to 408 m^2.

1.4 SITE DESCRIPTION

The approximate site centre has WGS 84 coordinates of 34° 3' 18" S and 22° 12' 11" E. The site is located north of Sandhoogte Road, Groot Brak River. The site currently consists of a single erf, is completely undeveloped and is predominantly bordered by undeveloped land. The site is currently covered with grasslands and large trees.

Figure 1-2: Locality Plan for Erf 2833, Groot Brak River

The typical soil classifications found in the vicinity of the proposed development are extracted from the BGIS Land Use Decision (LUDS) Tool:

- Soils with a marked clay accumulation, strongly structures with a reddish colour. They may occur associated with one or more of vertic, melanic and plinthic soils, and
- Greyish, sandy soils

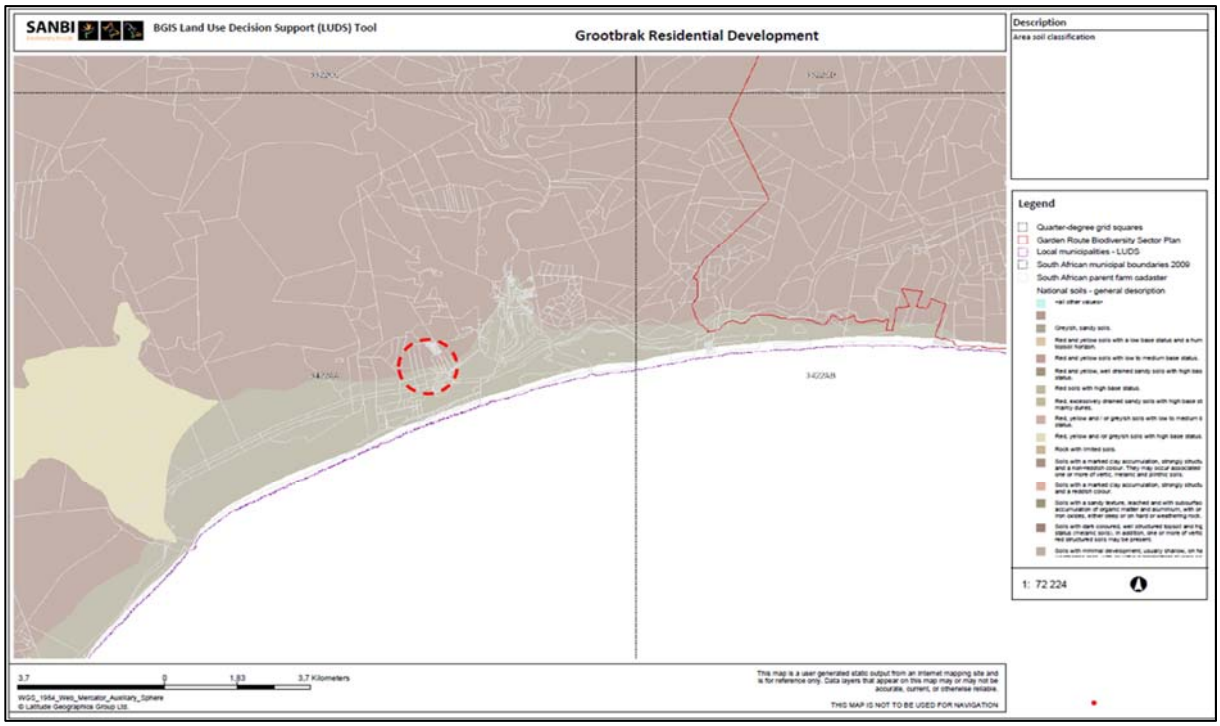


Figure 1-3: Typical Soil Classification (LUDS) Tool

This is a general soil classification map of Southern Africa, and only serves as an indication of the typical soil in the area.

The topography across the site is very steep, varying from approximately 1:6.5 (15%) to 1:2 (50%).

Figure 1-4: Local Topography of Erf 2833, Groot Brak River

2 EXISTING BULK SERVICES

Mossel Bay Municipality provided information pertaining to the existing bulk services in close proximity to the site. The information has been attached as **ANNEXURE B** to this report**.**

3 WATER

NOTE: Information pertaining to the water distribution system (Section 3 of this report) was copied directly from the report "**DEVELOPMENT ON ERF 2833, MOSSEL BAY: CAPACITY ANALYSIS OF THE BULK MUNICIPAL WATER SERVICES**" (dated 12 January 2024) prepared by GLS Consulting (Pty) Ltd. The full report has been attached as **ANNEXURE C** for ease of reference.

3.1 DISTRIBUTION ZONE

The proposed development is located on Erf 2833 in Great Brak. It is proposed that the development will be supplied from the Sandhoogte Water Treatment Plant (WTP) zone, with reservoir Top Water Level (TWL) = 150,3 m and a capacity of 9 200 kL (8 000 kL – Sandhoogte WTP to Great Brak & 1 200 kL – Sandhoogte WTP to Mossel Bay).

The development is situated inside the water priority area.

3.2 WATER DEMAND

No allowance was made in the original master planning for future development on Erf 2833 in the original water analysis. For this re-analysis of the water master plan, the total annual average daily demand (AADD) for the proposed development was calculated as follows:

- 43 Group/Cluster housing (Low Density) @ 0,5 kL/d/unit = 22,5 kL/d(1)
- Fire flow criteria (Medium Risk) – for Group/Cluster Housing = 25 L/s @ 10 m
- Fire flow criteria (Low Risk) - for Residential Stand 33 = 15 L/s @ 10 m

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

The AADD for the existing stands (fully occupied) as well as the proposed development in the Sandhoogte WTP reservoir zone was calculated as follows:

• Sandhoogte WTP zone fully occupied (Great Brak)		=	1 040 kL/d
• Sandhoogte WTP zone fully occupied (Mossel Bay)		=	2 167 kL/d
• Proposed development		=	23 kL/d
	Total	=	3 230 kL/d

3.3 PRESENT SITUATION

3.3.1 RETICULATION NETWORK

The existing water reticulation network of the Sandhoogte WTP zone has sufficient capacity to accommodate the proposed development on Erf 2833.

The following link services items will however be required to connect the development to the existing 200 mm Ø pipe in Sandhoogte Road, and to manage high static pressure at the lower lying erven of the development:

Link service:

- Item 1: 300 m x 110 mm Ø new supple pipe R 262 000 *
- Item 2: PRV to manage high water pressures R 174 000 *

Total R 436 000 *

* Including P & G , Contingencies and Fees, but excluding VAT – Year 2023/24 Rand Value. (This is a rough estimate, which does not include major unforeseen costs).

The route for the proposed pipeline and position of the proposed PRV are schematically shown on Figure 1 (**ANNEXURE C**) but must be finalised after a detailed pipeline route and PRV position investigation.

3.3.2 RESERVOIR CAPACITY

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 water master plan the fully occupied AADD of the Sandhoogte WTP distribution zone is currently approximately 3 230 kL/d. The current storage capacity of the existing Sandhoogte WTP reservoirs is 9 200 kL, which results in a current storage capacity of 68 hours of the AADD.

There is sufficient capacity in the existing Sandhoogte WTP reservoirs to accommodate the proposed development.

3.3.3 ADDITIONAL RESERVOIR CAPACITY FOR FIRE FIGHTING

According to “The Neighbourhood Planning and Design Guide” (so called “Red book”) it is not required to have additional reservoir capacity for typical firefighting volumes. In some cases where water is supplied by e.g. an elevated tank, additional storage is required.

It is proposed that no additional reservoir storage capacity is required for typical firefighting volumes on Erf 2833 in Great Brak.

There is sufficient capacity in the Sandhoogte WTP reservoirs to accommodate the duration of the design fire flow on Erf 2833.

3.4 CONCLUSION

The developer of Erf 2833 in Great Brak will be liable for the payment of a Development Contribution (as calculated by the Mossel Bay Municipality) for bulk water infrastructure as per Council Policy.

There is sufficient capacity in the existing water reticulation system to accommodate the proposed development.

The minimum requirements to accommodate the proposed development on Erf 2833 in the existing water system is the implementation of link service items 1 & 2 to connect to the existing water system and to regulate hight static water pressures, as shown on Figure 1 **(ANNEXURE C)**.

3.5 DESIGN PARAMETERS

The following specifications shall be applicable:

3.5.1 VALVES

- All valves shall be in accordance with SABS 1200 I SABS 664/1974 and approved by the relevant Department Head.
- All valves to be in accordance with SABS 1200, SABS 664/1974 and approved by the relevant department head.
- Valves to be approved and to exceed the specification of AVK resilient seal type.
- Valves shall be clockwise opening or anti-clockwise closing.
- Direction of opening to be clearly marked on valve body or spindle cap.
- All valves shall heavy duty, class 16 with non-rising spindle
- All valves shall be fitted with cast iron caps, secured with retaining bolts.
- All valves Belltobies shall be polymer concrete as per AV Moulding, concrete, recycled plastic or cast iron, depending on area and relevant condition.
- Only valves supplied with a minimum thickness of 225-micron Copon EP 2300 epoxy paint applied to all surfaces after it has been thoroughly cleaned by grit blasting to SA 1/2 finishes in compliance with the requirements of SIS 05 09 00 or valves with similar approved coatings, will be acceptable.

3.5.2 FIRE HYDRANTS

- All fire hydrants shall be in accordance with SANS 1200, comply with the Local Fire Department Standard Regulations and approved by the relevant department head.
- All fire hydrants shall be 110mm diameter (internal) and left hand closing.
- Outlets shall be London Round Thread with cast iron caps and securing chain.
- Hydrant covers shall be polymer concrete as per MV Moulding, concrete recycled plastic or cast iron, depending on area and relevant conditions.
- Hydrant covers shall be painted with a minimum of two coats oil paint, “Yellow”.

3.5.3 WATER SAVING

The development is in a water scarce area and the following general water saving practices are proposed:

- Dual flush toilets.
- Low flow (less than 7l/min) shower heads which make use of either aerators or pulse systems to reduce the flow without compromising the quality of the shower.
- Low flow (less than 10l/min) faucets in the bathrooms.
- Rainwater tanks – all houses should be fitted with rainwater collection tanks for irrigation and washing of vehicles.
- Geyser and pipe insulation. Homeowners must be required to install geyser and pipe insulation. This must be included in their building guidelines.

4 SEWAGE

Based on the information received for the existing sewage infrastructure (refer to **ANNEXURE B**), the proposed development falls within the Groot Brak Wastewater Treatment Works drainage area.

4.1 STATUS QUO

There is no existing sewer gravity main at the south of the proposed development. There is an existing 160mm diameter uPVC sewer gravity main approximately 300m from the proposed development, running parallel to Sandhoogte Road, conveying sewage to the Long Street sewage pump station in Groot Brak. It is then pumped via a rising main parallel to Sandhoogte Road to Wastewater Treatment Works to the East of the proposed development.

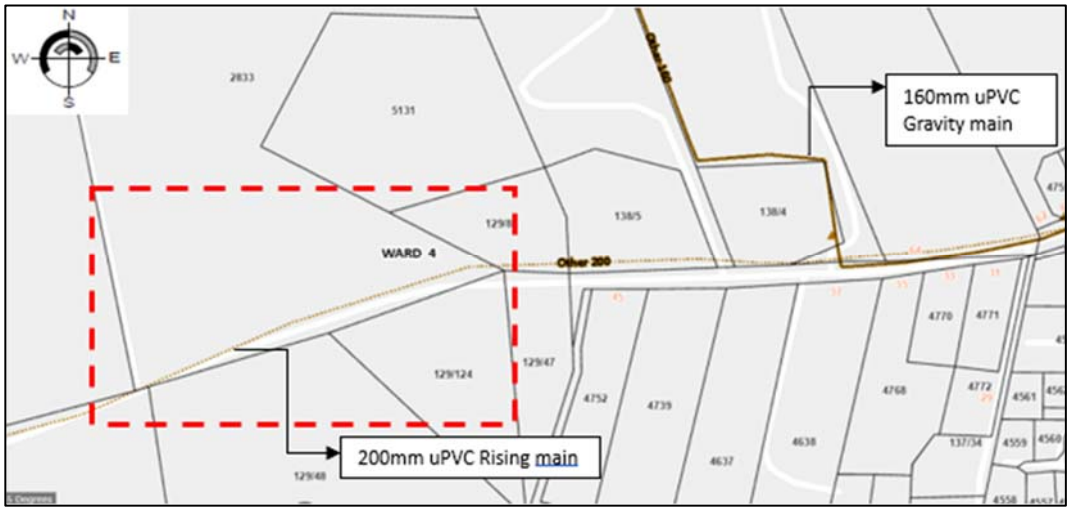


Figure 4-1: Existing sewage infrastructure

Due to the topography of the proposed development and the anticipated invert levels of the Municipal infrastructure, it is envisaged that the reticulation for the development be connected to the existing sewer gravity main discussed above. However, during discussions with officials from Mossel Bay Municipality officials, it became evident that the Long Street pump station is not operating at acceptable level of service. This is due to various reasons including lack of capacity and problems during load shedding. It became evident that no further development in the Mid-Brak area will be allowed before the pump station issue has been resolved.

It was therefore decided to install a conservancy tank on the site. Sewer from the development will gravity feed into the tank. When the tank is full, the sewer it will be pumped out by vacuum truck (Honey Sucker) and delivered to the Sewer Treatment Plant west of the DR1578.

The conservancy tank will be positioned at the lowest side of the site, to allow future connection to the Municipal gravity line after the issues with the Long Stret Pump station have been resolved.

The proposed development area will cover approximately 6.04 ha and will generate a design peak flow as detailed in the following sections.

4.2 DEMAND CALCULATIONS

In accordance with the *Neighborhood Planning and Design Guide*, the following:

1. From **Table K.4**:
    - Sewage flow is estimated to be 90% of the Average Annual Daily Demand (AADD) (As calculated in Section 3 of this report)
    - Average Dry Weather Flow (ADWF) = 90% x 22,5kℓ/day = 20.25kℓ/day

Land use		Density #1 units/ha	Stand size #2 m²	Unit of measure	Water demand (AADD) kL/ha/d	Water demand (AADD) kL/unit/d #3	Sewer flow (excl. infiltration) (Unit PDDWF) #4 % AADD	Sewer flow (excl. infiltration) (Unit PDDWF) #4 kL/unit/d #3	Sewer flow (excl. infiltration) (Unit PDDWF) #4 Unit Hydro-graph (UH)
Group/ cluster housing	High density	60 to 40	130 to 200	kL/unit	21	0.40 to 0.45	95% to 90%	0.38 to 0.41	UH5
	Medium density	40 to 30	200 to 270	kL/unit	17	0.45 to 0.50	90% to 85%	0.41 to 0.43	UH5
	Low density	30 to 20	270 to 400	kL/unit	14	0.50 to 0.60	85% to 80%	0.43 to 0.48	UH5

Table 4-1: Recommended Sewage Flow

2. From **Table K.8**:
    - Peak factor = 2.5 (Residential)
    - Peak Dry Weather Flow (PDWF) = 20.25 x 2.5 = 50,625kℓ/day

Land use	Peak factor
Residential – see Figure K.16	1.8 to 2.5
Business/commercial	1.3 to 1.5
Industrial – light	2.5 to 4.0
Industrial – heavy	2.0 to 3.0
Clinics, restaurants, laundromats and hotels	1.8 to 2.5

Table 4-2: Recommended Peak Factor

3. Add 15% infiltration to make provision for stormwater ingress into the sewage system:
    - Peak Wet Weather Flow (PWWF) = 1.15 x 50,6 = 58.21kℓ/day = 0.659ℓ/s

4.3 PROPOSED RETICULATION

A minimum pipe size of 160mm diameter is proposed for the gravity main for the new development to accommodate the anticipated sewage flows that will be generated, with 110mm diameter connections from the erven:

- The total estimated sewage flow for the proposed development is 0.659ℓ/s.
- As per the *Neighborhood Planning and Design Guide*, the optimum flow velocity is between 0.6 – 2.5m/s. The maximum velocity of 4m/s is acceptable for short pipe lengths.
- For the estimated flow of 0.659ℓ/s, at a flow velocity of 1.5m/s, a minimum diameter of 75mm is required. However, the minimum pipe diameter for sewer pipes is 160mm by industry guidelines.

- Assuming the conservancy tank will only be pumped out every 7 days, the size of the tank can be calculated as follows:

  Required Tank Capacity = 7 days x ADWF = 7 x 20.25kℓ/day = 141.75 kℓ
  Assumed occupancy rate = of 65%, therefore tank capacity = 92,13kℓ.
  Tank dimensions required = 5.5m x 5.5m x 3m deep

4.4 DESIGN PARAMETERS AND STANDARDS

The following design criteria must be followed:

- Pipe diameter: uPVC Class 34, SANS 791, 160mm diameter solid wall for main lines and 110mm diameter solid wall for individual unit connections.
- Mossel Bay Municipality's Standard Details shall be used.
- A minimum self-cleansing velocity of 0,7m/s.
- A maximum velocity of 3.5m/s to prevent segregation of solid and liquids.
- All design slopes of gravity mains must be in line with applicable design standards.
- Prefabricated fibre cement shafts or concrete manhole rings to be used for concrete manholes where required.
- Manhole covers to be Polymer concrete or similar approved.

5 STORMWATER

5.1 INTRODUCTION

The proposed development makes provision for a total of 44 residential units, comprising a mixture of 2-and 3 bedroom units (refer to **ANNEXURE A** for typical unit layouts). The two-bedroom unit has a floor area (including garage and covered patio) of approximately 141m^2 while the three bedroom unit has a footprint of approximately 163m^2.Assuming that each unit includes a further 47m2 of paving (driveways and back of house areas) it can be argued that for a worst-case scenario, the total impervious area can be calculated as follows:

- 44 x 210m2 = 9,240m^2 of hard surfacing, paving, roofs etc. (limited to inside of erven)

The total length of roads within the proposed development is equal to 715m. It is important to note that the 305m long servitude road is existing and already surfaced with interlocking paving blocks. There are therefore only 410m of new surfaced roads that need to be build as part of this development. Assuming (worst case scenario) that all the new roads will consist of a 6m wide surfaced area, the total area of new road surfaces can be calculated as follows:

- 410m x 6m = 2,460m2

From the above it follows that the total proposed development has the potential to create 11,700m^2 of new impervious area. Since the size of Erf 2833 is approximately 60,400m^2 in extend, it follows that only roughly 20% of the erf will be hardened with the proposed development.

5.2 STATUS QUO

The site generally drains towards an existing drainage line running from the northeastern corner towards the southwestern corner. (refer to the flow line analysis included as Figure 5-1.)

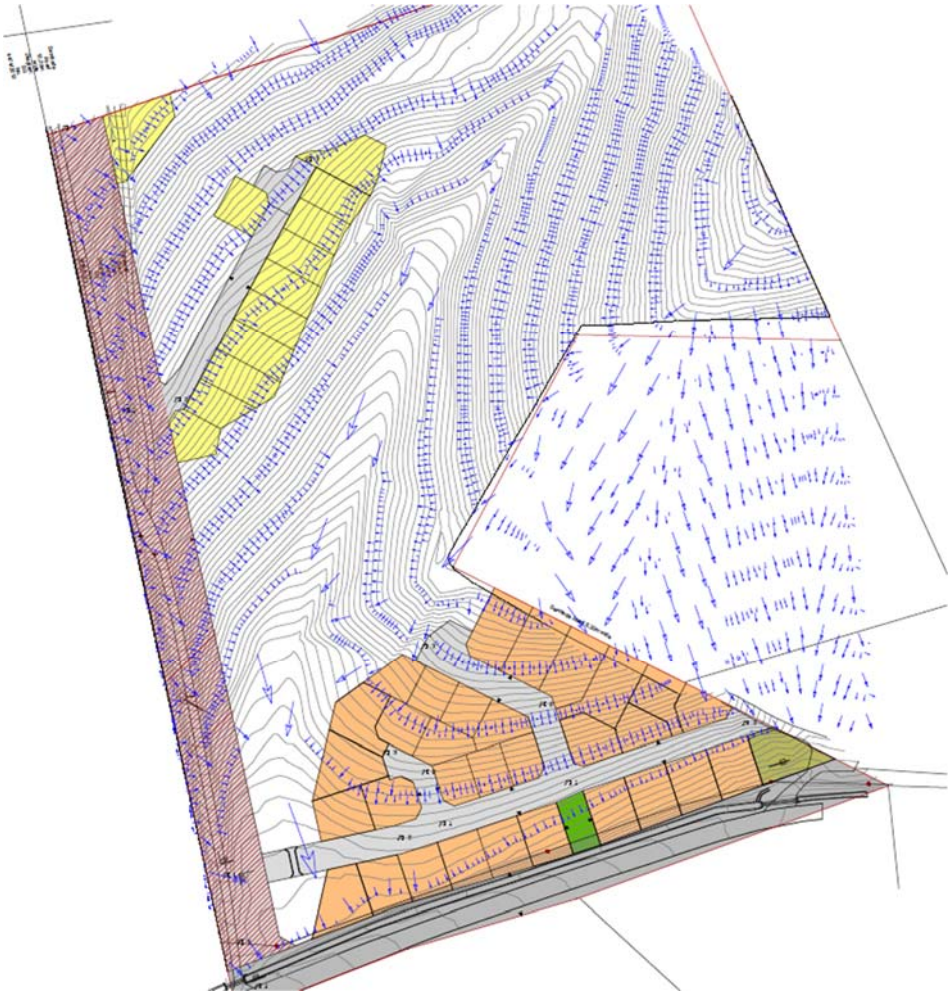


Figure 5-1 - Current Flow Line Analyses

From the lowest point, water drains overland towards an existing stormwater trapezoidal channel running parallel along the northern edge of Sandhoogte Road.

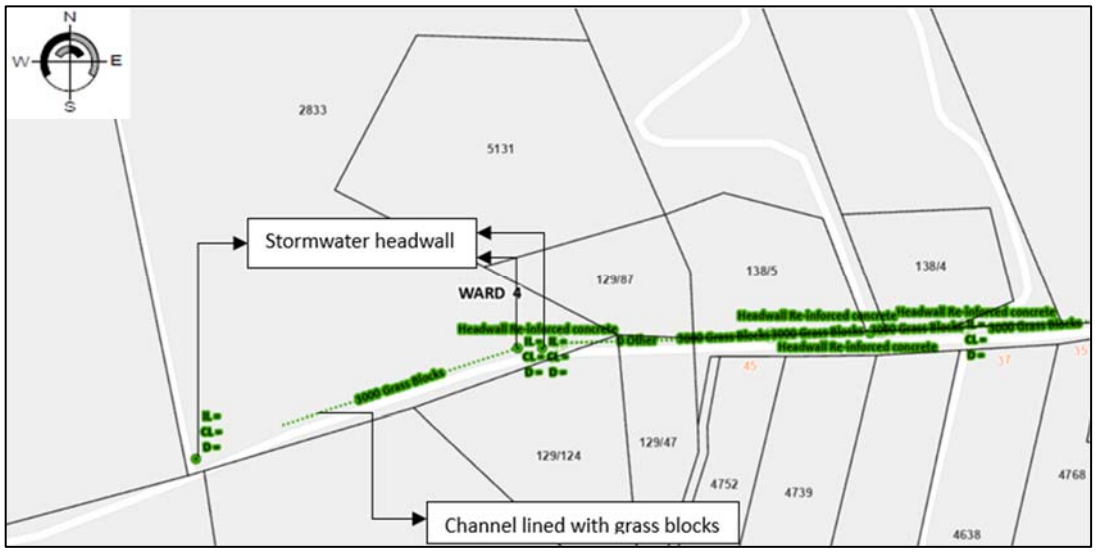


Figure 5-2: Existing stormwater infrastructure

5.3 PROPOSED STORMWATER MANAGEMENT

Due to the large undeveloped areas, ideal site topography and environmental benefits, it is proposed that the stormwater generated by the proposed development be managed by a Sustainable Urban Drainage System (SUDS) approach. The principle of the SUDS approach is to mimic natural hydrological cycles, which prevents erosion of natural channels, siltation of water bodies and pollution, reducing environmental degradation.

SUDS embraces several options that are arranged in treatment trains, which helps to improve the efficiency and the resiliency of the system. There are three stages in the treatment train, each having slightly different combinations of SUDS options to control the stormwater:

1. ”Source Controls” manage stormwater runoff as close to its source as possible, typically on site. Typical SUDS options include green roofs, rainwater harvesting, permeable pavements and soak-aways.
2. ”Local Controls” manage stormwater runoff in the local area, typically within the road reserves. Typical SUDS options include bio-retention areas, filter strips, infiltration trenches, sand filters and swales.
3. ”Regional Controls” manage the combined stormwater runoff from several developments. Typical SUDS options include constructed wetlands, detention and retention ponds.

The following approach to stormwater management for the proposed development is therefore proposed:

1. “Source Controls” - Reduce runoff by means of rainwater harvesting tanks which collect and store water from building roofs. Emergency overflows will be included in the design to allow controlled discharge of water during major storms. Harvested water can be used for general purposes such as irrigation of landscaped gardens as well as washing and general maintenance of facilities. Harvested water can also be used as part of a dual plumbing system in the water borne Sewer Reticulation Network, greatly reducing the development’s potable water demand.
2. “Local controls” – Divert excess water toward the existing grass lined stormwater channel currently situated on the erf. If required, the capacity of the channel can be increased by improving the permeability of the channel. Creation of natural cavities or area of increased permeability created along the drainage channel flow line, will help reduce speeds and improve soil infiltration
3. Reducing the hardened surface area of the development to a maximum of 60% will ensure that the post-development runoff generated is limited and that it can be discharged overland to the natural surroundings without causing erosion and damaging the natural environment. In the case of the proposed development, hardened areas comprise only approximately 20% of the total area of the erf.

5.3.1 PEAK FLOW CALCULATION

The Rational Method was used to determine a high-level estimate of the expected stormwater run-off for minor (1:5 Year) and major (1:50 Year) storms for the expected catchment area. The Rational Method is sufficient for calculating the runoff, as the catchment area is smaller than 15km².

1. The run-off factors were determined for the pre- and the post-development of the catchment area, by taking into consideration the size, slope and land surface coverage of the catchment areas.

2. The peak run-off was determined by taking into account the run-off factor, the Mean Annual Precipitation of Mossel Bay, the time of concentration of the catchment area, the return period, and the rainfall intensity expected.

The catchment area was delineated manually using Google Earth imagery and levels. The pre- and post-development runoffs were calculated manually using the following parameters:

	Pre-development	Post-development
MAP	420mm	420mm
Total Catchment Area	60,400m^2	60,400m^2
Total watercourse length	0,365km	0.388km
Time of Concentration	24.5min	25.6min
Run-off Coefficient	0.354	0.123

Table 5-1 - Rational Method Parameters

The detailed rational method calculation has been attached as **ANNEXURE D**, but for ease of reference the pre- and post-development peak flows have been summarized in Table 5-2 below.

Return Period	Pre-Development	Post Development
$Q_{1:2}$	0,0693	0,064
$Q_{1:5}$	0,1003	0,089
$Q_{1:10}$	0,1348	0,117
$Q_{1:20}$	0,1853	0,152
$Q_{1:50}$	0,3021	0,212
$Q_{1:100}$	0,4482	0,274
$Q_{1:200}$	0,5518	0,338

Table 5-2 - Summary of Pre- and Post Development Peak Flow

5.4 DESIGN PARAMETERS AND STANDARDS

The following design criteria must be followed:

- Minor system: 5 Year return period.
- Major system: 20 Year return period.
- The minimum gradient for pipelines (if required) will give a minimum velocity of 0.7m/s. with the pipe flowing full.
- The maximum velocity used is 3.5m/s.
- Minimum pipe diameter is 450mm.
- Pipes to be reinforced concrete Class 100D spigot and socket pipes.

6 ROADS

6.1 STATUS QUO

The condition of the roads surrounding the proposed development is based on a visual desktop inspection:

- Sandhoogte Road runs along the southern boundary of Erf 2833 and the condition of the road can be classified as good.
- There is a 3m wide existing paved road in the right of way running along the western boundary of Erf 2833. The condition of the access road can be classified as good.

6.2 PROPOSED ACCESS

The development accessed from the existing servitude road perpendicular to Sandhoogte Road, running along the western boundary of Erf 2833. Alterations or widening of the road may be required.

A detailed Traffic Impact Assessment (Report 23-041_TIA) was prepared by Urban Engineering and can be referenced for more detail.

Access approval from the Municipal Road Authority will be required. The accesses will need to be constructed to a standard which allows for safe entry and exit of refuse removal trucks and Firefighting trucks to the site.

6.3 DESIGN PARAMETERS AND STANDARDS

The standard of roads to be provided are as follows:

- Where the road reserve is 8m, the access road within the development is proposed to be 5m wide, and 6m wide where the road reserve is 10m.
- The type of road surface to be discussed and agreed with the client.
- Sub-base and base materials to be imported.
- Sub-surface drainage, where applicable, will be installed.
- Barrier kerbs to be installed on bellmouths.
- Mountable kerbs and channels to be installed on the road edge, depending on the cross-fall of the road.

7 SOLID WASTE MANAGEMENT

The existing Municipal dump will be used for solid waste disposal. Removal of waste and management thereof will be handled by Mossel Bay Municipality as per the Services Agreement between the Mossel Bay Municipality and the Developer.

Refuse removal will be dealt with once a week as applicable to all the current residential areas in the Mossel Bay Municipal Area. As per the Municipal by-laws, the Mossel Bay Municipality may require the developer to install a refuse receptacle on the property, which will be located adjacent to a public street or in a position that will provide sufficient access to the refuse collection vehicle. The receptacle will also have to comply with other standard conditions or requirements that the Municipality may impose relating to the access, health, pollution control, recycling, safety or aesthetics thereof.

Solid waste for residential units is based on an estimated 0.85 kg/person/day (as per the *Neighborhood Planning and Design Guide*), with the assumption that the average household in the development will comprise of four persons.

1. Annual waste generation per household = 0.85 x 4 x 365 = 1241kg/household/annum = 1.241 tonnes/household/annum
2. Annual waste generation for the proposed development (44 residential units) = 1.241 x 44 = 54.604 tonnes/annum
3. Total volume waste generated for the proposed development (Assumption made based on average composition of municipal waste) = 54.604 x 0.75 = 40.953m^3/annum

The Mossel Bay Municipality to confirm whether the existing solid waste site will be able to accommodate the solid waste expected to be generated by the proposed development.

8 FLOOD LINES

This proposed development is not directly affected by flood lines.

9 DEVELOPMENT CONDITIONS AND LAND REHABILITATION

The general terrain and the underlying geology of this site appears to be suitable for housing development. A specialist Geotechnical Investigation will need to be completed to confirm the suitability of the site.

10 AVAILABILITY OF SERVICES AND DEVELOPMENT CONTRIBUTIONS

Capital Contributions are the tariffs payable in respect of the water, electricity, sewerage, roads and solid waste removal infrastructure of the Municipality, relating to the capital and replacement costs and associated interest charges in respect thereof. The development costs for these capital contributions are to be determined by the Directors: Electrotechnical Services, Civil Engineering Services and Community Services in accordance with standard formulas & applicable road model.

11 CONCLUSION AND RECOMMENDATIONS

The purpose of this report is to assess the existing municipal engineering services and the extent thereof that will be affected by the proposed residential development in Groot Brak. The impact of the proposed development is summarised below:

SUMMARY OF IMPACT	VALUE
DOMESTIC WATER DEMAND (AADD) (From GLS Report)	22,5kℓ/day
SEWERAGE DAILY DRY WEATHER FLOW (ADDWF)	20.25kℓ/day
SEWERAGE PEAK DAILY DRY WEATHER FLOW (PDDWF)	50.62kℓ/day
SEWERAGE PEAK DAILY WET WEATHER FLOW (PDWWF)	58.21kℓ/day
SOLID WASTE GENERATED	54 tonnes/annum

Table 11-1: Summary of proposed development's impact

Existing civil services near the proposed development were identified by the Mossel Bay Municipality from their GIS database, and the following preliminary proposals were made regarding the required services and feasible connection points to the existing infrastructure:

WATER

Based on the investigation done by GLS Consulting (**ANNEXURE C**), there is sufficient capacity in the existing water reticulation system to accommodate the proposed development.

The minimum requirements to accommodate the proposed development on Erf 2833 in the existing water system is the implementation of link service items 1 & 2 to connect to the existing water system and regulate high static water pressures, as shown on Figure 1 in **ANNEXURE C**.

SEWER

A waterborne sewer reticulation system is proposed for the development. Until such time as the issues with the Long Street sewer pumps station have been resolved, sewer to gravity feed down to a conservancy tank situated on the low part of the site. This tank will need to be cleaned out by vacuum truck once full and the truck shall then deliver its contents to the Great Brak Waste Water Treatment Plant. Once the problems with the Long Street sewer pumps station have been resolved, the conservancy tank should be removed and the sewer line should be extended to connect into the existing Municipal sewer main approximately 300m east from the proposed development, running parallel to Sandhoogte Road. It is envisaged that the tank should have sufficient capacity to only need to be cleaned once every 7 days, resulting in a 5.5mx5.5mx 3m deep tank.

STORMWATER

The proposed development will only harden approximately 20% of the total site footprint. 80% of the site will remain undeveloped and permeable, resulting in large areas available for ground water infiltration. The existing main drainage lines will remain unchanged, but it is expected that the introduction of flat lawns, soft landscaped beds, rainwater harvesting tanks and roads that cut across the general fall of the site, will increase the length of the longest water course, which leads to an increase in time of concentration and subsequent reduction in Peak Flow Volumes.

TRAFFIC IMPACT

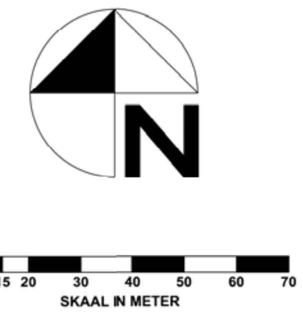
The development accessed from the existing servitude road perpendicular to Sandhoogte Road, running along the western boundary of Erf 2833. Alterations or widening of the road may be required.

A detailed Traffic Impact Assessment (Report 23-041_TIA) was prepared by Urban Engineering and can be referenced for more detail.

We trust that sufficient detail has been provided to decide on the way forward. if required, a detailed design of the proposed development's Civil Engineering Infrastructure based on the abovementioned report can be conducted by Urban Engineering (Pty) Ltd.

Should any additional information be required, or if you wish to discuss these recommendations with us, please do not hesitate to contact us.

ANNEXURE A
SITE DEVELOPMENT PLAN



cell: 082 464 7871 | email: janvrolijk@vodmail.co.za

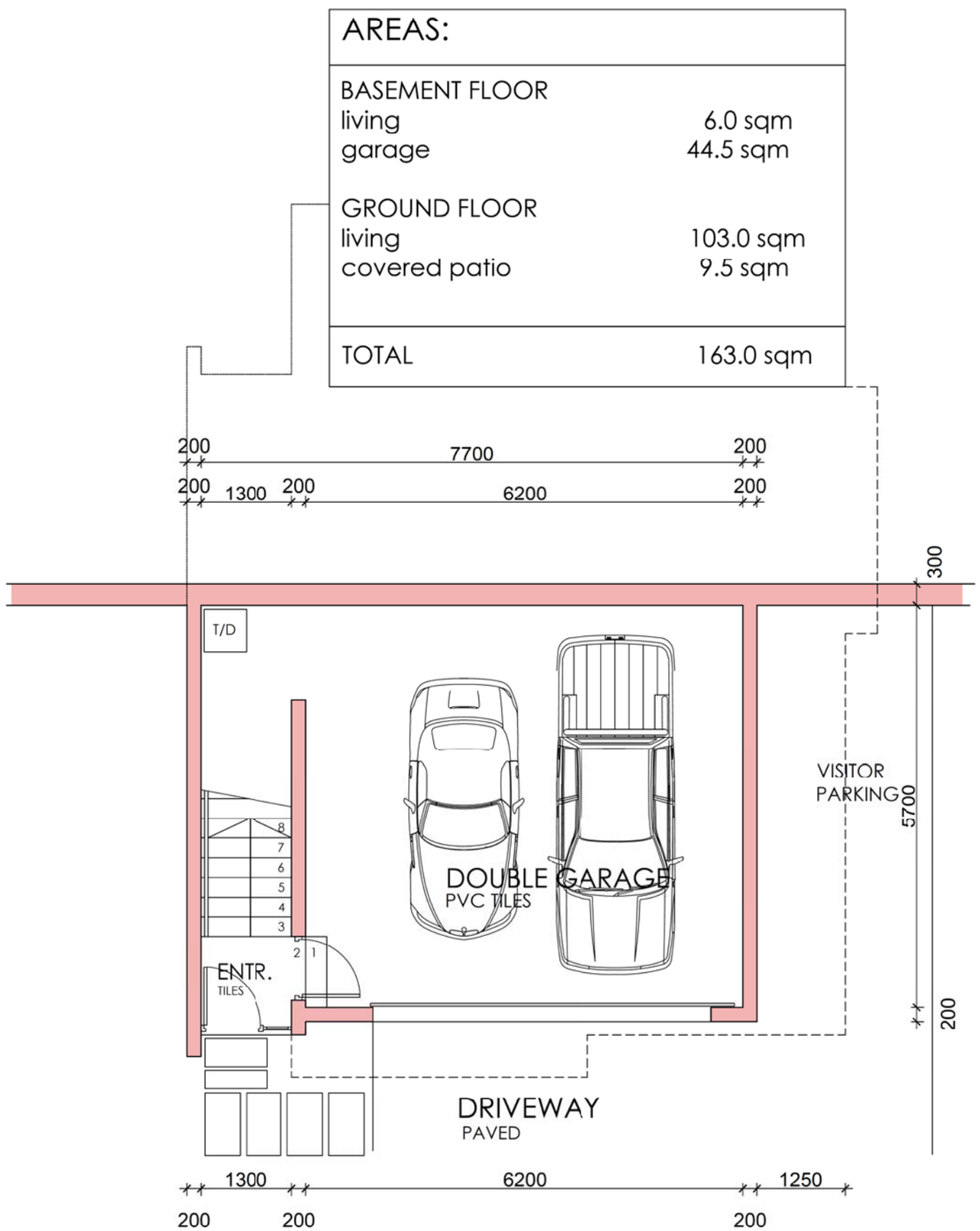
PROJECT

DRAWING TITLE

PROJECT No.	DWG No.	REVISION No.	DATE OF PRINT
ERF 2833 G BRAK	P.2	3	08.09.2023
SCALE	PROJECT DATE	DRAWN BY	CHECKED BY
NTS	SEPT 2023	AA	JV

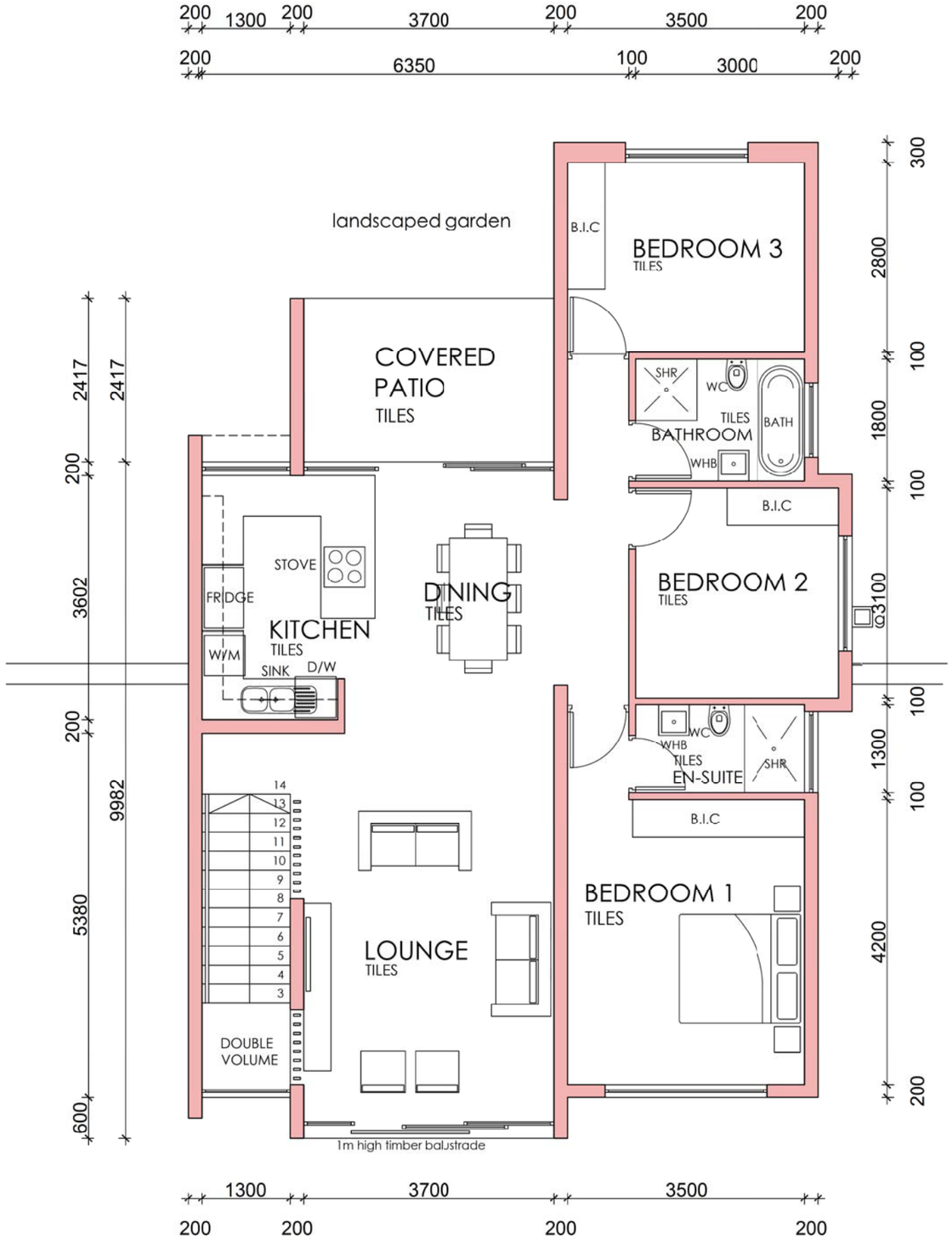
TYPICAL 3 BEDROOM UNIT

AREAS:	
BASEMENT FLOOR	
living	6.0 sqm
garage	44.5 sqm
GROUND FLOOR	
living	103.0 sqm
covered patio	9.5 sqm
TOTAL	163.0 sqm



Lower Ground Floor Plan

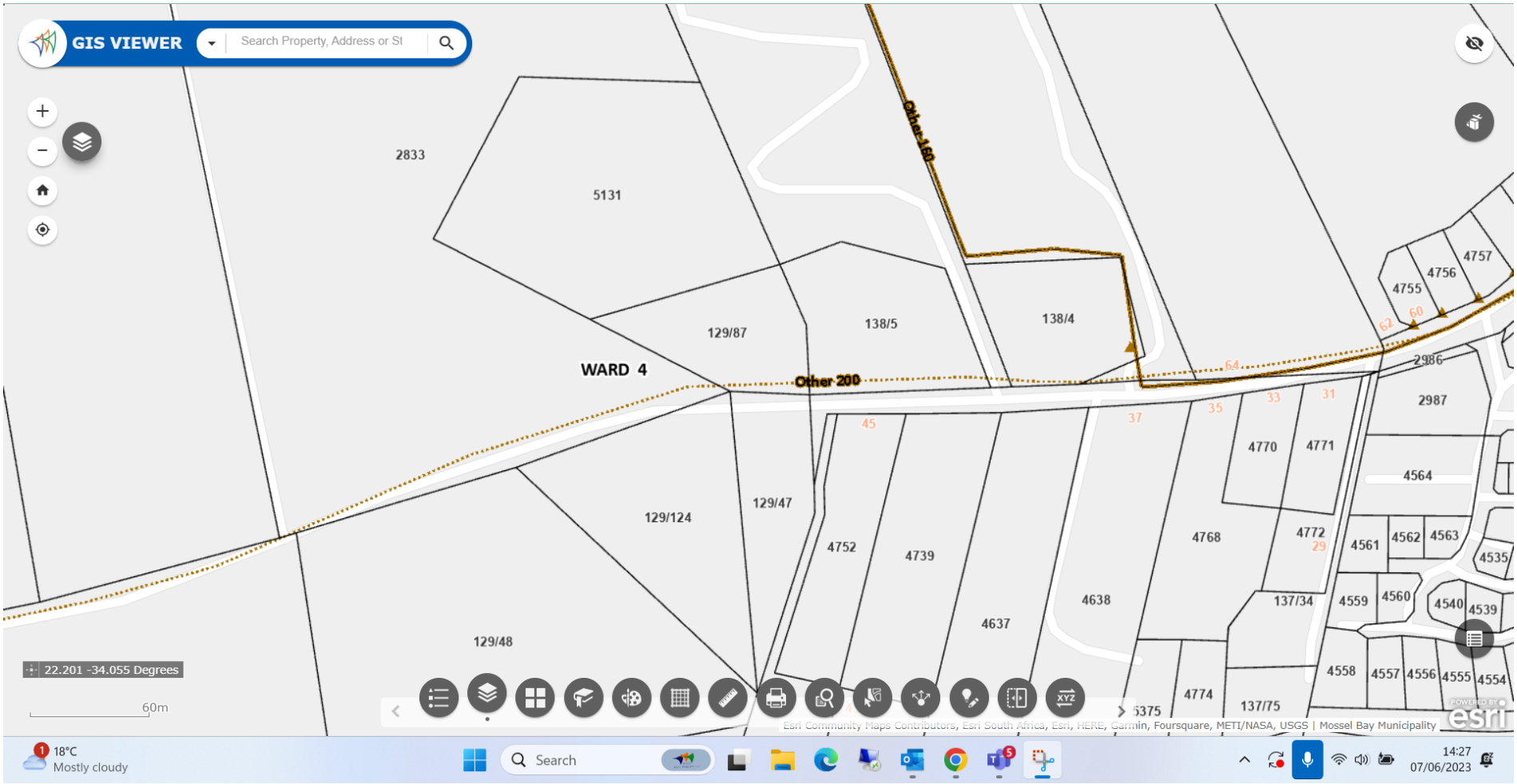
SCALE 1:100



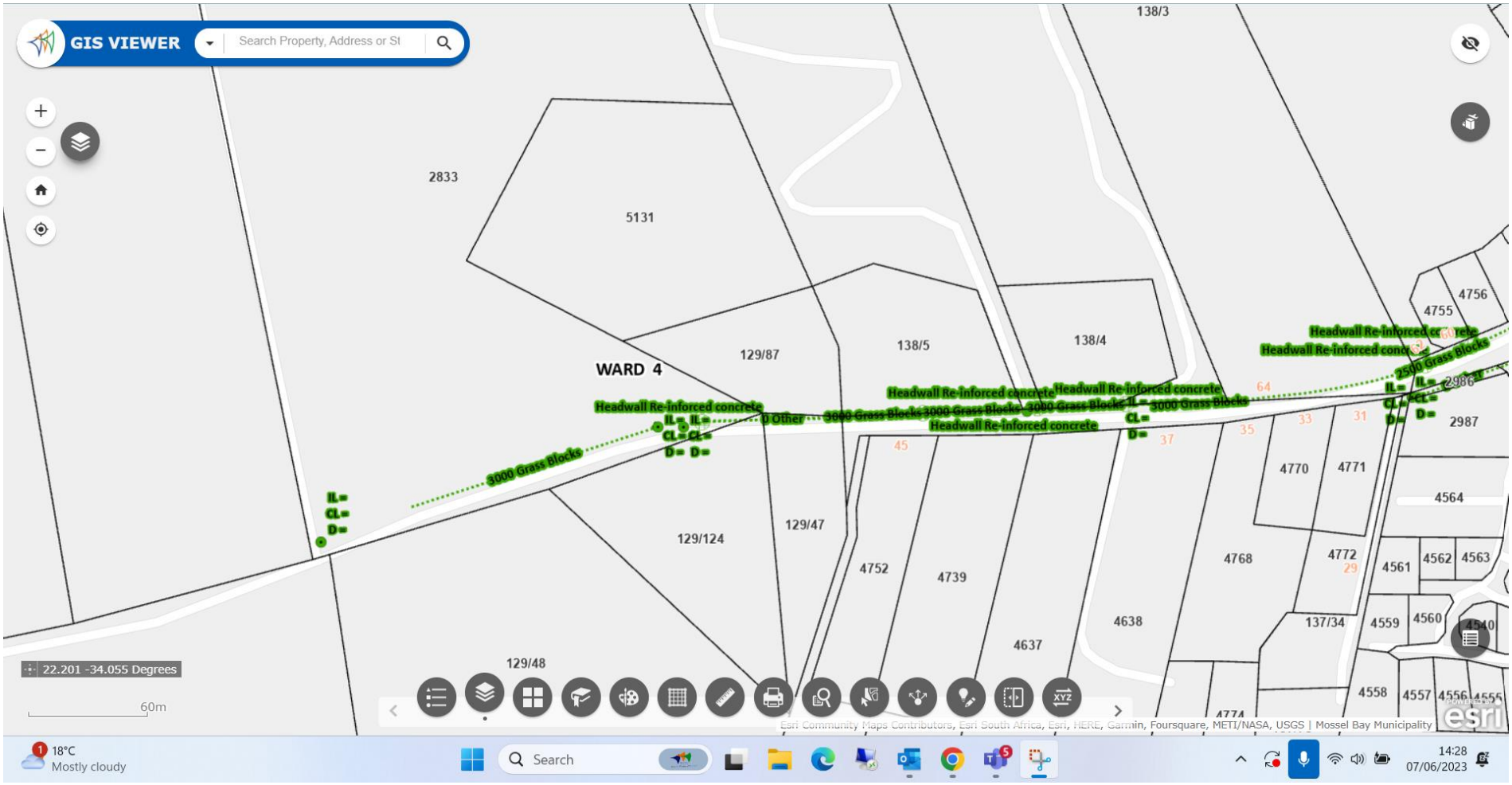
Ground Floor Plan

SCALE 1:100

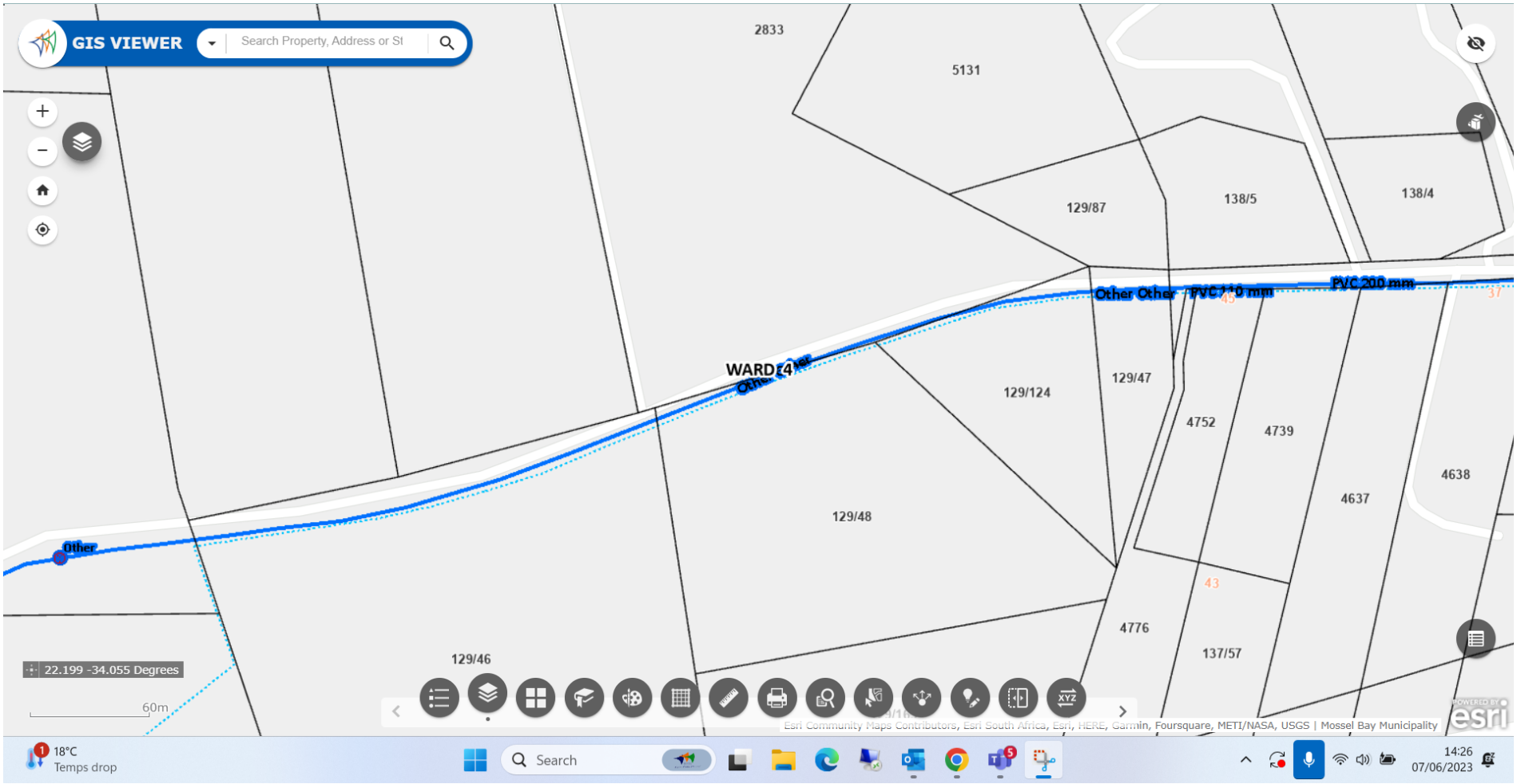
ANNEXURE B
INFORMATION RECEIVED FROM MOSSEL BAY MUNICIPALITY



Existing Sewer Infrastructure



Existing Stormwater Infrastructure



Existing Water Infrastructure

ANNEXURE C
INFORMATION RECEIVED FROM GLS CONSULTING

Infrastructure planning

12 January 2024

Urban Engineering
18 Varing Avenue
George
6529

Attention: Mr. Frans van Aardt

Dear Sir

DEVELOPMENT ON ERF 2833, MOSSEL BAY: CAPACITY ANALYSIS OF THE BULK MUNICIPAL WATER SERVICES

The request by Mr Frans van Aardt of Urban Engineering regarding comments on the available municipal water supply for the proposed development (development of 43 Residential units), refers.

This document should inter alia be read in conjunction with the "Mossel Bay Municipality Water Master Plan" dated April 2017.

The proposed development on Erf 2833 was not taken into consideration for the master planning of the water network.

1. WATER DISTRIBUTION SYSTEM

1.1. Distribution zone

The proposed development is located on Erf 2833 in Great Brak. It is proposed that the development will be supplied from the Sandhoogte Water Treatment Plant (WTP) zone, with reservoir Top Water Level (TWL) = 150,3 m and a capacity of 9 200 kL (8 000 kL – Sandhoogte WTP to Great Brak & 1 200 kL – Sandhoogte WTP to Mossel Bay).

The development is situated inside the water priority area.

1.2. Water demand

No allowance was made in the original master planning for future development on Erf 2833 in the original water analysis.

For this re-analysis of the water master plan, the total annual average daily demand (AADD) for the proposed development was calculated as follows:

•	43 Group/Cluster housing (Low Density) @ 0,5 kL/d/unit	=	22,5	kL/d[(1)]
•	Fire flow criteria (Medium Risk) – for Group/Cluster Housing	=	25	L/s @ 10 m
•	Fire flow criteria (Low Risk) - for Residential Stand 33	=	15	L/s @ 10 m

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

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Reg no: 2007/003039/07
www.gls.co.za

Directors: Rebecca Pole, Marius de la Rey, Garreth Young

The AADD for the existing stands (fully occupied) as well as the proposed development in the Sandhoogte WTP reservoir zone was calculated as follows:

• Sandhoogte WTP zone fully occupied (Great Brak)		=	1 040	kL/d
• Sandhoogte WTP zone fully occupied (Mossel Bay)		=	2 167	kL/d
• Proposed development		=	23	kL/d
	Total	=	3 230	kL/d

1.3. Present situation

1.3.1. Reticulation network

The existing water reticulation network of the Sandhoogte WTP zone has sufficient capacity to accommodate the proposed development on Erf 2833.

The following link services items will however be required to connect the development to the existing 200 mm Ø pipe in Sandhoogte Road, and to manage high static pressure at the lower lying erven of the development:

Link service:

• Item 1:	300 m x 110 mm Ø new supple pipe		R	262 000 *
• Item 2:	PRV to manage high water pressures		R	174 000 *
		Total	R	436 000 *

* Including P & G , Contingencies and Fees, but excluding VAT – Year 2023/24 Rand Value. (This is a rough estimate, which does not include major unforeseen costs).

The route for the proposed pipeline and position of the proposed PRV are schematically shown on Figure 1 but must be finalised after a detailed pipeline route and PRV position investigation.

1.3.2. Reservoir capacity

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 water master plan the fully occupied AADD of the Sandhoogte WTP distribution zone is currently approximately 3 230 kL/d. The current storage capacity of the existing Sandhoogte WTP reservoirs is 9 200 kL, which results in a current storage capacity of 68 hours of the AADD.

There is sufficient capacity in the existing Sandhoogte WTP reservoirs to accommodate the proposed development.

1.3.3. Additional reservoir capacity for fire fighting

According to “The Neighbourhood Planning and Design Guide” (so called “Red book”) it is not required to have additional reservoir capacity for typical firefighting volumes. In some cases where water is supplied by e.g. an elevated tank, additional storage is required.

It is proposed that no additional reservoir storage capacity is required for typical firefighting volumes on Erf 2833 in Great Brak.

There is sufficient capacity in the Sandhoogte WTP reservoirs to accommodate the duration of the design fire flow on Erf 2833.

2. CONCLUSION

The developer of Erf 2833 in Great Brak will be liable for the payment of a Development Contribution (as calculated by the Mossel Bay Municipality) for bulk water infrastructure as per Council Policy.

There is sufficient capacity in the existing water reticulation system to accommodate the proposed development.

The minimum requirements to accommodate the proposed development on Erf 2833 in the existing water system is the implementation of link service items 1 & 2 to connect to the existing water system and to regulate hight static water pressures, as shown on Figure 1.

We trust that you find this of value.

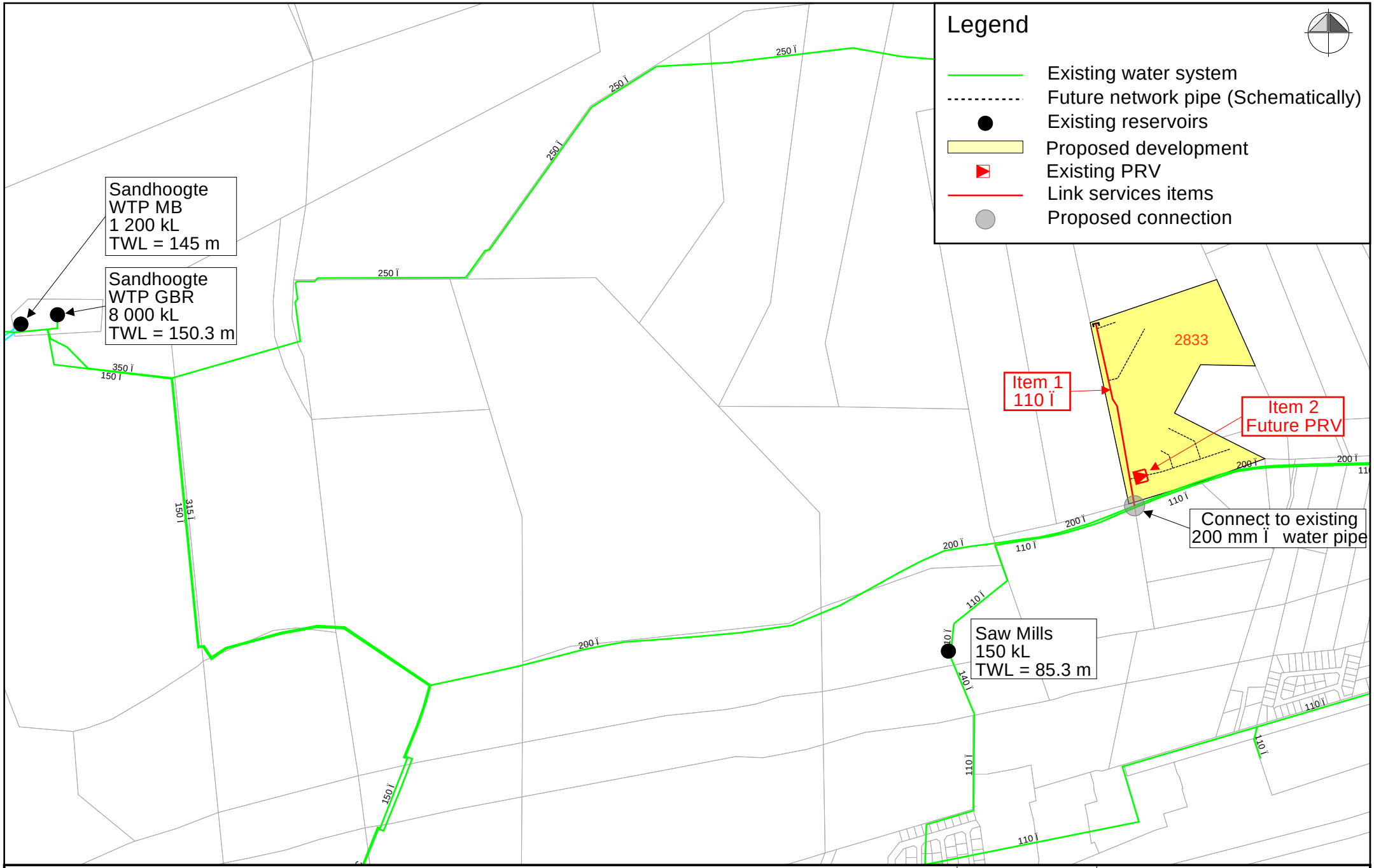
Yours sincerely,

GLS Consulting (Pty) Ltd
REG. NO.: 2007/003039/07

_____
Per: PT MALHERBE

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

Attention: Mr. Eric Louw



January 2024

Proposed Development:
Erf 2833 Great Brak

0 100 200 400 m

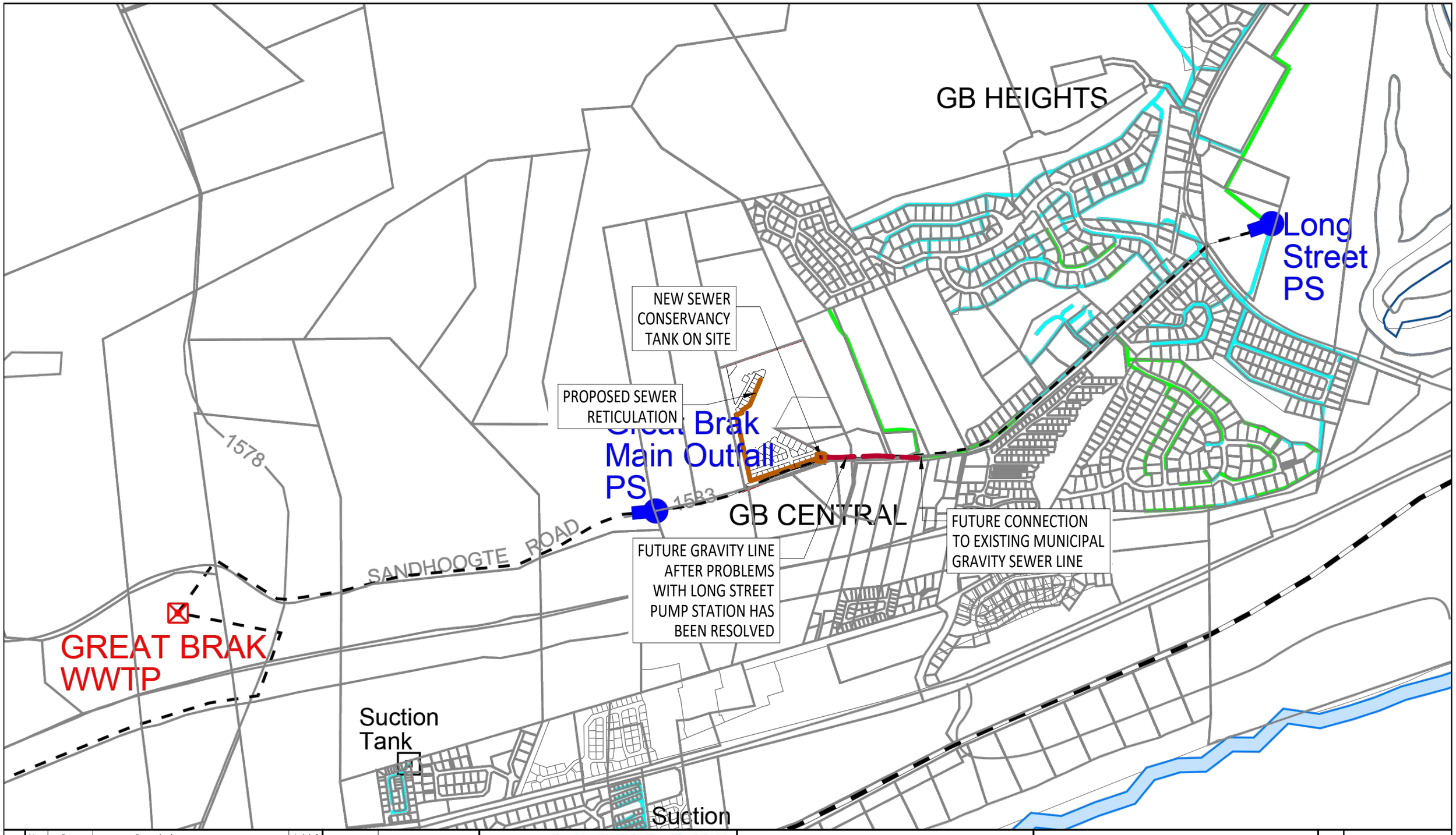
Scale 1:8000

GLS Infrastructure planning

Figure 1

Proposed Development
Mossel Bay - Erf 2833
Existing Water Reticulation

ANNEXURE D
CONCEPTUAL LAYOUTS



Revisions	No.	Date	Description	Initial
	A	AUG 23	CES REPORT REV 1	
	B	OCT 23	CES REPORT REV 2	

Designed	F van AARDT (Pr Eng)
Checked	F van AARDT (Pr Eng)
Drawn	F van AARDT (Pr Eng)
Checked	F van AARDT (Pr Eng)

URBAN ENGINEERING CONSULTANTS
CONSULTING CIVIL AND STRUCTURAL ENGINEERS

GROOTBRAK RESIDENTIAL DEVELOPMENT

PROPOSED SEWER LAYOUT INCLUDING CONSERVANCY TANK AND FUTURE CONNECTIONS

A3	Scale NTS
Drawing No.	23-041-00
Rev No.	B