

ENGINEERING SERVICES REPORT

**PROPOSED DEVELOPMENT OF AALWYNDAL
FARM 220/209, MOSSEL BAY, WESTERN
CAPE**

Report Number 22-085_CES



Date: September 2023

Revision (2)

QUALITY ASSURANCE DATA

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Revised by:

Frans van Aardt (B.Ing, M.Ing, Pr.Eng)
 on behalf of Urban Engineering (Pty) Ltd

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LIST OF ABBREVIATIONS

| | |
|-------|---|
| 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) |
| GHPSD | Guidelines for Human Planning and Settlement Design |

1 INTRODUCTION

Urban Engineering (Pty) Ltd was appointed by NN Busdiens (Pty) Ltd to prepare a Civil Engineering Service Report pertaining to the proposed development of Portion 209 of Vyf Brakkefonteinen, No 220. The site is located approximately 1km West of the N2/Voorbaai Interchange and is approximately 7km Northwest from the Mossel Bay CBD. The nearby Langeberg Mall and Voorbaai areas are located to the East of the proposed development.

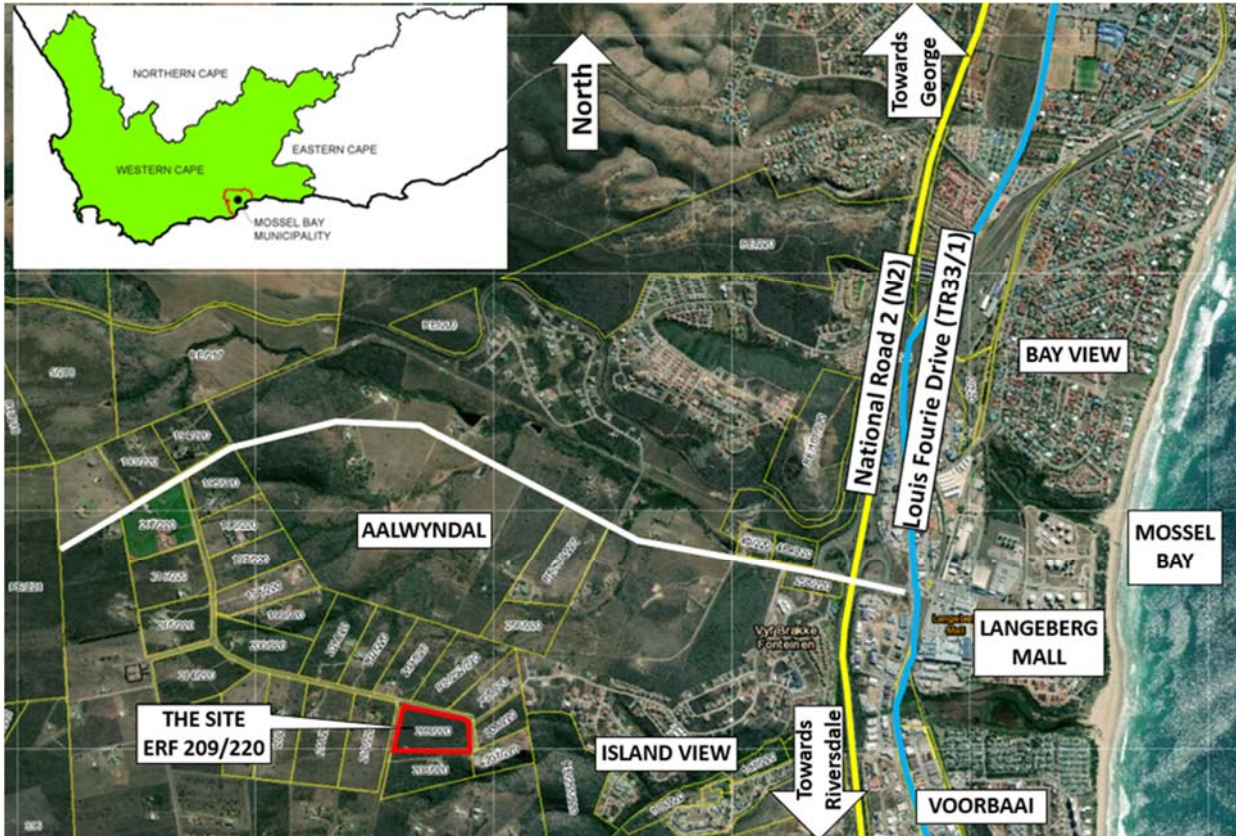


Figure 1-1 - Locality Plan

1.1 BACKGROUND

The site is currently zoned as Single Residential Zone I. There are no current land uses on the Erf as seen in Figure 1-2.

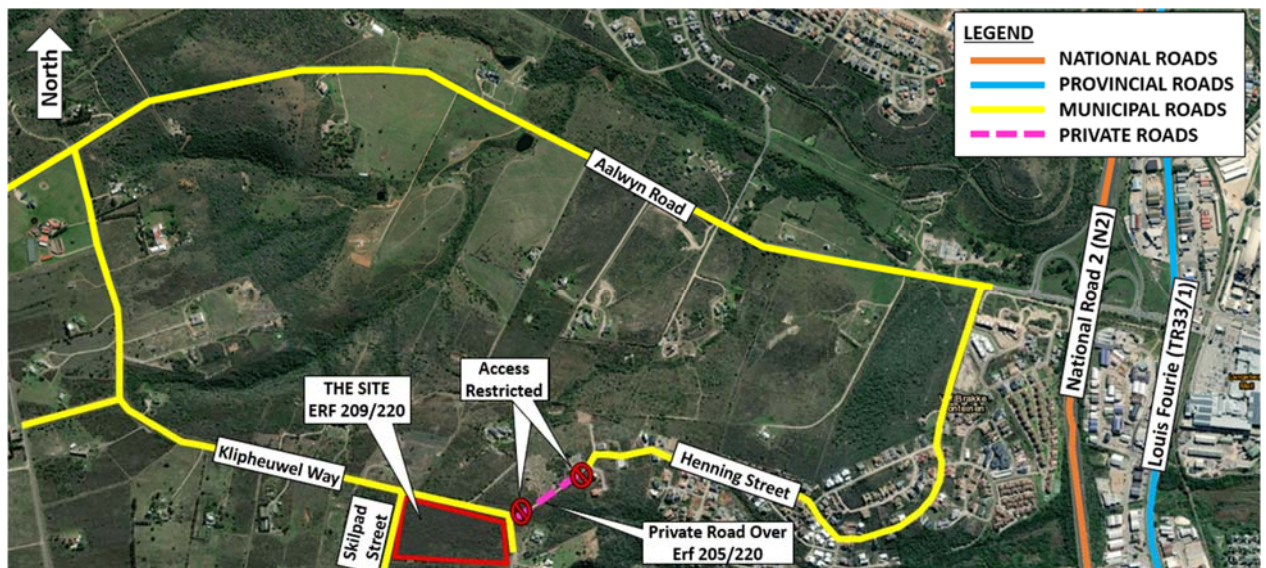


Figure 1-2 Erf Land Use Display

The proposal is to convert a portion of the land/erf into different land use developments. The proposed development includes residential and business units.

The Site Development Plan has been attached as **Annexure A**, but for ease of reference an extract has been included as Figure 1-3 below.

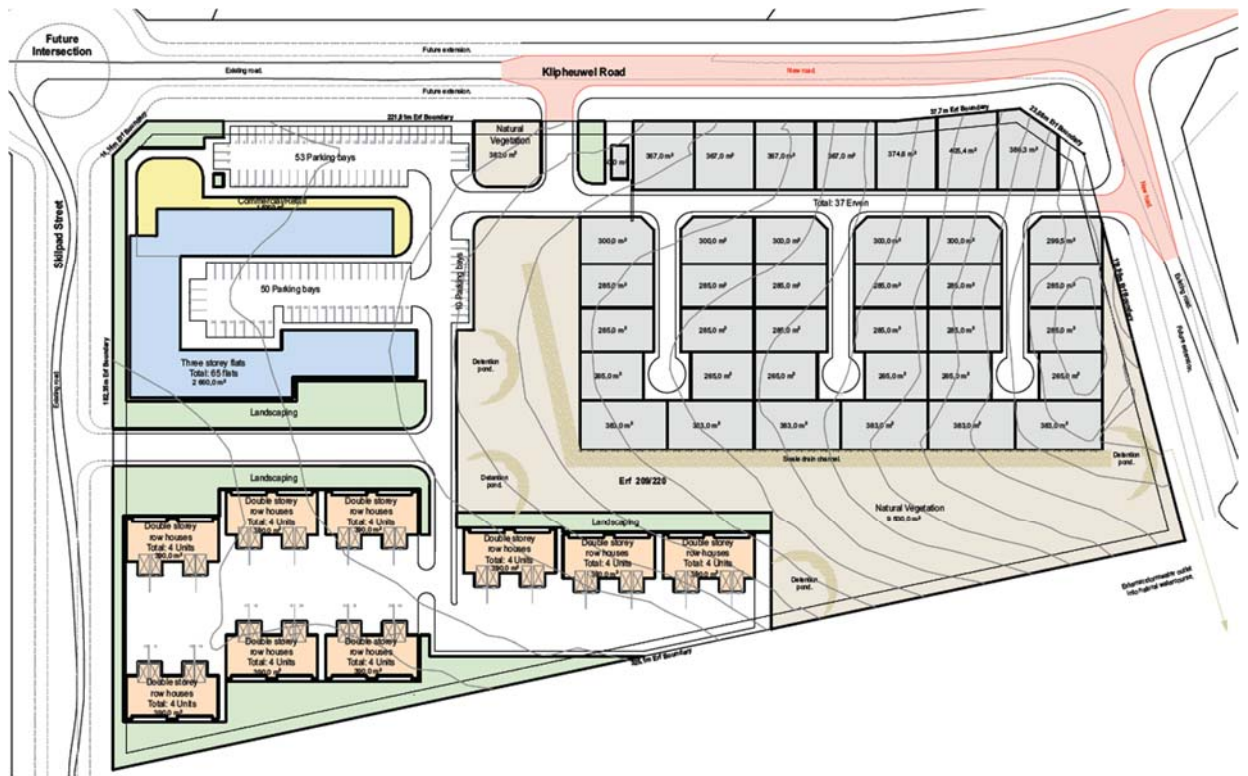


Figure 1-3 Site Development Plan

1.2 OBJECTIVE OF THIS REPORT

The purpose of this report is to determine the demand on municipal water and sewer services and to investigate the availability and capacity of these services.

1.3 SITE DESCRIPTION

The site is located at the junction of Klipheuwel Road and Skilpad Street. The approximate site centre has WGS 84 coordinates of 34°09.70'40"S and 22°04'46.7"E. The site consists of a single Erf of approximately 5 Hectares in area with a frontal dimension of 282m and a width of 187m. There are currently no structures on the site.

1.4 TOPOGRAPHICAL SURVEY

The topography across the site is the steepest at approximately 8.6% from the Southwestern portion of the site. A Topographical Plan of the site has been attached to this report as **ANNEXURE B** and shows the approximate contours across the development. The site has an average altitude of roughly 48m above msl (mean sea level) with its highest and lowest points situated at approximately 59m and 37m above msl respectively.

2 EXISTING BULK SERVICES

Information regarding Existing Bulk Services were obtained from two separate sources:

1. GLS Consulting Engineering Master Plan for Water and Sewer.
2. Mossel Bay Municipality system was referenced for the position of Existing Bulk Services. (Refer to Annexure C&D for extracts).

3 POTABLE WATER

3.1 STATUS QUO

Water for the development will be sourced from the Mossel Bay Municipality Water Network.

The Water Services Infrastructure consists of various raw water sources including the Wolwedans Dam, Klipheuwel Dam, Hartenbos Kuil Dam and Ernst Robertson Dam as well as boreholes. Raw water pipelines convey the untreated water from the source to several Water Treatment Plants situated throughout the municipal area.

The 3.0 Mℓ Aalwyndal Reservoir is presently supplied from the 17.4Mℓ Langeberg Reservoir. The Langeberg Pumpstation provides the water supply via the “Die Voorbaai Bulkwater” Pipeline.

The Aalwyndal Reservoir supplies the Aalwyndal smallholding area along a gravity feed Water Reticulation Network which consists of 160mm up to 63mm diameter pipes. The floor of the Aalwyndal Reservoir is at a level of 162.6m. The full water level is at 169.3m. The highest proposed Erf for the development is situated at a level of approximately 59m above sea level. The minimum required residual head for dwelling houses are 24m, which implies that the existing elevated storage tank is more than adequate for the proposed development.

3.2 PROPOSED RETICULATION

The proposed reticulation consists of a 90mm ring feed water main which is connected to the existing 110mm water line, running within the Klipheuwel Road Reserve. A Schematic Layout has been included is **ANNEXURE C**, to this report.

3.3 WATER DEMAND CALCULATIONS

The Neighbourhood Planning and Design Guide (NPDG), issued by the Department of Human Settlements, was used to calculate the domestic water demand.

3.3.1 DOMESTIC WATER

The water demand in accordance with the NPDG is based on the following:

| Land use | | Stand size (m ²) | Water demand (AADD) | |
|--------------------|--------------|------------------------------|---------------------|-------------|
| | | | Unit of measure | Unit demand |
| Residential stands | Small size | 400 - 670 | kℓ/unit/day | 0.6 - 0.8 |
| Group housing | Low density | 270 - 400 | | 0.5 - 0.6 |
| | High density | 130 - 200 | | 0.4 - 0.45 |
| Flats | Very high | 80 - 100 | | 0.25 - 0.3 |

Note: Usage for group housing, even larger than 400 m² is determined as for residential stands of between 400 and 670 m². Usage for group housing, using units less than 100 m² is determined as for flats (refer to NPDG)

| Land use | | Density #1 units/ha | Stand size #1 m ² | Unit of measure | Water demand (AADD) | |
|--------------------------|--|------------------------|------------------------------------|--------------------------|------------------------|--------------|
| | | | | | kL/ ha/d #1 | kL/unit/d #3 |
| Residential stands | High density, small sized | 20 to 12 | 400 to 670 | kL/unit | 11 | 0.60 to 0.80 |
| | Medium density, medium sized | 12 to 8 | 670 to 1 000 | kL/unit | 9 | 0.80 to 1.00 |
| | Low density, large sized | 8 to 5 | 1 000 to 1 600 | kL/unit | 8 | 1.00 to 1.30 |
| | Very low density, extra large sized | 5 to 3 | 1 600 to 2 670 | kL/unit | 7 | 1.30 to 2.00 |
| Group/cluster housing | High density | 60 to 40 | 130 to 200 | kL/unit | 21 | 0.40 to 0.45 |
| | Medium density | 40 to 30 | 200 to 270 | kL/unit | 17 | 0.45 to 0.50 |
| | Low density | 30 to 20 | 270 to 400 | kL/unit | 14 | 0.50 to 0.60 |
| Flats | Very high density | 100 to 80 | 80 to 100 | kL/unit | 25 | 0.25 to 0.30 |
| | High density | 80 to 60 | 100 to 130 | kL/unit | 23 | 0.30 to 0.35 |
| | Medium density | 60 to 50 | 130 to 160 | kL/unit | 21 | 0.35 to 0.40 |
| | Low density | 50 to 40 | 160 to 200 | kL/unit | 19 | 0.40 to 0.45 |
| Business/commercial | | FAR = 0.4 | n.a. | kL/100 m ² #2 | 21 | 0.65 |

Table 3-1 Recommended Unit Average Annual Daily Demands (AADD)

| Land Use | | Average stand size (m ²) | No. of units | Demand/ unit | Total (kL) |
|--------------|-----------------------------------|---|-----------------|-----------------|---------------|
| High Density | Erven (260 - 360 m ²) | 300 | 37 | 0,495 | 18,315 |
| | Commercial/Retail | 1630 | 1 | 0,65 | 10,595 |
| Very High | Flats | 41 | 65 | 0,34 | 22,1 |
| Very High | Group House (Row Houses) | 98 | 36 | 0,37 | 13,32 |
| Total | | | 139 | | 64,33 |

Table 3-2 AADD Calculations for Different Land Uses

The water demand figures, operating pressures and required storage capacity for the total proposed development is set out in Table 3-3 below:

| | |
|---|-----------|
| Annual Average Daily Demand (AADD) | |
| * Water for the grounds to be from rainwater collection | 64,33 kℓ |
| Peak Factor (day) Average) | 1,7 |
| Instantaneous Peak Flow | 1,266 ℓ/s |
| Max Operating Pressure | 24 m |
| Minimum operating Pressure | 90 m |
| Storage Capacity Required (48 hours of AADD) | 128,66 kℓ |

Table 3-3 Water Demand for the Proposed Development

Hydraulic Considerations

As stipulated in the NPDG, the following hydraulic considerations should be adhered to as far as possible:

- The pressure should be kept as low as possible to minimize real losses.

- The number of low and high points on pipes should be kept to a minimum to reduce the number of scour and air valves respectively.
- The velocities in the pipeline should be kept between 0.6 m/s and 1.2 m/s.
- Velocities through special fittings should not exceed 6 m/s or as per manufacturer's specifications.
- Pipelines should be designed to be protected against water hammer/surge pressures.
- Using 110 mm as the minimum pipe size for ring mains in urban areas should be considered where the provision of fire flow is required

3.3.2 WATER FOR FIRE FIGHTING

The provision of water for Firefighting should comply with the requirements as specified in the NPDG as well as the SANS 10400 (National Building Codes).

According to the NPDG guidelines, housing and flats are classified as Moderate Risk 2 for which fire hydrants should provide a Minimum Design Fire Flow of **1500 ℓ/min** per hydrant, minimum pressure at the fire node of 10 m and a minimum residual head of 5 m. This fire flow must be sustained for a period of at least 2 hours, by all hydrants with a maximum spacing between hydrants of 120 m. The Site Development Plan will therefore require 4 hydrants.

The resultant reservoir capacity required to satisfy the Firefighting needs are calculated as follows:

- 4 x Hydrant @ 1500 ℓ/min/hydrant x 60 minutes = **360 kℓ/h**
- 2 Hour Storage = **720 kℓ**

NPDG specifies the following with regards to Firefighting:

- Hydrants should not be provided off mains smaller than 75 mm diameter.
- Hydrants should be located in vehicular thoroughfares, opposite stand boundary pegs, and at a maximum spacing of 200 m (or as required by the local Fire Department).
- 75 mm diameter sluice-valve hydrants should be used for the high-risk and moderate-risk categories. For the low-risk category, the hydrant may be the screw-down type.
- The location of hydrants should be indicated by using permanent marker posts on the verge opposite the fitting or painted symbols on road or kerb surfaces.
- Symbols on markers should be durable.
- The hydrants' flow rate should be serviced and checked for conformity requirements at intervals not exceeding one year.
- Where possible, fire hydrants should be positioned to also serve as a scour valve

3.4 FUTURE MASTER PLANNING

Information provided by GLS Consulting pertaining to the development of 175/220, indicate a proposed future upgrade of the gravity water line along Aalwyndal Road. The upgrade entails increasing the existing 100mm diameter water line to a 250mm water line. The relevant information has also been attached as **ANNEXURE C**.

3.5 WATER STORAGE

The purpose of storing water is to meet balancing requirements and cater for emergencies (e.g. Firefighting) or planned shutdowns. The balancing volume is required to cater for peak outflows while a constant (or variable) inlet flow is being received. Where water is obtained from a Bulk Water Supply authority, the storage capacity provided should comply with the requirements of the authority. For domestic water use, a storage capacity of 48 hours of Annual Average Daily Demand is suggested, although there may be situations where 24 hours will suffice.

Since the Annual Average Daily (24 hours) Demand has been estimated as 64.33 kℓ, it follows that a reservoir spare capacity of at least 126.66 kℓ is required to satisfy the domestic water use requirement.

Combining the domestic requirement (128.66 kℓ) and the Firefighting requirement (720 kℓ), it follows that a total reservoir spare capacity for the proposed development of approximately 848.66 kℓ will be required. The Municipality's current storage capacity is considered sufficient to address the additional requirements.

Since the total capacity of the Aalwyndal Reservoir is in excess of 3.0 Mℓ, additional onsite storage is therefore not required at this stage.

3.6 PROPOSED FIRE RETICULATION

It is proposed to create a 75mm diameter ring main class 12 uPVC pipe with a 32mm diameter water connection to each Erf within the development.

In order to ensure proper coverage of the site, four proposed fire hydrants will not be placed directly on a 75mm ring feed but at a slight offset. This is not seen as a problem as the hydrants can be used to scour the line should it be required.

4 WATER DESIGN PARAMETERS

The following specifications as reflected in the Mosselbay Municipality's Civil Engineering Standards & Requirements for Service shall be applicable:

4.1 VALVES

- All valves shall be in accordance with SABS 1 200 I 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 be heavy duty, class 16.
- All valves shall have non rising spindles.

- 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 internal 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.

4.2 FIRE HYDRANTS

- All fire hydrant types 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 63 mm diameter (Internal).
- Outlets shall be London Round Thread with cast iron caps and securing chain.
- Hydrants shall be left hand closing.
- Hydrant covers shall be polymer concrete as per AV 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".

4.3 WATER SAVING

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

- Dual Flush Toilets
- Low flow shower heads which make use of either aerators or pulse systems to reduce the flow without compromising the quality of the shower. The choice of shower heads are up to the homeowner but must have a flow of less than 7 liters per minute.
- Low flow faucets. The faucets in bathrooms should have a peak flow of less than 10 liters per minute.
- Rainwater Tanks - All houses should be fitted with rainwater collection tanks for landscaping and washing of vehicles.
- Consideration should be given to provide solar pumps at each rainwater tank in order to more effectively supply the units. The overflow from tanks should be directed into the stormwater system. All water sources situated externally on buildings should be fed from these rainwater tanks.
- Geyser and Pipe Insulation. Homeowners must be required to install geyser and pipe insulation. This must be included in their building guidelines.

5 SEWERAGE

The proposed development area will approximately be 3.9 ha when fully developed and will generate a design peak flow as detailed in the sections below. A gravity sewerage pipeline connection to the Existing Sewerage Reticulation Network is proposed.

5.1 STATUS QUO

Sewerage in the Aalwyndal smallholding area is presently handled by a combination of suction and septic tanks with soak-aways (french drains). The closest waterborne sewerage reticulation is in the Northern residential suburb in Henning Street.

5.2 DEMAND CALCULATIONS

The expected sewer flow is calculated in accordance with the recommendations published in the Neighbourhood Planning and Design Guide (NPDG) of which an extract has been included as Table 5-1 below.

| Land use | Density #1 units/ha | Stand size #2 m ² | Unit of measure | Water demand (AADD) | | Sewer flow (excl. infiltration) (Unit PDDWF) #4 | | | |
|------------------------------|--|---------------------------------|----------------------------|------------------------|------------------|--|------------------|---------------------------------|-----|
| | | | | kL/ ha/d | kL/ unit/d #3 | % AADD | kL/ unit/d #3 | Unit Hydro- graph (UH) | |
| Residential stands | High density, small sized | 20 to 12 | 400 to 670 | kL/unit | 11 | 0.60 to 0.80 | 80% to 70% | 0.48 to 0.56 | UH5 |
| | Medium density, medium sized | 12 to 8 | 670 to 1 000 | kL/unit | 9 | 0.80 to 1.00 | 70% to 60% | 0.56 to 0.60 | UH3 |
| | Low density, large sized | 8 to 5 | 1 000 to 1 600 | kL/unit | 8 | 1.00 to 1.30 | 60% to 55% | 0.60 to 0.72 | UH2 |
| | Very low density, extra-large sized | 5 to 3 | 1 600 to 2 670 | kL/unit | 7 | 1.30 to 2.00 | 55% to 40% | 0.72 to 0.80 | UH1 |
| 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 |
| Flats | Very high density | 100 to 80 | 80 to 100 | kL/unit | 25 | 0.25 to 0.30 | 100% to 98% | 0.25 to 0.29 | UH6 |
| | High density | 80 to 60 | 100 to 130 | kL/unit | 23 | 0.30 to 0.35 | 98% to 97% | 0.29 to 0.34 | UH6 |
| Business/commercial | FAR = 0.4 | n.a. | kL/100m ² #2 | | 21 | 0.65 | 80% | 0.52 | UH7 |

Table 5-1 Demands and Hydrographs of Different Land Use Categories (NPDG)

The calculations are based on “The Neighbourhood Planning and Design Guide”

Due to the size of the proposed stands, the Average Dry Weather Flow (ADWF) for the proposed area is 64,33 kℓ as calculated in Table 3-2.

For the remaining of the land uses, we can assume that 88% of the water demand as determined under item 3.3.1 (Table 3-2) will end up in Sewer Reticulation System:

Based on the ADWF for the remaining land uses would therefore be:

$$Q = 64,33 \text{ kℓ/d} \times 0,88$$

$$= 55.730 \text{ kℓ/d} = 0.65 \text{ ℓ/s}$$

Using a peak factor of 2.5

This would lead to an expected Peak Dry Weather Flow (PDWF) as follows:

$$Q = 0.65 \text{ ℓ/s} \times 2.5 \text{ therefore PDWF} = 1.625 \text{ ℓ/s}$$

If an infiltration rate of 12% is used for the ingress of stormwater into the system, the Peak Wet Weather Flow (PWWF) is calculated as follows:

$$Q = 1.625 \text{ l/s} \times 1.12$$

$$\text{PWWF} = 1.82 \text{ l/s}$$

An average daily flow (ADF) of 55.730 kℓ has been assumed (88% of AADD), with a peak factor of 2.5 and a 12% increase for extraneous flow has been allowed. Applying these figures, the fully Developed Design Peak Flow is estimated at approximately **1.82 l/s**.

5.3 FUTURE MASTER PLANNING

Aalwyndal has been identified as one of the next development nodes in Mossel Bay. A recent service report prepared for the proposed development of erf 21244 (Kobus Steyn on behalf of Great Karoo Eco Investments) indicated that the surrounding pump and gravity systems in Num Num, Alwynfleur and Seemeeu Park does not have the required capacity to handle additional flow expected to be generated by Aalwyndal in the future.

6 SEWER DESIGN PARAMETERS

The following design criteria must be adhered to:

- The internal Sewerage Reticulation will be designed to drain at least 80% of each residential Erf.
- The average residential discharge is 800 ℓ/unit/day with a peak factor of 3,5.
- An allowance for an additional infiltration flow of 15%.
- A minimum self-cleansing velocity of 0,7m/s
- A minimum pipe diameter of 160mm and 110mm for house connections
- Precast concrete ring manholes spaced at a maximum distance of 90m with polymer covers.

7 ROADS

The proposed access to the development is via Klipheuwel Road and Skilpad Street to the north and west of the site. A comprehensive Traffic Impact Assessment (TIA) will be prepared as part of the application. That will deal with the road access.

The access will need to be constructed to a standard which allows for safe entry and exit to the site for refuse removal trucks and Firefighting trucks to the site.

The planned densification of the Aalwyndal area will lead to a direct increase in traffic volumes. In order to effectively handle the increased traffic volumes, geometric upgrades to the various roads have been proposed to ensure mobility along the main corridors remain unhindered. Currently, the only access to the development area is from the Klipheuwel Road, which intersect with Aalwyn Way from the N2 intersection with Louis Fourie Road.

The long-term strategy for the area indicates a new link road connecting Aalwyndal with the West via new link roads that will form part of a current Regional Road Planning Initiative for the greater Mossel Bay area. This proposed future road network is indicated on the Aalwyndal Precinct Plan which is shown as **ANNEXURE E**.

8 STORMWATER

A detailed Stormwater Management Plan was prepared by Element Consulting Engineers.

9 SOLID WASTE MANAGEMENT

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

10 FLOOD LINES

This proposed development is not directly affected by flood lines.

11 DEVELOPMENT CONDITIONS AND LAND REHABILITATION

The general terrain and the underlying geology of this site appears to be suitable for housing development.

12 CAPITAL 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.

Due to the complexity in calculation and time lapse between date of calculation and actual payment, it is recommended that the Capital Contribution amounts be determined after consultation with the relevant Municipal Departments and not be specified in the Engineering Services Report.

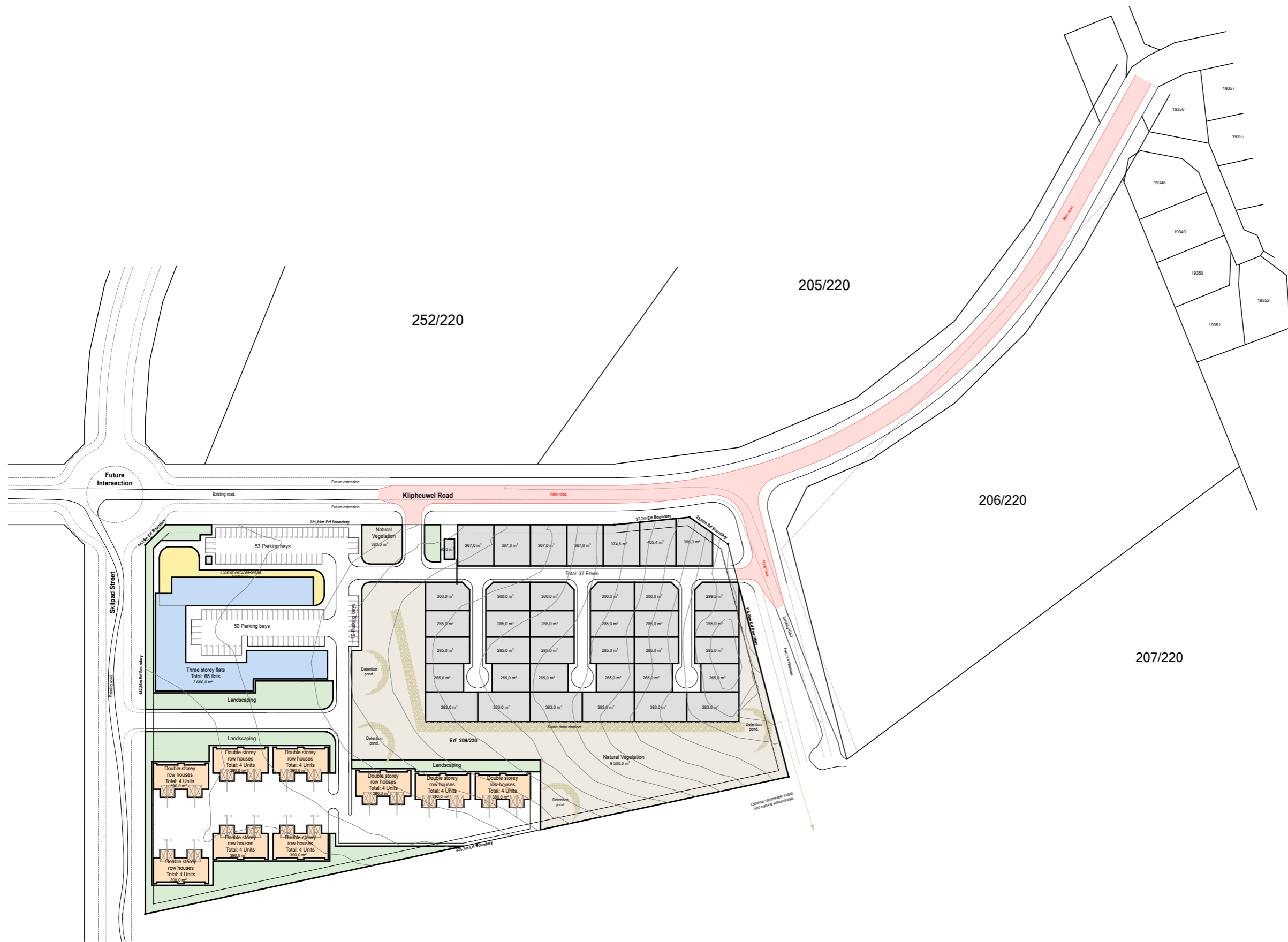
13 SUMMARY

The findings of this report are summarised below:

1. The proposed rezoning is in line with the Mossel Bay Municipality's Local Spatial Development Framework.
2. Water for the site will be obtained from the existing 90mm uPVC Pipe that runs along the Southern site boundary along Klipheuwel Road.
3. On site water storage for Firefighting purposes are not required since the site will be supplied directly from the Aalwyndal Reservoir which satisfies the storage requirements.
4. Sewer discharge will be through the existing Municipal Sewerage Network.
5. Stormwater management will be based on the Sustainable Urban Drainage System (SUDS) approach to stormwater run-off.
6. The Capital Contributions are to be determined by the various Municipal Directorates involved.
7. The access approval for the proposed development is dealt with under the Traffic Impact Assessment.

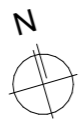
ANNEXURE A
SITE DEVELOPMENT PLAN

| Outeniquasig, Aalwyndal, Mossel Bay Erf 220/209, 4,83 hectares | |
|---|---|
| Legend | Area/Quantity |
| | Commercial/Retail ± 1 630m ² |
| | Flats ± 65 |
| | Row houses 36 Units |
| | Erven 37 |
| | Natural vegetation |
| | Landscaping |
| | Detention pond |
| | Swale drain |
| | New access road. |



| DEVELOPMENT DATA | | |
|--|---|------------------------|
| Erf / Portion | 209/220 | Site Area 4,83 Hectare |
| Township | Aalwyndal | Title Deed No - |
| Town Planning Scheme & Year | Mossel Bay Zoning Scheme By-Law 2021 | Amendment Scheme No - |
| ZONING | Annexure | |
| Business Zone I (BZ), General Residential I (GRZI), General Residential II (GRZII), Transport Zone I, Transport Zone II, Open Space II. | A - Engineering service report. B - Traffic impact study. C - Stormwater Management. D - Planning statement. | |
| | PERMISSIBLE | ACTUAL |
| F.S.R. (sqm) | 3 | TBC |
| Business Zone I (BZ), | | |
| COVERAGE (sqm) | 100% | TBC |
| Business Zone I (BZ), | 60% | TBC |
| General Residential I (GRZI), | 60% | TBC |
| General Residential II (GRZII), | | |
| HEIGHT | 12m | 3 STOREYS |
| Business Zone I (BZ), | 8m | 2 STOREYS |
| General Residential I (GRZI), | 8m | 2 STOREYS |
| General Residential II (GRZII), | | |
| DENSITY | 35 Units/hectare. | TBC |
| General Residential I (GRZI), | 60 Units/hectare. | TBC |
| General Residential II (GRZII), | | |
| BUILDING LINES | REQUIRED | ENCROACH TO |
| Business Zone I (BZ), | 0m | N/A |
| Street boundary | 0m | N/A |
| Side & Rear | | |
| General Residential I (GRZI), | 4m | N/A |
| Public street boundary | 2m | N/A |
| Internal street boundary | 3m | 1m |
| Side & Rear along perimeter | 1m | N/A |
| Side & Rear | 4m | N/A |
| General Residential II (GRZII), | 2m | N/A |
| Public street boundary | 0m | N/A |
| Street boundary | | |
| Side & Rear | | |
| TOTAL G.L.A. (GENERAL LETTABLE AREA) | | AREA |
| GROUND FLOOR COMMERCIAL | | - sqm |
| CIRCULATION & ABUSIONS | | - sqm |
| G.L.A. (GROUND FLOOR) | | - sqm |
| GROSS G.L.A. | | -sqm |
| TOTAL G.B.A (GENERAL BUILDING AREA) | | AREA |
| TOTAL GROUND FLOOR | | - sqm |
| TOTAL FIRST FLOOR | | - sqm |
| GROSS G.B.A. | | - sqm |
| PARKING | | QUANTITY |
| REQUIRED FOR SHOP ± 1300 @ 4/100sqm | | 52 |
| REQUIRED FOR DWELLING HOUSE (GRZII) 9 @ 1,25/FLAT | | 18 |
| REQUIRED FOR FLATS 65 @ 1,25/FLAT | | 81 |
| TOTAL REQUIRED | | 151 |
| TOTAL PROVIDED | | 131 |

SITE PLAN scale 1:2 000



Date: Friday, 08 September 2023
 Scale: ---
 DrawingNo: ---
 RevisionNo: ---

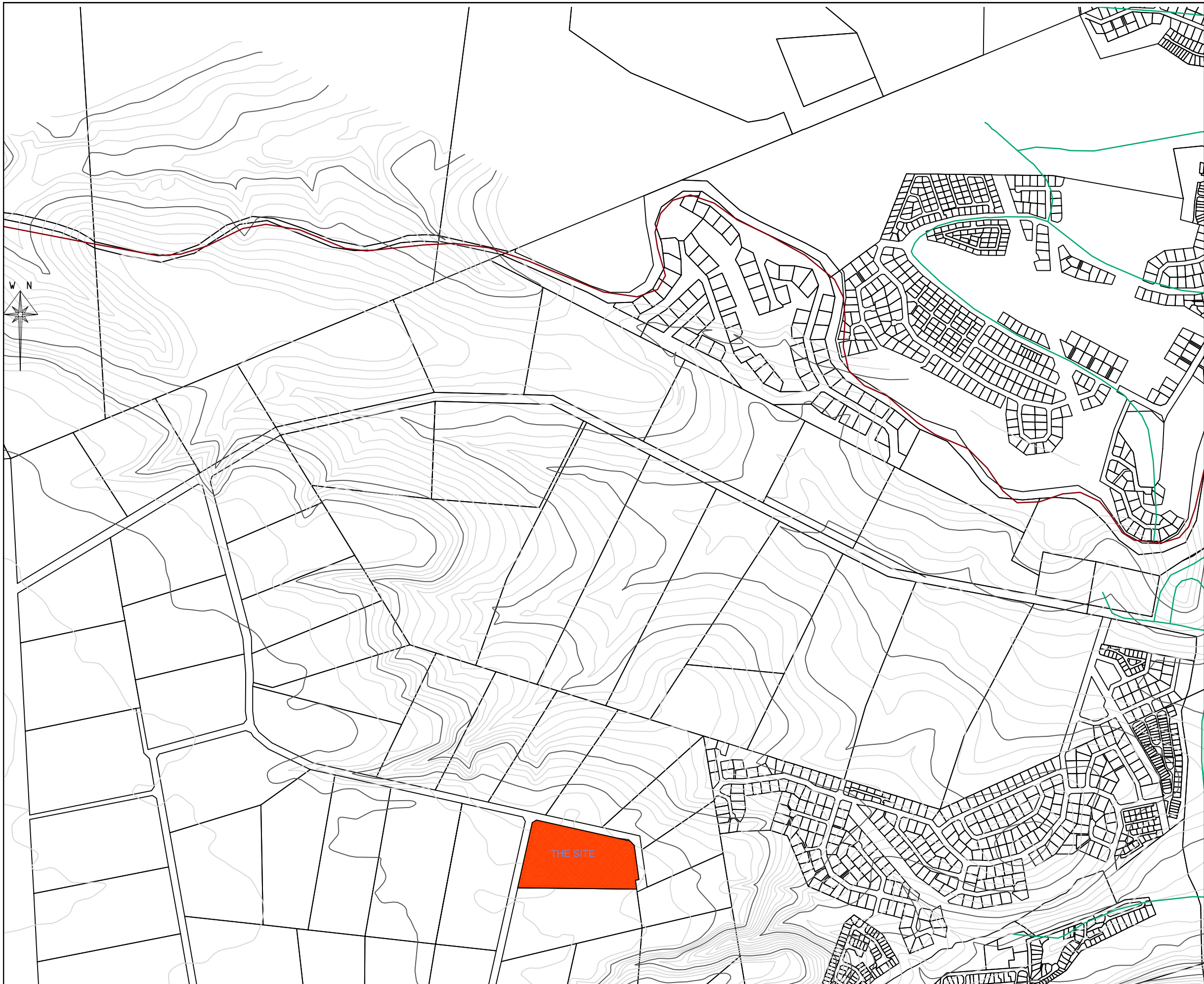


HAMILTON WESSELS ARCHITECTS (PTY)LTD
 88 Montagu Street, Mossel Bay.
 Western Cape | South Africa | 0040
 PO Box 260 | Mossel Bay

Outeniquasig

ANNEXURE B

TOPOGRAPHIC PLAN

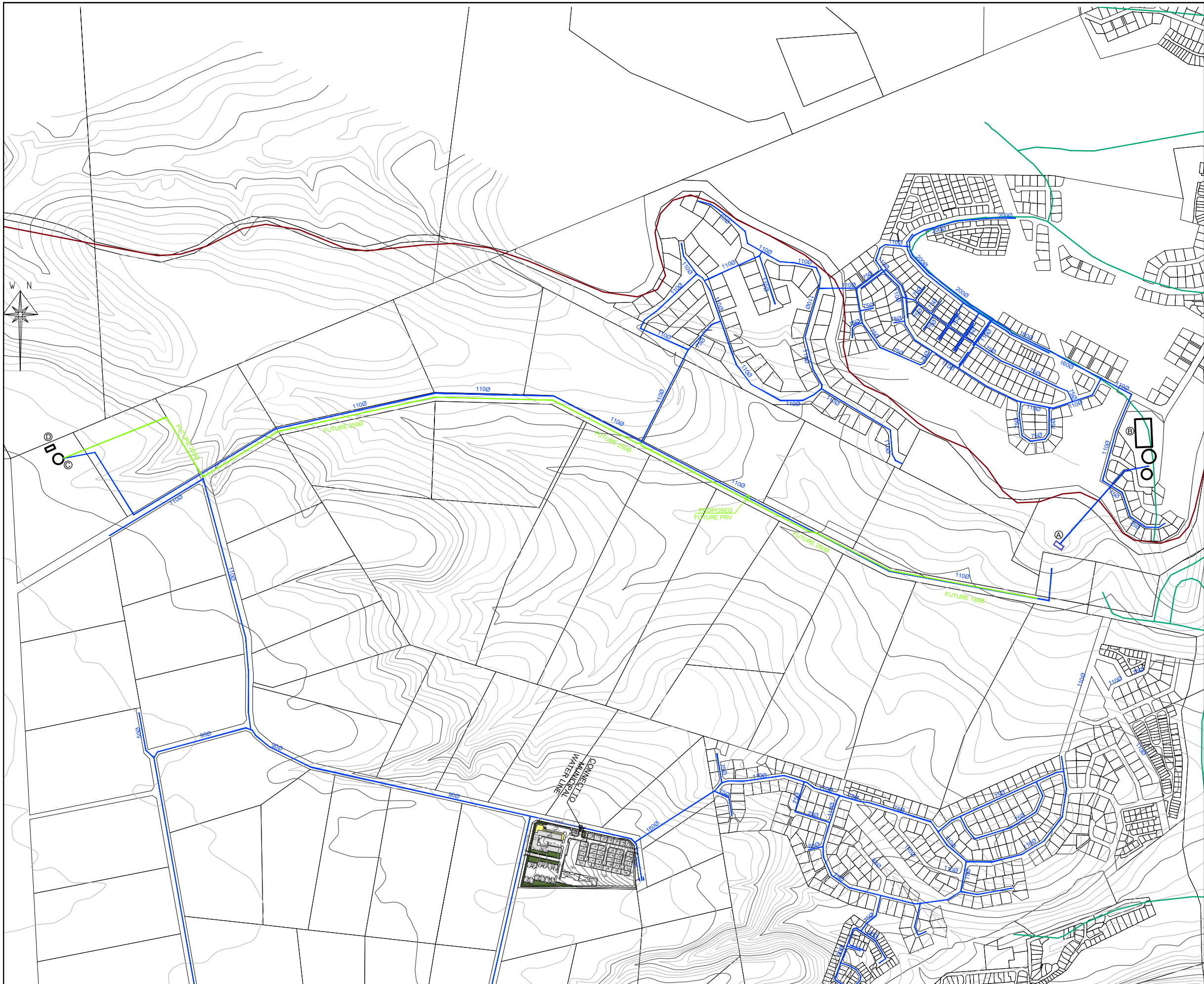


Project
MOSSEL BAY AALWYNDAL

Drawing Title
TOPOGRAPHIC PLAN

| | | | |
|--------------------|----------|----------------|-----------|
| Scale (Paper Size) | 1 : 5000 | Date | JUL 2022 |
| Designed | EW | Drawing Number | 22-085-03 |
| Drawn | EW | Revision | - |
| Checked | FvA | | |

ANNEXURE C
**EXISTING AND FUTURE WATER
INFRASTRUCTURE**



LEGEND:

WATER MAINS:

- EXISTING WATER PIPES
- GLS MASTER PLAN PIPES

RESERVOIRS AND PUMP STATIONS:

- A Langeberg Pump Station
35 l/s @ 126m
FL = 27.30
- B Langeberg Reservoirs
17.4 MI
FWL = 80.40
FL = 75.63
- C Aalwyndal Reservoir
3.0 MI
FWL = 169.25
FL = 162.585
- D Aalwyndal Pump Station
35 l/s @ 126m

SEWER:

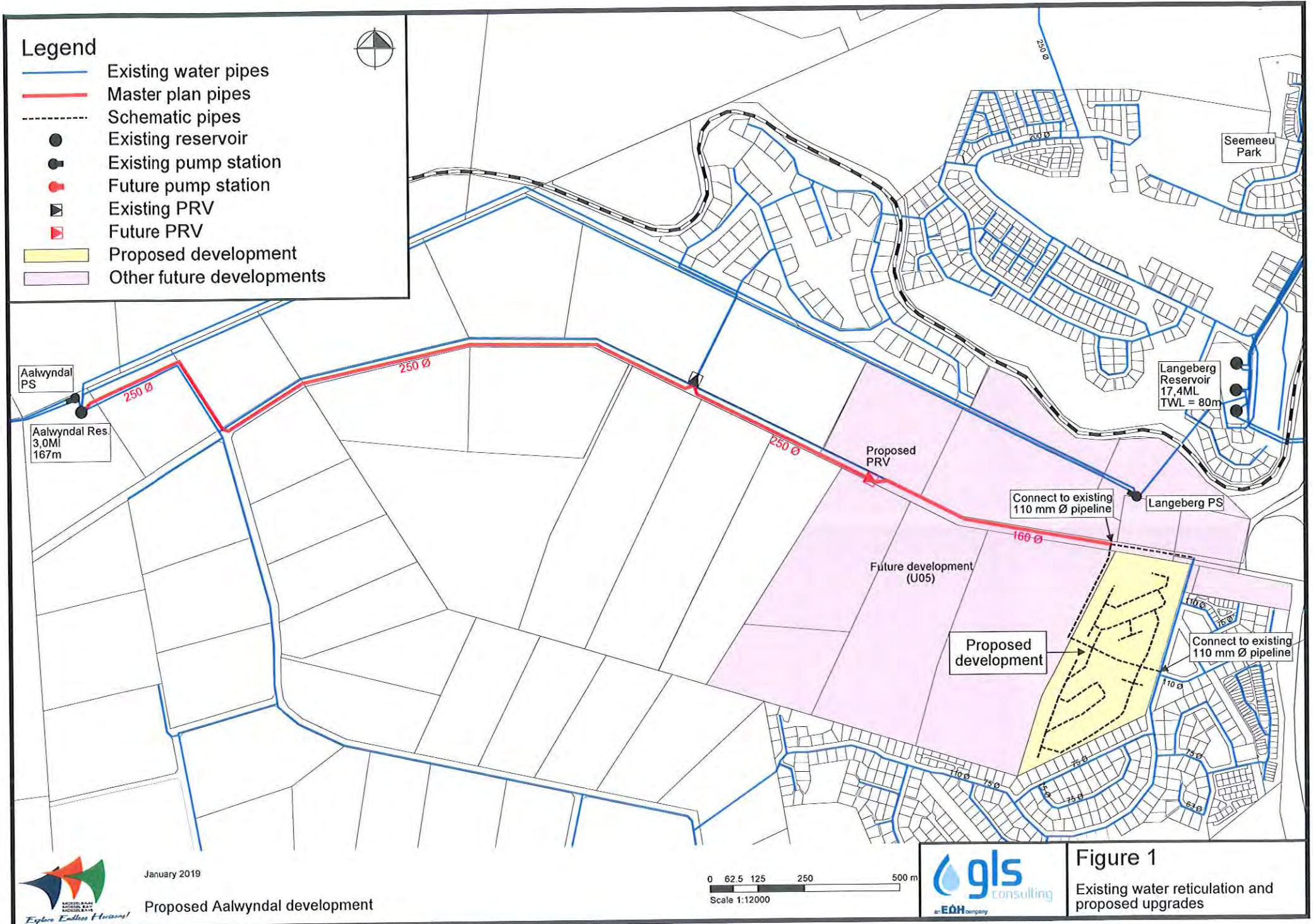
- Sewer 1100 and 1600



Project
PROPOSED DEVELOPMENT OF PTN 209, AALWYNDAL

Drawing Title
EXISTING AND PROPOSED NEW WATER RETICULATION

| | | | |
|--------------------|----------|----------------|------------------|
| Scale (Paper size) | 1 : 5000 | Date | JUL 2022 |
| Designed | EW | Drawing Number | 22-085-01 |
| Drawn | EW | Revision | - |
| Checked | FvA | | |



Legend

- Existing water pipes
- Master plan pipes
- - - Schematic pipes
- Existing reservoir
- ⦿ Existing pump station
- Future pump station
- ▣ Existing PRV
- ▣ Future PRV
- Proposed development
- Other future developments



Aalwyndal PS
Aalwyndal Res.
3.0ML
167m

Langeberg Reservoir
17.4ML
TWL = 80m

Langeberg PS

Proposed PRV

Connect to existing
110 mm Ø pipeline

Future development
(U05)

Proposed development

Connect to existing
110 mm Ø pipeline



January 2019

Proposed Aalwyndal development

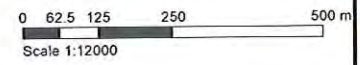
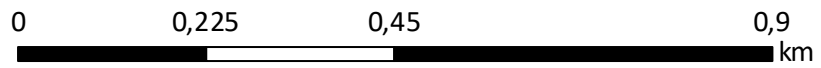


Figure 1

Existing water reticulation and proposed upgrades



Mossel Bay Municipality



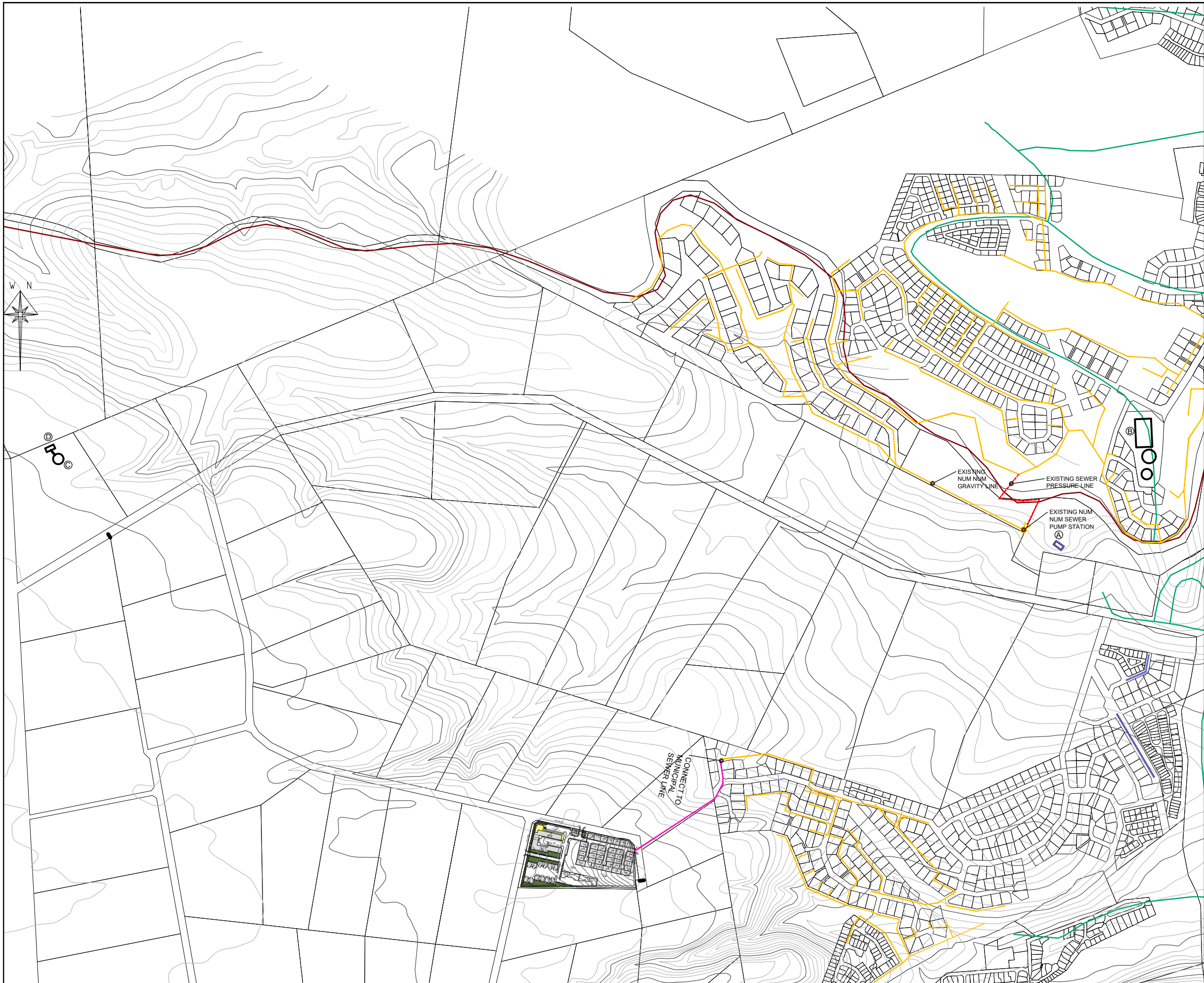
1:9 028

Date: 2022-06-02

Disclaimer:
The Mossel Bay Municipality accepts no responsibility for
and will not be liable for any errors or omissions
contained herein.



ANNEXURE D
**EXISTING AND FUTURE SEWER
INFRASTRUCTURE**



LEGEND:
WATER MAINS:

| | |
|--|---|
| | EXISTING SEWER PIPES |
| | EXISTING SEWER PRESSURE LINE |
| | PROPOSED DEVELOPMENT SEWER RETICULATION |

RESERVOIRS AND PUMP STATIONS:

| | |
|--|---|
| | Langeberg Pump Station 35 l/s @ 126m FL = 27.30 |
| | Langeberg Reservoirs 17.4 MI FWL = 80.40 FL = 75.63 |
| | Aalwyndal Reservoir 3.0 MI FWL = 169.25 FL = 162.585 |
| | Aalwyndal Pump Station 35 l/s @ 126m |

SEWER:

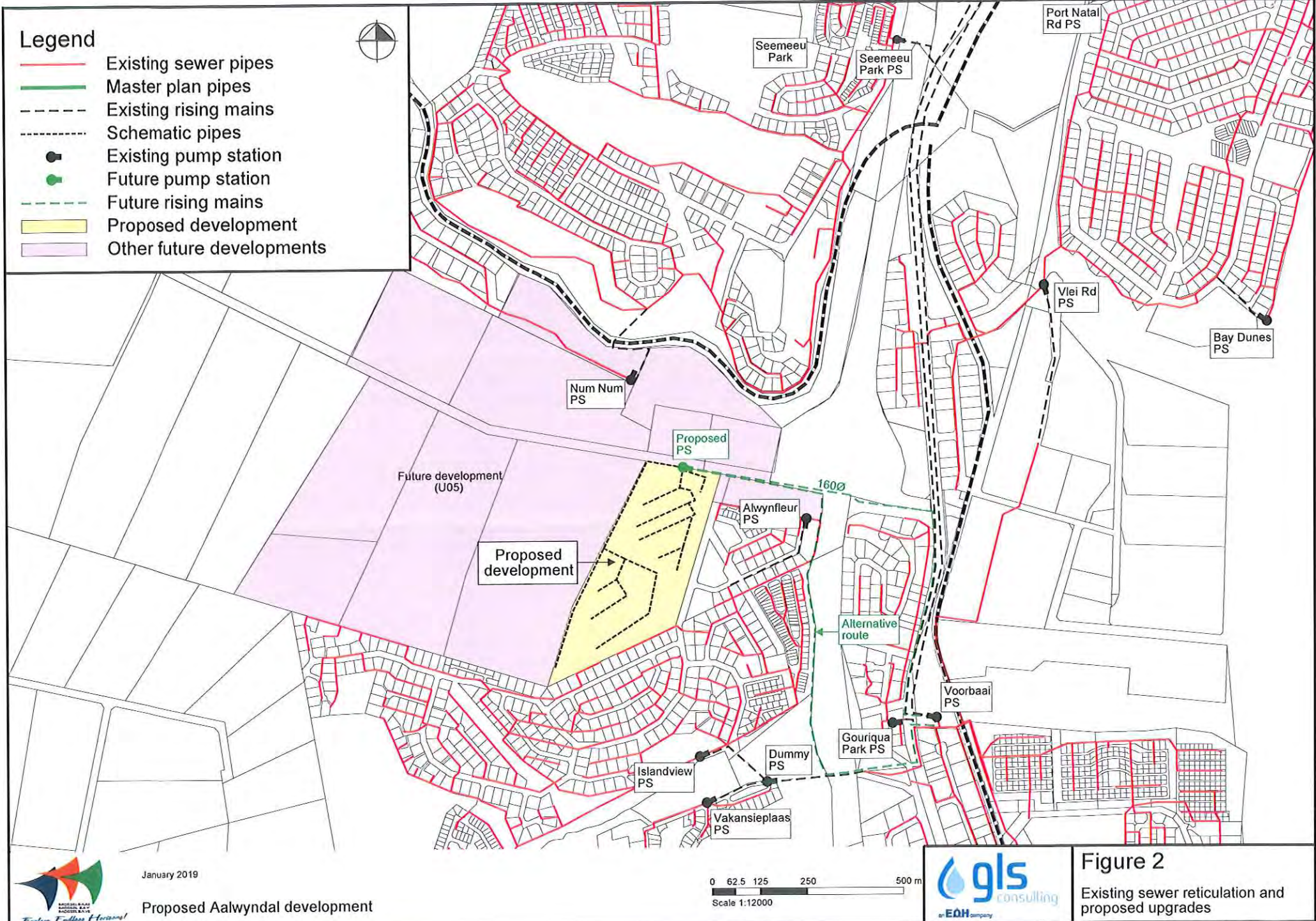
| | |
|--|---------------------|
| | Sewer 110Ø and 160Ø |
|--|---------------------|



Project
PROPOSED DEVELOPMENT OF PTN 209, AALWYNDAL

Drawing Title
EXISTING AND PROPOSED NEW SEWER RETICULATION

| | | | |
|--------------------|----------|----------------|------------------|
| Scale (Paper size) | 1 : 5000 | Date | JUL 2022 |
| Designed | EW | Drawing Number | 22-085-02 |
| Drawn | EW | Revision | |
| Checked | FvA | | |



Legend

- Existing sewer pipes
- Master plan pipes
- - - Existing rising mains
- Schematic pipes
- Existing pump station
- Future pump station
- - - Future rising mains
- Proposed development
- Other future developments



January 2019

Proposed Aalwyndal development

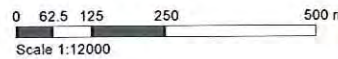
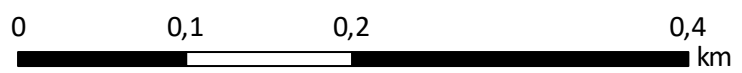


Figure 2

Existing sewer reticulation and proposed upgrades



1:4 514

Date: 2022-06-02

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contained herein.



ANNEXURE E

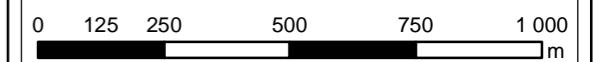
ROADS MASTER PLAN



AREA / TOWN:
**AALWYNDAL
PRECINCT PLAN**

TITLE:
**LOCAL SPATIAL
DEVELOPMENT PLAN**
ITO SECTION 9(1) OF THE MUNICIPAL BY-LAW
ON LANDUSE PLANNING

- LEGEND:
- APP. 55 LRdn NOISE CONTOUR
 - EXISTING RESIDENTIAL COVERAGE
 - RESIDENTIAL
 - COMMERCIAL
 - OPEN SPACE
 - MIXED USE NODE
 - RESIDENTIAL & AIRPORT RELATED COMMERCIAL USES
 - MAIN DISTRIBUTOR ROADS
 - NEW MAIN ROUTES (Alignment approximate)
 - NEW MAIN ROUTES (Alignment to be further investigated during detail planning)



NOTES:
EXTENT OF OPEN SPACE IS
CONCEPTUAL AND MUST
BE GROUND TRUTHED.

A3 SCALE: 1:15 000

DATE: **JAN 2018**

PLAN NO: **MB/A/7.2**

