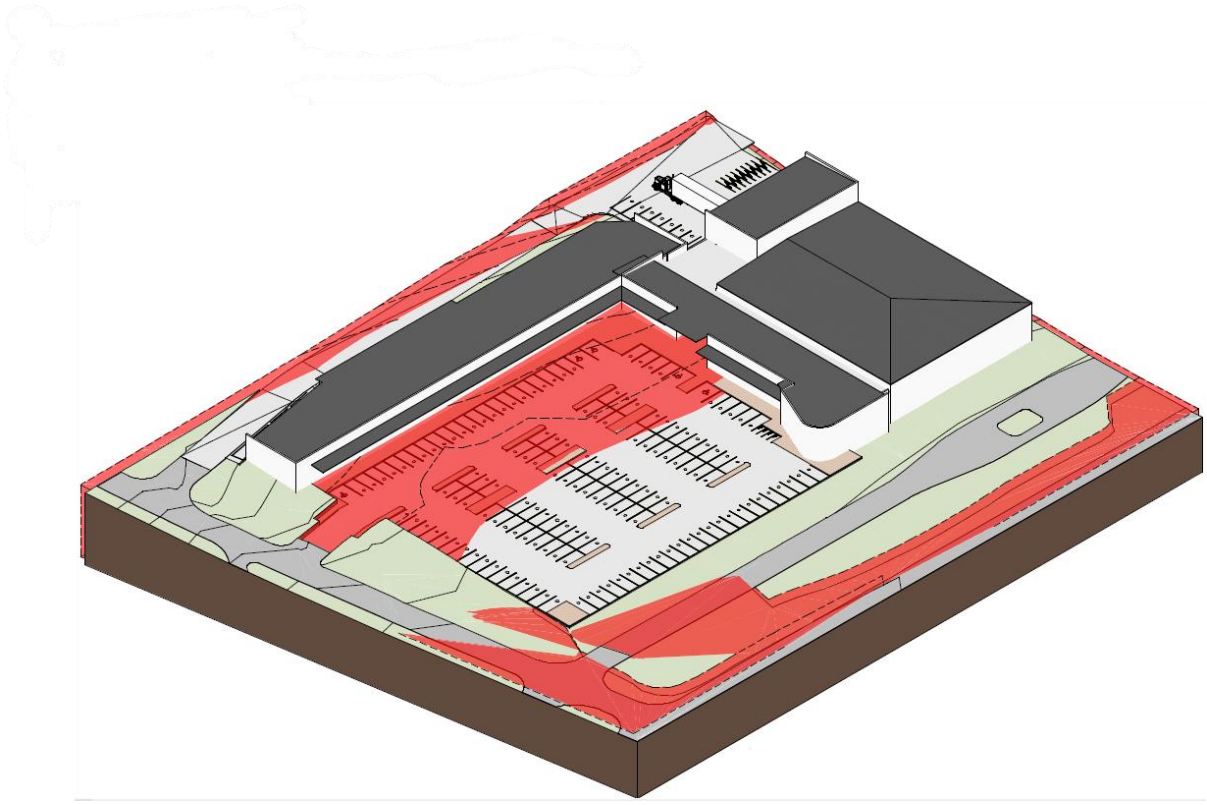
PROPOSED SHOPPING CENTRE ON ERVEN 3456-3465, 3504-3507 & 4967, SEDGEFIELD, WESTERN CAPE



CIVIL & ELECTRICAL ENGINEERING SERVICES REPORT

Report Number: 25051_REP_01

Revision: 0A

Date: 28 April 2026

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LOCALITY PLAN - RETAIL DEVELOPMENT, SEDGEFIELD



1. INTRODUCTION

KLS Consulting Engineers has been appointed by Shoprite Checkers (Pty) Ltd as the Consulting Civil & Electrical Engineers for the proposed Shopping Centre on Erven 3456-3465, 3504-3507 & 4967, Sedgefield, Western Cape.

The purpose of this report will be to address all civil & electrical engineering issues generated from the proposed development. The following documents and guidelines have been used in the civil services infrastructure design and management implementation of this development:

- The Site Development Plan and proposed building layout of the Shopping Centre by **SVA**
- "GUIDELINES FOR HUMAN SETTLEMENT PLANNING AND DESIGN" (CSIR "Red Book")
- The "ROADS DRAINAGE MANUAL" as published by the South African National Roads Agency

2. DESCRIPTION OF THE PROPOSED SITE

2.1. LOCALITY

Refer to ***Annexure A*** for the site development plan layout.

The proposed development is situated on Erven 3456-3465, 3504-3507 & 4967.

The proposed development is situated between the railway line and the Main Service Road that runs parallel to the N2. Between Egret Road and Aviemore Security Village.

The total size of the proposed development is approximately 1.2ha.

2.2. EXISTNG TOPOGRAPHY

The existing area slopes from North to the South. The Southern boundary line of the property falls in an easterly direction. There is an existing pipe culvert underneath Egret Road that discharges stormwater all along the N2.

In general, the ground slopes from North to South with a fall from approximately 17.32m MSL to 11.06m MSL. over 106m, +/-6% slope.

2.3. COVER TYPE

The existing site is covered by grass, indigenous thick bushes and trees. An Access Road is also on site as previously constructed infrastructure for the Aviemore Security Village housing scheme.

3. DESCRIPTION OF THE PROPOSED DEVELOPMENT

The proposed development is for a retail facility which includes retail line shops.

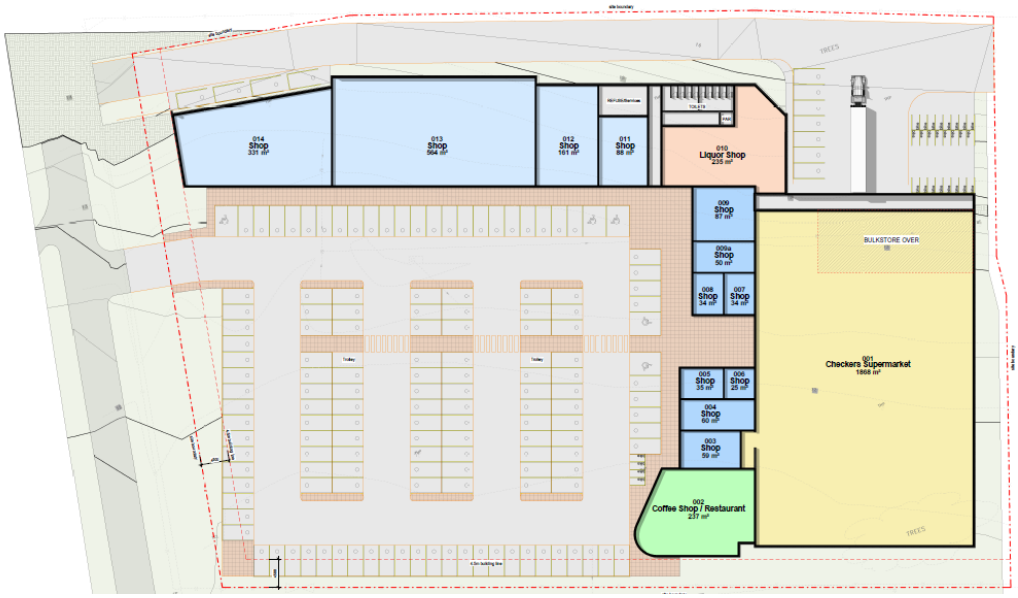


Figure 1: Site Development Plan (refer to Appendix A)

4. SITE CLEARANCE & PREPARATION

A site-specific geotechnical investigation was done by R.A. Bradshaw & Associates CC. The ground conditions are summarised in the Geotech report as follow (see **Figure 2** below):

a) The site is underlain by thickly developed aeolian sand with groundwater probably at depths greater than 3m below current ground levels. The upper approximately 1.5m of the sandy soils is loose to locally very loose.

b) The combination of the loose layer of sand and the sloping nature of the site are the two most significant factors influencing the development of the site.

c) Special measures will be required to ensure the loose layer is densified across the site and the deep cut slopes at the back of the site must be formally supported probably with an anchored soldier pile wall with gunited arches.

d) An imbalance between cut and fill volumes will occur if the current conceptual platform levels are adopted, and consideration should be given to raising platform levels to equalise the volumes or at least reduce the amount of material to be spoiled.

e) Provided that the loose layer is densified, spread footings with a maximum allowable bearing pressure of 150kPa are considered appropriate.

f) Special measures to be adopted include checking foundation conditions, ensuring safety of workers in trenches and that new service trenches do not adversely affect founding conditions for footings and also ensuring that the backfill in trial pits and existing service trenches is compacted.

Figure 2: Geotech – Conclusion & Recommendations

Site clearance and topsoil stripping of the Road Reserve and services lines will be done prior to any roadworks or pipe laying.

5. BULK EARTHWORKS

5.1. INSITU SOILS

The geotechnical report indicates that the subgrade conditions are good and is classified as an G7 material. The sandy layers are suitable for engineered fill, backfill below surface beds and retaining walls.

5.2. FINAL FLOOR LEVELS

The levels for the proposed development earthwork platforms were governed by the level of the Southern grass lined canal that conveys stormwater runoff along the N2 route.

5.3. BULK EARTHWORKS ROADS

A cut to fill operation will be carried out to the parking areas and G7 fill will be imported for the raised building platform (where required).

5.4. SUBSOIL DRAINAGE

No groundwater indicated during the geotechnical study. Subsoil pipes will be installed where required.

6. ROADS ACCESS AND PARKINGS

6.1. EXTERNAL ROADS & ACCESS

Access to the proposed development will be from Egret Road as shown on the site development plan. Entrance 1: Truck entrance off Egret Road will be 6.5m wide, towards the North-Eastern corner of the site. Entrance 2: Shopping Centre entrance will be 7m wide from kerb to kerb consisting of 2x 3.5m wide lanes. with paved walkways. The entrances & access roads are indicated in **Figure 3** below:

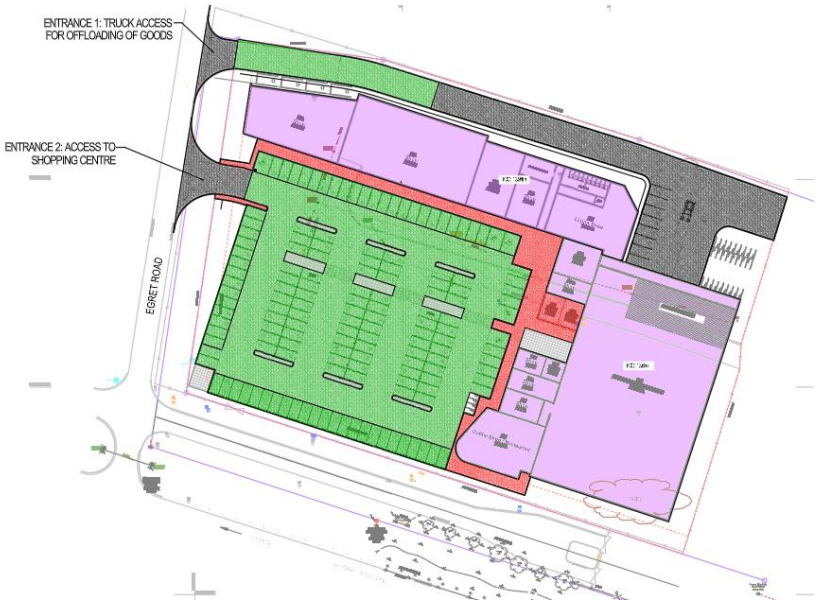


Figure 3: Entrance 1 & 2 from Egret Road

6.2. INTERNAL ROADS & PARKING

The internal road and parking area infrastructure consist of the following:

- 80mm Interlocking Pavers (40 MPa) to roadways.
- 30 MPa concrete to high traffic areas and loading bays.
- Asphalt surfacing to the light vehicle parking area.

The stormwater detail design makes allowance for the creation of low and high points to the proposed roads & parking areas to cater for adequate crossfalls and longitudinal slopes to meet the minimum standards for effective stormwater drainage.

7. STORMWATER DRAINAGE

Climate data from SAWS are used in runoff calculations. Parameters are summarized in

Erven 3456-3465, 3504-3507 & 4967, Sedgefield, Western Cape	
Reference Coordinates	34°01' S; 22°48' E
MAP (mm)	687
Total Catchment Size (m²)	12 000
Peak Storm Duration (minutes)	15

Table 1. Refer to ***Appendix C*** for preliminary calculations.

Erven 3456-3465, 3504-3507 & 4967, Sedgefield, Western Cape	
Reference Coordinates	34°01' S; 22°48' E
MAP (mm)	687
Total Catchment Size (m²)	12 000
Peak Storm Duration (minutes)	15

Table 1: Site specific climate and parameters

The proposed development will increase the existing impervious areas and subsequently increase the stormwater run-off generated on site. All preliminary design calculations are based on the Rational Method, Alternative 3, as per the SANRAL Roads Drainage Manual

7.1. EXISTING STORMWATER NETWORK

There is no formal stormwater system in the direct vicinity of the site.

7.2. PROPOSED STORMWATER NETWORK

The following minimum specifications will be implemented in the proposed stormwater infrastructure design:

- 100D Concrete spigot & socket pipes
- Minimum pipe size for municipal connections - 375mm diameter
- Minimum cleansing velocity inside a half full pipe – 0.9m/s
- Maximum spacing between manholes, inlets, catchpits – 90m.

The standard stormwater principles, as stipulated by the relevant guidelines of this document, and the requirements of the local authority, will be employed for the design of the internal stormwater network, within the constraints of the development site.

Runoff from the roof and parking areas will drain towards the permeable paving within the parking area of proposed development.

Table 2 gives a summary of the preliminary runoff calculations for the entire site.

Runoff Summary: Rational Method Alternative 3							
Return Period, 1:	*years*	2	5	10	20	50	100
Runoff Coefficient	C_{pre}	0.3					
	$C_{post,}$	0.79					
Rainfall Intensity	*mm/h*	44.0	64.8	82.0	101.6	133.2	161.6
Pre-Development Flow	m^3/s	0.03	0.05	0.06	0.08	0.11	0.14
Post-Development Flow	m^3/s	0.12	0.18	0.23	0.29	0.38	0.46

Table 2: Runoff Summary, Rational Method

7.3. Minor Storms (1:5-year and smaller rainfall events)

A minor storm is categorized as all rainfall events with up to a 1:5-year recurrence interval. The underground stormwater network to the north of the site, consisting of a gravity fed pipe network and inlet structures, will be designed to have sufficient capacity to effectively manage and convey all minor rainfall events.

All areas (roof and parking) will drain towards the permeable paving for all rainfall events.

7.4. Major Flows (Larger than 1:5-year rainfall events)

During rainfall events with a return period larger than 1:5-years, the proposed roads, parking areas and swales will act as overland flow routes which will channel surface run-off in excess of the minor system's capacity, towards the permeable paving.

7.5. Attenuation

On site attenuation will be incorporated to attenuate storms in excess of the 1:50 year return period (post development) within the constraints of the development. Attenuation will be achieved within the Shopping Centre parking area, by means of permeable paving.

The attenuation requirements are calculated using the ABT Grigg method - summarised in ***Table 3***. A storage volume of 263m³ is required for the total site. The attenuation facility has an capacity of 395m3 to attenuate runoff for larger storms without increasing the pre-development flow.

$V_{st} = 60\left(\frac{1+m}{2}\right) q_{pa} t_{ca} (1-a)^2$		
Ratio Hydrograph Recession Time =	m	1
Post-dev Peak Discharge (1:50) =	q_{pa} (in m^3/s)	0.377
Post-dev Time of Concentration =	t_{ca} (in min)	15
Post-dev Peak Discharge (1:5) =	q_{pb} (in m^3/s)	0.045
q_{pb}/q_{pa} =	α	0.119
Storage Volume Required V_{st} =	**V_{st} (in m^3)**	**263**

Table 3: Attenuation Volume Calculations

The permeable paving system will have the following characteristics – see ***Table 4,*** and typical cross section as illustrated in ***Figure 4:***

Table 4: Permeable Paving Design Parameters

Permeable Paving Characteristics		
Max Subsoil Drainage Rate	m^3/s	*0.015*
19mm Stone Porosity	n_{19}	0.3
53mm Stone Porosity	n_{53}	0.45
19mm Stone Layer Thickness	d_{19} (m)	0.1
53mm Stone Layer Thickness	d_{53} (m)	0.25
minimum design coefficient of permeability	k (m/s)	0.00028
Total Permeable Paving	Area (m^2)	3950
Total Storage Capacity	V (m^3)	**395**

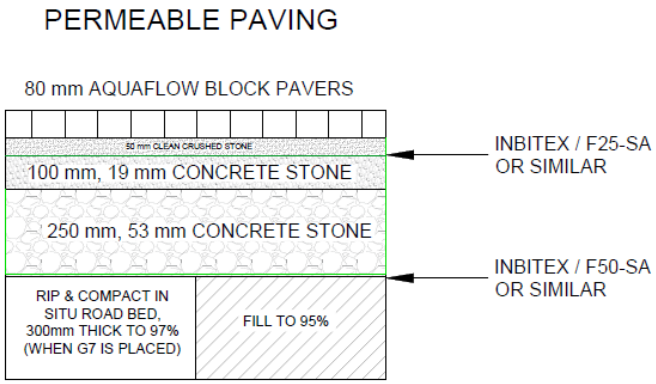


Figure 4: Permeable Paving Cross Section

8. WATER RETICULATION

8.1. EXISTING WATER NETWEORK

An existing 90mm diameter municipal watermain runs along the Southern boundary of the proposed development. The main fire and potable water metered connection for the proposed development will be from this existing line.

8.2. INTERNAL POTABLE WATER & FIRE PROTECTION

The proposed internal water reticulation network will consist of the following ring mains:

- Potable water ring main (110mm uPVC Class 12)
- Fire hydrant ring main (110mm uPVC Class 16) or as required by the Fire Engineer)

The estimated water demand from the development will be:

- Gross Annual Average Daily Demand: 15 972 litre per day
- Instantaneous Peak Demand: 0.55 l/s (refer to ***Appendix D***)

From the GLS report there is sufficient capacity in the existing Sedgefield reservoirs to accommodate the proposed development. Please refer to ***Annexure G*** for the GLS report.

The internal water reticulation network will connect to the existing with a suction hydrant and booster connection. Please refer to ***Annexure E*** for the Combined Services Layout.

Allowance was made for fire flows, but the internal fire water reticulation will be designed by a Fire Consultant and does not form part of the civil engineering scope of works.

Note: Internal sprinklers and fire hydrants will be included under the fire services contract

Gate valves will be installed at the start of all sub-branches (junctions) of the internal network.

The bedding and blanket material for the ring mains and connections will be clean sand imported from commercial sources. This material will comply with SABS 1200 regulations for Class C bedding and blanket.

9. SANITATION

9.1. EXISTING FOUL SEWER NETWORK

There is a 160mm dia. foul sewer pipe to the east of the proposed development.



Figure 5: Existing sewer line along Southern boundary of the proposed site

There is also a 150mm dia. foul sewer pipe as part of the old housing scheme development that would be removed and capped at the Eastern boundary (indicated by the red line in **Figure 7** below.

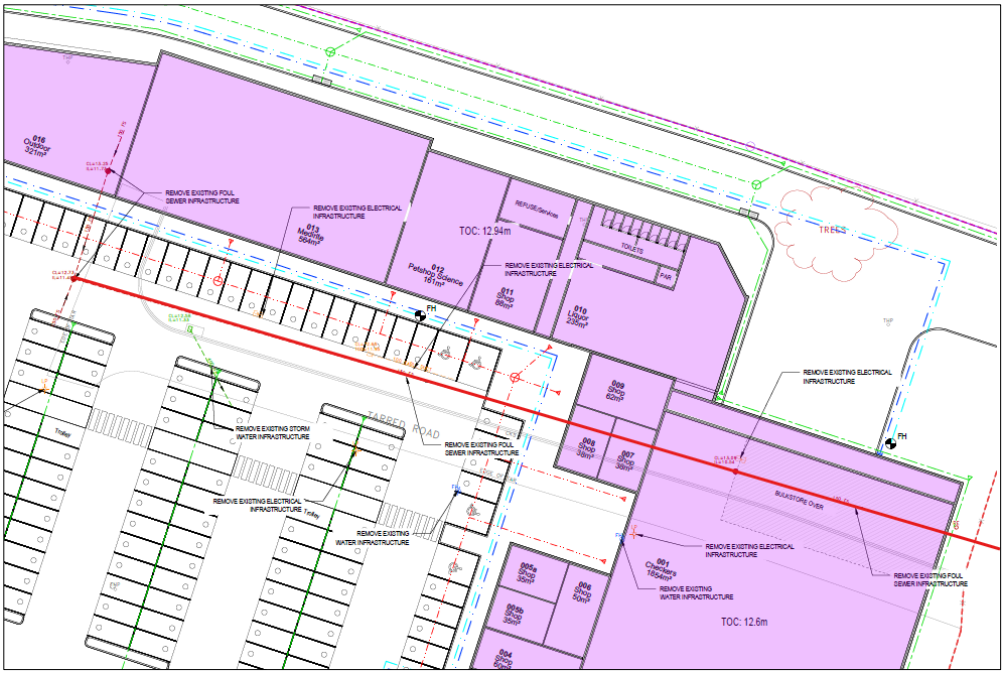


Figure 6: Existing foul sewer line that would be removed

9.2. INTERNAL FOUL SEWER NETWORK

The proposed development slopes from North to South and will connect to the existing 160mm dia. line in Bushbuck Street towards Sedgefield Pump Station no. 17. From PS 17 is linked to PS no.2 via a 100 mm Ø rising main. According to GLS report (Refer to ***Annexure G***), there is sufficient capacity for this development.

The internal sewer network will consist of a 160mm diameter uPVC Class 34 pipe network and round precast fibre cement manholes.

The development will generate the following sewage flows:

- Annual Average Daily Sewage Yield: 14 375 litre per day
- Peak day dry weather flow (PDDWF) 0.5l.s
- Peak Daily Wet Weather Sewage Yield (15% infiltration): 0.57 l/s

Refer to ***Appendix E***.

The bedding and blanket material for the internal sewage pipe trenches will be selected bedding sand from trench excavations on site or imported clean sand from commercial sources. The bedding material will comply with SANS 1200 regulations for Class C bedding and blanket. Manholes will be precast fibre cement solid shaft type.

10. ELECTRICAL SUPPLY

After a meeting on site with a council representative to discuss the development and the electrical supply to the site from the council electrical network, the council confirm the below.

There is an existing substation, circled in yellow in the image below. In this substation a new 11kV switch needs to be installed with a 70mm x 3 core 11kv Pilc CU Cable (indicated in red below) to the new development (indicated by the green block below). At the end of this cable a Minisub with the bulk meter for the development will be installed. LV cables from the minisub will be installed to the Main Distribution Board in the new shopping centre for the development.



Figure 7: Image of electrical supply

11. CONCLUSION

This report confirms that bulk services are available or could be made available for this development, and that the development is supported from a Civil & Electrical Engineering perspective.



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Annexure A – Site Development Plan



1 Ground Floor Site Plan

1 : 250

F:\Shoprite Sedgefield C15\XXX.00P01 Drawings\00 Revit\Sedgefield 05 Maxed GLA.rvt

NOTES

- The design on this drawing is copyright and remains the property of SVA International (Pty) Ltd. Reg. No 2011/137280/07
- All work to be carried out in strict accordance with local authority requirements, National Building Regulations, and the S.A.B.S.standards.
- This drawing may not be scaled. Only figured dimensions and levels may be used.
- All relevant details, levels, and dimensions must be checked on site before commencement of work. Any discrepancies to be reported to the Architects office immediately

REVISIONS

Rev	Date	Issued by	Description
T1	2026-01-22	SVA	Issued For Information

Key Plan

Signatures:
Engineer:

Signatures:
Architect:

FOR INFORMATION

CONSULTANTS

Project Manager

Quantity Surveyor

Structural Engineer

Civil Engineer

Mechanical Engineer

Electrical Engineer

Wet & Fire Services Engineer

Interior Designer

Landscape Architect

Lighting Specialist

Client

Project
Sedgefield

Drawing
Ground Floor Site Plan

Scale	Size	Date	Drawn
1 : 250	A1	01/22/26	TL

Project No.	Drawing No.	Revision No.
CA00000-00	**A(10)1002**	**T1**

Date & Time printed: 22/01/2026 06:05:21

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Annexure B – Topographical Survey

SURVEY NOTES:

- THIS SURVEY WAS DONE BY MATT PEPE & ASSOCIATES CC
- SURVEY TO BE CHECKED AND ACCEPTED PRIOR TO ANY SITE CLEARANCE / WORK ON SITE. THIS SURVEY WILL BE USED AS THE BASE OF ALL VOLUME CALCULATIONS. (IF YOU PLAN TO USE ANOTHER SURVEYOR TO CHECK THE SURVEY, WE WILL SUPPLY XYZ COORDINATES SO THAT THE Z-VALUES CAN BE CHECKED AT THE EXACT SAME POINTS.)

IF ANY DISCREPANCY IS NOTED, KLS IS TO BE INFORMED IMMEDIATELY PRIOR TO START OF EARTHWORKS, SO THAT THE DESIGN LEVELS MAY BE ADJUSTED IF NECESSARY.

LEGEND

- EXISTING SEWER & MANHOLE
- EXISTING WATERMAIN
- EXISTING ELECTRICAL
- EXISTING TELECOMMUNICATION
- EXISTING STORMWATER & MANHOLE
- EXISTING STORMWATER DRAIN
- EXISTING GREY WATER
- BUILDING LINES
- SURVEY GENERAL CADASTRAL LINE
- 1265.0 — 0.2m NGL CONTOURS
- CONTROL POINTS/ BENCHMARKS

Topographical Survey
Sedgefield
Knysna Municipality

Coordinate System
WGS 84/23

Height Datum
Approximate Mean Sea Level

Bench Marks
BM3 16748.28 3765847.42 11.008 RIP
BM4 16851.16 3765814.52 11.058 BOLT
BM5 17060.37 3765718.56 11.817 HC
BM6 16529.82 3765902.97 13.510 BOLT
RM1 17006.20 3765733.38 10.463 IP12

Scale 1:250

Surveyed in March 2026
by M.Jacobs and B.Agenbag
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LEGEND

CL	COVER LEVEL
EB	ELECTRICAL BOX
SP	SIGNAGE POLE
WPM	WATER PIPE MARKER
FH	FIRE HYDRANT
IL	INVERT LEVEL
LP	LIGHT POLE
TH	TOP HEADWALL
THP	TRIAL HOLE PIT
TOD	TOP OF DUCT
RE	RODDING EYE
TEL	TELEPHONE POLE

CONTROL CO-ORD LIST WG 23

NAME	Y CONST	X 03 7000 000	Z	DESCRIPTION
J	16917.68	65760.79	10.950	20mm RIP IN CONCRETE
K	17060.65	65714.36	11.791	20mm RIP IN CONCRETE
RM1	17006.20	65733.38	10.463	12mm RIP IN CONCRETE

CLIENT
SHOPRITE
CHECKERS PROPERTIES

PROJECT
ERF 1669
SEDGEFIELD

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SURVEY PLAN

SCALE 1:200 (A0) SYSTEM: WG 23 DATUM: MSL

SURVEYOR A & LA PEPE | DRAWN LA PEPE | DATE 06 DECEMBER 2011

DRG No. JB2983 REV No A

No.	REVISION / WYSIGING	DATE DATUM	AUTHOR OUTEUR
A	FOR INFORMATION	28/04/2026	KLS

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SEDGEFIELD SHOPPING CENTRE

SURVEY LAYOUT

DRAWN UITGETEK	CHECKED NAGESIEN	DATE DATUM
N. WOLTER	N. WOLTER	2025_08_18

DRG. No. / TEK. Nr. 25051/110

SCALE SKAAL 1:250 (A0)

REVISION No. WYSIGING Nr. A

Survey Layout_Sedgefield_Shopping Centre_Knysna.dwg

Annexure C – Preliminary Stormwater Calculations

FLOOD RUN-OFF CALCULATIONS	PROJECT:	SEDGEFIELD SHOPPING CENTRE		
kls CONSULTING ENGINEERS progress delivered	Project no:	25051	Page No	1
	Catchment Name:	SEDGEFIELD SHOPPING CENTRE	Rev:	A
	Calculation Method:	SANRAL AND RATIONAL METHOD (ALTERNATIVE 3)		
	Calculated by:	Neil Wolter		
	Date:	2025-10-13		
	Checked By:	Neil Wolter	Signed:	
	Date:	2025-10-13		

Catchment characteristics (All methods)

Description of catchment	Sedgefield
Name of watercourse (If applicable)	N/A

Physical characteristics

Size of catchment (A)	0.012	km^2
Longest watercourse (L)	0.160	km
Average slope (S_{av})	0.060	m/m
Dolomitic area ($D_{\%}$)	0%	%

Meteorological characteristics

Rainfall region:	SWARTVLEI - 0029450_W	
Weather Service station Coordinates	34"1 & 22"48	
Nearest Weather Station number	0021204_W	
Mean annual precipitation (MAP)	687	mm
2-year return period daily rainfall (M)	56.3	mm
Days of thunder per year (R)	5	days/year

Area distribution factors

Rural (α)	Urban (β)	Lakes (γ)
1.000	0.000	0.000

Notes:

Time of concentration (T_c) (All Methods)

Overland/Sheet flow $(= P_{1T} \times ARF_T)$		Defined watercourse	
$T_c = 0.604\left(\frac{rL}{\sqrt{S_{av}}}\right)^{0.467}$		$T_c = \left(\frac{0.87L^2}{1000S_{av}}\right)^{0.385}$	
0.323	hours	0.250	hours

Notes:
Minimum Tc of 15minutes (0.25 hours).
Choose Between Defined and Overland for TC

Catchment run-off coefficients (Rational Methods)

Rural

Surface slope	%	Factor	C_S
Vleis and pans (<3%)	0.0%	0.03	0.000
Flat Areas (3-10%)	100.0%	0.08	0.080
Hilly (10-30%)	0.0%	0.16	0.000
Steep Areas (>30%)	0.0%	0.26	0.000
Total	100.0%	-	0.080
Permeability	**%**	**Factor**	**C_P**
Very permeable	0.0%	0.04	0.000
Permeable	94.0%	0.08	0.075
Semi-permeable	0.0%	0.16	0.000
Impermeable	6.0%	0.26	0.016
Total	100.0%	-	0.091
Vegetation	**%**	**Factor**	**C_V**
Thick bush and plantation	40.0%	0.04	0.016
Light bush and farm-lands	54.0%	0.11	0.059
Grasslands	0.0%	0.21	0.000
No vegetation	6.0%	0.28	0.017
Total	100.0%	-	0.092

Urban

Description	%	Factor	C_S
Lawns in sandy soil, flat grade(<2%)	0.00%	0.10	0.000
Lawns in sandy soil, steep grade(>7%)	0.00%	0.20	0.000
Lawns in heavy soil, flat grade(<2%)	0.00%	0.17	0.000
Lawns in heavy soil, steep grade(>7%)	0.00%	0.35	0.000
Residential: Houses	0.00%	0.50	0.000
Residential: Flats	0.00%	0.70	0.000
Light industry	0.00%	0.80	0.000
Heavy industry	0.00%	0.90	0.000
Business complexes in the city centre	0.00%	0.95	0.000
Business complexes in suburban areas	0.00%	0.70	0.000
Street area	0.00%	0.95	0.000
Maximum Flood	0.00%	1.00	0.000
Total (C_2)	0.00%	-	0.000

Notes:

Adjustment of run-off coefficients (Rational Methods)

Return period (years), T	2	5	10	20	50	100	
Rural run-off coefficient, C_1 $(C_1 = C_S + C_P + C_V)$	0.263	0.263	0.263	0.263	0.263	0.263	
Adjustment of above for dolomitic areas, C_{1D} $\left(= C_1(1 - D_{\%}) + C_1 D_{\%}\left(\sum\left(D_{factor} \times C_{S\%}\right)\right)\right)$	0.263	0.263	0.263	0.263	0.263	0.263	
Adjustment factor for initial saturation of rural areas, F_t	0.750	0.800	0.850	0.900	0.950	1.000	
Adjusted rural run-off coefficient, C_{1T} $(= C_{1D} \times F_t)$	0.197	0.210	0.224	0.237	0.250	0.263	
Combined run-off coefficient, C_T $(= \alpha C_{1T} + \beta C_2 + \gamma 1)$	0.197	0.210	0.224	0.237	0.250	0.263	

FLOOD RUN-OFF CALCULATIONS	PROJECT:	SEDGEFIELD SHOPPING CENTRE		
kls CONSULTING ENGINEERS progress delivered	Project no:	25051	Page No	2
	Catchment Name:	SEDGEFIELD SHOPPING CENTRE	Rev:	A
	Calculation Method:	SANRAL AND RATIONAL METHOD (ALTERNATIVE 3)		
	Calculated by:	Neil Wolter		
	Date:	2025-10-13		
	Checked By:	Neil Wolter	Signed:	
	Date:	2025-10-13		

Flood run-off: Rational method (Alternative 1)

Return Period (years), T	2	5	10	20	50	100
Point rainfall (mm), P_T						
Point intensity (mm/hour), P_{IT} (= P_T/T_C)	0.00	0.00	0.00	0.00	0.00	0.00
Area reduction factor (%), ARF_T	100%	100%	100%	100%	100%	100%
Average intensity (mm/hour), I_T	0.00	0.00	0.00	0.00	0.00	0.00
Peak flow (m^3/s) $Q_T = \frac{C_T I_T A}{3,6}$ $Q_T = \frac{C_T I_T A}{3,6}$	0.00	0.00	0.00	0.00	0.00	0.00

Flood run-off: Rational method (Alternative 2)

Return Period (years), T	2	5	10	20	50	100
Rainfall duration (minutes) t	19.36	19.36	19.36	19.36	19.36	19.36
Point rainfall (mm), P_T $PtT = 1.13(0.41+0.64LnT)(-0.11+0.27lnt)(0.79M^{\wedge 0.69} R^{0.20})$	11.71	19.75	25.84	31.92	39.97	46.05
Point intensity (mm/hour), P_{IT} (= P_T/T_C)	46.84	79.01	103.35	127.70	159.87	184.21
Area reduction factor (%), ARF_T	100%	100%	100%	100%	100%	100%
Average intensity (mm/hour), I_T	46.84	79.01	103.35	127.70	159.87	184.21
Peak flow (m^3/s) $Q_T = \frac{C_T I_T A}{3,6}$ $Q_T = \frac{C_T I_T A}{3,6}$	0.03	0.055	0.08	0.10	0.13	0.16

Flood run-off: Rational method (Alternative 3)

Return Period (years), T	2	5	10	20	50	100
Point rainfall (mm), P_T	11.00	16.20	20.50	25.40	33.30	40.40
Point intensity (mm/hour), P_{IT} (= P_T/T_C)	44.00	64.80	82.00	101.60	133.20	161.60
Area reduction factor (%), ARF_T	100%	100%	100%	100%	100%	100%
Average intensity (mm/hour), I_T	44.00	64.80	82.00	101.60	133.20	161.60
Peak flow (m^3/s) $Q_T = \frac{C_T I_T A}{3,6}$ $Q_T = \frac{C_T I_T A}{3,6}$	0.03	0.045	0.06	0.08	0.11	0.14

Flood run-off: SDF

Return Period (years), T	2	5	10	20	50	100	200
Basin	20.0						
Mean Annual Percipitation (MAP)	480.0						
Mean 24 hour maximum rainfall (1:2) - M	53.0						
Mean number of thunder days per annum - R	12.0						
Rainfall duration (minutes) t	19.36	19.36	19.36	19.36	19.36	19.36	19.36
Point rainfall (mm), P_T $PtT = 1.13(0.41+0.64LnT)(-0.11+0.27lnt)(0.79M^{\wedge 0.69} R^{0.20})$	13.38	22.57	29.53	36.48	45.67	52.63	59.58
Area reduction factor (%), ARF_T	100%	100%	100%	100%	100%	100%	100%
Average intensity (mm/hour), $I_T = P_{tT} \times ARF / T_c$)	53.52	90.29	118.11	145.92	182.69	210.50	238.32

Run-Off Coefficients

Calibration Factors	C_2 (2-year return period) (%)	15	C_{100} (2-year return period) (%)	60

Return Period (years), T	2	5	10	20	50	100	200
Retrun Period Y_T Factors	0.00	0.84	1.28	1.64	2.05	2.33	2.580
Run-off coefficient (C_T),	0.15	0.31	0.40	0.47	0.55	0.60	0.65
Peak flow (m^3/s) $Q_T = \frac{C_T I_T A}{3,6}$ $Q_T = \frac{C_T I_T A}{3,6}$	0.03	0.09	0.16	0.23	0.33	0.42	0.51

FLOOD RUN-OFF CALCULATIONS	PROJECT:	SEDGEFIELD SHOPPING CENTRE		
kls CONSULTING ENGINEERS progress delivered	Project no:	25051	Page No	1
	Catchment Name:	SEDGEFIELD SHOPPING CENTRE	Rev:	A
	Calculation Method:	SANRAL AND RATIONAL METHOD (ALTERNATIVE 3)		
	Calculated by:	Neil Wolter		
	Date:	2025-10-13		
	Checked By:	Neil Wolter	Signed:	
	Date:	2025-10-13		

Catchment characteristics (All methods)

Description of catchment	Sedgefield
Name of watercourse (If applicable)	N/A

Physical characteristics

Size of catchment (A)	0.012	km^2
Longest watercourse (L)	0.211	km
Average slope (S_{av})	0.030	m/m
Dolomitic area ($D_{\%}$)	0%	%

Meteorological characteristics

Rainfall region:	SWARTVLEI - 0029450_W	
Weather Service station Coordinates	34"1 & 22"48	
Nearest Weather Station number	0021204_W	
CoCT Mean annual precipitation (MAP)	687	mm
2-year return period daily rainfall (M)	56.3	mm
Days of thunder per year (R)	5	days/year

Area distribution factors

Rural (α)	Urban (β)	Lakes (γ)
0.000	1.000	0.000

Notes:

Time of concentration (T_c) (All Methods)

Overland/Sheet flow $(= P_{rr} \times ARF_r)$		Defined watercourse	
$T_c = 0.604\left(\frac{rL}{\sqrt{S_{av}}}\right)^{0.467}$		$T_c = \left(\frac{0.87L^2}{1000S_{av}}\right)^{0.385}$	
0.250	hours	0.250	hours

Notes:
Minimum Tc of 15minutes (0.25 hours).
Choose Between Defined and Overland for TC

Catchment run-off coefficients (Rational Methods)

Rural

Surface slope	%	Factor	C_S
Vleis and pans (<3%)	0.0%	0.03	0.000
Flat Areas (3-10%)	0.0%	0.08	0.000
Hilly (10-30%)	0.0%	0.16	0.000
Steep Areas (>30%)	0.0%	0.26	0.000
Total	0.0%	-	0.000
Permeability	**%**	**Factor**	**C_P**
Very permeable	0.0%	0.04	0.000
Permeable	0.0%	0.08	0.000
Semi-permeable	0.0%	0.16	0.000
Impermeable	0.0%	0.26	0.000
Total	0.0%	-	0.000
Vegetation	**%**	**Factor**	**C_V**
Thick bush and plantation	0.0%	0.04	0.000
Light bush and farm-lands	0.0%	0.11	0.000
Grasslands	0.0%	0.21	0.000
No vegetation	0.0%	0.28	0.000
Total	0.0%	-	0.000

Urban

Description	%	Factor	C_S
Lawns in sandy soil, flat grade(<2%)	0.00%	0.10	0.000
Lawns in sandy soil, steep grade(>7%)	13.50%	0.20	0.027
Lawns in heavy soil, flat grade(<2%)	0.00%	0.17	0.000
Lawns in heavy soil, steep grade(>7%)	0.00%	0.35	0.000
Residential: Houses	0.00%	0.50	0.000
Residential: Flats	0.00%	0.70	0.000
Light industry	0.00%	0.80	0.000
Heavy industry	0.00%	0.90	0.000
Business complexes in the city centre	0.00%	0.95	0.000
Business complexes in suburban areas	0.00%	0.70	0.000
Street area	86.50%	0.95	0.822
Maximum Flood	0.00%	1.00	0.000
Total (C_2)	100.00%	-	0.849

Notes:

Adjustment of run-off coefficients (Rational Methods)

Return period (years), T	2	5	10	20	50	100
Rural 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
Adjustment of above for dolomitic areas, C_{1D} $\left(= C_1(1 - D_{\%}) + C_1 D_{\%}\left(\sum\left(D_{factor} \times C_{S\%}\right)\right)\right)$	0.000	0.000	0.000	0.000	0.000	0.000
Adjustment factor for initial saturation of rural areas, F_t	0.750	0.800	0.850	0.900	0.950	1.000
Adjusted rural 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 $(= \alpha C_{1T} + \beta C_2 + \gamma 1)$	0.849	0.849	0.849	0.849	0.849	0.849

FLOOD RUN-OFF CALCULATIONS	PROJECT:	SEDGEFIELD SHOPPING CENTRE		
kls CONSULTING ENGINEERS progress delivered	Project no:	25051	Page No	2
	Catchment Name:	SEDGEFIELD SHOPPING CENTRE	Rev:	B
	Calculation Method:	SANRAL AND RATIONAL METHOD (ALTERNATIVE 3)		
	Calculated by:	Neil Wolter		
	Date:	2025-10-13		
	Checked By:	Neil Wolter	Signed:	
	Date:	2025-10-13		

$PtT = 1.13(0.41+0.64LnT)(-0.11+0.27lnt)(0.79M^{0.69} R^{0.20})$

Flood run-off: Rational method (Alternative 1)

Return Period (years), T	2	5	10	20	50	100
Point rainfall (mm), P_T						
Point intensity (mm/hour), P_{IT} (= P_T/T_C)	0.00	0.00	0.00	0.00	0.00	0.00
Area reduction factor (%), ARF_T	100%	100%	100%	100%	100%	100%
Average intensity (mm/hour), I_T	0.00	0.00	0.00	0.00	0.00	0.00
Peak flow (m^3/s) $Q_T = \frac{C_T I_T A}{3,6}$	0.00	0.00	0.00	0.00	0.00	0.00

Flood run-off: Rational method (Alternative 2)

Return Period (years), T	2	5	10	20	50	100
Rainfall duration (minutes) t	15.00	15.00	15.00	15.00	15.00	15.00
Point rainfall (mm), P_T	10.54	17.78	23.26	28.73	35.98	41.45
Point intensity (mm/hour), P_{IT} (= P_T/T_C)	42.16	71.12	93.03	114.94	143.90	165.81
Area reduction factor (%), ARF_T	100%	100%	100%	100%	100%	100%
Average intensity (mm/hour), I_T	42.16	71.12	93.03	114.94	143.90	165.81
Peak flow (m^3/s) $Q_T = \frac{C_T I_T A}{3,6}$	0.12	0.20	0.26	0.33	0.41	0.47

Flood run-off: Rational method (Alternative 3)

Return Period (years), T	2	5	10	20	50	100
Point rainfall (mm), P_T	11.00	16.20	20.50	25.40	33.30	40.40
Point intensity (mm/hour), P_{IT} (= P_T/T_C)	44.00	64.80	82.00	101.60	133.20	161.60
Area reduction factor (%), ARF_T	100%	100%	100%	100%	100%	100%
Average intensity (mm/hour), I_T	44.00	64.80	82.00	101.60	133.20	161.60
Peak flow (m^3/s) $Q_T = \frac{C_T I_T A}{3,6}$	0.12	0.18	0.23	0.29	0.38	0.46

Flood run-off: SDF

Return Period (years), T	2	5	10	20	50	100	200
Basin	20.0						
Mean Annual Percipitation (MAP)	480.0						
Mean 24 hour maximum rainfall (1:2) - M	53.0						
Mean number of thunder days per annum - R	12.0						
Rainfall duration (minutes) t	15.00	15.00	15.00	15.00	15.00	15.00	15.00
Point rainfall (mm), P_T $PtT = 1.13(0.41+0.64LnT)(-0.11+0.27lnt)(0.79M^{0.69} R^{0.20})$	12.04	20.32	26.58	32.84	41.11	47.37	53.63
Area reduction factor (%), ARF_T	100%	100%	100%	100%	100%	100%	100%
Average intensity (mm/hour), $I_T = P_{tT} \times ARF / T_c$)	48.18	81.27	106.31	131.34	164.44	189.48	214.51

Run-Off Coefficients

Calibration Factors	C_2 (2-year return period) (%)	15	C_{100} (2-year return period) (%)	60

Return Period (years), T	2	5	10	20	50	100	200
Retrun Period Y_T Factors	0.00	0.84	1.28	1.64	2.05	2.33	2.580
Run-off coefficient (C_T),	0.15	0.31	0.40	0.47	0.55	0.60	0.65
Peak flow (m^3/s) $Q_T = \frac{C_T I_T A}{3,6}$	0.02	0.08	0.14	0.20	0.30	0.38	0.46

Annexure D – Water Demand Calculations

Item no	Description	Total no. of units/staff	Area (m^2)	Water demand per day			TOTAL (litre)
				Per unit litre/100m^2/day	Per unit litre per unit	Per person litre per person	By area/ number
1	Business/ Commercial		3,993	400			15,972
							-
							-

Gross annual average daily water demand (GAADD) **15,972 l/day**

Max. Demand over 24 hour day = daily demand/daily hours/60/60 **0.55 l/s**

Instantaneous Peak Demand {P(i) = 1} **0.55 l/s**

Fire Flow (Fire Engineer to confirm) **25.00 l/s**

Design Methodology:

a) Units: Yield in litre per ha per day - SANS 10252-1 and CSIR Red Book Section J.4, Table J.2 & J.4

b) Peak factor calculation: The flow from Industrial Developments are contra-cyclical from residential (zero peak).

c) Water demand based on an 8 hour day

d) Fire Flow (Moderate Risk): 6000l/min for 4 hours = 25 l/s *(Fire Engineer to confirm)*

Annexure E – Sewer Yield Calculations

Item no	Description	Total no. of units	Area (m²)	Sewage Yield per day			TOTAL (litre)
				Per unit litre/100m²/day	Per unit litre per unit	Per person litre per person	By area/ number
1	Business/ Commercial		3,993	360	-	-	14,375 - -

Annual Average Daily Sewage Yield (AADSY) **14,375 l/day**

Maximum Flow over 24 hour day = daily flow/daily hours/60/60 **0.50 l/s**

Peak Factor = 1

Peak Daily Dry Weather Sewage Yield (PDDWSY) **0.50 l/s**

Infiltration = 15%

Peak Daily Wet weather Se **0.57 l/s**

Design Methodology:

a) Units: Yield in litre per unit per day - SANS 10252-1 and CSIR Red Book Table C.1 Chapter 10 Appendix C
b) Peak factor calculation: The flow from Industrial Developments are contra-cyclical from residential:
c) Calculations based on an 8 hour day
d) Assume infiltration of 15%: During Heavy Rainfall in Winter

Annexure F – Combined Services Layout

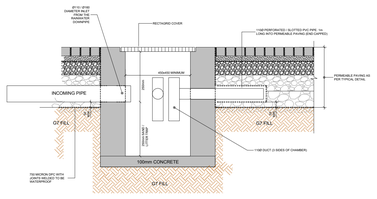
GENERAL SERVICES NOTES:

1. ALL WORK TO BE IN ACCORDANCE WITH SABS 1200 AND THE PROJECT SPECIFICATIONS
2. ALL EXISTING SERVICES IN THE VICINITY OF THE WORKS TO BE EXPOSED, LOCATION AND DETAILS RECORDED, REPORTED TO ENGINEER FOR APPROVAL, PRIOR TO START OF ANY EXCAVATION IN THE VICINITY OF SERVICES
3. SERVICES SETTING OUT COORDINATES REFER TO CENTER OF MANHOLE, CENTER OF KERB INLET OR CENTER OF GRID INLET IF NOT AGAINST KERB.
4. CONTRACTOR TO APPLY AND OBTAIN WAYLEAVES BEFORE CONSTRUCTION MAY COMMENCE AND MUNICIPAL SERVICES ARE EXPOSED OR CONNECTED TO.
5. ALL TIE-IN LEVELS MUST BE DETERMINED BY CONTRACTOR AND SUBMITTED TO ENGINEER AT LEAST ONE WEEK BEFORE CONSTRUCTION OF THOSE SERVICES.
6. ALL COVER LEVELS ARE INDICATIVE AND SHOULD BE CONFIRMED ON SITE.
7. ALL RAINWATER DOWNPIPES TO BE LIASED WITH ARCHITECT FOR EXACT GULLEY POSITIONS / SURFACE DISCHARGE.
8. ALL BENDS, T-PIECES, REDUCERS ETC. TO uPVC WATER MAINS SHALL BE DUCTILE IRON TO EB 12842, FUSION BONDED THERMOPLASTIC, COATED INTERNALLY AND EXTERNALLY WITH PLASCOAT PPA 071 HES, TO A MINIMUM 0.25mm COATING THICKNESS WITH EPDM RUBBER INSERT SEAL.
9. ALL VALVES SHALL BE AVK OR SIMILAR APPROVED OF RESILIENT SEAL TYPE, BE CLOCKWISE OPENING / ANTI-CLOCKWISE CLOSING, HEAVY DUTY CLASS 16 WITH NON-RISING SPINDLES
10. WATERMAIN LINES SHALL NOT BE PRESSURE TESTED AGAINST ISOLATING VALVES, TEMPORARY BLANK FLANGES OR END CAPS TO BE INSTALLED FOR TESTING.
11. ALL PIPES TO BE INSTALLED WITH A CLASS C BEDDING
12. FOR INTERFACE AT BUILDINGS, REFER TO ARCHITECT's DRAWINGS (PLUMBING).
13. CIVIL CONTRACTOR TO LIAISE WITH PLUMBER REGARDING INTERFACE AT BUILDINGS FOR ALL WATER AND SEWER CONNECTIONS.
14. MINIMUM COVER OF WATER PIPES TO BE 800mm.
15. SEWER BUILDING CONNECTIONS TO BE AT 1:60 SLOPE.
16. MEDIUM DUTY COVER & FRAMES IN WALKWAYS / LANDSCAPING AREAS AND HEAVY DUTY COVER & FRAMES IN ROADWAYS (AND WHERE ADDITIONALLY INDICATED)
17. WHERE CONNECTION TO AN EXISTING SEWER MANHOLE IS TO BE MADE, FLEXIBLE uPVC COUPLING SHALL BE BUILT INTO EXISTING MANHOLE (SEALED AND EPOXY). THE MANHOLE BENCHING MODIFIED ACCORDINGLY, EXISTING SEWAGE FLOW HANDLED / MAINTAINED AND FOREIGN MATERIAL PREVENTED FROM ENTERING THE SEWAGE SYSTEM AT ALL TIMES.
18. ROADWAYS AND WALKWAYS TO BE RE-INSTATED TO MATCH EXISTING LAYERWORKS & FINISH WHERE APPLICABLE.
19. ALL SUBLINKS TO HYDRANTS TO HAVE A VALVE AFTER TEE (NOT SHOWN ON SHORT LENGTHS)
20. WHERE DOMESTIC AND FIRE LINES RUN PARALLEL, PIPES ARE TO BE INSTALLED IN THE SAME TRENCH @ 400mm C/C
21. ALL FIRE HYDRANT CONNECTIONS TO BE 750 T-OFF FROM FIRE LINE (UNLESS OTHERWISE SHOWN)
22. ALL FIRE HYDRANTS TO BE PEDESTAL TYPE (REFER TO TYPICAL DETAIL DRAWING)
23. REFER ARCHITECTS DRAWING FOR SECONDARY SEWER CONNECTIONS FROM BUILDING
24. SLEEVES TO BE 110Ø CLASS 34 uPVC OR OTHERWISE SHOWN (REFER TO ELECTRICAL ENGINEER AND ARCHITECT DRAWINGS).
25. MIN COVER ON SLEEVES TO BE 600mm IN WALKWAYS AND LANDSCAPING AREAS AND 800mm IN ROADWAYS
26. SPECIAL CARE TO BE TAKEN TO AVOID THE TRAPPING OF RAIN WATER, BY PLANNING THE WORKS PROPERLY, AND BY INSTALLING TEMPORARY CUT-OFF DRAINS IF REQUIRED, ETC.
27. PROPOSED WALKWAY PAVING / LANDSCAPING TO BE IN ACCORDANCE WITH ARCHITECTS LAYOUT AND DETAILS.
28. REFER TO ARCHITECT / STRUCTURAL ENGINEER'S DRAWINGS FOR FINAL FLOOR LEVELS / TOC LEVELS
29. REFER A4 BOOKLET FOR TYPICAL DETAILS

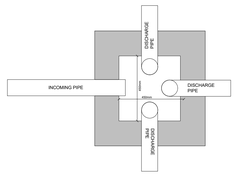
LEGEND

- STORMWATER LINE (SPIGOT & SOCKET CLASS 100D) 375mm Ø (UNLESS OTHERWISE SHOWN)
- SW MANHOLE (NUMBER, COVER- , INVERT LEVEL & DEPTH)
- SW OUTLET STRUCTURE
- 110mm Ø SUBSOIL WRAPPED IN GEOTEXTILE WITH RODDING EYE
- RAINWATER DOWNPIPE JUNCTION BOX (450x450mm)
- DOUBLE GRID INLET
- TRIPLE GRID INLET
- 160mm Ø FOULSEWER (uPVC Heavy Duty class 34)
- FOULSEWER MANHOLE (NUMBER, COVER- , INVERT LEVEL & DEPTH)
- 110mm Ø FOULSEWER CONNECTION (uPVC Heavy Duty class 34)
- RODDING EYE
- 110mm uPVC CLASS 12 WATERMAIN (UNLESS OTHERWISE SHOWN)
- AV AIRVALVE & CHAMBER
- GATE VALVE & CHAMBER
- NON RETURN VALVE (AS PER DETAIL)
- 80mm BULK WATER METER ON 110mm Ø uPVC CLASS 16 PIPE
- 110mm UPVC CLASS 16 FIRE MAIN (UNLESS OTHERWISE SHOWN)
- 75mm UPVC CLASS 16 WATER MAIN (UNLESS OTHERWISE SHOWN)
- FH FIRE HYDRANT (PEDESTAL TYPE)
- TWIN BOOSTER CONNECTOR (AS PER DETAIL)
- BARRIER KERB (BK2 / Fig 4 OR BK4 / Fig 3)
- BARRIER KERB & CHANNEL (BK2 / Fig 4 OF BK4 / Fig 3 + C1 / Fig 14)
- 90mm Ø uPVC CLASS 9 RAINWATER & SUBSOIL RAISING MAIN
- V-CHANNEL (2 x C1 / Fig 14)
- OPEN CHANNEL WITH WINDROW BERM CUT
- L11 Terraforce Block
- EXISTING SEWER & MANHOLE
- EXISTING WATERMAIN
- EXISTING ELECTRICAL
- EXISTING STORMWATER LINE
- EXISTING GREY WATER
- LEASE BOUNDARY
- SURVEY CADASTRAL LINE
- 60 0.2m DESIGN CONTOURS
- 60 NGL CONTOURS
- EXISTING BUILDING
- PROPOSED BUILDINGS
- PROPOSED PERMEABLE PAVING

TYPICAL PERMEABLE PAVING SUBSOIL DISCHARGE



TYPICAL SECTION



PLAN

A	FOR APPROVAL	28/04/2026	KLS
No.	REVISION / WYSIGING	DATE DATUM	AUTHOR OUTEUR

kls CONSULTING ENGINEERS progress delivered

13 Fairle Street Roosevelt, Cape Town 7700

Cape Town: +27(0)21 948 0900 Mossel Bay: +27(0)21 948 0972 website: www.kls.co.za e-mail: info@kls.co.za

SEDGEFIELD SHOPPING CENTRE

COMBINED SERVICES LAYOUT

DRAWN OPTEKEN	N. WOLTER	CHECKED NAGESIEN	N. WOLTER
DATE DATUM	2025_08_18	SCALE SKAAL	1:250 (A0)
DRG. No. TEK. Nr:	25051/200	REVISION No. WYSIGING No.	A

Plot Date: 28/04/2026 | Plotted By: Nicolaas Wolter | Last Saved By: N.WOLTER

Annexure G – GLS Report

Infrastructure planning

14 April 2026

The Director: Technical Services
Knysna Municipality
P.O. Box 21
Knysna
6570

Attention: Mr Rhoydon Parry

Dear Sir,

PROPOSED COMMERCIAL DEVELOPMENT ON ERVEN 3504 TO 3507, 3456 TO 3465 & 4967, SEDGEFIELD: CAPACITY ANALYSIS OF THE BULK WATER AND SEWER SERVICES

This report is an update of the original bulk water and sewer capacity investigation report for development on Erven 3504 to 3507, 3456 to 3465 & 4967 in Sedgefield, dated 3 February 2026.

The request by Mr Hannes Kotze of KLS Consulting Engineers regarding comments on the bulk water and sewer supply of the proposed development (Sedgefield Shopping Centre on Erven 3504 to 3507, 3456 to 3465 & 4967, Sedgefield), refers.

This document should inter alia be read in conjunction with the Water Master Plan (performed for the Knysna Municipality) dated December 2018 and the Sewer Master Plan dated December 2018. Although the existing hydraulic water and sewer models used to perform the December 2018 water and sewer master plans for Knysna Municipality are more than 5 years old, the existing models are assumed to be the most accurate representation of the existing system up to date hereof and were consequently used to perform this investigation.

It is however recommended that the existing WADISO (hydraulic water analysis software) and SEWSAN (hydraulic sewer analysis software) models used to perform this investigation are updated by Knysna Municipality with the latest as-built and water demand information.

The proposed development was conceptually taken into consideration for the December 2018 master plans for the water and sewer networks as future development area S13.

1. WATER DISTRIBUTION SYSTEM

1.1 *Distribution zone*

The master plan indicated that the proposed development should be accommodated in the existing Sedgefield reservoir water distribution zone. The recommended connection to the existing Sedgefield water system is to the existing 90 mm Ø pipe in Main Service Road, as shown in Figure 1 attached.

It is also recommended that an existing 90 mm Ø pipe running through the development area is abandoned.

The proposed development is situated inside the water priority area.

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1.2 *Water demand*

The original water analysis for the master plan was performed with a total annual average daily demand (AADD) for the proposed development (future development area S13 in the December 2018 water master plan) of 21,6 kL/d.

For this re-analysis, the AADD and fire flow for the proposed development were calculated as follows:

- 3 993 m^2 GLA shopping centre @ 0,4 kL/d/100 m^2 = 16,0 kL/d
- Fire flow criteria (Moderate risk) = 25 L/s @ 10 m

1.3. *Present situation*

1.3.1 Reticulation network

The Water Master Plan indicated that the proposed development should be accommodated within the existing Sedgefield reservoir water distribution zone. The Sedgefield reservoir water distribution zone is supplied under gravity from the Sedgefield no. 1 and no. 2 reservoirs with a Top Water Level (TWL) of 74,3 metres above mean sea level (m a.s.l.).

Static water pressure at the proposed connection point in Main Service Road is 59.3 m water head. During peak demand conditions (with the demand of the proposed development included), the pressure can decrease to roughly 55.4 m.

The capacity of the existing system to supply fire flow to the proposed development is calculated at 25,4 L/s @ 10 m water head at the proposed connection point in Main Service Road.

The existing Sedgefield reticulation network has sufficient capacity to accommodate the proposed development in the existing water system to comply with the pressure and fire flow criteria as set out in the water master plan.

1.3.2 Reservoir capacity

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

According to the Water Master Plan the AADD of the Sedgefield reservoir water distribution zone is approximately 1 931 kL/d. The combined reservoir storage capacity of the Sedgefield no. 1 and no. 2 reservoirs are 4 000 kL (1 500 kL+ 2 500 kL), which results in a current reservoir storage capacity of 49,7 hours of the AADD.

With full development of the proposed development included, the reservoir storage capacity decreases to 49,4 hours of the AADD supplied.

There is therefore sufficient capacity in the existing Sedgefield reservoirs to accommodate the proposed development. In the Water Master Plan additional reservoir storage capacity is however proposed in the near future for Sedgefield.

1.3.3 Bulk supply

An existing 200 mm Ø bulk pipe supplies bulk water from the Sedgefield Main reservoir (4.0 ML reservoir to the north of Sedgefield) to the Sedgefield no. 1 & no. 2 service reservoirs. This pipe is currently at capacity with a flow velocity during peak demand conditions of more than 1.8 m/s.

With full occupation of all the existing registered erven in Sedgefield (when all existing erven with development rights are fully developed) the flow velocity in this pipeline will however increase to more than 2.2 m/s and result in insufficient water pressure in the existing Sedgefield high pressure PRV water distribution zone (area supplied directly from the bulk pipeline through a pressure reducing valve).

It is proposed in the Water Master Plan for Sedgefield that this pipeline is upgraded to a larger diameter in order to accommodate additional development within Sedgefield.

1.4 *Implementation of the master plan*

The following master plan item is proposed in the Water Master Plan for Sedgefield to augment bulk water supply in order to accommodate the proposed Sedgefield Shopping Centre (together with other future developments in the area), as shown in Figure 2 attached.

Bulk supply upgrade

- KSW.B1 : 1 750 m x 315 mm Ø bulk supply pipe R 7 288 000 *

After master plan item KSW.B1 is implemented, the existing Sedgefield water system will have sufficient spare capacity available in the bulk water system to accommodate the proposed development.

The following master plan item will be required in the near future to augment reservoir storage capacity for Sedgefield, as shown in Figure 2 attached.

(This upgrade is not required as a minimum requirement to accommodate the proposed development in the existing water system).

Reservoir upgrade

- KSW.B2 : 2,5 ML additional storage capacity (TWL = 74.3 m a.s.l.) R 12 322 000 *

(* Including P & G, Contingencies and Fees, but excluding VAT - Year 2025/26 Rand Value. This is a rough estimate, which does not include major unforeseen costs).

The route of the proposed pipeline and location of the proposed reservoir are schematically shown in Figure 2, but have to be finalised subsequent to detailed pipeline route and reservoir location investigations.

1.5 *Minimum items required*

The following minimum upgrade is required to accommodate the proposed development in the existing water system:

- Master plan item KSW.B1 is required to augment the capacity of the existing bulk water system to supply bulk water from the Sedgefield Main reservoir to the Sedgefield service reservoirs.

2. SEWER NETWORK

2.1 *Drainage area*

The Sewer Master Plan indicated that the proposed development should be accommodated in the existing Sedgefield Pump Station (PS) no. 17 drainage area. The recommended position for the sewer connection for the proposed development is at the proposed 160 mm Ø outfall sewer in Bushbuck Street, as shown in Figure 3.

A portion of the existing 160 mm Ø outfall sewer running through the erf should be abandoned.

The development is inside the sewer priority area.

2.2 *Sewer flow*

The original sewer analysis for the master plan was performed with a peak day dry weather flow (PDDWF) for the proposed development (future development area S13 in the December 2018 sewer master plan) of 17,5 kL/d.

For this re-analysis, the PDDWF for the proposed development was calculated as 14,4 kL/d.

2.3 *Present situation*

Sewage from Sedgefield PS no. 17 is pumped directly to Sedgefield PS no.2 via a 100 mm Ø rising main. From the Sedgefield PS no. 2 sewage is pumped to the Sedgefield PS no. 3 drainage area, from where sewage gravitates to the Sedgefield PS no. 3. From here sewage is pumped via a 100 mm diameter rising main to the Sedgefield Gravity drainage area, which drains towards the Sedgefield Wastewater Treatment Plant (WWTP).

The existing sewer system from the Sedgefield PS no. 17 to the Sedgefield WWTP has sufficient capacity to accommodate the proposed development.

The following link services item will, however, be required to connect the internal reticulation network of the proposed development to the existing sewer system.

Link services:

- Item 1 : 175 m x 160 mm Ø New outfall sewer R 633 000 *

(* Including P & G, Contingencies and Fees, but excluding VAT - Year 2025/26 Rand Value. This is a rough estimate, which does not include major unforeseen costs).

The route of the proposed pipeline is schematically shown in Figure 3, but has to be finalised subsequent to a detailed pipeline route investigation.

2.4 *Minimum items required*

The minimum upgrade required to accommodate the proposed development in the existing sewer system is link services item 1 to connect the internal reticulation network of the proposed development to the existing sewer system.

3. CONCLUSION

The developer of the proposed Sedgefield Shopping Centre on Erven 3504 to 3507, 3456 to 3465 & 4967 in Sedgefield may be liable for the payment of a Development Contribution (as calculated by Knysna Municipality) for bulk water and sewer infrastructure as per Council Policy.

The existing bulk supply system between the Sedgefield Main reservoir and the Sedgefield service reservoirs is at capacity and should be upgraded in order to accommodate the proposed development.

There is sufficient capacity in the existing water reticulation system downstream of the Sedgefield service reservoirs to accommodate the proposed development.

Master plan item KSW.B1 is required to augment the capacity of the existing bulk water system to supply bulk water from the Sedgefield Main reservoir to the Sedgefield service reservoirs.

The existing sewer reticulation system has sufficient capacity to accommodate the proposed development. Link services item 1 will, however, be required to connect the internal sewer reticulation network of the development to the existing sewer system.

We trust you find this of value.

Yours sincerely,

GLS CONSULTING (PTY) LTD
REG. NO.: 2007/003039/07



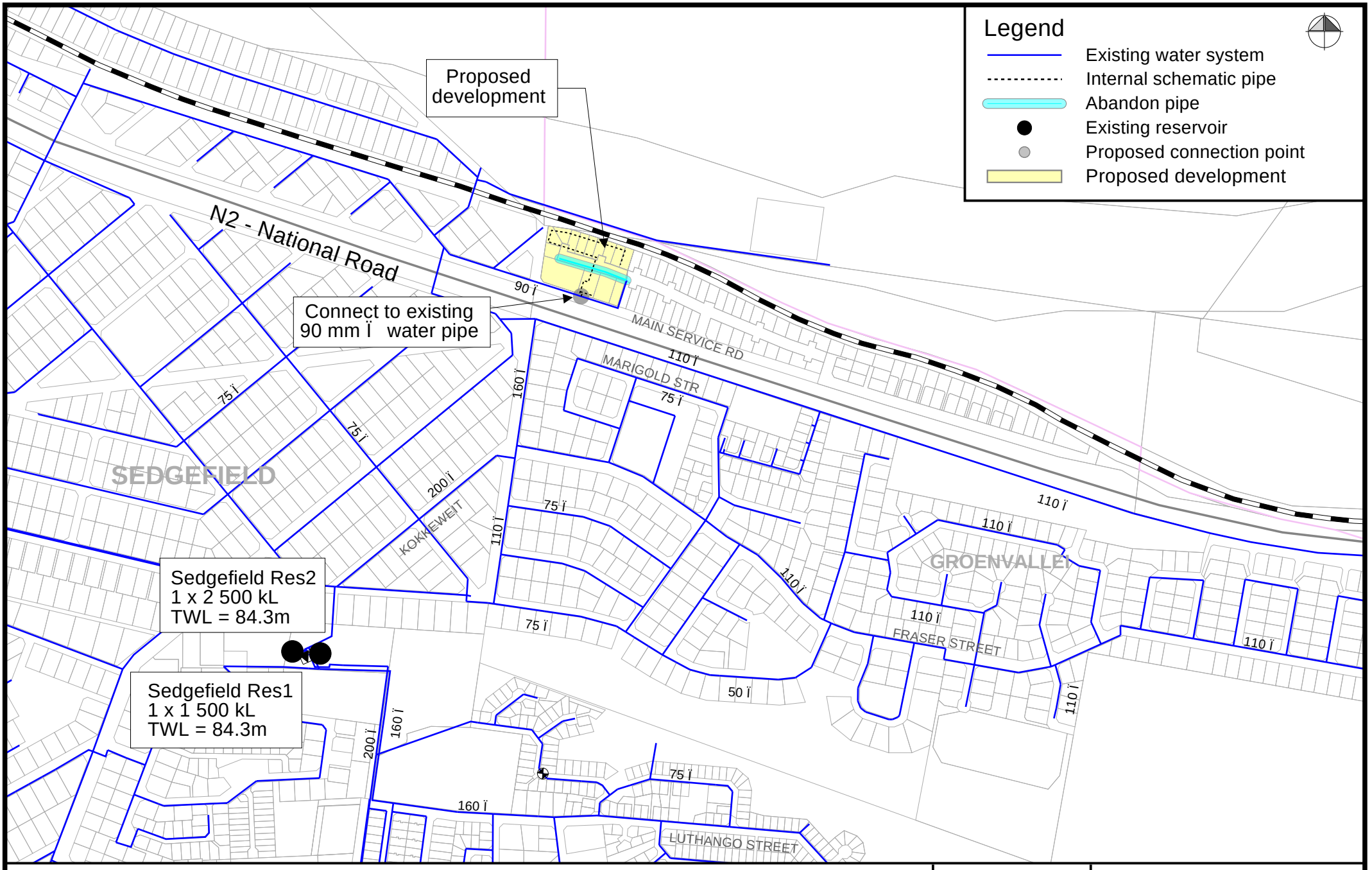
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Per: PC DU PLESSIS

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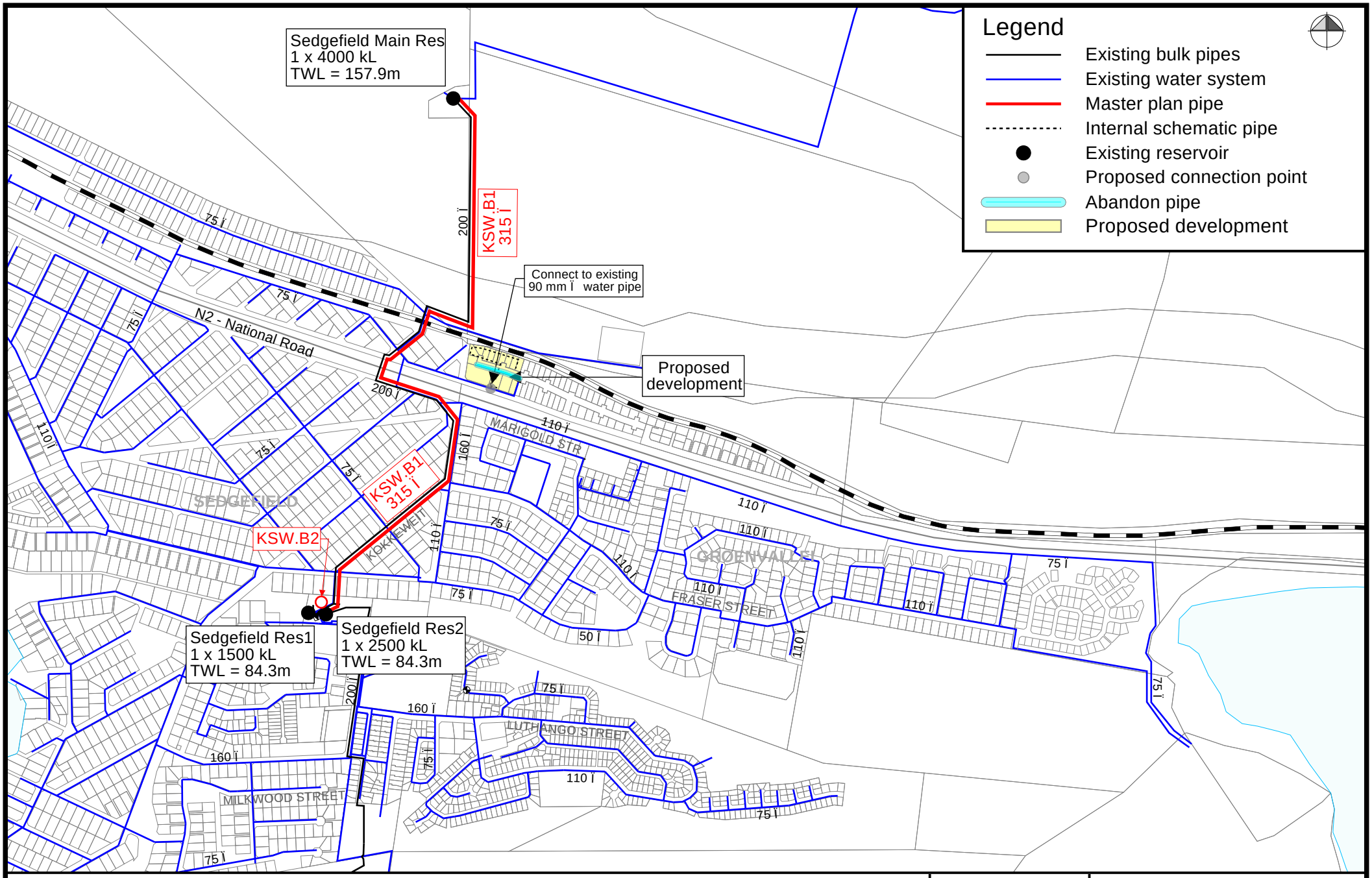
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Knysna Municipality - Sedgefield Shopping Centre

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Figure 1

Proposed Development
Shopping Centre - Sedgefield
Existing Water System



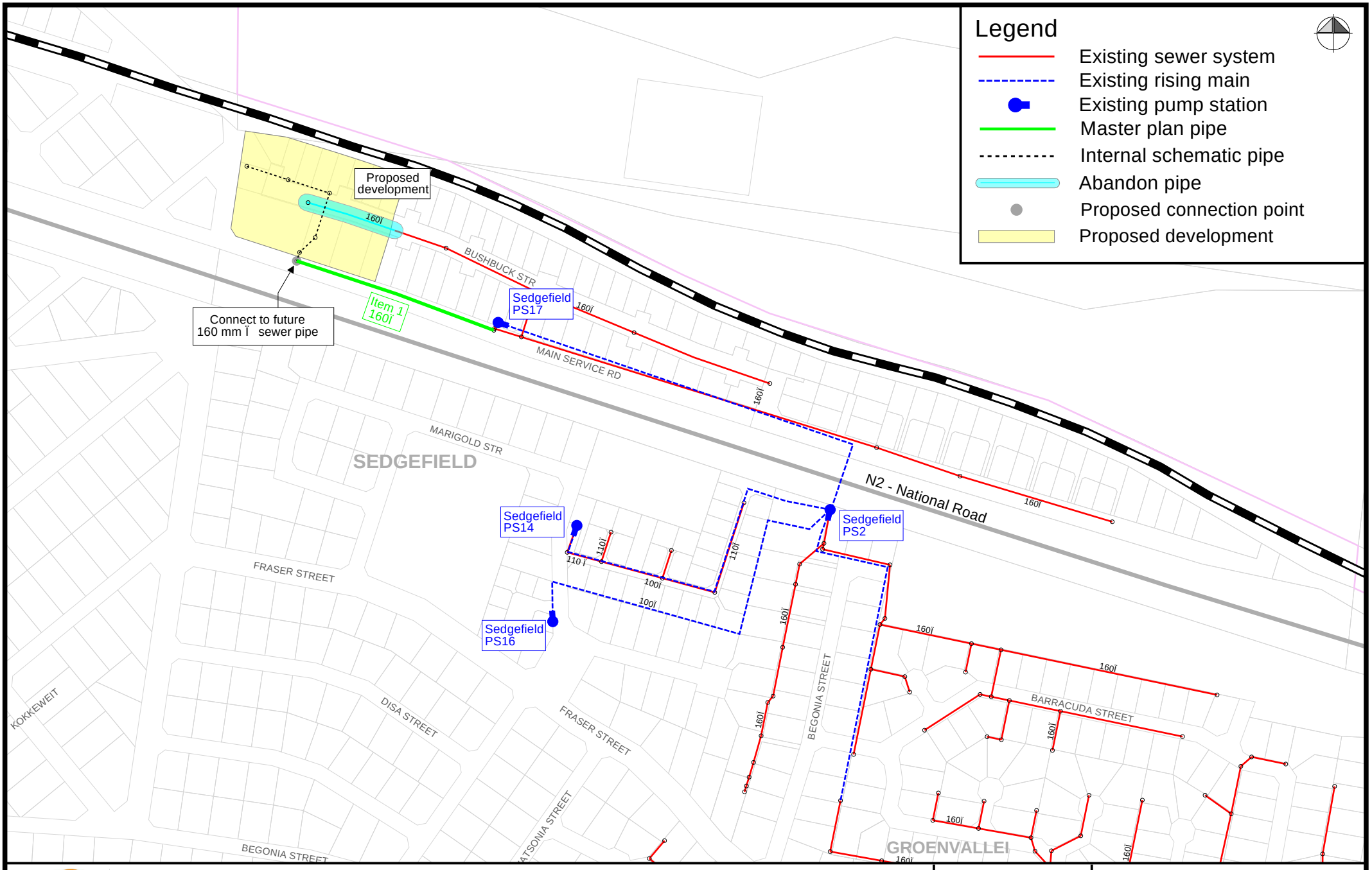
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Figure 2

Proposed Development
Shopping Centre - Sedgefield
Bulk Master Plan



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Figure 3
Proposed Development
Shopping Centre - Sedgefield
Existing Sewer System