ERF 134

SERVICES REPORT FOR
CIVIL ENGINEERING SERVICES FOR THE DEVELOPMENT OF ERF 134, CAPE INFANTA, SWELLENDAM MUNICIPALITY

HESRIV-573

March 2025

PREPARED BY:

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Mr. M. de Agrella
CAPE INFANTA
6740

TABLE OF CONTENT

1. INTRODUCTION

Hessequa Consulting Engineers CC has been appointed by Westerhelling Investments for the planning of civil engineering services for the proposed development of Erf 134, Cape Infanta, Swellendam Municipality.

The provision of civil engineering services will be in accordance with the guidelines and requirements of the *Guidelines for the Provision of Engineering Services and Amenities in Residential Township Development* as published by the CSIR and that of the Swellendam Municipality.

This report indicates, discusses and elaborates on the design criteria and specifications to be applied in the detail design of the internal and external infrastructure including roads, stormwater, water and Waste Water Treatment, Solid Waste Management, floodlines as well as requirements for the provision of electrical sleeves.

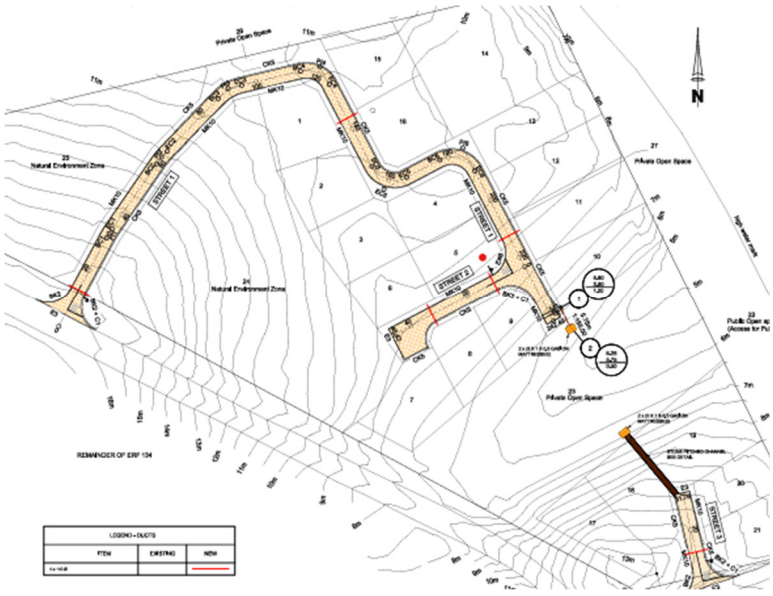
The concept design is based on a site survey completed by Pieter Houterman (Land Surveyor).

This report indicates, discusses and elaborates on the design criteria and specifications to be applied in the detail design of the internal and external infrastructure. The supply and distribution of electrical services and bulk supply will be discussed in a separate Electrical Services Report.

2. LOCATION

Infanta is situated west of the Breede River mouth and 60km south-east of Swellendam. Erf 134 Infanta is 86 ha in extent and currently has one residential unit. The project entails the development of an additional 20 units on erf 134.

The development is located north-east of Main Road 268. There is a dry watercourse that passes through the development site. Fifteen of the new units will be located north of the watercourse and the remainder 5 units to the south of the watercourse.



3. ACCESS ROADS

Access to the original dwelling and the additional 15 erven will be via an existing entrance, from main road 268, to erf 134. The five erven south of the water course will gain access from Hoek Street (gravel road).

The existing road network has sufficient spare capacity to accommodate the proposed development. The expected additional trips to and from the proposed development will have an insignificant impact on the surrounding road network. No upgrading of existing road network is envisaged.

4. ENGINEERING SERVICES

Civil engineering services will be designed in accordance with the design standards of the *Guidelines for the Provision of Engineering Services and Amenities in Residential Township Development* as published by the CSIR as well as the minimum requirements of Swellendam Municipality.

4.1. MASS EARTHWORKS

No mass earthworks will be required.

4.2. ROADS

The internal road reserves are 8m wide. The access road as well as the internal road network will consist of 4,5m wide road surfaces. Road finishing will consist of 60mm Interlocking segmented paving with stormwater pipework, open stone pitched channel and inlet- and outlet structures.

The design criteria will be based on the design standards of the *Guidelines for the Provision of Engineering Services and Amenities in Residential Township Development.* Suitable commercial sources for the construction materials are available within Swellendam municipal area and surrounding towns.

Table 1: Road Design Criteria

Parameter	**Residential Access way (Class 5d)**
Category	UC
Traffic Class	E0
Structural Design Traffic	$< 0.2 \times 10^6$
Surface Treatment	60mm Interlocking Segmented Paving
Sub-base from commercial sources	150mm G5 (95% MAASHTO) on 150mm Upper Selected (93% MAASHTO) on 150mm Roadbed prep in-situ Material (90% MAASHTO)
Carriage Way Width	4,5m
Design Speed	30 km/h
Minimum Gradient	0.5%
Cross Fall	2%
Bell mouths	8m Radius

4.3. STORMWATER

4.3.1. Stormwater Management Strategy

It is estimated that stormwater runoff, depending on erf coverage, will increase by approximately 25% post development.

The following measures are proposed to mitigate the impact of post development stormwater runoff downstream from the proposed development:

- Installation of 5,0 kℓ water tanks on each residential erf will contribute to the attenuation of initial runoffs. The tank overflow will be directed to underground soakaways. With the expected Mean Annual Precipitation (MAP) of 430mm/year, an average roof size of 215m² and 80% efficiency rate the expected annually rainwater harvesting per unit will be around 74 kℓ/household.
- The runoff from any hardened surface, within the developed plots, will be directed towards gardens using strategic landscaping with native vegetation to intercept the runoff.
- The concentration of stormwater runoff will be minimised through the application of landscaping techniques, i.e. by creating grass lined swales, undulations and depressions. These cutoff swales will intercept any overland flow, which will discourage erf runoff to road surfaces.
- Stormwater from road surfaces will be released into the water course through energy dissipating Reno Mattresses structures.

4.3.2. Stormwater Design

Stormwater infrastructure will be constructed in accordance with the standard requirements and specifications as agreed with the Swellendam Municipality. The 100-year floodlines were determined by Mr A.L.Fraser (Pr Eng) and falls outside the development area. See outcome of the floodline study attached to Annexure B.

Design criteria adopted for the development regarding stormwater infrastructure is summarised as follows:

Runoff rates will be determined according to the Rational Method.

Flood recurrence interval	:	2 years
Pipe material	:	Concrete
Pipe class	:	75D
Pipe diameters	:	Minimum 375mm Ø up to diameter as required
Bedding	:	Class C

Inlets	:	Kerb and grid inlet structure for the northern erven.
	:	Open stone pitched channel, in stormwater servitude, for the southern erven.
Manholes	:	Point of deflections on pipes

4.4. WATER

4.4.1. Water Demand

The estimated Annual Average Daily Demand (AADD) for the development is as follows:

21 Single Residential Erven (small) - 800 ℓ/unit/day	16,8 kℓ/day
Total AADD	**16,8 kℓ/day or 0,194 ℓ/s**

4.4.2. Availability of sufficient Water Sources

With the expected Mean Annual Precipitation (MAP) of 430mm/year, an average roof size of 215m² and 80% efficiency rate the expected annually rainwater harvesting per unit will be around 74 kℓ/household. It is proposed that the harvesting of rainwater be used for potable water consumption. Each household will be required to have a 5,0 kℓ water tank for rainwater harvesting.

There are boreholes (134: 134A and 134C) located on erf 134, north of the district road. Van Biljon (2014-a) undertook a 72-hour pumping test on borehole 134C. The 72-hour pumping test established that borehole 134C can produce 25 m³/day, every day, for 100 years. For the best-case scenario, the yield goes up to 48m³/day. According to van Biljon (2014), borehole 134C's daily yield is 25 m³/day which is more than the daily demand which has been estimated as 16,8 m³/day. There is therefore sufficient borehole water for the proposed development of 21 units on erf 134. The calculations are conservative because the houses are unlikely to be occupied throughout the year.

4.4.3. Water Storage and Fire Fighting

The proposed development, with houses of floor area over 200 m², is classified, with respect to firefighting, as low risk group 1 by the Red Book (2004). To achieve the minimal low risk group 1 residual water pressure of 7m and the firefighting flow rate of 900 ℓ/minute, a 125mm Ø water supply pipeline is required from the reservoir to the development.

Borehole 134C is located to the south of Main Road 268. It is recommended that a 130 kℓ SBS Tank reservoir be constructed near (the unused) borehole 134 A (Drawing HESRIV-573-W2). The size of

the reservoir is determined by the required firefighting capacity (108 kℓ) plus the daily demand of 16,8kℓ/day.

To ensure that sufficient firefighting capabilities exist, the supply pipeline from the reservoir to the development will consist of a 125mm Ø Class 9 uPVC water main complete with isolating valves, fire hydrants and erf connections. (Drawing HESRIV-573-W1). A servitude should be registered for the pipeline route.

4.4.4. Water Link Services

A new 125mm Ø, Class 9, uPVC water main will be constructed between the reservoir and development complete with isolating valves, fire hydrants and erf connections. An 200mm Ø corrosion protected steel sleeve will cross Main Road 268 between the two fence lines. An 125mm Ø HDPE fusion welded water main will be constructed through the steel sleeve. Water mains parallel to Main Road 268 will be constructed within the 5m building line. Confirmation that the District Roads Engineer support the proposal is attached under Annexure C of this report.

Erf connections will consist of HDPE PE80 PN12,5 pipes and terminated with endcaps.

The basis of the water reticulation design for the proposed development is summarised in the table below:

Table 2: Water Reticulation Design Criteria

PARAMETER	GUIDELINE
Pipe materials for erf connections	HDPE PE80 PN12,5
Pipe materials for reticulation mains	uPVC (Class 9)
Minimum diameter for reticulation mains	125mm
Minimum diameter for erf connections serving two erven	25mm branching to 2 x 20mm
Minimum diameter for erf connections serving one erf	20mm
Valves	125mm AVK (open clockwise)
Fire Hydrants	AVK London V on respective pipe Ø
Water meters	20mm Elster Kent (Water meter to be installed by Swellendam Municipality with Building Plan approvals.)

4.5. SEWERAGE

4.5.1. Sewage Management

Both the existing Infanta and the existing Infanta Park use septic tanks for sewage treatment. The septic tanks at Infanta Village are scattered amongst the potable water boreholes within the Village. A few new houses have conservancy tanks which are serviced by Swellendam Municipal tankers.

One of three alternatives are available for consideration and approval by Swellendam Municipality namely Conservancy Tanks, Septic Tanks with Soak-aways or small household WWT Package Plants. The nearest Waste Water Treatment Works is 74 km (Swellendam) from site. The use of Conservancy tanks is in our opinion not economically viable and not recommended.

It is proposed that each erf be fitted with an on-site WWTW Package Plant to handle the expected sewage flow. The factory built activated sludge sewage treatment plant will produce effluent that meets the Department of Water Affairs General Standards.

According to the Manufacturer's (Maskam Water) design criteria the system consists over the following qualities:

- Odourless and quiet.
- The installed is underground.
- Has a small footprint.
- Effluent meets the South African DWS General Standard.
- Includes nitrification and de-nitrification cycles.

The smallest available model is the ZF450 which has a capacity to treat 1,500 ℓ/day which is well above the expected 640 ℓ/day sewage flow per household. The water can be recycled for non-potable usage such as flushing toilets, with the remaining effluent being used for irrigation or being discharged underground to a soak-away. Alternatively, all the effluent can be discharged to a soak-away as the surrounding soil is sand and very porous. See Maskam Water Brochure and Process Description under Annexure D

4.5.2. Sewer Design Flows

In accordance with the *Guidelines for the Provision of Engineering Services and Amenities in Residential Township Development* it is expected that 80% of the Average annual water daily demand will end up in the wastewater system.

The annual average dry weather flow (AADWF) equals 80% of 16,8 kℓ/d = 13,44 kℓ/d (640 ℓ/household/day) = 0,156 ℓ/s.

To determine the Peak Wet Weather Flow (PWWF) a peak factor of 2,5 were taken in consideration with an expected stormwater infiltration of 15%. The PWWF equals 0,447 ℓ/s.

4.6. ELECTRICAL SLEEVES

The position of electrical sleeves (110mm Class 34 PVC) will be determined in consultation with the Electrical Engineer.

5. SOLID WASTE

The expected volume of solid waste generated, for the specific development, will be seasonable. The highest volume of solid waste will be generated during the December-January period with other peaks around school holidays. Low volumes of waste will be generated during winter months. It is expected that between 0,15 to 0,25 m³/household/week, solid waste, will be generated.

Homeowners will be expected to deliver household solid waste to a Waste Transfer Station that will be located at one of the two entrances to the development. Swellendam Municipality will service the transfer station on Tuesday's and transport the un-compacted solid waste to the Swellendam Municipal Solid Waste Site.

A letter from Swellendam Municipality accepting this proposal is shown as Annexure E. The final decision/position of the solid waste transfer station will be made in association with the Swellendam Municipality.

6. CONCLUSION

We trust that the information included in this report will provide insight to the level of services required for the proposed development.

G PEPLER Pr Tech Eng
HESSEQUA CONSULTING ENGINEERS

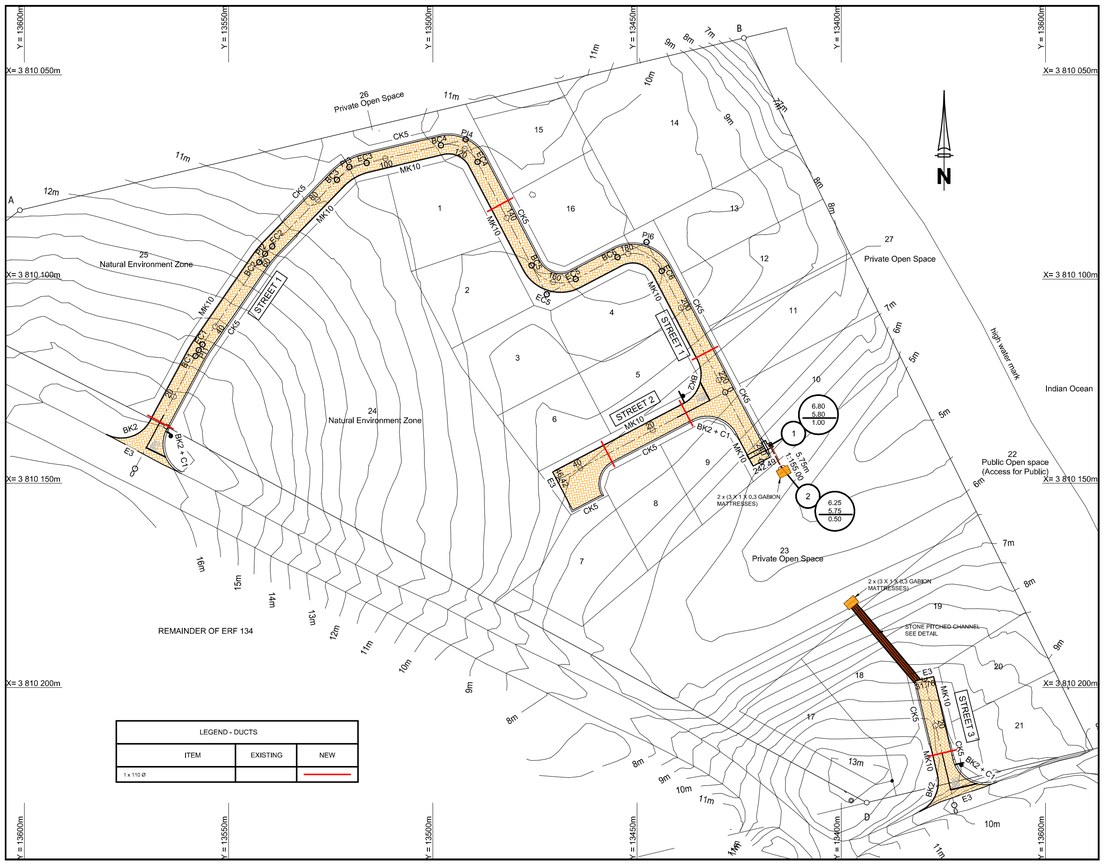
12 March 2025

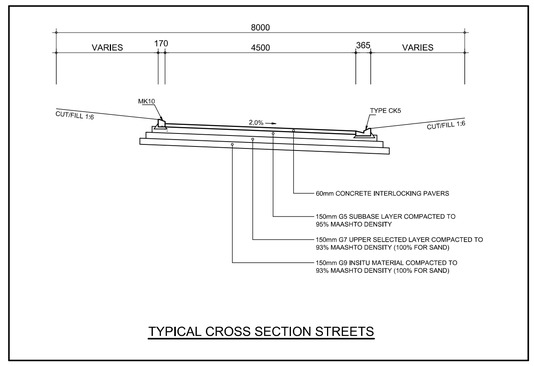
ANNEXURE A - DRAWINGS

HESRIV-573-R1 : Proposed street and stormwater layout with longitudinal sections

HESRIV-573-W1 : Water layout and typical sections

HESRIV-573-W2 : External water layout



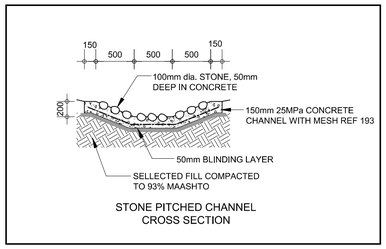


TYPICAL CROSS SECTION STREETS

CO-ORDINATE LIST FOR STORMWATER

POINT No.	COORDINATE : Lo19°/WGS84 Y +0,000	X +0,000
1	13417.447	3810145.853
2	13414.778	3810150.722

KEY
BK2 = BARRIER KERB TYPE BK2
BK2 + C1 = BARRIER KERB TYPE BK2 & CHANNEL TYPE C1
CK5 = MOUNTABLE KERB TYPE CK5
MK10 = EDGING TYPE MK10
"R1" = STOP SIGN



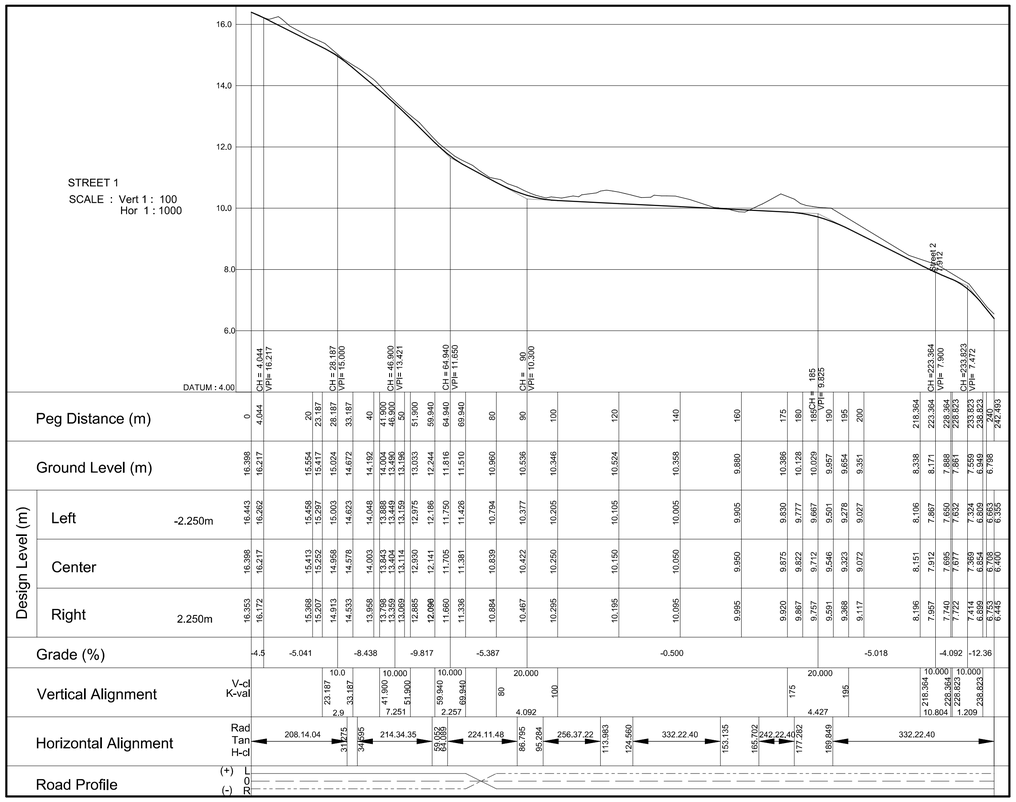
STONE PITCHED CHANNEL
CROSS SECTION

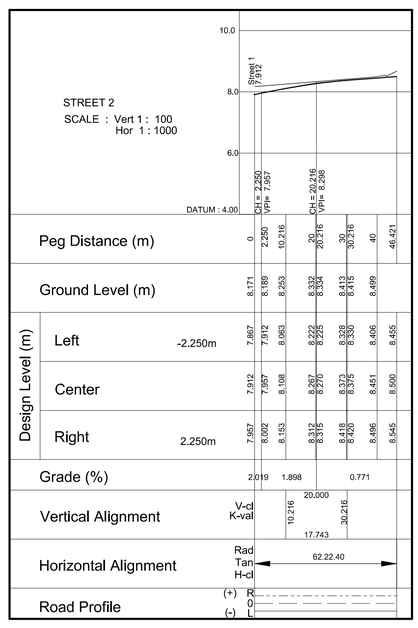
LEGEND - STORMWATER

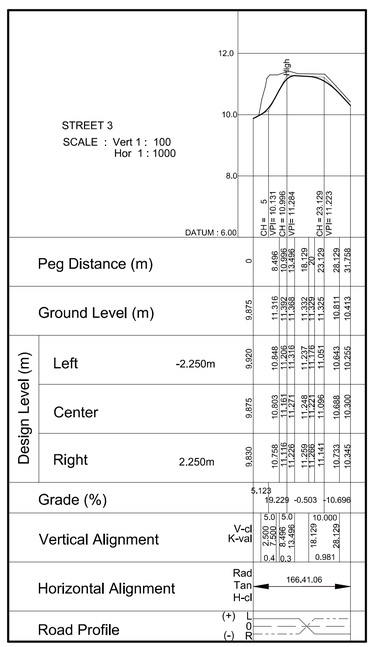
ITEM	EXISTING	NEW
Ø 375 STORMWATER PIPE (OGEE 100D)		
MANHOLE	○	●
GRID INLET STRUCTURE SEE DRAWING HESRIV-573-R2		
OUTLET STRUCTURE SEE DRAWING HESRIV-573-R1		
DISTANCE GRADIENT		56.00m 1:102.00
MANHOLE WITH PIPE		
MANHOLE NUMBER		SW02
COVER LEVEL INVERT LEVEL DEPTH		00.00 00.00 0.00

SETTING OUT DATA

POINT No.	CHAINAGE DISTANCE ON ROAD	COORDINATE : Lo19°/WGS84 Y -0,000	X +0 000 000,00	RADIUS
STREET 1 (4.5m WIDE)				
START	0,00	13572.914	3810146.400	
BC1	31.27	13558.118	3810118.847	
PI1		13557.332	3810117.382	30.00
EC1	34.59	13556.389	3810116.014	
BC2	59.05	13542.510	3810095.877	
PI2		13541.077	3810093.798	30.00
EC2	64.08	13539.317	3810091.988	
BC3	86.79	13523.488	3810075.709	
PI3		13520.448	3810072.582	15.00
EC3	95.27	13516.204	3810071.573	
BC4	113.98	13498.013	3810067.247	
PI4		13491.959	3810065.807	8.00
EC4	124.56	13489.074	3810071.321	
BC5	153.13	13475.825	3810096.639	
PI5		13472.116	3810103.728	8.00
EC5	165.69	13465.028	3810100.019	
BC6	177.29	13454.768	3810094.649	
PI6		13447.679	3810090.940	8.00
EC6	189.85	13443.970	3810098.029	
END	242.49	13419.562	3810144.673	
STREET 2 (4.5m WIDE)				
START	0,00	13428.431	3810127.724	
END	46.42	13469.561	3810149.247	
STREET 3 (4.5m WIDE)				
START	0.00	13372.312	3810228.776	
END	31.76	13379.626	3810197.871	







VERKLEINDE SKAAL/REDUCED SCALE
0 10 20 30 40 50
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Notas/Notes

Wysiging/Amendment

Nr. No.	Datum Date	Nagesien Checked	Deur By	Beskrywing Description

ESSEQUA
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CESA

Ontwerp Designed	Geteken Drawn	Nagesien Checked
AA	AA	GP

Raadgewende Ingenieur/ Consulting Engineer — Pr Tech Eng — 12-03-2025 Datum/Date

Klient/Client — Datum/Date

Klient/Client

CAPE INFANTA DEVELOPMENT

Erf 134
CAPE INFANTA
6740

Projek/Project

PROPOSED DEVELOPMENT OF ERF 134 : CAPE INFANTA

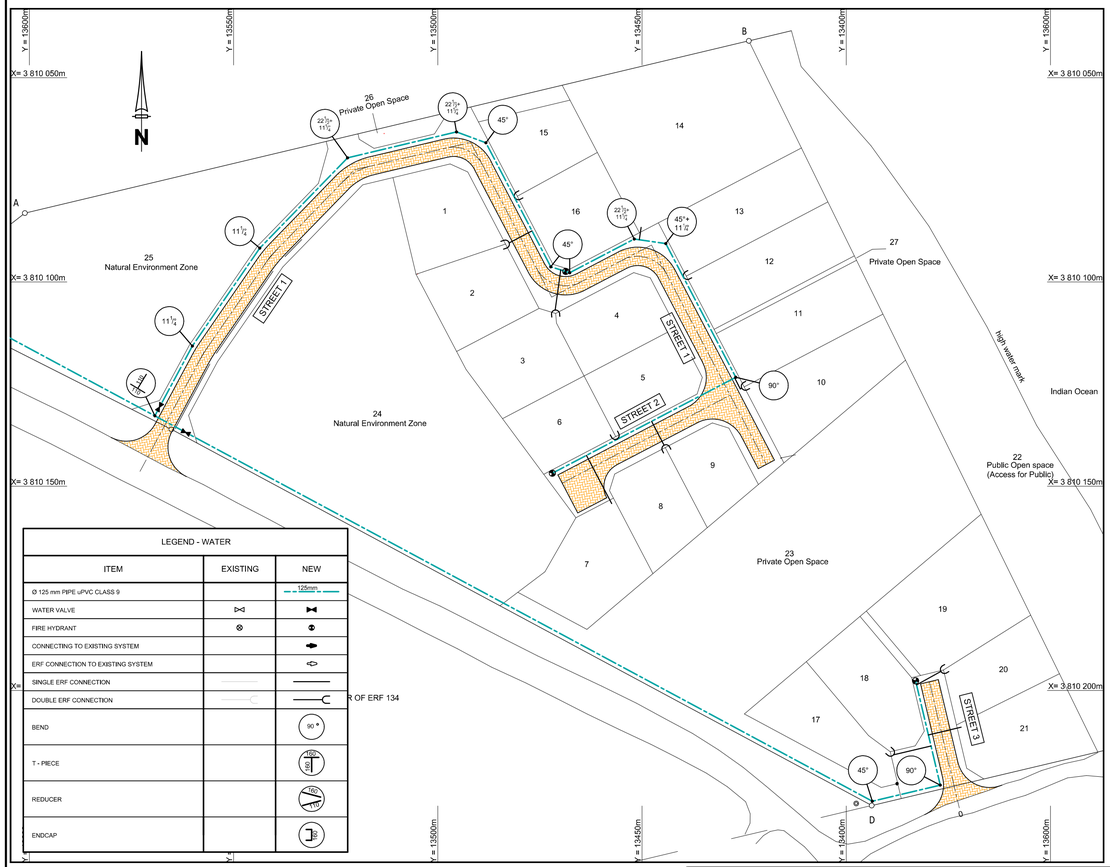
Tekening Beskrywing/Drawing description

PROPOSED STREET AND STORMWATER LAYOUT WITH LONGITUDINAL SECTIONS

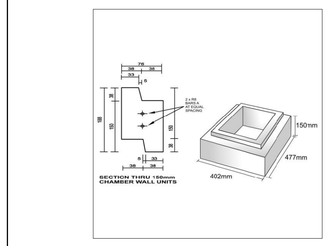
Skaal/Scale	Datum/Date
1:750	FEBRUARY 2025

Tekening nommer/Drawing number

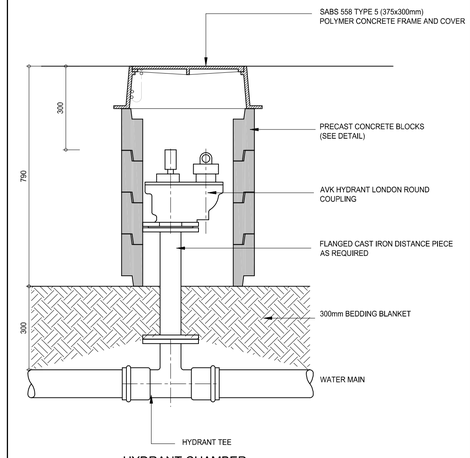
HESRIV-573-R1



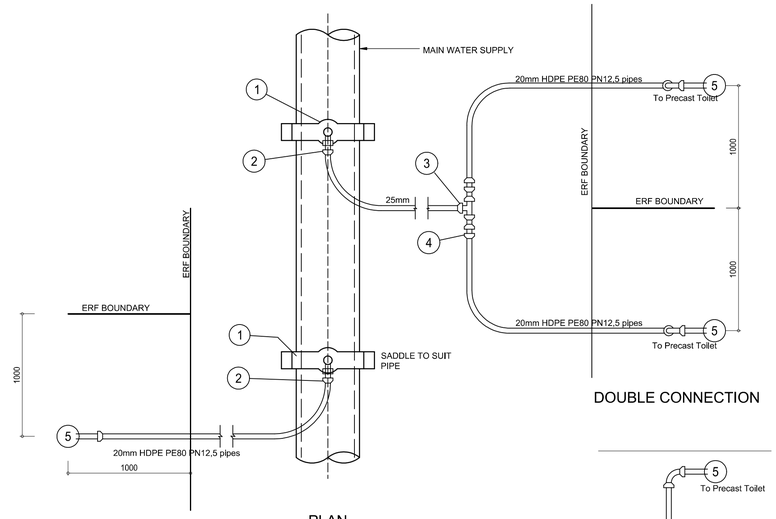
LEGEND - WATER		
ITEM	EXISTING	NEW
Ø 125 mm PIPE uPVC CLASS 9		125mm
WATER VALVE		
FIRE HYDRANT		
CONNECTING TO EXISTING SYSTEM		
ERF CONNECTION TO EXISTING SYSTEM		
SINGLE ERF CONNECTION		
DOUBLE ERF CONNECTION		
BEND		90 °
T - PIECE		160 / 160 / 110
REDUCER		160 / 110
ENDCAP		160



PRECAST CONCRETE BLOCK

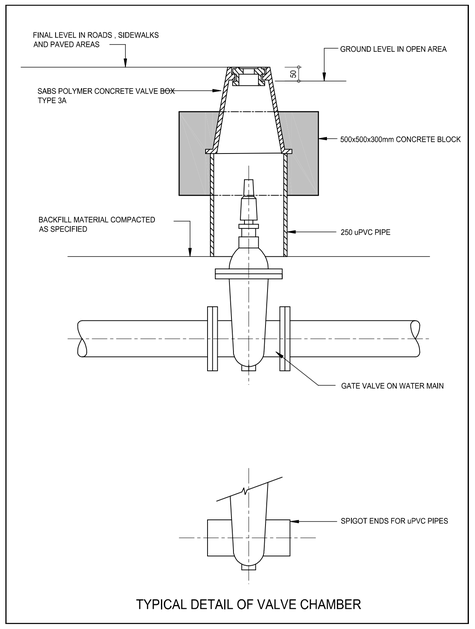


HYDRANT CHAMBER



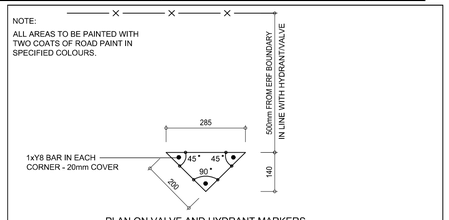
NOTES
1 90° MALE TO FEMALE ELBOW
2 PLASSON MALE COUPLING
3 25 x 25mm T-PIECE
4 25 x 20mm REDUCER
5 WATER METER

TYPICAL DETAIL OF
WATER CONNECTION ON ERVEN (25/20mm)

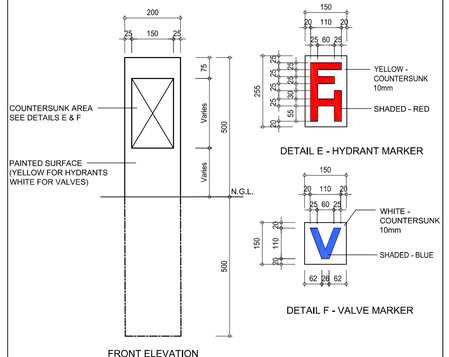


TYPICAL DETAIL OF VALVE CHAMBER

NOTE:
ALL AREAS TO BE PAINTED WITH TWO COATS OF ROAD PAINT IN SPECIFIED COLOURS.



PLAN ON VALVE AND HYDRANT MARKERS

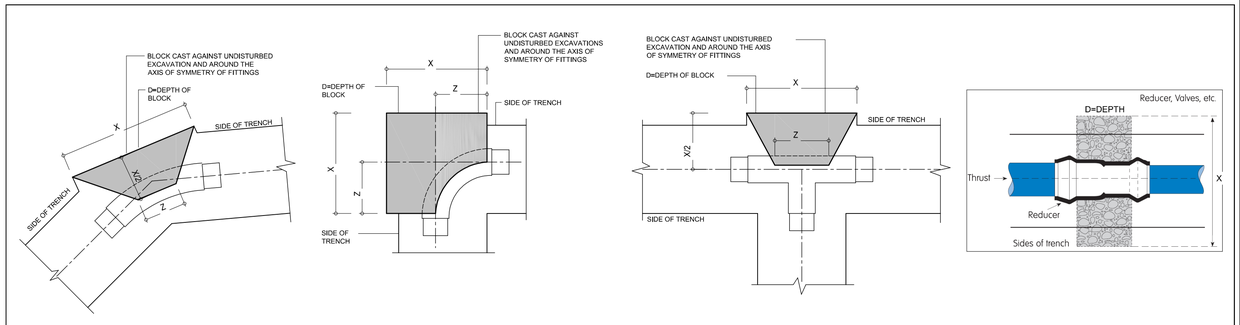


DETAIL E - HYDRANT MARKER

DETAIL F - VALVE MARKER

FRONT ELEVATION MARKERS

TYPICAL DETAIL OF
VALVE AND HYDRANT MARKERS



TYPICAL THRUST BLOCK DETAILS
SANDY SOIL
BEARING CAPACITY 200-400kPA

NOTE: COUPLINGS AND FLANGES MUST BE LEFT FREE OF CONCRETE

PIPE	11¼° BEND			22½° BEND			45° BEND			90° BEND			T-JUNCTION			END CAPS/VALVES REDUCERS	
DIAM.	Xmm	Dmm	Zmm	Xmm	Dmm	Zmm	Xmm	Dmm	Zmm	Xmm	Dmm	Zmm	Xmm	Dmm	Zmm	Xmm	Dmm
75	200	100	100	200	150	150	250	200	150	300	220	180	300	210	150	700	300
100	200	150	100	250	200	150	350	250	200	350	300	250	350	300	200	1000	400
150	250	200	200	350	300	200	500	450	350	550	450	400	600	400	280	1050	500
200	350	250	250	500	350	250	650	500	450	750	550	480	700	600	350	1100	600
250	400	350	300	600	450	300	800	600	500	1000	650	530	900	700	450	1150	700
300	500	400	350	700	550	350	950	750	550	1200	770	580	1150	800	550	1200	800
350	600	500	400	900	700	400	1200	900	600	1480	950	630	1550	900	550	1500	800

Wysiging/Amendment

Nr. No	Datum Date	Nageslen Checked	Deur By	Beskrywing/Description

VERKLEINDE SKAAL/REDUCED SCALE
0 10 20 30 40 50
50

Notas/Notes

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CESA

Ontwerp Designed	AA
Geteken Drawn	AA
Nagesien Checked	GP

Raadgewende Ingenieur
Consulting Engineer
Pr Tech Eng
Datum/Date 12-03-2025

Klient/Client
Datum/Date

Klient/Client
CAPE INFANTA DEVELOPMENT
Erf 134
CAPE INFANTA
6740

Projek/Project
PROPOSED DEVELOPMENT OF ERF 134 : CAPE INFANTA

Tekening Beskrywing/Drawing description
WATER LAYOUT AND TYPICAL DETAILS

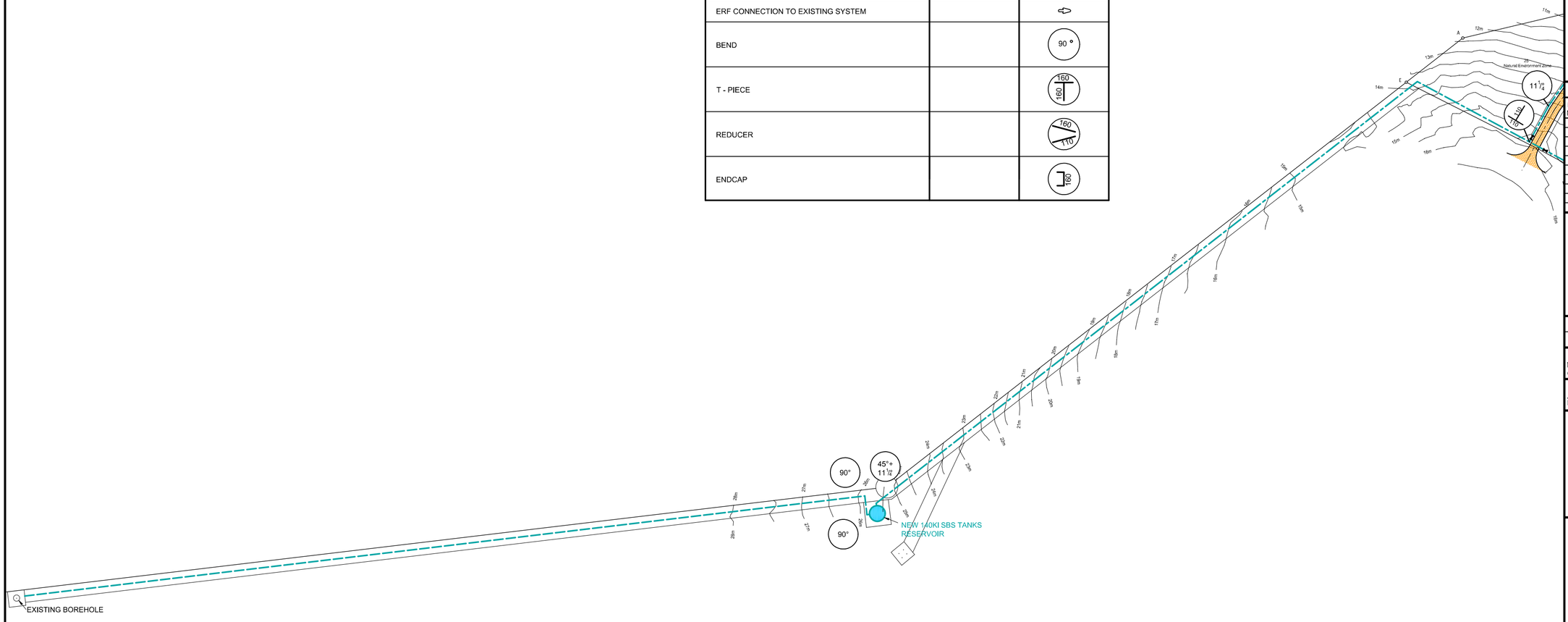
Skaal/Scale
N.T.S

Datum/Date
FEBRUARY 2025

Tekening Nommer/Drawing number
HESRIV-573-W1

12 Mar 2025

LEGEND - WATER		
ITEM	EXISTING	NEW
Ø 75 mm PIPE uPVC CLASS 9		75mm
Ø 125 mm PIPE uPVC CLASS 9		125mm
WATER VALVE	⋈	⋈
CONNECTING TO EXISTING SYSTEM		
ERF CONNECTION TO EXISTING SYSTEM		
BEND		90 °
T - PIECE		160 / 160
REDUCER		160 / 110
ENDCAP		160



VERKLEINDE SKAAL/REDUCED SCALE

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CESA

Designed	Drawn	Checked
AA	AA	GP

Pr Tech Eng
Raadgewende Ingenieur
Consulting Engineer

12-03-2025
Datum/Date

Klient/Client

Datum/Date

Klient/Client

CAPE INFANTA DEVELOPMENT

Erf 134
CAPE INFANTA
6740

Projek/Project

PROPOSED DEVELOPMENT OF ERF 134 : CAPE INFANTA

Tekening Beskrywing/Drawing description

EXTERNAL WATER LAYOUT

Skaal/Scale	Datum/Date
1:1500	MARCH 2025

Tekening nommer/Drawing number

HESRIV-573-W2

ANNEXURE B

100-Year floodlines as calculated by AL Fraser (Pr Eng)

LEGEND:

RS 20 - RIVER STATION 20

- 100 YEAR RI FLOODLINE

47m - CONTOUR LEVEL

-10 -5 0 5 10 15

SCALE BAR:

GENERAL NOTES:

1. Floor levels should be located 300mm above indicated flood levels as additional safety.
2. Table of Key Information:
   Catchment Area 291ha
   100 Year rainfall 130mm/day
   Time of Concentration 3h
   100year Peak flow 5m^3/s

REV	DATE	DESCRIPTION
3	15 June 2021	Note 1 removed, Drawing Number changed

Table of Floodline Information for 100 yr RI floods

RS	WSL	EGL
70	6.59	6.69
60	6.19	6.21
50	5.98	6.03
40	5.64	5.69
30	5.07	5.14
20	4.32	4.43
10	3.40	3.44

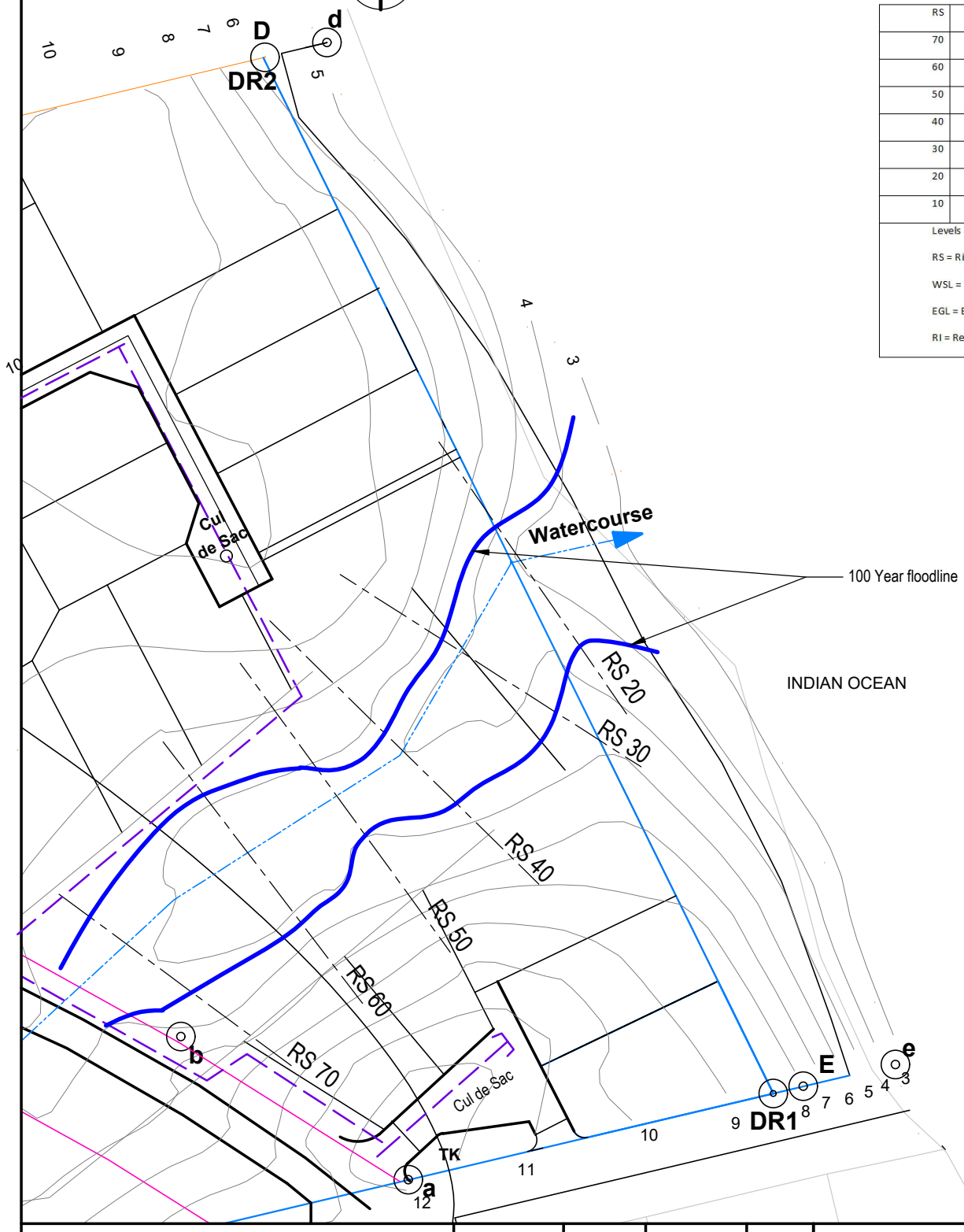
Levels are to m amsl.

RS = River Station

WSL = Water Surface Level

EGL = Energy Grade Line

RI = Recurrence Interval



PORTION 134, CAPE INFANTA, SWELLENDAM MAGISTERIAL DISTRICT - FLOODLINES

DESIGN:	ALF	DRAWN:	JBS	SCALE 1:1000	
FOREST LODGE, MAIN ROAD, SEDGEFIELD. TEL: 044 343 2093				DATE: 12 Dec. 2020	
FRASER Consulting Civil Engineers cc				AF134-04 REV. 3	A4

ANNEXURE C

Confirmation from Western Cape Road Network Management in support of the water main crossing of Main Road 268

Western Cape Government
Transport and Public Works

ROAD NETWORK MANAGEMENT
Email: Grace.Swanepoel@westerncape.gov.za
tel: +27 21 483 4669
Rm 335, 9 Dorp Street, Cape Town, 8001
PO Box 2603, Cape Town, 8000

REFERENCE : 16/9/6/1-27/24 (Job 23035)
ENQUIRIES : Ms GD Swanepoel
DATE : 10 August 2017

Fraser Consulting Civil Engineers
PO Box 178
SEDGEFIELD
6573

Attention: Mr A Fraser

Dear Sir

REQUEST FOR INFORMATION: CROSSING MAIN ROAD 268

1. Your e-mail of 24 May 2017 to Mr Van Eeden at Overberg District Municipality refers.

2. Your application for information affects Main Road 268, of which this Branch is the Road Authority, as follows:

2.1 With a crossing at ±km68.58.

2.2 Parallel to that road and outside of the road reserve, but within the adjacent 5m Building Line (Roads Ordinance 19 of 1976), between ±km68.58 LHS and km68.82 (end of Proclaimed Main Road).

3. This Branch will support your proposal, provided that the steel sleeve pipe, which must be installed from fence line to fence line, is sufficiently protected against corrosion and provided that the sleeve pipe is at least 1000mm below the lowest point across the cross-section (side drains; which should be allowed to be at least 800mm in depth).

4. Upon receipt of such a detail design this Branch will act accordingly.

Yours faithfully

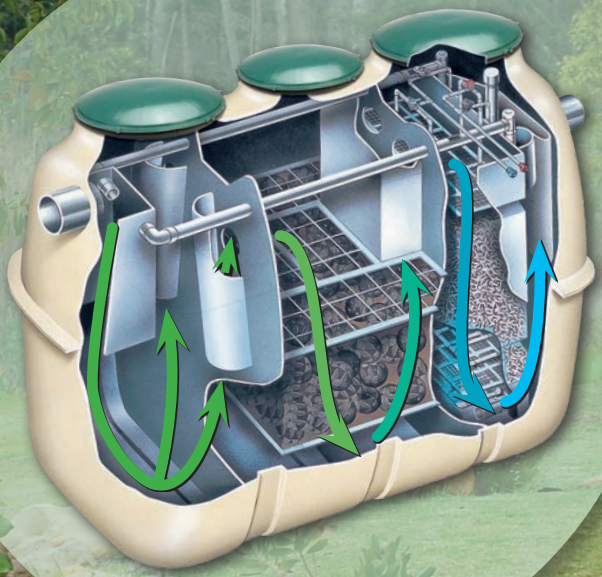
ML WATTERS
For CHIEF DIRECTOR: ROAD NETWORK MANAGEMENT

ANNEXURE D

Maskam Water brochure and process description

SAVE WATER: Treat and re-use all your BLACK and GREY water on-site

Fusion Series Waste Water Treatment



- Odourless
- Installed underground
- Lowest cost of ownership
- Quiet
- Small Footprint
- Effluent meets South African DWS General Standard
- Nitrification & De-nitrification cycles
- Developed for urban and rural use

Save money – treating your waste water on-site for re-use is cheaper than buying municipal water

MASKAM WATER

maskamwater.com

Applications:

- Households and grouped housing
- Schools
- Hotels
- Office blocks
- Lodges & guest houses
- Farms
- Factories
- Informal settlements
- Commercial wastewater secondary treatment

  Waste strength reduction:

  <75 mg/l COD

  <25 mg/l TSS
- Commercial wastewater pre-treatment before discharging to municipal sewer network (COD reduction)

Material:

- All materials are noncorrosive in the septic environment.

Easy to install or retrofit:

Save water - Treat your waste water on-site and re-use for:

- Toilet flushing
- Irrigation
- Cleaning of hard landscaping
- Water features
- Other non-potable uses (potable use is possible through further treatment)

Maintenance:

- System will be provided with maintenance contract.
- Maintenance provider is dependent upon geographical location.
- 6 Monthly service required.
- No check-ups needed between service intervals.

Disinfection:

- Chlorine / UV / Ozone

Electrical Panel

- Monitors the system 24/7
- Warning light and siren will notify user if a problem occurs
- IP65 enclosure
- Power supply to Blower and UV (disinfection)
- Indicator lights on front of panel for each alarm condition
- Optional: GSM module

Air Pump

- Feeds oxygen to aeration chamber and powers recirculation/sludge return

Available models

Clarus Model	Daily Treatment Capacity * (litres per day)	Length (mm)	Width (mm)	Height (mm)	Power consumption (Watts) Excluding disinfection
ZF 450	1500	2160	1120	1580	58
ZF 800	3000	2500	1450	1880	58
ZF 1120	4000	3020	1750	2000	95
ZF 1440	5000	3380	1840	12150	115
ZF 2000	7500	3960	1990	2270	125
ZF 2400	9000	4670	1990	2270	210
ZF 3200	12000	4560	2260	2420	340
ZF 4000	15000	4660	2440	2540	340

* Daily treatment capacity is based on influent values equal to or less than domestic sewage (grey and black water combined). The influent values below is the maximum organic loading for the above treatment capacities. For influent with heavier loadings, please contact our office or your nearest Maskam Water Dealer to assist with sizing the correct plant for your application.

COD	400	BOD	250	Ammonia	20

Financing available

The saving in your water bill can cover the instalment

CLARUS ENVIRONMENTAL
Zoeller Family of Water Solutions

www.maskamwater.com

CLARUS ENVIRONMENTAL
Zoeller Family of Water Solutions™

3649 Cane Run Road • Louisville, KY 40211-1961, USA
1-800-928-7867 • 1-502-778-2731 • Fax: 1-502-774-3624
www.clarusenvironmental.com

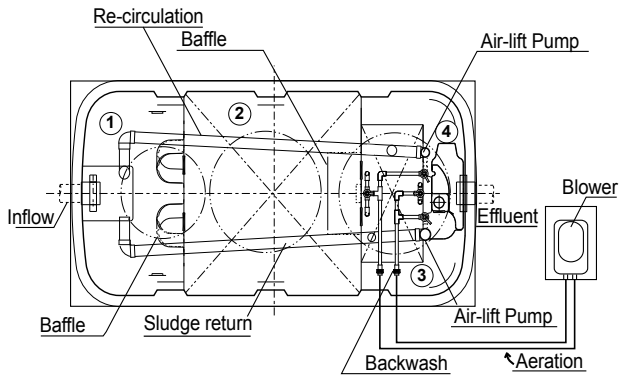
SECTION: C3.10.150
CL0053
1215
Supersedes
0214

Fusion® Series Treatment Systems

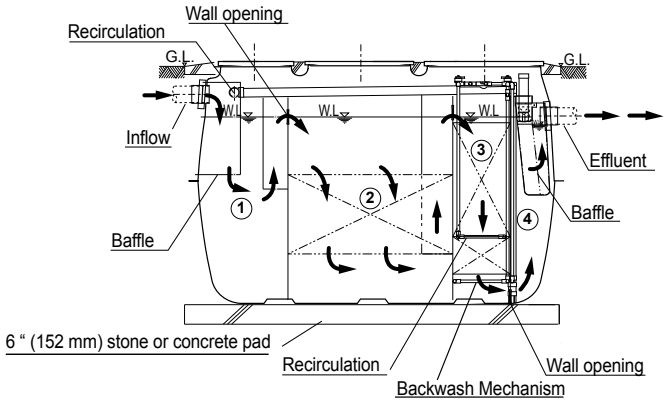
PROCESS DESCRIPTION

How the **Fusion®** system works

NSF Certified to NSF/ANSI Standard 40 Class 1 Performance Designation



Top View



Side View

Numbers correspond to the explanations below.

1. **Sedimentation Chamber**
   This chamber is designed to physically separate solids (sludge) and fat/grease (scum) from the incoming water.

2. **Anaerobic Chamber**
   This chamber contains a spherical-skeleton type of filter media (4.3 inch diameter). Through fixed film processes on the surface of the filter media, biological anaerobic treatment thrives while suspended solids are captured. Furthermore, the microorganisms in this chamber convert nitrates in the recirculated water returning from the aerobic chamber to gaseous nitrogen. The nitrogen then escapes to the atmosphere.

3. **Aerobic Filter Media Chamber**
   The aerobic floating and circulating filter media chamber consists of an aeration upper section and a filter media lower section. The chamber is filled with hollow, cylindrical filter media (0.6 inch diameter and 0.55 inches long). Biological treatment takes place with the help of the fixed film growth on the filter media surface. Aeration is continuous. Residual suspended solids are captured by the filter media circulating in this section.

   The filter media in the Aeration chamber are backwashed regularly (5 or 10 minute cycle, twice a day) by the backwash system located at the bottom of the chamber. The backwashed water is transferred by an air lift pump back into the sedimentation chamber for further digestion.

4. **Treated Water Storage Chamber**
   During normal operation, a recirculation line transfers a portion of the treated water back into the sedimentation chamber by way of an air lift pump. This chamber is designed to temporarily store treated water coming out of the aerobic filter media chamber. The treated water in the storage chamber is ready for discharge.

All Clarus Environmental products must be installed and maintained in accordance with all applicable codes.
Product information presented here reflects conditions at time of publication. Consult factory regarding discrepancies or inconsistencies.

ANNEXURE E

Swellendam Municipality acceptance letter to collect solid waste from the site transfer station.

+27 28 514 8500
info@swellenmun.co.za
swellenmun
www.swellenmun.co.za
+27 28 514 2694

49 Voortrek Street, Swellendam | P.O Box 20, Swellendam 6740

Date: 28 September 2020

Enquiries: B. Burger

Attention: A. Fraser

Reference Number: 16/5/2/2

Per e-mail: fraser@fcce.co.za

Sir,

DEVELOPMENT OF ERF 134, INFANTA: SOLID WASTE REMOVAL

Your request regarding the update on our previous letter concerning solid waste collection in Infanta, has reference.

The solid waste facility was indeed upgraded during 2019, as mentioned in Dr. Clayton's letter, dated 20 February 2012. The facility, which only excepts demolition and garden waste, is also equipped with a household (wet waste) and recyclables container unit. These containers are serviced weekly by an external service provider – all of the household refuse is then hauled to the Bontebok solid waste facility in Swellendam.

Should the abovementioned development go forth, a transfer station, which must be able to accommodate the volume of refuse generated internally, should be established at the entrance gate of the proposed development. This station shall then be serviced by either the contractor collecting the waste in Infanta, or the contractor hauling the waste to Swellendam. Details of such a station shall be considered during the civil services or the building plan application process.

I hope this will clarify the status quo of the current solid waste disposal function.

Please do not hesitate to contact us for any additional information.

Best regards

F. ERASMUS Pr. (Tech.) Eng.

DIRECTOR: INFRASTRICTURE SERVICES