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KAROO KONSULT
CK NO: 2008 / 077949 / 23

U VERWYSING:	ONS VERWYSING:	DATUM:
DJ	KK-P-001_REV 1	05/01/2026
YOUR REFERENCE:	OUR REFERENCE:	DATE:

REEBOK ONTWIKKELINGS (PTY) LTD.
P.O. Box 80
MOSSEL BAY
6500

Attention : Mr Hennie de Jager

Dear Sir

PROPOSED DEVELOPMENT OF PORTION 29 (PORTION OF PORTION 4) OF FARM 142 AND PORTION 1 OF FARM 331, MOSSEL BAY : CIVIL ENGINEERING SERVICES REPORT

Below please find the Engineering Services Report for the proposed development of Portion 29 (Portion of Portion 4) of Farm 142 and Portion 1 of Farm 331, Mossel Bay, based on the latest Site Development Plans as received from Formaplan. Refer to the enclosed "Rezoning and Subdivision Plan" by Formaplan with number "De J 3.5" dated 20 July 2024.

1. INTRODUCTION

1.1 Brief

As per Figure 1: Locality Map below, the properties are to be developed as a unit and subdivided as detailed in the aforementioned with one (1) access point.

Existing bulk civil infrastructure will be utilized in order to accommodate the proposed development of Portion 29 (Portion of Portion 4) of Farm 142 and Portion 1 of Farm 331.

All future reticulation will conform to Mossel Bay Municipal Standards.

1.2 General

The proposed development area is situated between the R102 and N2 Highway in the Midbrak area between Mossel Bay and George. The total number of residential erven forming part of the proposed development amounts to 143no. erven with an average size of 337m².

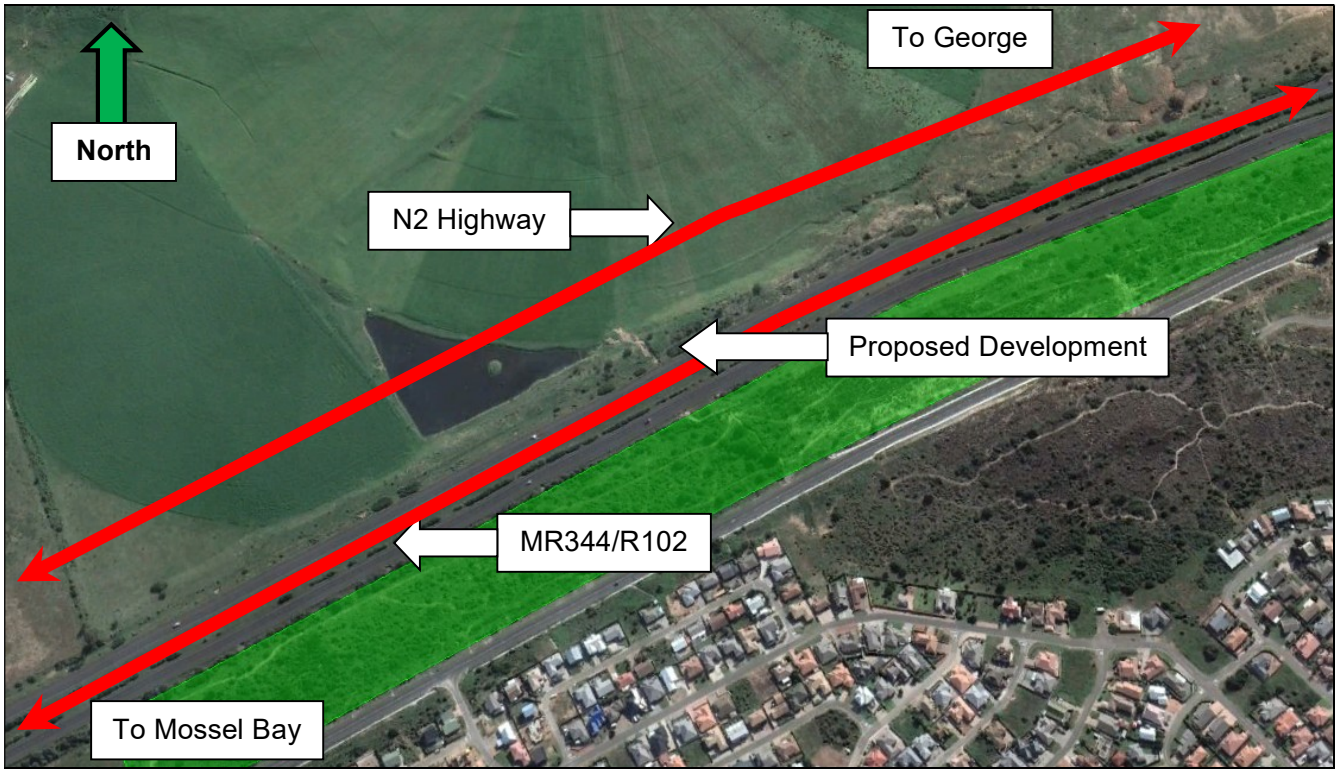


Figure 1: Locality Map
Portion 29 (Portion of Portion 4) of Farm 142 and Portion 1 of Farm 331

The land use for the proposed developed is as follows:

Description / Land Use	No.	Area (±m²)	Total (±m²)
General Residential Stands Zone I	143	337	46,092
Utility Zone Sewer Pumpstation	1	708	708
Utility Zone Electrical Substation	1	65	65
Utility Zone Refuse Collection	1	98	98
Private Open Space Zone II	5	20,572	20,572
Private Open Space Zone II (Conservation)	1	37,119	37,119
Transport Zone III	1	13,831	13,831
Transport Zone II	1	33,905	33,905
TOTAL			**152,390 m²**

2. BULK WATER SUPPLY SYSTEM

2.1 Proposed Water Demand for the Development

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

Existing network capacity in the vicinity of the site is subject to the confirmation by Mossel Bay Municipality. GLS Consulting (GLS) were appointed by Mossel Bay Municipality to compose a Water Master Plan for the Municipal area and to determine the effect of any form of developments in the Municipal area on the Water Master Plan. Prior to compiling this report, relevant information was distributed to GLS to determine whether the existing water network system has enough capacity to accommodate the proposed housing development. Confirmation regarding connectivity as well as capacity were received from GLS which confirmed that normally a development of this size can be accommodated in the existing system without any Bulk upgrades by the developer.

GLS confirmed via e-mail on 05 September 2025 that the old Bulk Waterline linking the Sandhoogte WTW and the Tergniet Reservoir is no longer an option and that all future reinforcement of the existing Bulk Water Infrastructure will need to be done parallel to the existing network to the specific zone.

GLS also confirmed that the preferred option to supply this development with potable water is the installation of approximately 1,250m of new 160mm diameter Bulk water distribution line South of the development within the road reserve of MR344/R102. See enclosed e-mail from GSL dated 05 September 2025.

We have received confirmation from Cobus Louw Pr. Eng that the developer of Klipheuwel Country Estate directly adjacent to our development has already received approval for the construction of the proposed 160mm diameter watermain, see attached layout drawings as well as correspondence received from the Department of Infrastructure confirming their support of the proposed installation subject to certain conditions being met. According to Messrs. Cobus Louw Pr. Eng the installation of the proposed pipeline will commence early in 2026. Following which we will be able to connect to this pipeline once construction of our development starts, which is current anticipated late 2026/early 2027 once all approvals are in place.

According to Table J.2 – J.4 for Calculating the Annual Average Daily Demand (AADD) from "The Neighbourhood Planning and Design Guide", the following calculation was done to determine the AADD for the various Land Uses:

The water use for the applicable areas of the proposed development is as follows:

Description / Land Use	**Calculations**	**AADD**
General Residential Stands Zone I	143no. x 600 ℓ/day	85,800 ℓ/day
Utility Zone Sewer Pumpstation	708m² x 0 ℓ/m²/day	-
Utility Zone Electrical Substation	65m² x 0 ℓ/m²/day	-
Utility Zone Refuse Collection	98m² x 0 ℓ/m²/day	-
Private Open Space Zone II	20,572m² x 12 kℓ/ha/day	24,686 ℓ/day
Private Open Space Zone II (Conservation)	37,119m² x 0 kℓ/ha/day	-
Transport Zone III (Roads)	13,831m² x 0 ℓ/day	-
Transport Zone II (Rem Farm 1/331)	33,905m² x 0 ℓ/day	-
	TOTAL AADD	**110,486 ℓ/day**

The Annual Average Daily Demand (AADD) can be reduced by up to 20% due to that fact that all outdoor use water will be from on-site sources ie. rainwater harvesting and re-use of grey water as per Table J.6.

Therefore, the reduced AADD is as follows:

$$110{,}486 \text{ ℓ/day} \times \left(1 - \frac{20}{100}\right) = \textbf{88,389 ℓ/day}$$

This development is classified as Residential (RES) according to Table J.9 and from the design codes, we expect to design for a peak factor of 2.20.

Peak Demand = 88,389 ℓ/d x 2.2
= 194,456 ℓ/d
= 2.25 ℓ/s

Fire flow:

Such a development would fall into the low risk – single residential housing category according to Table J.17 – J.18 and as such, the following would apply:

- 15 ℓ/second total fire flow;
- 15 ℓ/second minimum flow at one hydrant;
- 10 m pressure at fire node;
- 5 m pressure at the rest of the system; and
- 1-hour design fire flow

With the supply spread over a wide area, according to the GLS Water Master Plan the existing reservoirs have enough storage capacity and capacity for fire flow conditions ie. 54,000 ℓ to accommodate this development.

According to the Water Master Plan for the Municipal area, enough capacity exists at the Water Treatment Plants.

A water reticulation system exists within the adjacent neighbourhoods to which the proposed development could connect (see enclosed GLS Water Master plan). A system of reservoirs, water pump stations and water mains deliver potable water to developed areas.

2.2 Proposed Services

As per the Water System Master plan and correspondence provided by GLS Consulting for Mossel Bay Municipality, the existing system has enough capacity to accommodate the proposed development without bulk supply upgrades, depending on the installation of the proposed 160mm diameter watermain for the Klipheuwel Country Estate.

The proposed development can connect to the proposed 160mm diameter Bulk water distribution line scheduled for construction early in 2026 at entrance to the development adjacent to MR344/R102. The proposed development should however have their own bulk water meter constructed on order to measure actual water use. See attached Drawing no. KK-P-001-1 to KK-P-001-3 indicating proposed services.

3. BULK SEWAGE SYSTEM

3.1 Wastewater Treatment Works

The proposed development is located within the existing Rheebokrif Main Outfall Pump Station (PS) drainage area. The site is located within the greater Great Brak Wastewater Treatment drainage area. As a result, effluent generated from the site will eventually be pumped and drained towards the existing “Great Brak” Wastewater Treatment Plant (WWTP) as indicated on GLS Figure MBS 2.1c Existing Sewer System Layout attached.

Previous investigation of the bulk sewerage infrastructure, by GLS Consulting, found that the Rheebokrif PS has a total capacity of 52 ℓ/s and currently operates at around 15 % of capacity which indicates sufficient capacity to accommodate the proposed development in the reticulation system. The total design capacity for the seven (7) wastewater treatment plants in the Mossel Bay Municipal area are 22.54 Mℓ per day. The current combined average daily inflow for the seven wastewater treatment plants is 10.72 Mℓ per day

Wastewater generated from the proposed development will gravitate into the existing system and conveyed by means of gravity sewer lines as well as a sewer pump station to pump sewage through rising mains into the existing systems to the Great Brak Wastewater Treatment Works, where it will be treated.

According to the Sewer Master Plan for the Municipal area, sufficient capacity exists at the Sewage Treatment Plant within the existing system.

3.2 Wastewater Reticulation System

A wastewater reticulation system exists within the boundaries of the proposed development. It is proposed that the development will drain to the existing Rheebokrif PS indicated on erf 144 of Portion 29 (Portion of Portion 4) of Farm 142. The existing Rheebokrif PS has a total capacity of 52 ℓ/s and currently operates at around 15 % of capacity which indicates sufficient capacity to accommodate the proposed development. From this point all wastewater generated will be pumped to the Great Brak Wastewater Treatment Plant where it will be treated as can be seen on GLS Sewer Master plan.

3.3 Wastewater Flow Demand

Our calculations are based on "The Neighbourhood Planning and Design Guide".

3.3.1 According to Table K4 from "The Neighbourhood Planning and Design Guide", for Calculating the expected average daily wastewater flow per dwelling unit is as follows:

Description / Land Use	Units	Area (±m²)	ℓ/unit/day
General Residential Stands Zone I	143	337	600

Based on the above, the Average Dry Weather Flow (ADWF) for the units would therefore be:

Q = 143 x 600
Q = 85,800 ℓ/d
ADWF = 85.80 kℓ/d

3.3.2 For the remaining of Land Uses, 0% of the water demand as determined under item 2.1 will end up in sewer reticulation system since the calculated water demand is for irrigation purposes only.

3.3.3 The proposed development is classified as Residential according to Table K8. The Peak Factor to be used is 2.5.

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

Q = 88,800 x 2.5
= 214,500 ℓ/d
= 214.50 kℓ/d
PDWF = 2.48 ℓ/s

If an infiltration rate of 15% is used for the ingress of stormwater into the system, the Peak Wet Weather Flow (PWWF) is calculated as follows:

Q = 214,500 x 1.15
= 246,675 ℓ/d
= 246.68 kℓ/d
PWWF = 2.86 ℓ/s

3.4 Proposed Services

It is proposed that the development will drain to the existing Rheebokrif PS indicated on erf 144 of Portion 29 (Portion of Portion 4) of Farm 142. The existing Rheebokrif PS has a total capacity of 52 ℓ/s and currently operates at around 15 % of capacity which indicates sufficient capacity to accommodate the proposed development.

From this point all wastewater generated will be pumped to the Great Brak Wastewater Treatment Plant where it will be treated as can be seen on GLS Sewer Master plan.

See attached Drawing no. KK-P-001-1 to KK-P-001-3 indicating proposed services.

4. STORMWATER

No bulk stormwater outfall systems are required as the stormwater will be dispersed into the existing culverts towards the lower lying northern side of the site underneath the N2 highway, however, all upstream stormwater generated by the existing developed area as well as that from MR344 will have to be dealt with through the proposed development.

It is proposed that the stormwater generated upstream of the development be conveyed through the development by means of both an underground system as well as an emergency overland flow system. A combination of field inlets, open channels and low water drifts will be utilised as part of this system.

See attached Drawing no. KK-P-001-1 to KK-P-001-3 indicating proposed services.

4.1 Design Criteria

The following documents serves as a base for the detail design criteria and standards:

- Guidelines for Human Settlement Planning and Design ("Red Book"); and
- SANRAL Drainage Manual.

4.2 Runoff Calculation

The calculated stormwater runoff is as follows:

Description	Portion 29 of Farm 142 and Portion 1 of Farm 331	
MAP (mm)	561 mm	
Area	0.152390 km²	
Design Period	1:5 years	
Runoff Q (l/s)	Pre-Development	Post Development
	1 : 5	1 : 5
	570	986
Dispersal areas	Existing System N2 North of Development	

Refer to the attached spreadsheets for pre-and post-development runoff calculations. From the above it can be seen that there will be a marginal increase in volume of stormwater because of the proposed development which is currently dealt with as overland flow towards and received by the existing system towards the N2 North of the development.

4.3 Stormwater Management Techniques : During Construction

The stormwater surface run-off water will be managed carefully during construction. The following management techniques will be implemented:

- Temporary cut-off channels and berms; and
- Routing of run-off towards the existing drainage routes.

4.4 Stormwater Management Techniques : Post-Construction

The factors to consider in Stormwater Management falls broadly into two main categories, namely those related to quantity and those related to quality.

Any development brings about changes to the natural environment of a site, which in turn has an effect or disrupts the natural hydrological cycle. Changes include, among other:

- Increase in impermeable surfaces (roads, roofs etc.) resulting in lower infiltration, higher run-off volumes and velocities; and
- Changes to natural flow routes through earthworks, infrastructure and shaping of terrain.

The management of the increased run-off volumes and velocities is important as it can be detrimental to the receiving drainage system and properties downstream of the site, as it could cause property damage.

By restricting peak flows to pre-development levels, the *status quo* of the catchment is maintained. This could be achieved through the implementation of the following recommended practices, as described in paragraphs 4.5 and 4.6 below.

4.5 Infiltration

By dispersing the run-off to numerous small outfalls spread across the site, the recharge of the underground water table is promoted.

The provision of strategically placed landscaped areas could promote on-site infiltration where possible. This could reduce the peak flow rate if required.

4.6 Attenuation

Attenuation functions by the principle of allowing large flows of water to enter a facility but limiting the outflow by having a small opening at the low point in the facility. The difference between in- and outflows is directed to a catchment area.

Attenuation in the form a dam will not be possible in this instance, but rainwater tanks at downpipes from the roof could alleviate peak flows onto hardened surfaces before allowing flow onto erven, roads, channels and catchpits.

With the installation of rainwater tanks, peak flows could be reduced to lower levels than before, which will assist the existing network in dealing with overland stormwater flow.

4.7 Stormwater Management Recommendations

The planning of stormwater design elements must always be seen as a holistic process which incorporates much more than the infrastructural elements required in adequately dealing with stormwater. It affects a range of environmental goals and management principles and aims not only to mitigate negative impacts but actively promote positive modifications in its application.

The design approach to be adopted for the proposed development and as discussed above, can be summarised as follows:

- Promotion of on-site infiltration;
- Minimise concentration of stormwater;
- Maintain pre-development run-off levels as far as possible;
- Identify escape routes for major floods;
- Responsible discharge of stormwater into downstream systems; and
- Allowing for the necessary attenuation in the form of rainwater tanks.

5. ACCESS ROADS

Access to the proposed development will be from MR344/R102 by means of the existing access road to Rheebokrif Main Outfall Pump Station (PS). This road will be upgraded to a surfaced road and re-aligned as per the drawings attached.

6. SOLID WASTE

Refuse removal will be dealt with once a week as applicable to all the current residential areas in the Mossel Bay Municipal area.

Solid waste is based on an estimated 3.5 kg/person/day

It is expected that occupancy should not exceed an average of four (4) people per unit.

Therefore: 143 units x 4 people per unit x 3.5kg/person/day
= 2,002 kg/day
= 2.00 tons/day

Volume = 2.09 tons/day x 0.75
= 1,50 m^3/d
= 548 m^3/annum

Based on previous discussions with Mossel Bay Municipality the existing solid waste site will be able to accommodate the additional solid waste generated by the development.

7. FLOODLINES

This proposed development is not directly affected by any Flood line.

8. INTERNAL SERVICES

The proposed Civil Engineering Services are indicated on Drawing no. KK-P-001-1 to KK-P-001-3. Below find a brief description of the standard of Civil Engineering Services to be provided for the area.

8.1. Sewage

1971m of 160mm dia PVC-U heavy duty sewer pipe

33 No. Manholes

110mm dia PVC-U light duty house connections with end cap for 143 erven.

8.2 Water

1022m of 110mm dia PVC-U Class 12 water pipe

8 No. Gate valves

6 No. Fire hydrants

20mm dia HDPE Class 12 water house connections for 143 erven

1 No. 110mm Bulk Water meter

8.3 Roads

6,364m^2, paving surfaced roads. Road widths are 6.0m wide with Barrier/Mountable kerb and channels on the lower side of the roadway and concrete channels at intersections.

403m^2 concrete surfaced low water drifts

8.4 Stormwater

647m of 450 - 750mm Class 100D heavy duty stormwater pipe

8 No. Stormwater field inlets

10 No. Stormwater manholes/junction boxes

5 No. Stormwater double inlet catchpits

145m of concrete stormwater channels

5 No. Stormwater outlet headwalls

9. STANDARD OF ENGINEERING SERVICES TO BE PROVIDED

Levels of services are as follows:

9.1 Sewer

- Pipe diameter: UPVC Class 34, SANS 791, 160mm dia solid wall for main lines and 110mm solid wall for individual unit connections where required.
- Prefabricated Fibre cement shafts or concrete manhole rings to be used for manholes.

9.2 Water

- Pipe diameter of 160 mm dia UPVC Class 9/12 pipes depending on residual pressure.
- Each erf will be serviced with a 20mm diameter connection and an Elster Kent/Honeywell plastic water meter in a plastic meter box or similar approved meter by the Technical Services Directorate.
- Provision is made for fire hydrants according to design guidelines.
- All fire hydrants shall be 65 mm dia (internal)
- All fire hydrant outlet shall be of bayonet coupling type.
- All valves shall be AVK type valves – left hand/closing or similar approved.
- Provision is made for a bulk water meter at the connection point.

9.3 Roads and stormwater

- The access road width will be 6.0m minimum.
- All road surfaces will be 80mm interlocking concrete paving.
- Sub-base and base materials will be imported.
- Sub-surface drainage, where applicable, will be installed.
- The underground piped stormwater drainage system will be minimum 450mm diameter.
- Barrier kerbs will be installed around bell-mouths. Bellmouth's radius minimum 10m.
- All stormwater drains will be provided with a sand trap of at least 300mm.
- Low water drifts to be utilised at natural watercourses to accommodate overland flow.

9.4 Design Criteria and Standards

9.4.1 Design criteria

The following documents will serve as a base for the detail design criteria and standards:

- The Neighbourhood Planning and Design Guide ("Red Book"); and
- City of Cape Town Management of Urban Stormwater Impacts Policy – Version 1.1, 2009.
- Mossel Bay Municipality Minimum Standards for The Design of Civil Engineering infrastructure.

9.4.2 Construction specifications

All materials and workmanship shall comply with the specifications as set out in the South African National Standards for Civil Engineering (SANS).

9.4.3 Roads

The road system forms an integral part of the local area plan.

9.4.3.1 *Design Criteria*

The design criterion for roads is as follows:

- Design life – 20 years.
- Subgrade CBR – 15 to 20.
- Subbase CBR – 45minimum (processed crushed stone)
- Base course CBR – 80minimum (processed crushed stone)
- Surfacing – 80mm interlocking concrete paving
- Minimum road grade – 0.45 % Longitudinal
- Minimum Crossfall – 2.00 %

9.4.4 Stormwater

The storm water system forms an integral part of the road and urban planning layout. The system rests on three legs, the minor system, the major system and an emergency system. The minor storms are catered for in the pipe system while the major storms are routed through a linked system of roads and public open spaces using attenuation techniques. The emergency system recognizes failure of the minor and major system by storms greater than provided for in major system or in the event of malfunction of the minor system by providing continuous overland flow routes to minimize flooding of residential areas.

9.4.4.1 *Minimum design criteria for storm water system*

The data to be used for the design of the system is as follows:

- Minor system : 2-year return period conveyed in an underground pipe system. Preferably the overland flow shall not exceed 200m.
- Major system : 50-year return period. The difference between the 2 year and 50 year to be conveyed in the road prism with depth not exceeding 150mm within the road reserve width.
- The minimum gradients for pipelines are designed to give a minimum velocity of 0.7m per second with the pipe flowing full.
- The maximum velocity used is 3.5m per second.
- Major storm water overflows are to be provided to convey the excess storm water from the streets into designated public open spaces.
- Storm water flow velocities in road ways will be kept as low as possible and related to the surface finish to prevent scour and erosion.
- Roads are to be graded to ensure free and continuous flow to the main storm water system and to prevent local ponds at intersections.

9.4.4.2 *Pipelines*

- Storm water pipes are generally 50D, 75D or 100D as required by the loading and installation conditions.
- Pipes are generally laid on Class C bed.
- The minimum cover on pipes is 0.80m.
- The minimum pipe diameter is 450mm for longitudinal runs and catch pit connections.

9.4.5 Sewers

The sewer drainage system forms an integral part of the sewage system. The drainage for the site is towards Erf 150 within the development and will connect to the existing pump station situated on this erf as indicated via new gravity sewer mainlines as described in item 3.2 and 3.4.

9.4.5.1 *Minimum design criteria*

- A conventional waterborne sewerage system is provided with a single connection. The main sewer line will be constructed within open areas on the site, topography dependent.

- Design parameters : Average daily flow – As calculated
  : Peak factor – As calculated
  : Extraneous flow – 15 %
  : Minimum velocity – 0.7m per second
- Minimum cover to pipes : 0.80m
- Minimum pipe size : 110mm diameter for unit connections
  : 160mm diameter for sewer mains
- Minimum gradients : 110mm diameter unit connection @ 1:60
  : Main lines at 80% capacity as follows:

No. of Units	**Grade**
Less than 6	1:80
6 to 10	1:100
11 to 80	1:120
81 to 110	1:150
111 to 130	1:180
More than 130	1:200

- Maximum manhole spacing of 80m.

9.4.5.2 *Pipelines*

- Pipeline material for pipe sizes up to 160mm diameter. UPVC Class 34 complying with SABS.
- Pipes are generally laid on Class C bedding.

9.4.5.3 *Manholes*

- Dolomite aggregate and low alkali sulphate resistant cement to SABS 471 shall be used for all concrete, mortar or screed.
- Manhole cover to be central over main pipe on downstream side.
- Manhole covers and frames to be Polymer Concrete.

9.4.6 Water

The water reticulation network forms an integral part of the water distribution system.

9.4.6.1 *Minimum design criteria*

The design criteria generally as per the “Red Book” guidelines and specifically as follows:

- The average domestic consumption as calculated in item 2.1;
- Peak factors for the development calculated in accordance with the “Red Book”.
- Minimum pressures for the network are calculated for the fire flows of 15ℓ per second and peak demand at the point of lowest pressure under peak flow conditions.
- Valves to be placed such that a maximum of 4 valves need to be closed to isolate a section of pipeline.
- Valves to be spaced so that the length of main included in an isolated section does not exceed 600m.
- All valves to be installed at T-pieces where applicable and not within the road surface.
- Minimum cover to pipe to be 0.8m.

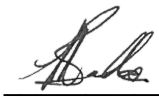
9.4.6.2 *Pipeline materials*

- Erf connection – UPVC Class 9/12 complying to SABS 966

We trust that enough detail has been provided to enable you to decide regarding 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 this office.

However, should any additional information be required, or if you wish to discuss this recommendation with us, please do not hesitate to contact us.

Yours faithfully



M BOTHA Pr Tech Eng
Project Director
pp Karoo Konsult cc.

Encl.

Proposed Services Layout : Drawing no. KK-P-001-1 to KK-P-001-3
GLS e-mailed correspondence : 05 September 2025
Proposed External Water Layout : Cobus Louw Pr. Eng Drawing no. M1350-11 to M1350-13
Department of Infrastructure support letter : DOI/CFS/RN/LU/WLWP-18/41
GLS Fig MBS 2.1c Existing Sewer System
GLS Fig MBS 6.4c Required Works – Priority Projects
Consolidation, Rezoning and Subdivision Plans : Formaplan : 20 July 2024
Pre-and Post Development Stormwater Run-off calculation Spreadsheets

BENCHMARKS COORDINATES				
CODE	Y-COORD	X-COORD	ELEVATION	DESCRIPTION
BM1	77107.818	3771876.964	30.651	12MM PEG IN CONCRETE
ST2	77146.084	3771869.213	26.424	12MM IN TAR
MH2	77394.998	3771988.689	16.479	CENTER OF MANHOLE COVER
MH4	77430.210	3771905.266	10.064	CENTER OF MANHOLE COVER

LIST OF QUANTITIES:

8.1 SEWAGE:

- 1931m OF 160mm Ø PVC-U HEAVY DUTY SEWER PIPE.
- 30 No. MANHOLES.
- 321m OF 110mm Ø PVC-U LIGHT DUTY HOUSE CONNECTIONS WITH END CAPS FOR 149 ERVEN.

8.2 WATER:

- 972m OF 110mm Ø HDPE CLASS 12 WATER PIPE.
- 6 No. FIRE HYDRANTS.
- 855m OF 20mm Ø HDPE CLASS 12 WATER HOUSE CONNECTIONS FOR 149 ERVEN.
- 1 No. 150mm BULK WATER METER.

8.3 ROADS:

- 6 364m², PAVING SURFACED ROADS.
- 403m², CONCRETE SURFACED DRIFTS.
- ROAD WIDTHS ARE 6.0m WIDE WITH BARRIER/MOUNTABLE KERB AND CHANNELS ON THE LOWER SIDE OF THE ROADWAY.
- 50m, CONCRETE CHANNEL AT INTERSECTION.

8.4 STORMWATER:

- 450m OF 600mm Ø CLASS 100D HEAVY DUTY STORMWATER PIPE.
- 33m OF 450mm Ø CLASS 100D HEAVY DUTY STORMWATER PIPE.
- 8 No. STORMWATER FIELD INLETS.
- 6 No. STORMWATER JUNCTION BOXES.
- 5 No. STORMWATER DOUBLE INLET CATCHPITS.
- 145m OF CONCRETE STORMWATER OPEN CHANNELS.
- 5 No. STORMWATER HEADWALLS.

GENERAL NOTES:

1. ALL WORK TO BE DONE IN ACCORDANCE WITH SANS 1200.
2. CONTOUR INTERVALS ARE 0.5m.

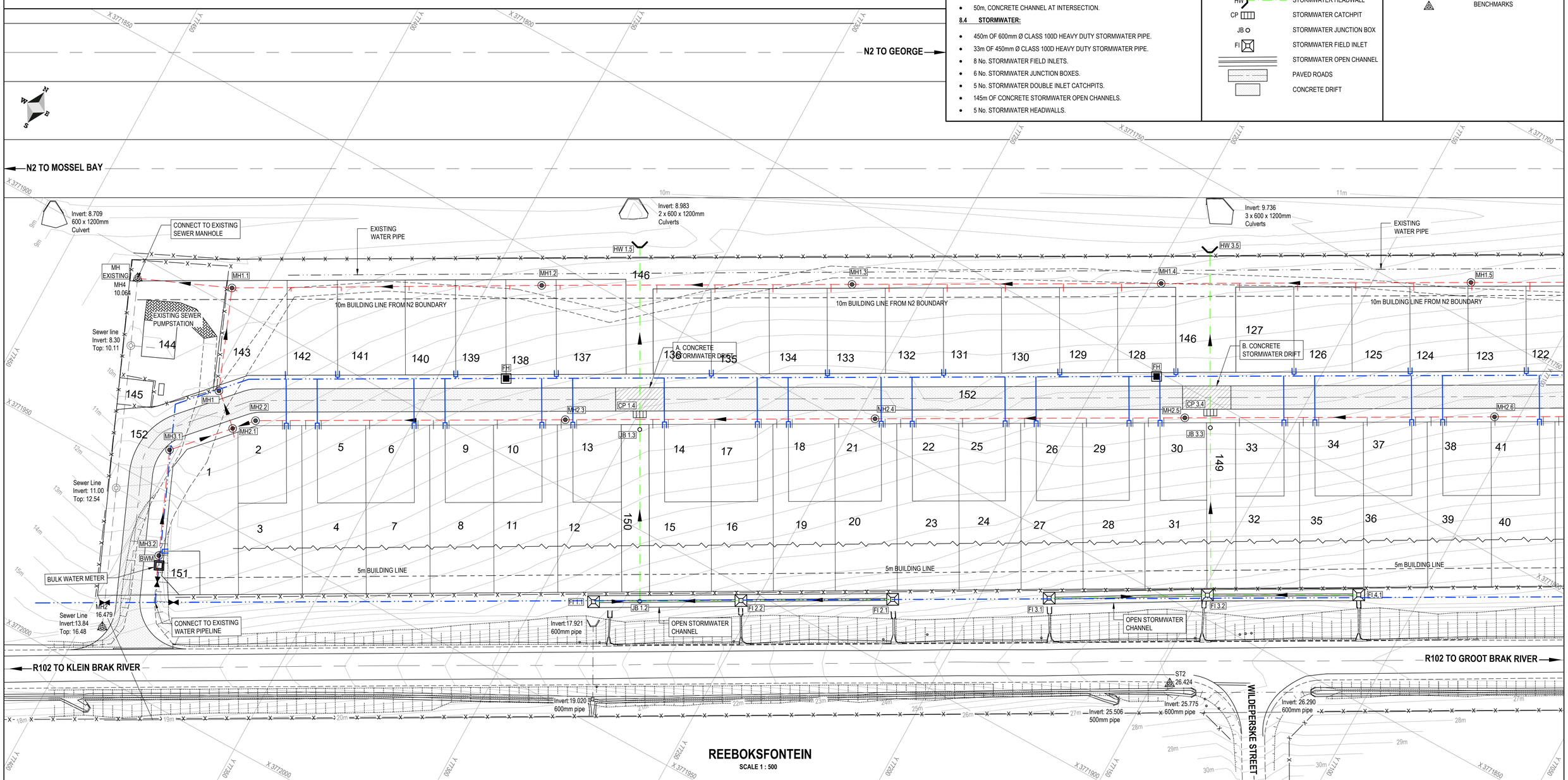
LEGEND:

PROPOSED:

- WATER PIPES
- WATER HOUSE CONNECTIONS
- VALVES
- FIRE HYDRANTS
- END CAP
- SEWER PIPES
- SEWER HOUSE CONNECTIONS
- SEWER MANHOLE
- STORMWATER PIPES
- STORMWATER HEADWALL (HW)
- STORMWATER CATCHPIT (CP)
- STORMWATER JUNCTION BOX (JB)
- STORMWATER FIELD INLET (FI)
- STORMWATER OPEN CHANNEL
- PAVED ROADS
- CONCRETE DRIFT

EXISTING:

- WATER PIPES
- SEWER PIPES
- STORMWATER PIPES
- ROADS
- OVERHEAD POWER LINE
- FENCE
- STORMWATER CHUTES
- STORMWATER HEADWALLS
- BENCHMARKS



REEBOKSFONTEIN
SCALE 1 : 500

KAROO KONSULT
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CLIENT: L. DE JAGER

REV	DATE	REVISION DETAILS	APPROVED
A	18/4/2022	PRELIMINARY DESIGN INFORMATION	M BOTHA
B	25/8/2022	LAYOUT AMENDED	M BOTHA

SCALE	1 : 500
SIZE	A1
DRAWN	M RICHARDS
DESIGNED	M BOTHA
REVIEWED	M BOTHA
APPROVED	DATE

PRELIMINARY
NOT FOR CONSTRUCTION

M BOTHA - ECSA - 201270359

PROJECT: REEBOKSFONTEIN
PORTION OF FARM 331

TITLE: GENERAL LAYOUT
(PLAN 1 OF 3)

DRAWING No.	COMPANY	DISC	NUMBER	REV
	KK	CE	0001	B

LIST OF QUANTITIES:

8.1 SEWAGE:

- 1931m OF 160mm Ø PVC-U HEAVY DUTY SEWER PIPE.
- 30 No. MANHOLES.
- 321m OF 110mm Ø PVC-U LIGHT DUTY HOUSE CONNECTIONS WITH END CAPS FOR 149 ERVEN.

8.2 WATER:

- 972m OF 110mm Ø HDPE CLASS 12 WATER PIPE.
- 6 No. FIRE HYDRANTS.
- 855m OF 20mm Ø HDPE CLASS 12 WATER HOUSE CONNECTIONS FOR 149 ERVEN.
- 1 No. 150mm BULK WATER METER.

8.3 ROADS:

- 6 364m², PAVING SURFACED ROADS.
- 403m², CONCRETE SURFACED DRIFTS.
- ROAD WIDTHS ARE 6.0m WIDE WITH BARRIER/MOUNTABLE KERB AND CHANNELS ON THE LOWER SIDE OF THE ROADWAY.
- AND CONCRETE CHANNELS AT INTERSECTIONS.

8.4 STORMWATER:

- 450m OF 600mm Ø CLASS 100D HEAVY DUTY STORMWATER PIPE.
- 33m OF 450mm Ø CLASS 100D HEAVY DUTY STORMWATER PIPE.
- 8 No. STORMWATER FIELD INLETS.
- 6 No. STORMWATER JUNCTION BOXES.
- 5 No. STORMWATER DOUBLE INLET CATCHPITS.
- 145m OF CONCRETE STORMWATER OPEN CHANNELS.
- 5 No. STORMWATER HEADWALLS.

GENERAL NOTES:

1. ALL WORK TO BE DONE IN ACCORDANCE WITH SANS 1200.
2. CONTOUR INTERVALS ARE 0.5m.

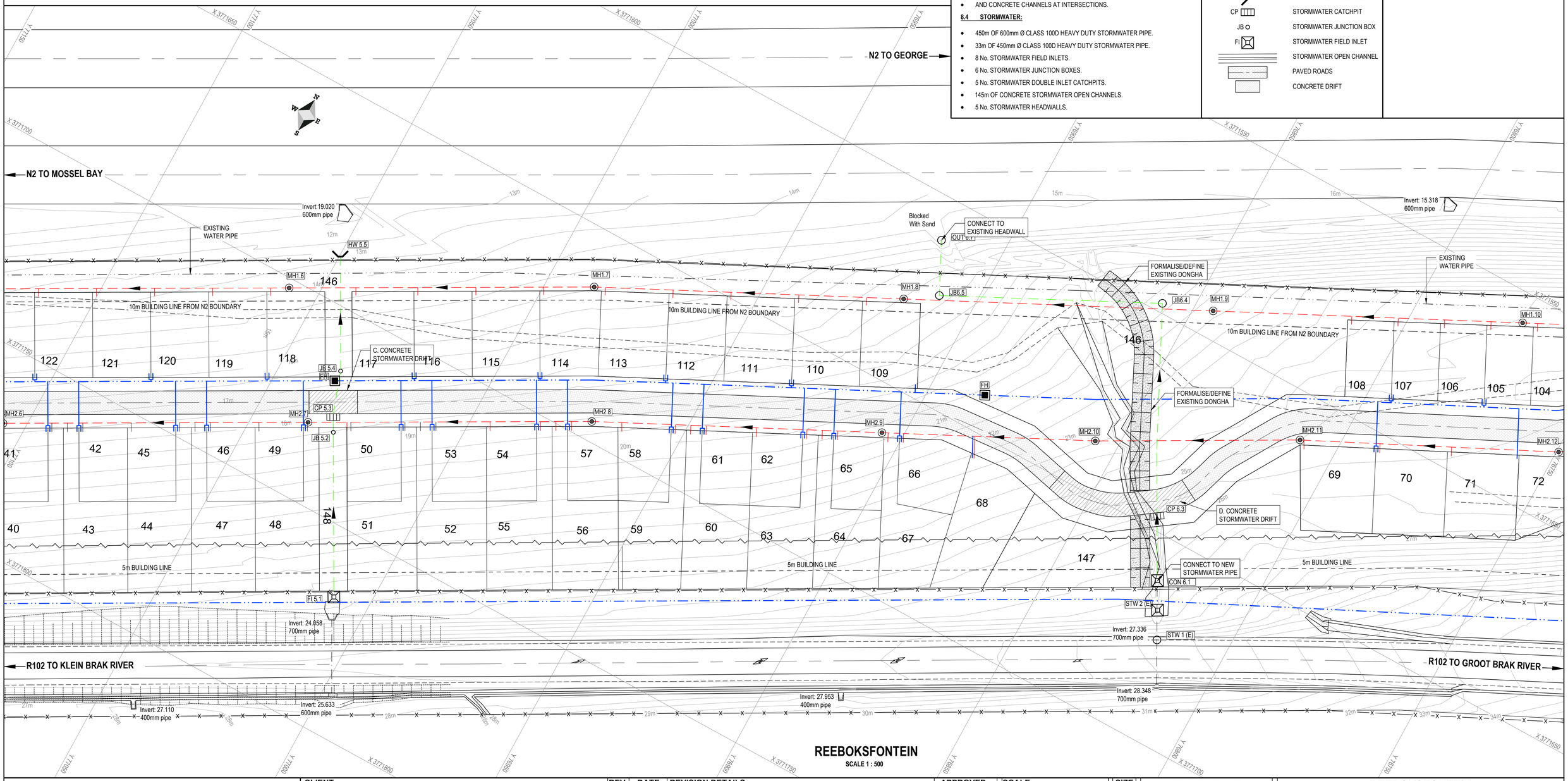
LEGEND:

PROPOSED:

- WATER PIPES
- WATER HOUSE CONNECTIONS
- VALVES
- FIRE HYDRANTS
- END CAP
- SEWER PIPES
- SEWER HOUSE CONNECTIONS
- SEWER MANHOLE
- STORMWATER PIPES
- STORMWATER HEADWALL
- STORMWATER CATCHPIT
- STORMWATER JUNCTION BOX
- STORMWATER FIELD INLET
- STORMWATER OPEN CHANNEL
- PAVED ROADS
- CONCRETE DRIFT

EXISTING:

- WATER PIPES
- SEWER PIPES
- STORMWATER PIPES
- ROADS
- OVERHEAD POWER LINE
- FENCE
- STORMWATER CHUTES
- STORMWATER HEADWALLS



REEBOKSFONTEIN

SCALE 1 : 500

KAROO KONSULT
CK NO: 2008 / 077949 / 23
17 ALPHEN RUN ROAD, OEWERZICHT, OUDTSHOORN, 6625
17 ALPHEN RUN ROAD, OEWERZICHT, OUDTSHOORN, 6625
072 386 1043 086 297 7700
marius.oudtshoorn@gmail.com

CLIENT

L. DE JAGER

REV	DATE	REVISION DETAILS	APPROVED
A	18/4/2022	PRELIMINARY DESIGN INFORMATION	M BOTHA
B	25/8/2022	LAYOUT AMENDED	M BOTHA

SCALE	1 : 500
SIZE	A1
DRAWN	M RICHARDS
DESIGNED	M BOTHA
REVIEWED	M BOTHA
APPROVED	DATE

PRELIMINARY
NOT FOR CONSTRUCTION

M BOTHA - ECSA - 201270359

PROJECT: REEBOKSFONTEIN
PORTION OF FARM 331

TITLE GENERAL LAYOUT
(PLAN 2 OF 3)

DRAWING No. – COMPANY KK – DISC CE – NUMBER 0002 – REV A

LIST OF QUANTITIES:

8.1 SEWAGE:

- 1931m OF 160mm Ø PVC-U HEAVY DUTY SEWER PIPE.
- 30 No. MANHOLES.
- 321m OF 110mm Ø PVC-U LIGHT DUTY HOUSE CONNECTIONS WITH END CAPS FOR 149 ERVEN.

8.2 WATER:

- 972m OF 110mm Ø HDPE CLASS 12 WATER PIPE.
- 6 No. FIRE HYDRANTS.
- 855m OF 20mm Ø HDPE CLASS 12 WATER HOUSE CONNECTIONS FOR 149 ERVEN.
- 1 No. 150mm BULK WATER METER.

8.3 ROADS:

- 6 364m², PAVING SURFACED ROADS.
- 403m², CONCRETE SURFACED DRIFTS.
- ROAD WIDTHS ARE 6.0m WIDE WITH BARRIER/MOUNTABLE KERB AND CHANNELS ON THE LOWER SIDE OF THE ROADWAY.
- AND CONCRETE CHANNELS AT INTERSECTIONS.

8.4 STORMWATER:

- 450m OF 600mm Ø CLASS 100D HEAVY DUTY STORMWATER PIPE.
- 33m OF 450mm Ø CLASS 100D HEAVY DUTY STORMWATER PIPE.
- 8 No. STORMWATER FIELD INLETS.
- 6 No. STORMWATER JUNCTION BOXES.
- 5 No. STORMWATER DOUBLE INLET CATCHPITS.
- 145m OF CONCRETE STORMWATER OPEN CHANNELS.
- 5 No. STORMWATER HEADWALLS.

GENERAL NOTES:

1. ALL WORK TO BE DONE IN ACCORDANCE WITH SANS 1200.
2. CONTOUR INTERVALS ARE 0.5m.

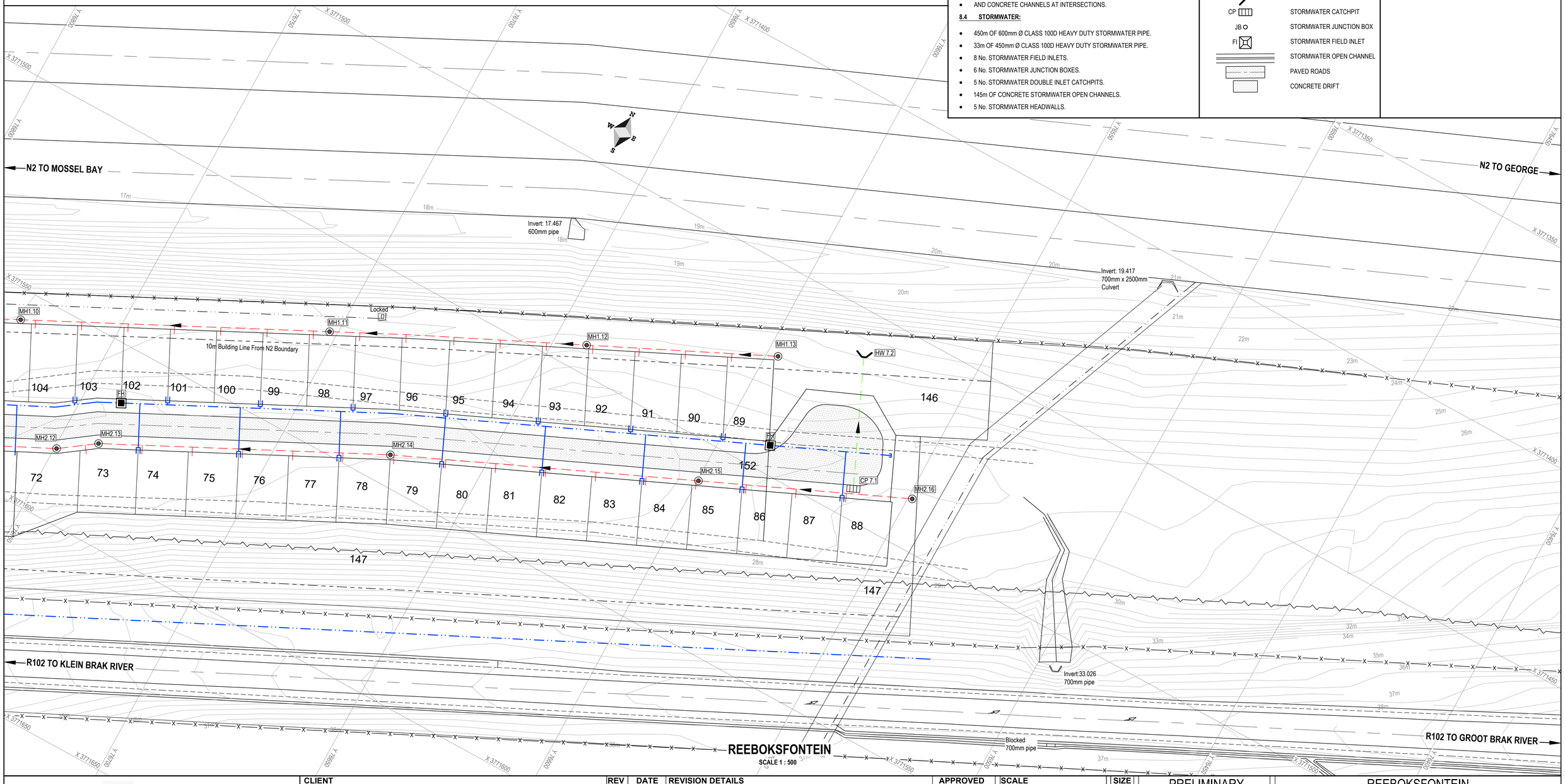
LEGEND:

PROPOSED:

- WATER PIPES
- WATER HOUSE CONNECTIONS
- VALVES
- FIRE HYDRANTS
- END CAP
- SEWER PIPES
- SEWER HOUSE CONNECTIONS
- SEWER MANHOLE
- STORMWATER PIPES
- HW — STORMWATER HEADWALL
- CP — STORMWATER CATCHPIT
- JB — STORMWATER JUNCTION BOX
- FI — STORMWATER FIELD INLET
- STORMWATER OPEN CHANNEL
- PAVED ROADS
- CONCRETE DRIFT

EXISTING:

- WATER PIPES
- SEWER PIPES
- STORMWATER PIPES
- ROADS
- OVERHEAD POWER LINE
- FENCE
- STORMWATER CHUTES
- STORMWATER HEADWALLS



KAROO KONSULT
CK NO: 2008 / 077949 / 23
17 ALPHEN RUN ROAD, OEWERZICHT, OUDTSHOORN, 6625
17 ALPHEN RUN ROAD, OEWERZICHT, OUDTSHOORN, 6625
072 386 1043 086 297 7700
marius.oudtshoorn@gmail.com

CLIENT

L. DE JAGER

REV	DATE	REVISION DETAILS	APPROVED
A	18/4/2022	PRELIMINARY DESIGN INFORMATION	M BOTHA
B	25/8/2022	LAYOUT AMENDED	M BOTHA

SCALE	1 : 500
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REVIEWED	M BOTHA
APPROVED	DATE

PRELIMINARY
NOT FOR CONSTRUCTION

M BOTHA - ECSA - 201270359

PROJECT: REEBOKSFONTEIN
PORTION OF FARM 331

TITLE GENERAL LAYOUT
(PLAN 3 OF 3)

DRAWING No. – KK – CE – 0003 – A
(COMPANY – DISC – NUMBER – REV)

Gmail Marius Botha <marius.oudtshoorn@gmail.com>

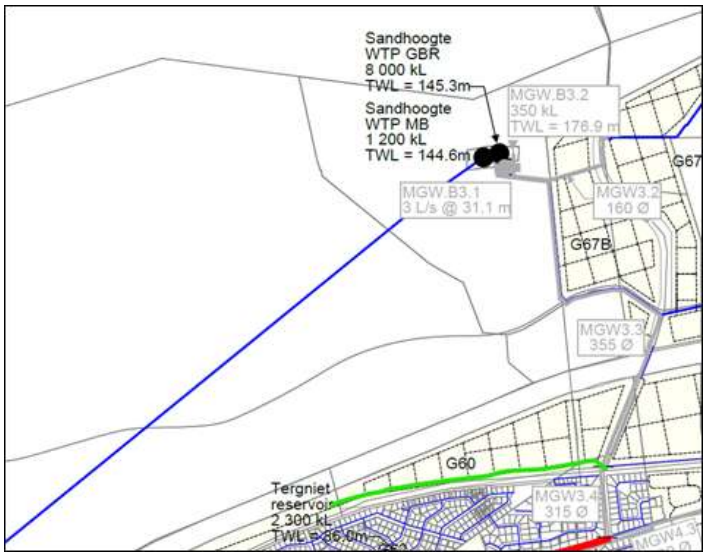
Bulk water capacity report: Erf 142/29 and Erf 331/1, Mossel Bay

Paul Malherbe <paul.malherbe@gls.co.za> 5 September 2025 at 09:55
To: Marius Botha <marius.oudtshoorn@gmail.com>
Cc: John Sharples <john@sescc.net>, Eric Louw <elouw@mosselbay.gov.za>, Fluffy de Jager <fluffy.fdj@gmail.com>, Hennie de Jager <hennie@karoonetwerkbw.co.za>, Flip du Plessis <Flip.duPlessis@gls.co.za>

Hi Marius,

Na die lewering van die kapasiteitsondersoekverslag in November 2024, is dit tot ons aandag gebring dat die her-implementering van die ou toevoerlyn direk tussen die Sandhoogte WTW en die Tergniet Reservoir nie as 'n opsie beskou kan word nie. Die munisipaliteit verkies dat enige versterking van die bestaande toevoer pype parallel aan die bestaande hoof toevoerlyn na die sone moet plaasvind.

Die implementering van 'n meesterplan item word wel nie vereis vir die voorgestelde ontwikkeling nie. Daar is egter 'n behoefte aan “link services" van ongeveer 1 250 m x 160 mm Ø direk suid van die N2-hoofpad, om die voorgestelde ontwikkeling aan die bestaand infrastruktuur te konnekteur. Sien in groen gemerk op die hieronder:



Vertrou dit is van waarde.

Vriendelike groete

Paul Malherbe, Jnr *BEng Civil Eng*

Civil Engineer

M +27 68 632 9188

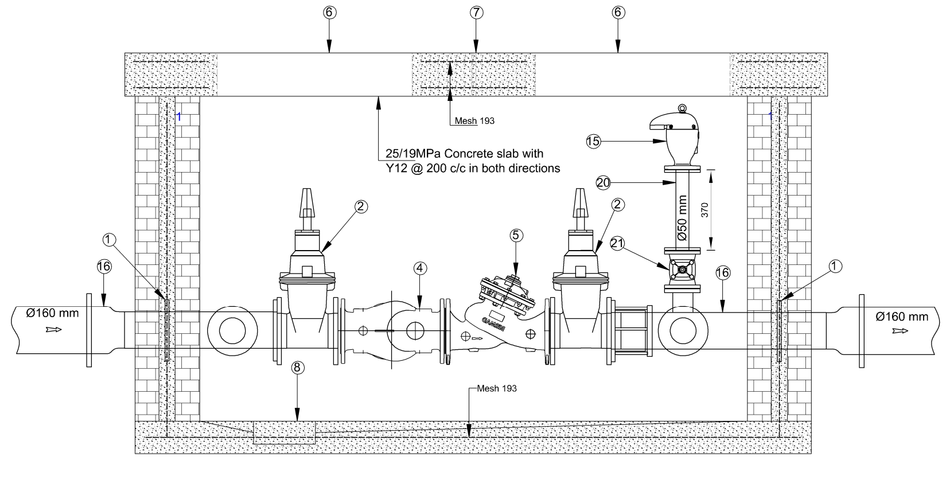
GLS Infrastructure planning

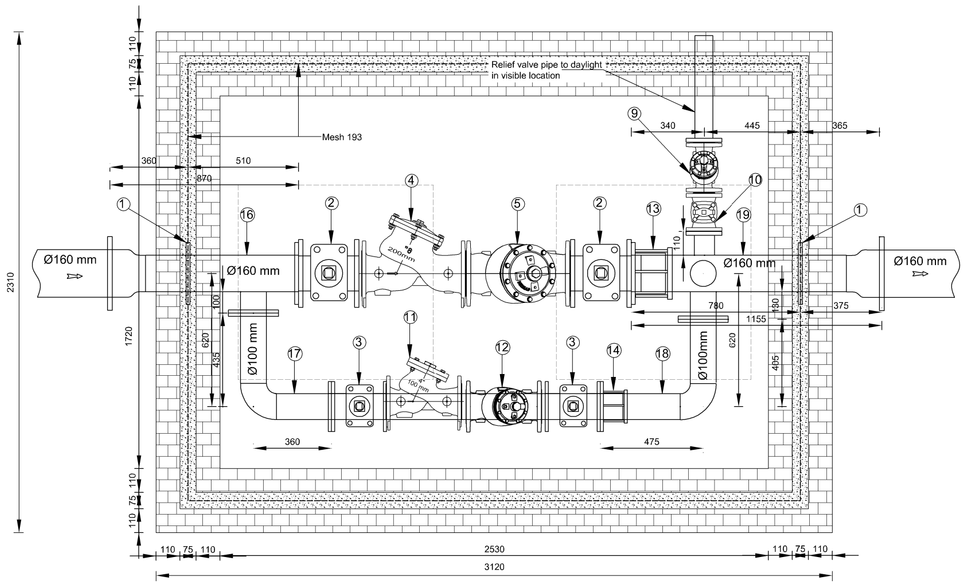
[Quoted text hidden]

www.gls.co.za
Stellenbosch- Pretoria

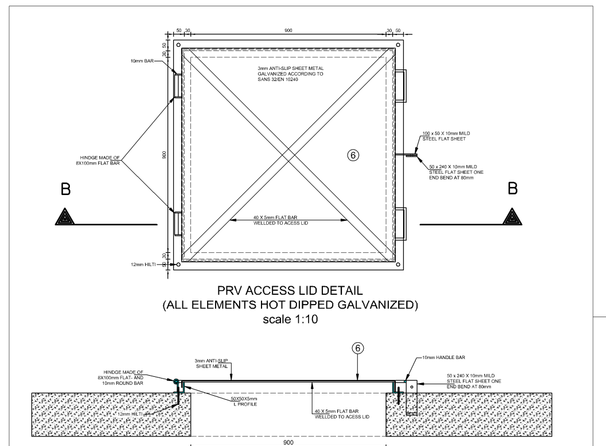
[Quoted text hidden]

Figure MBW 6.5c Little Brak, Great Brak & Glentana A1.pdf
1864K

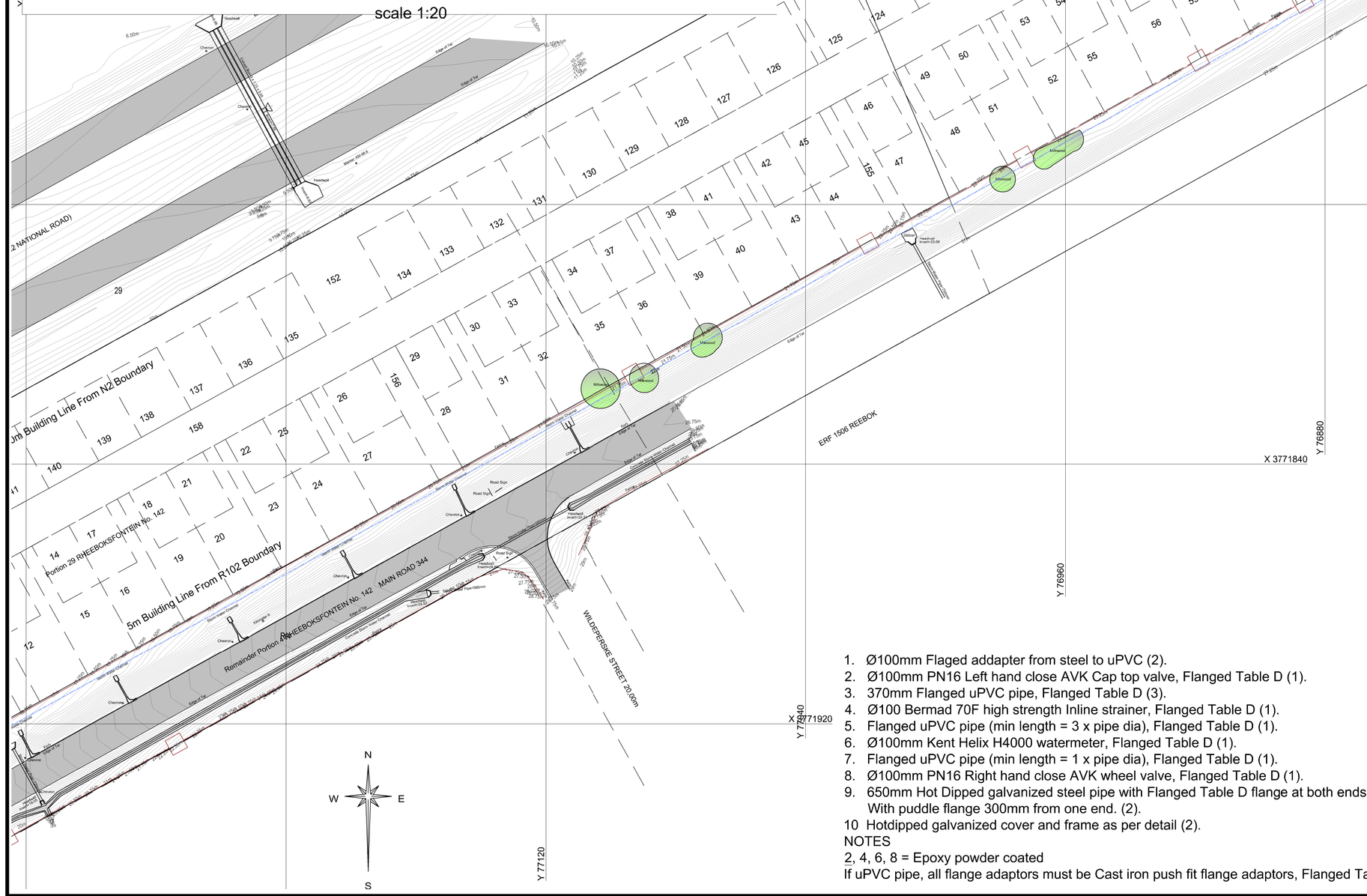


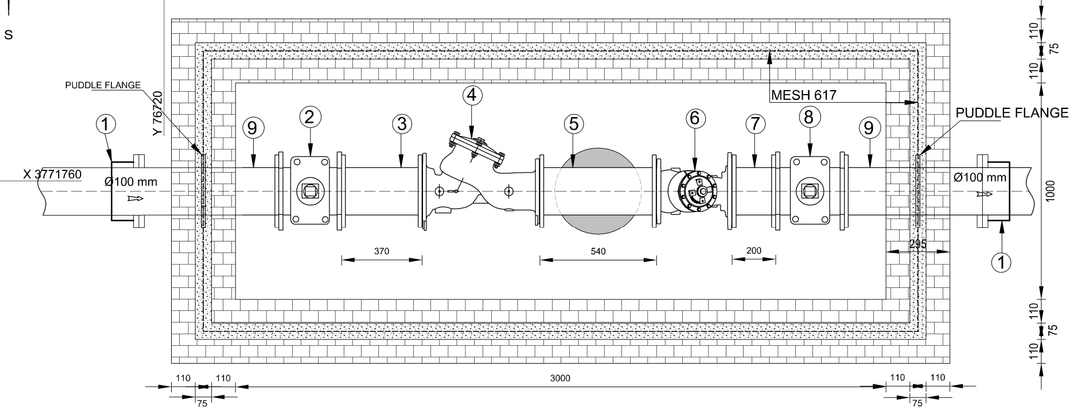


PRV CHAMBER SECTION AND PLAN
scale 1:20

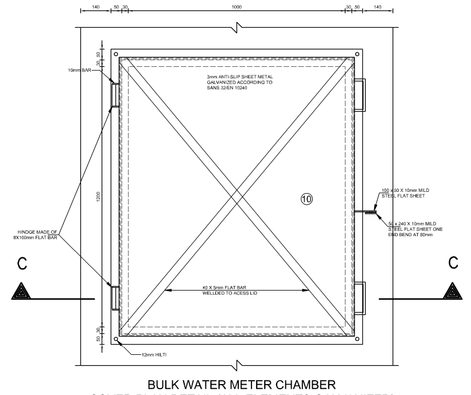


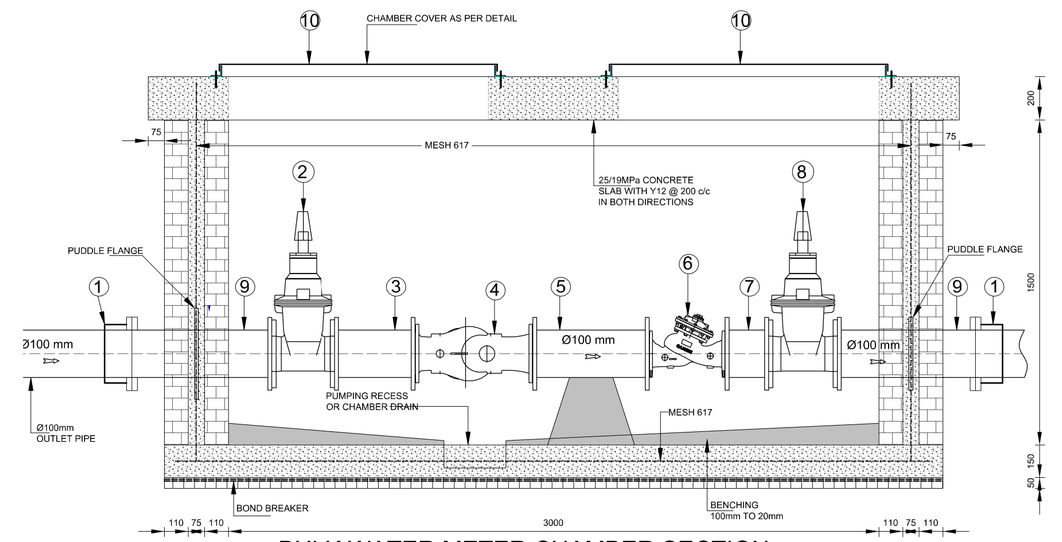
1. Puddle flange for Ø160mm pipe (2 off).
2. PN16 Flanged Ø160 mm AVK right hand closing wheel capped valve (2 off).
3. PN16 Flanged Ø100 mm AVK right hand closing wheel capped valve (2 off).
4. Ø160 mm Bermad 70F high strength strainer (1).
5. Ø160 mm Bermad 720-VF pressure reducing valve (1).
6. Lockable hot dipped galvanized access lid (2 off).
7. 2 x Ø25 mm Chamber vent
8. Pumping recess or chamber drain
9. Ø100 mm Bermad 730 relief valve (1)
10. PN16 Flanged Ø100 mm AVK right hand closing wheel capped valve (1)
11. Ø100 mm Bermad 70F High strength strainer (1)
12. Ø100 mm Bermad 720-VF pressure reducing valve (1)
13. Ø200 mm VJ Flanged adaptor (1)
14. Ø100 mm VJ Flanged adaptor (1)
15. Ø50 mm Bermad C70 air valve (1)
16. PN16 galvanized flanged reducing T-piece (1). Read with 19.
17. PN16/DN100 galvanized flanged 90° bend (1).
18. PN16/DN100 galvanized flanged/streight 90° bend (1).
19. PN16 galvanized flanged/streight reducing cross-piece (1). Read with 16.
20. 370mm PN16/DN50 galvanized flanged/streight section
21. PN16 Flanged Ø50 mm AVK right hand closing wheel capped valve (1).





BULK WATER METER CHAMBER PLAN
scale 1:20





BULK WATER METER CHAMBER SECTION
scale 1:20

1. Ø100mm Flaged addapter from steel to uPVC (2).
2. Ø100mm PN16 Left hand close AVK Cap top valve, Flanged Table D (1).
3. 370mm Flanged uPVC pipe, Flanged Table D (3).
4. Ø100 Bermad 70F high strength Inline strainer, Flanged Table D (1).
5. Flanged uPVC pipe (min length = 3 x pipe dia), Flanged Table D (1).
6. Ø100mm Kent Helix H4000 watermeter, Flanged Table D (1).
7. Flanged uPVC pipe (min length = 1 x pipe dia), Flanged Table D (1).
8. Ø100mm PN16 Right hand close AVK wheel valve, Flanged Table D (1).
9. 650mm Hot Dipped galvanized steel pipe with Flanged Table D flange at both ends. With puddle flange 300mm from one end. (2).
10. Hotdipped galvanized cover and frame as per detail (2).

NOTES
2, 4, 6, 8 = Epoxy powder coated
If uPVC pipe, all flange adaptors must be Cast iron push fit flange adaptors, Flanged Table D

OORSPRONKLIKE SKAAL IN mm/ ORIGINAL SCALE IN mm
0 10 25 50

Wysig. Amend.	Datum Date	Beskrywing-Description

Cobus Louw Pr. Eng.
Professional Engineer
POSBUS/P.O.BOX 1247
HARTENBOS
6520
TEL: (044) 692 0441
FAX: 086 6192 839
e-mail: admin@clconsult.co.za

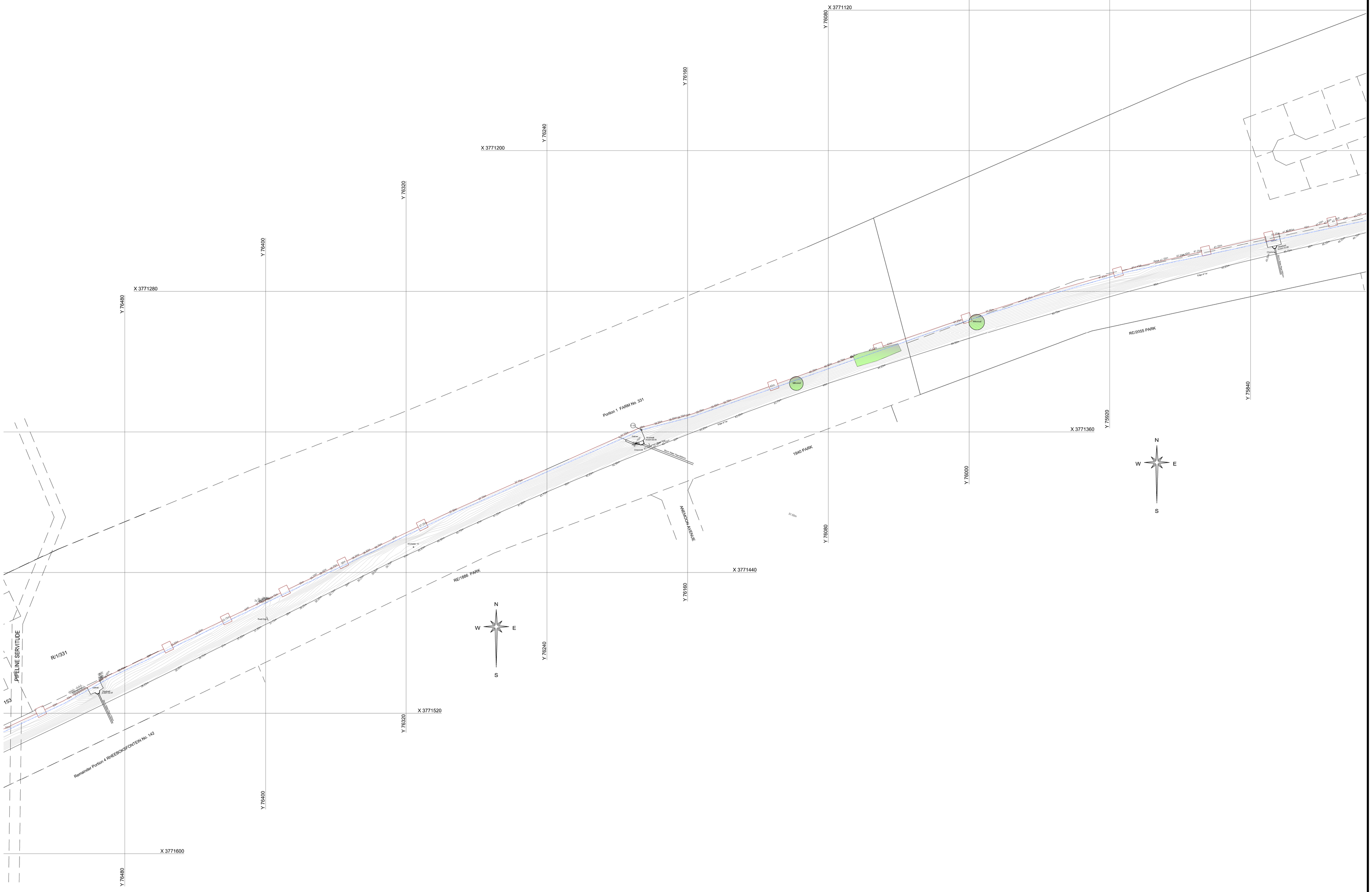
Ontwerp-Designed	J.L.L
Geteken-Drawn	C.B
Nagesien-Checked	

Pr.Ing. Pr.Eng.
Raadgewende Ingenieur-Consulting Engineer
Datum-Date: 2023-08-30
Kliënt-Client

Kliënt-Client	Projek-Project	Titel-Title	Skaal-Scale	Datum-Date
KLIPHEUWEL COUNTRY ESTATE (PTY) LTD	DEVELOPMENT OF PORTION 28 OF 143 & PORTION 8 of 140, MOSSEL BAY	PROPOSED EXTERNAL WATER LAYOUT PLAN M13560-11, 12 & 13	1:1 000	AUGUST 2023

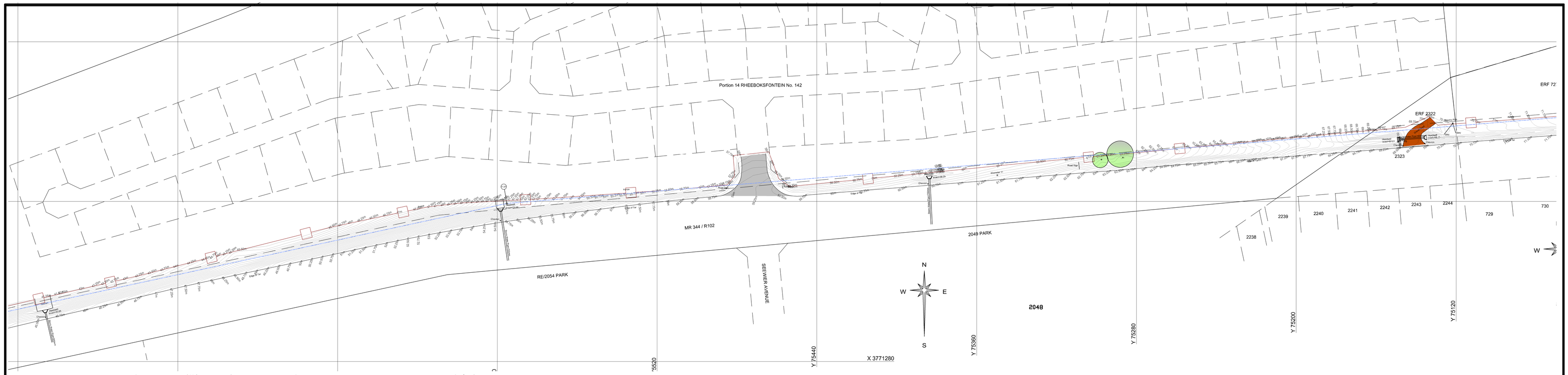
Tekening Nr.-Drawing No.
M1350-11

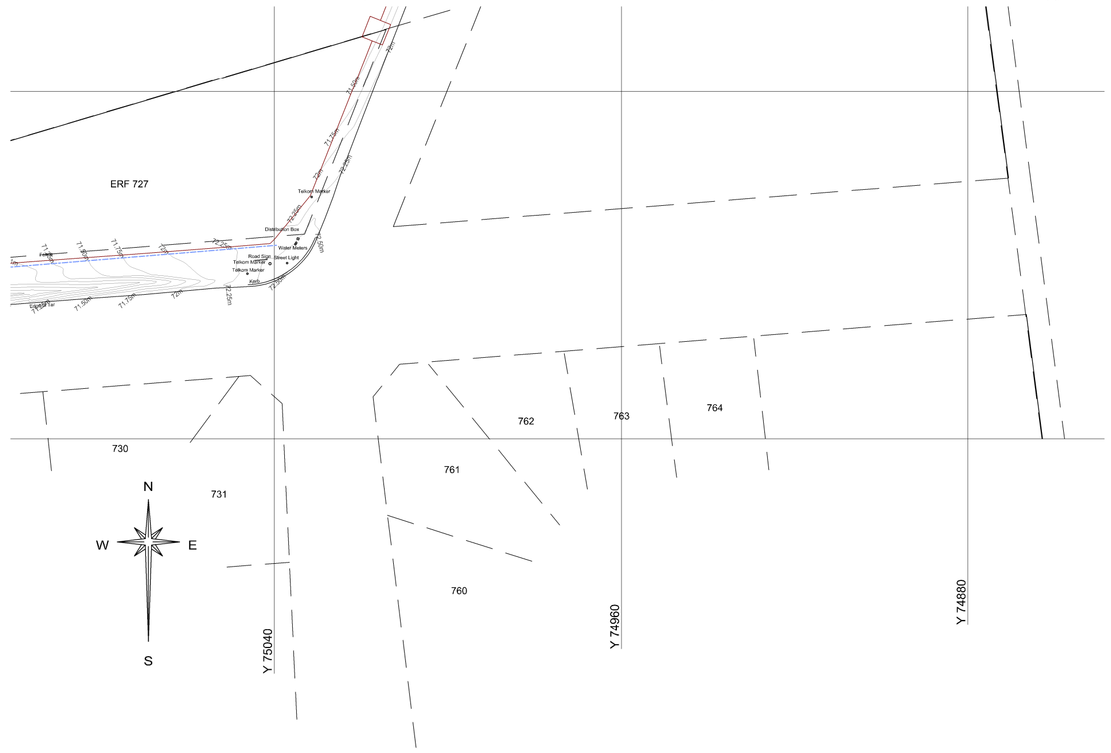
Wysiging Amendment

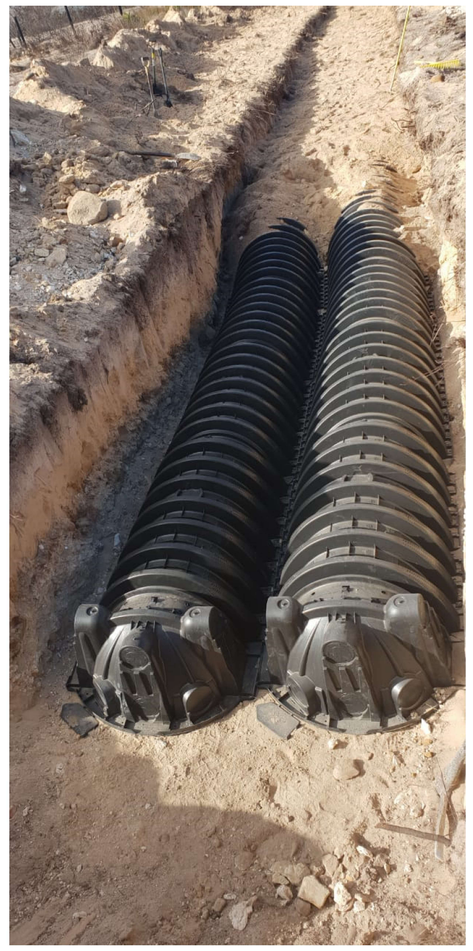


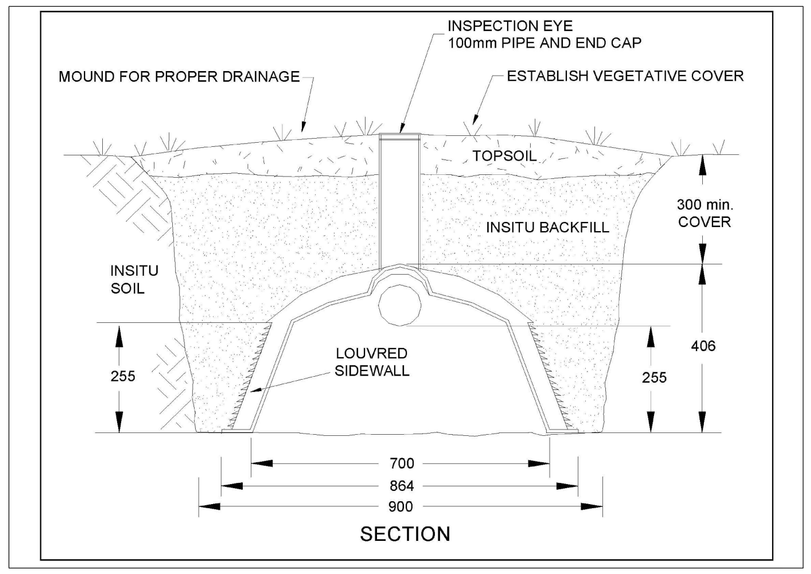
OORSPRONKLIKE SKAAL IN mm/ ORIGINAL SCALE IN mm (0 10 25 50)	Cobus Louw Pr. Eng. Professional Engineer POSBUS/P.O.BOX 1247 HARTENBOS 6520 TEL: (044) 692 0441 FAX: 086 6192 839 e-mail: admin@clconsult.co.za	Ontwerp-Designed J.L.L Geteken-Drawn C.B Nagesien-Checked	Pr.Ing. Pr.Eng. Raadgewende Ingenieur-Consulting Engineer Datum-Date: 2023-08-30 Kliënt-Client	Kliënt-Client KLIPHEUWEL COUNTRY ESTATE (PTY) LTD	Projek-Project DEVELOPMENT OF PORTION 28 OF 143 & PORTION 8 of 140, MOSSEL BAY	Titel-Title PROPOSED EXTERNAL WATER LAYOUT PLAN M13560-11, 12 & 13	Skaal-Scale 1:1 000 Datum-Date AUGUST 2023 Tekening Nr.-Drawing No. M1350-12 Wysiging Amendment .

Wysig. Amend.	Datum Date	Beskrywing-Description
.	.	.









TYPICAL INFILTRATION CHAMBER DETAIL

0 10 25 50 OORSPRONKLIKE SKAAL IN mm/ ORIGINAL SCALE IN mm

Wysig. Amend.	Datum Date	Beskrywing-Description
.	.	.

Cobus Louw Pr. Eng.
Professional Engineer
POSBUS/P.O.BOX 1247
HARTENBOS
6520
TEL: (044) 692 0441
FAX: 086 6192 839
e-mail: admin@clconsult.co.za

Ontwerp-Designed: J.L.L
Geteken-Drawn: C.B
Nagesien-Checked:

Pr.Ing. Pr.Eng.
Raadgewende Ingenieur-Consulting Engineer
Datum-Date: 2023-08-30
Kliënt-Client

Klient-Client: KLIPHEUWEL COUNTRY ESTATE (PTY) LTD

Projek-Project: DEVELOPMENT OF PORTION 28 OF 143 & PORTION 8 of 140, MOSSEL BAY

Titel-Title: PROPOSED EXTERNAL WATER LAYOUT PLAN M13560-11, 12 & 13

Skaal-Scale: 1:1 000

Datum-Date: AUGUST 2023

Tekening Nr.-Drawing No.: M1350-13

Wysiging Amendment: .

Western Cape Government

Department of Infrastructure
Vanessa Stoffels
Chief Directorate: Road Planning
Vanessa.Stoffels@westerncape.gov.za | Tel: 021 483 4669

Ref: DOI/CFS/RN/LU/WLWP-18/41 (Application 2024-11-0084)

Cobus Louw Professional Engineer
PO Box 1247
HARTENBOS
6520

Attention: Mr JL Louw

Dear Sir

WATER PIPELINE ALONG MAIN ROAD 344 (MR00344; R102) IN FAVOUR OF THE PROPOSED DEVELOPMENT RESULTING FROM THE CONSOLIDATION, REZONING, SUBDIVISION AND DEPARTURE OF BOTH PORTION 8 OF FARM 140 AND PORTION 28 OF FARM 143, MOSSEL BAY

1. The following refer:

1.1 This Branch's letter TPW/CFS/RP/LUD/REZ/SUB-18/172 (Job 29933) dated 30 November 2022 to Mossel Bay Municipality.

1.2 Your letter M1350 dated 15 August 2023 to this Branch.

2. MR00344, for which this Branch is the Road Authority, is affected by your request to amend this Branch's condition (as per paragraph 3.6 of its letter dated 30 November 2022) to not allow external services to be installed within this Branch's road reserve.

3. This Branch is willing to reconsider its stance, and allow the proposed 160mmØ water pipeline in its road reserve (within 1000mm from the northern road reserve boundary of the MR00344), provided that the following will be adhered to:

3.1 Confirmation that, once installed, the water pipeline will be carried over to Mossel Bay Municipality.

3.2 A long-section of the pipeline is produced. That drawing must indicate the type and class of pipe that will be installed. Note that this Branch will only accept a pipe of acceptable strength that will withstand the external pressures and is not prone to bursting.

3.3 Cross-section drawings (at 150m intervals) of an acceptable scale are produced that will confirm that the construction of this pipeline will not affect this Branch's recently upgraded MR00344 road structure and road reserve. The cross-section drawings must clearly reflect the MR00344 road level, the ground level between road edge and road reserve boundary and the pipeline (with at least 1000mm cover).

3.4 Detailed drawings (plan view and cross-sections) of any chambers and / or thrust blocks that may be constructed as a part of this pipeline must be produced.

4. Upon receipt of the abovementioned detailed information will this Branch respond accordingly.

Yours Sincerely

DD FORTUIN
***For* DEPUTY DIRECTOR-GENERAL: TRANSPORT INFRASTRUCTURE BRANCH**
DATE: 21 NOVEMBER 2024

ENDORSEMENTS

1. Cobus Louw Professional Engineer

   Attention: Mr JL Louw (e-mail: admin@clconsult.co.za)

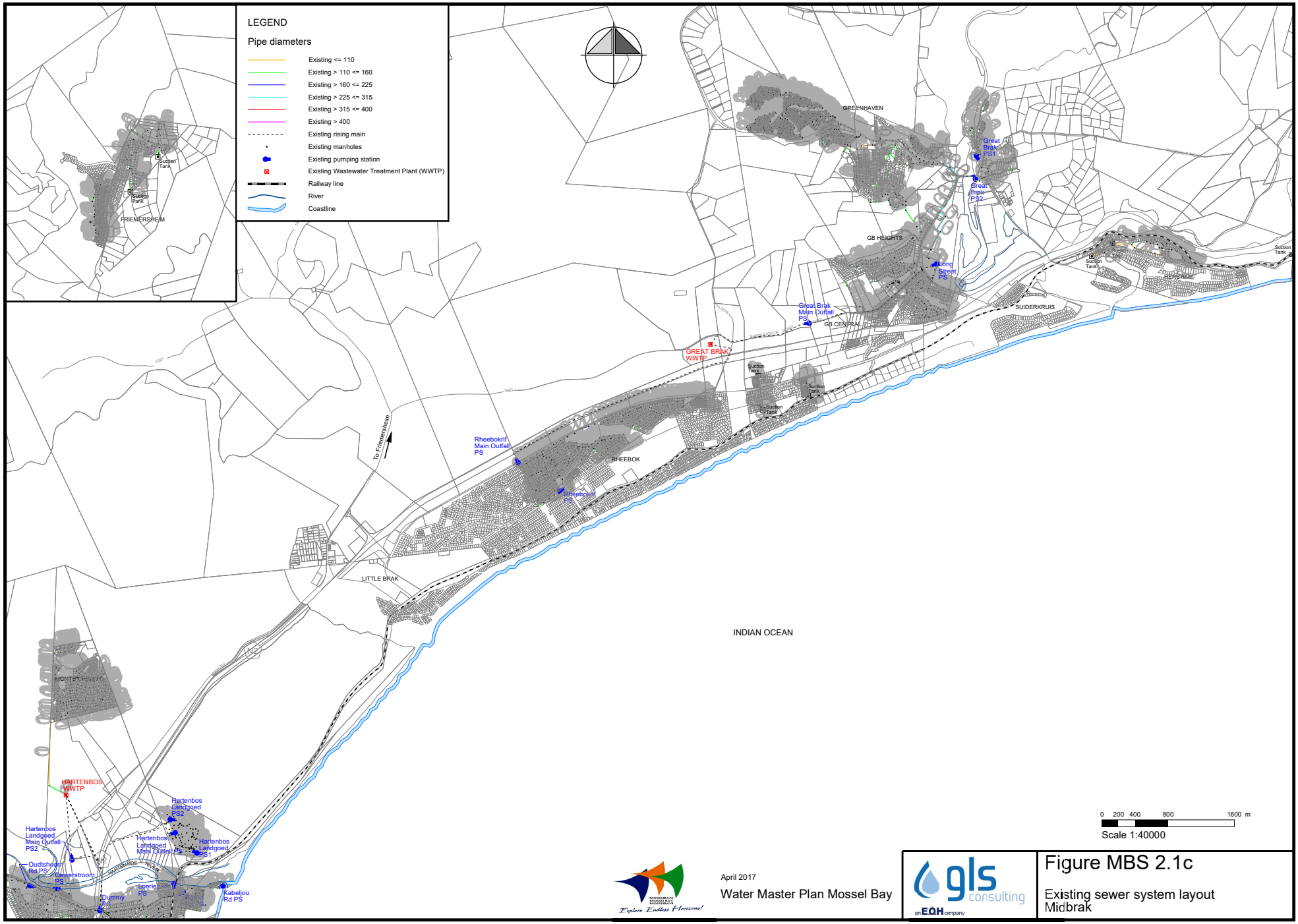
2. District Roads Engineer

   Oudtshoorn

3. Mr E Burger (e-mail)

4. Mr DD Fortuin (e-mail)

5. Mr M Steyn (e-mail)



April 2017

Water Master Plan Mossel Bay

Figure MBS 2.1c

Existing sewer system layout
Midbrak

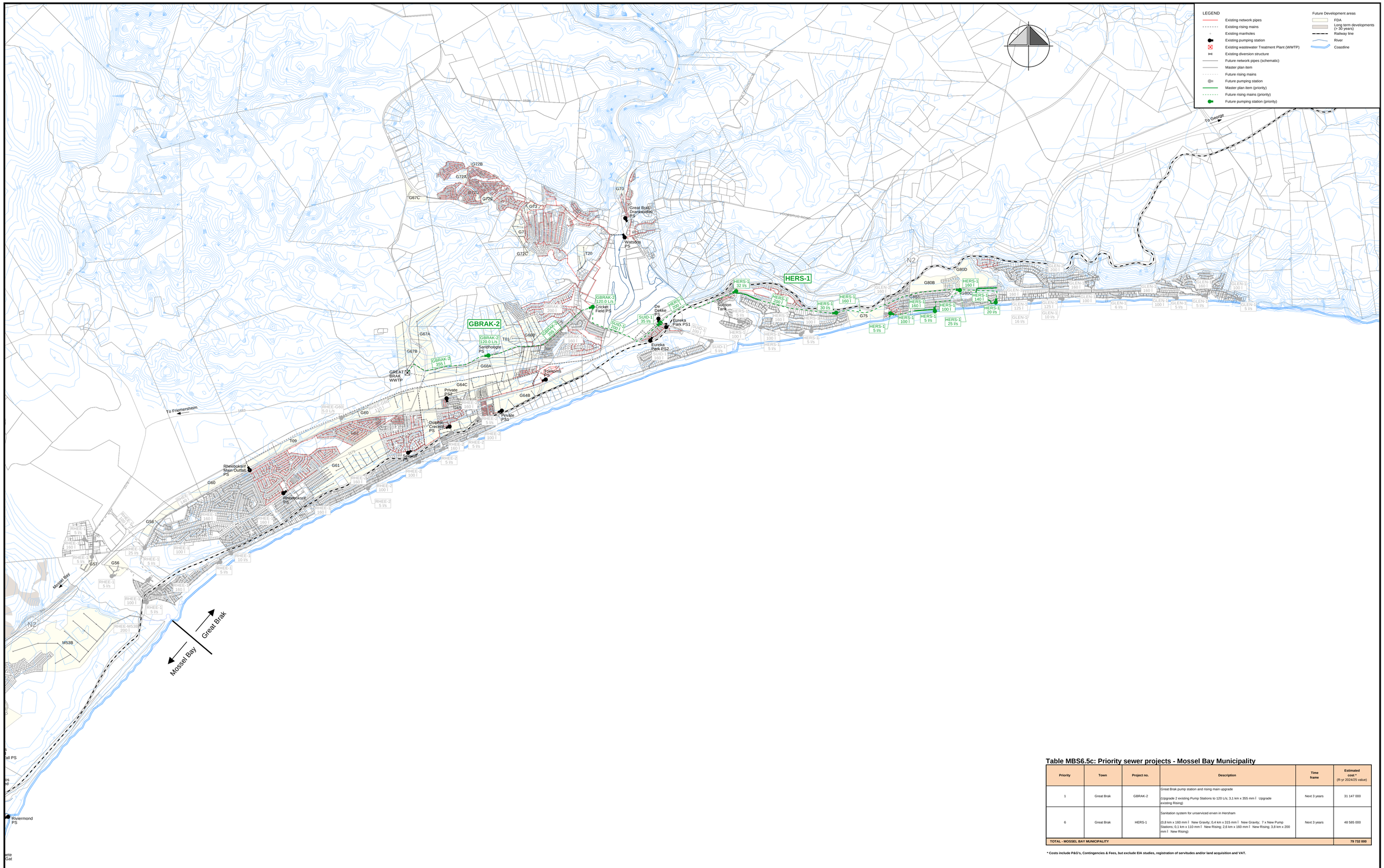


Table MBS6.5c: Priority sewer projects - Mossel Bay Municipality

Priority	Town	Project no.	Description	Time frame	Estimated cost * (R-yr 2024/25 value)
1	Great Brak	GBRAK-2	Great Brak pump station and rising main upgrade (Upgrade 2 existing Pump Stations to 120 L/s; 3,1 km x 355 mm l Upgrade existing Rising)	Next 3 years	31 147 000
6	Great Brak	HERS-1	Sanitation system for unserviced erven in Hersham (0,8 km x 160 mm l New Gravity; 0,4 km x 315 mm l New Gravity; 7 x New Pump Stations; 0,1 km x 110 mm l New Rising; 2,6 km x 160 mm l New Rising; 3,8 km x 200 mm l New Rising)	Next 3 years	48 585 000
TOTAL - MOSSEL BAY MUNICIPALITY					**79 732 000**

*** Costs include P&G's, Contingencies & Fees, but exclude EIA studies, registration of servitudes and/or land acquisition and VAT.**

April 2025

Sewer Master Plan - Mossel Bay Municipality

0 180 360 720 1440 m

Scale 1:25000

Figure MBS 6.4c

Required works - (Priority projects)
Little Brak, Great Brak & Glentana

LEGEND

1. Application is made ito Section 15(2)(e) of the By-Law on Municipal Land Use Planning for consolidation of Farm 1/331, Mossel Bay previously approved into Ptn A (4.1657ha) & Remainder (7.1027ha) with Ptn 29 of Farm 142 (3,9705ha) previously approved as Ptn B of Farm R/4/142 to form one consolidated property 15.2390ha in size - See PLAN A.

2. Application is made ito Section 15(2)(h) of the By-Law on Municipal Land Use Planning for an amendment of the current approved Subdivisional Area zoning of the properties fora development consisting of in total 87 Single Res Zone I erven, 5 private open spaces, 2 utility zone erven and private streets, to a Subdivisional Area consisting of 143 group housing erven, 5 private open space erven, 3 utility erven, private street, conservation erf and public street.

3. Application is made for subdivision of the Subdivisional Area as follows:

   143 erven - General Residential Zone I - Erven 1 to 143
   - average 337 m² (4,6092Ha

   1 erf - Utility Zone - Sewerage Pumpstation - Erf 144= 708m²

   1 erf - Utility Zone - Electr. Substation - Erf 145 = 65m²

   1 erf - Utility Zone - Refuse Collection - Erf 151 = 98m²

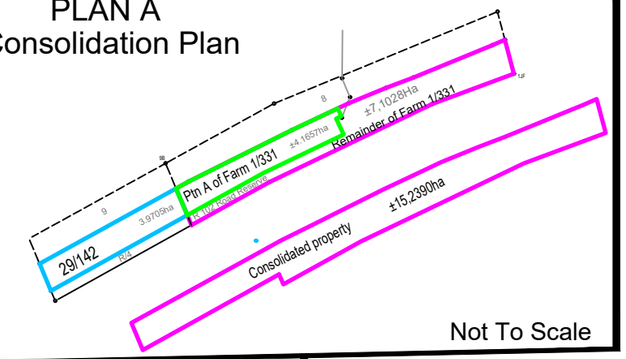
   5 erven - Open Space Zone II - Erven 146 - 150 = 2.0572ha

   1 erf - Open Space Zone III(conservation) - Erf 153 = 3.7119ha

   1 erf - Transport Zone III - Erf 152 = 1,3831ha

   1 erf - Transport Zone II - Rem Farm 1/331 = 3,3905ha

PLAN A
Consolidation Plan



Not To Scale

ZONINGS

- Gen Res Zone I Erven
- Open Space Zone II
- Utility Zone
- Open Space Zone III
- Transport Zone III
- Transport Zone II

8m Buffer area accommodating a 5m wide berm as requested by Minister and a 3m wide servitude area for sewerage pipe line

5.5m Buffer area accommodating a 2.5m wide strip area as requested by Minister and a 3m wide servitude area for sewerage pipe line

8B

8

9B

29

153

1/331

R/1/331

R 102 Road Reserve

N

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Kopiereg Voorbehou

Client: De Jager Brothers

Klient:

FORMAPLAN cc
STADS- & STREEKSBEPLANNERS
TOWN- & REGIONAL PLANNERS
P.O. Box 9824, George 6530 / 8 St John St
Tel: (044) 873-0305 Faks: (044) 874-5632

Project: Consolidation, Rezoning & Subdivision

Projek:

Title: Subdivision Plan

Titel:

Property: Ptn 29 of 142 & Ptn 1 of Farm 331, MOSSEL BAY

Eiendom:

Scale: 1 : 3500 on A3 Plot

Skaal :

Drawing Number : Tekening Nommer: De J 3.5

Date : 20 July 2024

Datum:

RATIONAL METHOD: PRE DEVELOPMENT

Description of the catchment	Portion 29 of Farm 142 and Portion 1 of Farm 331		
River details	Stormwater Network N2 North of Development		
Calculated by	Marius Botha	Date	2026/01/05

Physical characteristics

Size of the catchment (A)	0.15239	km^2	Days of thunder per year (R)		10	days / year	
Longest watercourse (L)	0.164	km	**Weather Services**		Area distribution factors		
Average slope (S_{av})	0.075	m/m	Station		Rural (α)	0%	
Dolomite area ($D_{\%}$)	0	%	Number		Urban (β)	100%	
Mean annual rainfall (MAP)	561	mm	1 day T(2) rainfall (M)		Lakes (γ)	0%	

Rural

Surface slope	%	Factor	C_s
Vleis and pans (<3%)	0	0.01	0.0000
Flat areas (3-10%)	0	0.06	0.0000
Hilly (10-30%)	0	0.12	0.0000
Steep areas (>30%)	0	0.22	0.0000
Total	0	0.41	0
Permeability	%	Factor	C_p
Very permeable	0	0.03	0.0000
Permeable	0	0.06	0.0000
Semi-permeable	0	0.12	0.0000
Impermeable	0	0.21	0.0000
Total	0	0.42	0
Vegetation	%	Factor	C_v
Thick bush & plantation	0	0.03	0.0000
Light bush and farmlands	0	0.078	0.0000
Grasslands	0	0.17	0.0000
No vegetation	0	0.26	0.0000
Total	0	0.278	0.0000
Total			0

Urban

Description	%	Factor	C_2
Lawns			
Sandy, flat (<2%)	50	0.07	0.04
Sandy, steep (>7%)	50	0.18	0.09
Heavy soil, flat (<2%)	0	0.15	0.00
Heavy soil,steep (>7%)	0	0.3	0.00
Residential area			
Houses	0	0.4	0.00
Flats	0	0.6	0.00
Industry			
Light industry	0	0.65	0.00
Heavy industry	0	0.75	0.00
Business			
City centre	0	0.83	0.00
Suburban	0	0.6	0.00
Streets	0	0.9	0.00
Maximum flood	0	1	0.00
Total	**100.00**		**0.125**

Time of concentration (T_c)

Overland flow

$$Tc = 0.604 \left(\frac{rL}{\sqrt{S_{av}}}\right)^{0.467}$$

Tc = hours

Defined watercourse

$$Tc = \left(\frac{0.87L^2}{1000S_{av}}\right)^{0.385}$$

Tc = 0.0447 hours

Notes

As Tc is less than 0.25 hours, for point intensity use Tc as:

0.25

As ARF is more than 100% use:

100

Run-off coefficient

Return period (years), T	2	5	10	20	50	100	PMF
Run-off coefficient C_1 ($C_1 = C_s + C_p + C_v$)	0.000	0.000	0.000	0.000	0.000	0.000	
Adjusted for dolomitec areas, C_{1D} ($=C_1 (1 - D_{\%}) + C1\ D_{\%}(\sum(D_{factor} \times C_{S\%}))$)	0.000	0.000	0.000	0.000	0.000	0.000	
Adjustment factor for initial saturation, F_t	0.500	0.550	0.600	0.670	0.830	1.000	
Adjusted run-off coefficient, C_{1T} ($= C_{1D} \times F_t$)	0.000	0.000	0.000	0.000	0.000	0.000	
Combined run-off coefficient C_t ($= \alpha C_{1T} + \beta_{C2} + \gamma_{C3}$)	0.125	0.125	0.125	0.125	0.125	0.125	

Rainfall

Return period (years), T	2	5	10	20	50	100	PMF
Point rainfall (mm), P_T	20.25	26.92	33.14	40.80	53.71	66.12	
Point intensity (mm/hour), P_{iT} ($= P_T / T_C$)	81.00	107.68	132.56	163.20	214.84	264.48	
Area reduction factor (%), ARF_T	108.91	108.91	108.91	108.91	108.91	108.91	
Average intensity (mm/hour), I_T ($= P_{iT} x ARF_T$)	88.21	107.68	144.37	177.74	233.98	288.04	

Peak flow

Return period (years), T	2	5	10	20	50	100	Max
Peak flow (m3/s) $Q_T = \frac{C_T I_T A}{3.6}$	0.4668	0.5698	0.7639	0.9405	1.2380	1.5241	
Peak flow (L/s)	**467**	**570**	**764**	**940**	**1238**	**1524**	

RATIONAL METHOD: POST DEVELOPMENT

Description of the catchment	Portion 29 of Farm 142 and Portion 1 of Farm 331		
River details	Stormwater Network N2 North of Development		
Calculated by	Marius Botha	Date	2026/01/05

Physical characteristics

Size of the catchment (A)	0.15239	km^2	Days of thunder per year (R)		10	days / year	
Longest watercourse (L)	0.164	km	**Weather Services**		Area distribution factors		
Average slope (S_{av})	0.075	m/m	Station		Rural (α)	0	
Dolomite area ($D_{\%}$)	0	%	Number		Urban (β)	100%	
Mean annual rainfall (MAP)	561	mm	1 day T(2) rainfall (M)		Lakes (γ)	0	

Rural				**Urban**			
Surface slope	%	Factor	C_s	**Description**	%	Factor	C_2
Vleis and pans (<3%)	0	0.01	0.0000	**Lawns**			
Flat areas (3-10%)	0	0.06	0.0000	Sandy, flat (<2%)	47	0.07	0.03
Hilly (10-30%)	0	0.12	0.0000	Sandy, steep (>7%)	13	0.18	0.02
Steep areas (>30%)	0	0.22	0.0000	Heavy soil, flat (<2%)	0	0.15	0.00
Total	0	0.41	0	Heavy soil,steep (>7%)	0	0.3	0.00
Permeability	%	Factor	C_p	**Residential area**			
Very permeable	0	0.03	0.0000	Houses	40	0.4	0.16
Permeable	0	0.06	0.0000	Flats	0	0.6	0.00
Semi-permeable	0	0.12	0.0000	**Industry**			
Impermeable	0	0.21	0.0000	Light industry	0	0.65	0.00
Total	0	0.42	0	Heavy industry	0	0.75	0.00
Vegetation	%	Factor	C_v	**Business**			
Thick bush & plantation	0	0.03	0.0000	City centre	0	0.83	0.00
Light bush and farmlands	0	0.078	0.0000	Suburban	0	0.6	0.00
Grasslands	0	0.17	0.0000	Streets	0	0.9	0.00
No vegetation	0	0.26	0.0000	Maximum flood	0	1	0.00
Total	0	0.278	0.0000				
Total			0	Total	**100.00**		**0.216**

Time of concentration (T_c)

Overland flow

$$Tc = 0.604 \left(\frac{rL}{\sqrt{S_{av}}} \right)^{0.467}$$

Tc = hours

Defined watercourse

$$Tc = \left(\frac{0.87L^2}{1000 S_{av}} \right)^{0.385}$$

Tc = 0.0447 hours

Notes

As Tc is less than 0.25 hours, for point intensity use Tc as:

0.25

As ARF is more than 100% use:

100

Run-off coefficient

Return period (years), T	2	5	10	20	50	100	PMF
Run-off coefficient C_1 ($C_1 = C_s + C_p + C_v$)	0.000	0.000	0.000	0.000	0.000	0.000	
Adjusted for dolomitec areas, C_{1D} ($=C_1 (1 - D_{\%}) + C1\ D_{\%}(\sum(D_{factor} \times C_{S\%})$)	0.000	0.000	0.000	0.000	0.000	0.000	
Adjustment factor for initial saturation, F_t	0.500	0.550	0.600	0.670	0.830	1.000	
Adjusted run-off coefficient, C_{1T} ($= C_{1D} \times F_t$)	0.000	0.000	0.000	0.000	0.000	0.000	
Combined run-off coefficient C_t ($= \alpha C_{1T} + \beta_{C2} + \gamma_{C3}$)	0.216	0.216	0.216	0.216	0.216	0.216	

Rainfall

Return period (years), T	2	5	10	20	50	100	PMF
Point rainfall (mm), P_T	20.25	26.92	33.14	40.80	53.71	66.12	
Point intensity (mm/hour), P_{iT} (= P_T / T_C)	81.00	107.68	132.56	163.20	214.84	264.48	
Area reduction factor (%), ARF_T	108.91	108.91	108.91	108.91	108.91	108.91	
Average intensity (mm/hour), I_T (= P_{iT}xARF_T)	88.21	107.68	144.37	177.74	233.98	288.04	

Peak flow

Return period (years), T	2	5	10	20	50	100	Max
Peak flow (m3/s) $Q_T = \frac{C_T I_T A}{3.6}$	0.808	0.986	1.322	1.627	2.142	2.637	
Peak flow (L/s)	**808**	**986**	**1322**	**1627**	**2142**	**2637**	