URBAN - CONSULT

TOWN PLANNING CONSULTANTS

PROPOSED TOWNSHIP

NEW EERSTERUS EXTENSION 15

PORTION OF THE REMAINDER OF THE FARM BULTFONTEIN 107 JR

TSHWANE METROPOLITAN MUNICIPALITY

STORMWATER RUN-OFF CALCULATION AND PROPOSED STORMWATER SYSTEM

FEBRUARY 2022

PREPARED BY:

D & G ENCOTECH CONSULTING ENGINEERS

21 Johannes Drive
HENNOPSPARK Ext 3
CENTURION
TEL: (012) 653 8089

P O BOX 9304
CENTURION
0046

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PROPOSED NEW EERSTERUS EXT 15

STORMWATER RUN-OFF CALCULATION & PROPOSED STORMWATER SYSTEM

1. INTRODUCTION

URBAN CONSULT Town Planner (Mr Robert Streak) requested D and G Encotech (PTY) LTD to supply the engineering input for the stormwater handling to be submitted with the township application for the proposed new township, New Eersterus Ext 15.

The stormwater run-off and handling investigation is based on the standard SIA Report to CoT requirements but will only be submitted as a SIA Report to the Engineering Department at CoT after the department formally replied to the township application.

The total area of the township is 886.78 ha.

2. GENERAL INFORMATION

2.1 THE TOWN PLANNER IS:

URBAN CONSULT
P O Box 95884
WATERKLOOF
0145

Owner:	Robert Streak
Mobile:	082 573 0409
Email	urb-con@mweb.co.za

2.2 CONSULTING ENGINEER

ENCOTECH CONSULTING ENGINEERS
P O Box 9304
CENTURION
00046

Responsible partner:	Johannes Duvenhage Pr. Eng- ECSA 20170186
Tel - office:	(012) 653 8089
Mobile:	083 271 5823
Email:	jd@encotech.co.za

3. LOCALITY

New Eersterus Extention 15 lies on the eastern side of the existing township, Soshanguve Block Y, Ext 1.

The eastern border is the road reserve of the future PWV 9 road.

Part of the northern border is the road reserve of the future K214 Road.

On the western side it borders the existing Bultfontein surfaced Road.

On the southern side is the Remainder of the Farm Bultfontein 107 JR

A locality plan is attached as **Annexure 1**.

The layout of the proposed new township is shown on **Annexure 2**.

4. SITE CHARACTERISTICS

The site drains naturally from south to north. A large area of farmland on the southern side of the of the proposed development forms part of the catchment area.

The geology (**paragraph** 5) of the catchment area is allows for very high permeability soil (weathered granite) with low run-off coefficient **but** with a horizontal flow of water on the ferriccrete and solid granite sub surface areas with the well know high water table in certain areas during the peak rainy season. A further indication of the soil conditions are the small channel area at the centre of streams and the disappearance of the channel in total in certain areas.

The approach followed with the proposed stormwater system is also to allow for adequate subsurface drains in the stormwater reticulation system to prevent the forming of an un-foreseen high water table near any building.

Area of New Eersterus Ext 15	= 886 ha
Average Slope: S to N	= ± 1:30
Lowest point	= S
L (water flow)	= 5 500 m
$_{d}H$	= 189 m
MAP	= 680 mm

Vegetation:

The virgin vegetation on the property is reasonable dense scattered bush and veld grass with a strip of dense trees near the stream.

5. GEOLOGY

The study area is underlain by transported sandy and gravelly soils which are underlain by pedogenic (ferricrete) gravels in a sandy matrix which constitutes the pebble marker

horizon and is often cemented into a soft rock hardpan ferricrete. These horizons generally do not extend to great depth and are underlain by sandy residual soils and weathered granite or granophyre bedrock belonging to the Bushveld Complex. The upper soil horizons can be expected to be potentially compressible, however, these horizons are generally not very prominent and modified normal foundation precautionary measures are usually employed. Hard machine excavation van be expected in either the hardpan ferricrete or in the bedrock horizons, damp proofing precautions should be taken and the presence of a seasonal perched water table occurring on top of the hardpan ferricrete or the bedrock horizon may not be ruled out. The upper soil horizons should be suitable for use as backfill underneath surface beds and for use in the construction of paved areas (probably G7 quality) after removal of all organic matter.

6. CATCHMENT AREAS AND STORMWATER RUN-OFF CALCULATIONS

The catchment areas and the summary calculation tables are indicated on the attached **Annexure 3**. The catchment areas and stormwater run-off for the 1:2 year & 1:20 year flood is indicated on the layout drawing attached as **Annexure 4**.

The following methodology was applied:

- The un-developed catchment areas to the south of the proposed developments (**A1, B1, B3, D1, F1 & G1)** were all taken as developed areas for the run-off calculation.
- The **1:20 year** run-off from these catchments were used to calculate the pipe sizes running through New Eersterus Ext 15.
- All outlet pipe sizes to a stream or river were based on the **1:20 year** flood

A summary of the pipe sizes and flood re-occurrence intervals are summarized in Table 1 and are also shown on the attached **Annexure 5**.

TABLE 1

Catchment	Pipe No	Node	$Q_{1:2}$ (m^3/s)	$Q_{1:20}$ (m^3/s)	Pipe Ø
A	1	1a to 2a		0.87	525
	2	2a to 3a		1.61	675
	3	3a to 4a		2.32	825
	4	4a to 5a, 6a		2.41	900
	5	6a to 7a		2.79	900
	6	7a to 8a		3.12	1050

TABLE 1 continue

Catchment	Pipe No	Node	$Q_{1:2}$ (m³/s)	$Q_{1:20}$ (m³/s)	Pipe Ø
B		1b-inlet		3.80	
	1	2b to 6.1b		5.37	1200
	2	3b to 4b		1.96	750
	3	4b to 5b		2.39	825
	4	5b to 6b		2.78	900
	5	6b to 10b		2.78	900
	6	7b to 8b		8.0	1500
	7	8b to 9b		8.4	1500
	8	9b to 10b		8.73	1500
	9	10b to 6.1b		8.80	1650
	10	6.1b to 11b		12.10	1800
	11	11b to 12b		12.21	1800
	12	12b to 13b		12.61	1800
C	1	1c to 2c	0.88		525
	2	2c to 3c	1.43		675
	3	3c to 4c	1.92		750
	4	4c to 5c	2.03		825
	5	5c to 6c	2.20		825
	6	6c to 7c	2.46	6.28*	1350*
	7	7c to 8c		7.90*	1500*
	8	8c outlet		7.90*	1500*
D		1d boundary	4.19	10.70	
		2d-inlet	4.35	11.10	
	1	2d to 3d		11.10	1800
	2	3d to 4d		11.26	1800
	3	4d to 5d		11.53	1800
	4	5d to 6d		11.53	1800
	5	6d to 7d		11.85	1800
E		1e-boundary	0.51	1.30	
	1	1e to 2e		1.30	675
	2	2e to 3e		2.91	900
	3	3e to 4e		3.79	1050
F		1f-road	5.24	13.37	
	1	1f to 2f		13.37	1950
	2	2f to 3f		13.37	1950
	3	3f to 4f		14.96	1950
G	1	1g to 2g		2.75	900
	2	2g to 3g		3.50	1050
	3	3g to 4g		3.71	1050
	4	4g to 5g		4.05	1050
	5	5g to 6g		4.31	1200
	6	6g to 7g		4.55	1200

TABLE 1 (continue)

Catchment	Pipe No	Node	$Q_{1:2}$ (m³/s)	$Q_{1:20}$ (m³/s)	Pipe Ø
G (continue)**J**	7	7g to 8g		4.85	1200
	8	8g to 9g		5.13	1200
	9	9g to 10g		5.48	1200
	10	10g to 11g		5.98	1650
	11	11g to 12g		6.69	1350
	12	12g to 13g		7.10	1350
	13	13g to 14g		7.52	1350
	14	14g to 15g		7.71	1350
H_{total}		Pipe out	1.34	3.43	1050
I	1	1i to 2i	0.42		
	2	2i to 3i	1.12		
	3	3i to 4i	1.41	3.59*	1050*
	4	4i - outlet	1.70	4.53*	1050*
J	1	1j to 2j	0.23		450
	2	2j to 3j	0.74		525
	3	3j to 4j	1.05		600
	4	4j to 5j	1.17		600
	5	5j to 6j	1.59		750
	6	6j to7j	1.74	4.43*	1200*
	7	7j to 8j	1.82	4.66*	1200*
	8	8j - outlet	1.97	5.03*	1200*

7. SUB-SURFACE DRAINS

The areas where sub-surface drains are to be installed is shown on **Annexure 5**. With the future submission of the complete SIA report with the Services Report a more detail analysis of the drainage will be included. The detail design will allow for draining the sub-surface drains into the stormwater reticulation system.

8. FLOODLINES

The development is influenced by the 1:50 year & 1:100 year floodlines. There are two (2) specific areas where augmentation to the normal scenario is required (refer to **Annexure 4**:

a) The natural stream from catchment **D1** disappears on the catchment areas **D2, D3 & E3**. This is like a micro Okavango Delta. The run-off in the stream will be collected on the northern side of catchment **D2** but a cut-off wall with adequate subsurface drainage capacity will be install in catchments **D2, D3 & E3** to prevent the ground water to raise the water table during the rainy season.

b) At the north-eastern corner of catchment **E4** the natural channel (omissible catchment area) runs over the corner of this area. A small attenuation pond will be allow for on the open area to the east of catchment **E4** and the outflow drained into the stormwater reticulation system. Sub-surface drainage will also be installed on the open area.

9. SUMMARY

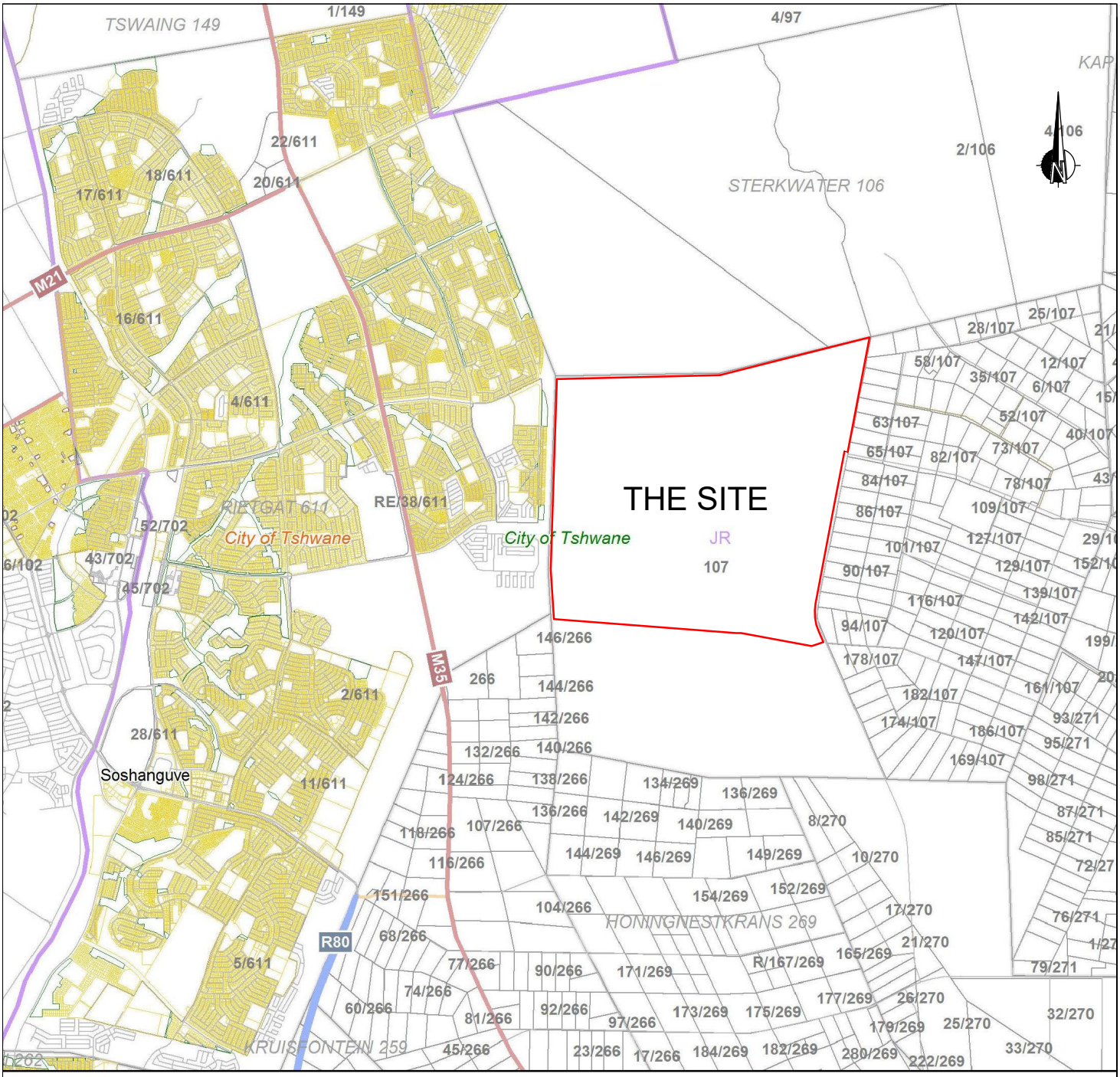
The proposed development lies on a geological area where the weather top material is highly permeable but the deeper solid layers mostly impermeable with the high water table emerging at shallow bedrock conditions during the rainy season. After good rainfall (80 mm or more) over a day or two, when the soil is already saturated and then followed with a dry spell afterwards, it normally takes a week or two for the surface seepage water to no longer run on the surface.

The proposed development can be successfully developed from a stormwater run-off and handling perspective as long as the precautionary measures are implemented in the detail design.

Report Compiled by:

_____ February 2022

J Duvenhage Pr Eng



D&ENCOTECH CONSULTING ENGINEERS PO BOX 9304 CENTURION 0046 TEL (012) 653 8089/653 7546 FAX (012) 653 8541 e-mail: info@encotech.co.za	CONSULTING CIVIL ENGINEERS AND PROJECT MANAGERS 21 JOHANNES DRIVE HENNOPSPARK CENTURION	LOCATION OF PROJECT: BULTFONTEIN DEVELOPMENT	DESCRIPTION OF PROJECT: LOCALITY	JOB No.: J1119	ANNEXURE 1

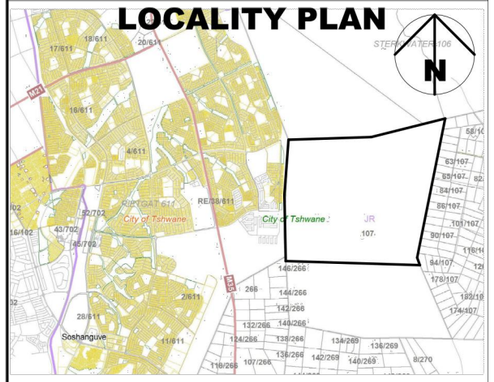
PROPOSED TOWNSHIP

NEW EERSTERUS EXT 15

SITUATED ON A PORTION OF THE REMAINDER OF THE FARM BULTFONTEIN 107 JR

TSHWANE METROPOLITAN MUNICIPALITY

LOCALITY PLAN



PROPOSED ZONING

PROPOSED ZONING	NO	ERF NO'S	AREA (Ha)	NOTATION
RESIDENTIAL 1 180 - 300 sqm	16331	1 - 16 331	411.35	
RESIDENTIAL 3 (40 U / HA)	38	16332 - 16 369	41.84	
RESIDENTIAL 4 (100U / HA)	13	16370 - 16 382	46.21	
BUSSINESS 2	9	16383 - 16 391	30.97	
INSTITUTIONAL	12	16 392 - 16 403	18.89	
EDUCATIONAL	11	16 404 - 16 414	69.12	
INDUSTRIAL 2	18	16 415 - 16 432	58.9	
MUNICIPAL	1	16433	5.4	
PUBLIC OPEN SPACE	41	16 434 - 16 475	204	
TOTAL	16474		886.78	

NOTES:
ALL ERVEN COUNT AND DIMENSIONS ARE SUBJECT TO FINAL SURVEY
TOWNSHIP TO BE DIVIDED INTO SEVERAL EXTENSIONS AFTER APPROVAL
FINAL ERF NUMBERS TO BE ALLOCATED ON TOWNSHIP DIVISION APPLICATIONS.
THE LAND IS SUBJECT TO A INFORMAL SETTLEMENT IN THE NORTH WESTERN CORNER.
THE INFORMAL SETTLEMNT WILL BE RELOCATED TO THE PLANNED TOWNSHIP AS FAR AS POSSIBLE

TOWNSHIP DATA

TOTAL TOWNSHIP AREA (INCLUDING OPEN SPACE)	Approx. 1190 Ha
TOTAL NUMBER OF RES UNITS (INCLUDING HIGH DENS)	22 608
TOTAL ROAD LENGTH	
TOTAL ROAD AREA	
MIN AND MAX SIZE OF ERVEN	180 - 400 sqm
MIN AND MAX ROAD GRADIENT	
TOTAL AREA OF OPEN SPACES	APPROX 204 HA
CONTOUR INFORMATION	Contour interval - 0.5 m

INTERNAL RESIDENTIAL STREETS ARE 12 M TO 16M WIDE
FUTURE PROVINCIAL ROADS K216 AND K214 HAVE BEEN INCORPORATED WITH PROVISIONAL ACCESS POINTS AS EARMARKED BY GAUTRANS

FLOODLINE CERTIFICATE

I HEREBY CONFIRM THAT THE ERVEN IN THE TOWN DOES NOT FALL WITHIN THE 1: 50 and 1 : 100 YEAR FLOODLINE AS DESCRIBED IN THE WATER ACT,ACT 36 OF 1998, ARTICLE 144.

THE FLOODLINES ARE PRELIMINARY AND WILL BE FINALIZED WITH DETAIL STORMWATER MASTERPLANS ON TOWNSHIP DIVISION APPLICATIONS.

The floodlines shown on this plan are only indicative as received from City of Tshwane Municipality.

O J Gerber Pr Tech Eng ECSA 8770192

DATE :	31/10/2019
SCALE :	1 : 5000
DRAWING NUMBER :	CPD/NEST/X15/1

CONTOURS INTERVAL OF CONTOURS - 0.5 m
The contours on the layout plan is in accordance with the requirements of reg. 18(1) of the Townplanning and Township Ordinance, 1986 (15 of 1986)

TOWNPLANNING CONSULTANT

URBAN CONSULT TOWN PLANNERS
P.O. BOX 95884
WATERKLOOF
0145
PRETORIA
EMAIL : urb-con@mweb.co.za
CELL : 082 573 0409

ANNEXURE 2

Project no: RS19006

Report: SANS634:2012 Detailed Preliminary Shallow Soil Engineering Geological Assessment Conducted for the Proposed Township Establishment on a Portion of the Remainder of the Farm Bultfontein 107 JR, Tshwane Metropolitan Municipality, Gauteng Province, South Africa.

Two zonation figures:

1. Figure 1: Reference: Figure A12: Broad Preliminary Geotechnical Zonation Map 2 (Zone V-Seasonal Seepage). Figure Version: V1.0
2. Figure 2: Reference: Figure A12: Broad Preliminary Geotechnical Zonation Map 2 (Zone V-Seasonal Seepage). Figure Version: V1.0

The site is preliminary assigned with 5 (five) broad geotechnical zones namely:

- Zone I: C1-R/(1AD 2B 2-3E(F-(2)
- Zone II: C1-R-P(Borrow Activities)/(1-2AD-2B-2-3E(F-(2))
- Zone III: C2-C1-R/(2ABD 2-3E(F-(2-3L)
- Zone IV: C2-C1-P(Developed) // 2ABDE (2-3F)
- Zone V: C2-C1-R/(2ABD 2-3E (2-3FL)

DH WESSELS Pr. Sci. Nat
SACNASP Registration number 400076/8

Area No	Area (ha)	Area km²	Accumulate area (km²)	L = m	L = km	∑ L	Htop (m)	Hx	Δ H (m)	Q1:2 (m³/s)	Q1:20 (m³/s)
A1	4.5	0.045	0.0450	180	0.18	0.18	1202.5	1183	19.5	0.34	0.87
A2	6.0	0.060	0.1050	200	0.20	0.38	1202.5	1176	26.5	0.63	1.61
A3	7.3	0.073	0.1780	250	0.25	0.63	1202.5	1166.5	36	0.91	2.32
A4	1.5	0.015	0.1930	52	0.05	0.68	1202.5	1164.5	38	0.96	2.45
A5	2.4	0.024	0.2170	82.5	0.08	0.76	1202.5	1162.5	40	1.03	2.64
A6	3.0	0.03	0.2470	134.5	0.13	0.90	1202.5	1162.5	40	1.09	2.79
A7	6.0	0.06	0.3070	270	0.27	1.17	1202.5	1159	43.5	1.22	3.12
A8	3.0	0.03	0.3370	262	0.26	1.43	1202.5	1153.5	49	1.25	3.18
B1	32.9	0.329	0.3290	850	0.85	0.85	1254	1205	49	1.49	3.80
B2	19.8	0.198	0.5270	430	0.43	1.28	1254	1187.5	66.5	2.1	5.37
B3	16.4	0.164	0.1640	808	0.81	0.81	1252.5	1206.5	46	0.77	1.96
B4	4.6	0.046	0.2100	219	0.22	1.03	1252.5	1192	60.5	0.94	2.39
B5	4.8	0.048	0.2580	200	0.20	1.23	1252.5	1179.5	73	1.09	2.78
B6	13.2	0.132	0.3900	375	0.38	1.60	1252.5	1166.5	86	1.48	3.78
B6.1	2.5	0.025	0.4150	82	0.08	1.68	1252.5	1165.5	87	1.54	3.94
B7	83.2	0.832	0.8320	1420	1.42	1.42	1275.5	1196.5	79	3.13	8.0
B8	8.1	0.081	0.9130	257	0.26	1.68	1275.5	1189	86.5	3.29	8.4
B9	7.7	0.077	0.9900	225	0.23	1.90	1275.5	1179	96.5	3.42	8.73
B10	10.9	0.109	1.0990	528	0.53	2.43	1275.5	1165.5	110	3.45	8.8
B11	156.0	1.56	1.5600	2430	2.43	2.43	1275.5	1157.5	118	4.78	12.21
B12	6.1	0.061	1.6210	155	0.16	2.59	1275.5	1153	122.5	4.94	12.61
B13	4.3	0.043	1.6640	230	0.23	2.82	1275.5	1149.5	126	4.89	12.48

Area No	Area (ha)	Area km²	Accumulate area (km²)	L = m	L = km	∑ L	Htop (m)	Hx	Δ H (m)	Q1:2 (m³/s)	Q1:20 (m³/s)
C1	13.7	0.137	0.137	219	0.22	0.22	1197.5	1185	12.5	0.88	2.25
C2	13.9	0.139	0.276	260	0.26	0.48	1197.5	1176.5	21	1.43	3.66
C3	15.9	0.159	0.435	300	0.30	0.78	1197.5	1169	28.5	1.91	4.88
C4	7	0.07	0.505	250	0.25	1.03	1197.5	1161.5	36	2.03	5.18
C5	11	0.11	0.615	334	0.33	1.36	1197.5	1158	39.5	2.2	5.62
C6	9.1	0.091	0.706	112	0.11	1.48	1197.5	1153.5	44	2.46	6.28
C7	21.8	0.218	0.924	155	0.16	1.63	1197.5	1149	48.5	3.1	7.9
C8	0.9	0.009	0.933	52	0.05	1.68	1197.5	1148	49.5	3.1	7.9
D1	133.1	1.331	1.331	2365	2.37	2.37	1317.5	1193	124.5	4.19	10.7
D2	15.3	0.153	1.484	600	0.60	2.97	1317.5	1176.5	141	4.35	11.1
D3	8.4	0.084	1.568	310	0.31	3.28	1317.5	1169	148.5	4.41	11.26
D4	9.1	0.091	1.659	277	0.28	3.55	1317.5	1162	155.5	4.52	11.53
D5	1.8	0.018	1.677	55	0.06	3.61	1317.5	1160.5	157	4.53	11.57
D6	9.3	0.093	1.770	283	0.28	3.89	1317.5	1152.5	165	4.64	11.85
D7	10	0.1	1.870	131	0.13	4.02	1317.5	1147.5	170	4.84	12.35
E1	9.8	0.098	0.098	606	0.61	0.61	1233.5	1196.5	37	0.51	1.3
E2	18.2	0.182	0.280	642	0.64	1.25	1233.5	1173.5	60	1.14	2.91
E3	11.1	0.111	0.391	232	0.23	1.48	1233.5	1166	67.5	1.48	3.79
E4	13.6	0.136	0.527	306	0.31	1.79	1233.5	1154.5	79	1.86	4.75
F1	173	1.73	1.730	2300	2.30	2.30	1285	1190	95	5.24	13.37
F2	10.6	0.106	1.836	585	0.59	2.89	1285	1176	109	5.19	13.25
F3	8.9	0.089	1.925	222	0.22	3.11	1285	1172	113	5.27	13.46
F4	22.1	0.221	2.146	5	0.01	3.11	1285	1171	114	5.86	14.96

Area No	Area (ha)	Area km²	Accumulate area (km²)	L = m	L = km	∑ L	Htop (m)	Hx	Δ H (m)	Q1:2 (m³/s)	Q1:20 (m³/s)
G1	25.2	0.252	0.252	1030	1.03	1.03	1232	1179	53	1.08	2.75
G2	7.9	0.079	0.331	161	0.16	1.19	1232	1171	61	1.37	3.50
G3	4.8	0.048	0.379	227	0.23	1.42	1232	1169	63	1.45	3.71
G4	9.0	0.09	0.469	426	0.43	1.84	1232	1169	63	1.59	4.05
G5	4.9	0.049	0.518	150	0.15	1.99	1232	1168	64	1.69	4.31
G6	5.0	0.05	0.568	150	0.15	2.14	1232	1168	64	1.78	4.55
G7	6.0	0.06	0.628	181	0.18	2.33	1232	1165	67	1.90	4.85
G8	5.4	0.054	0.682	150	0.15	2.48	1232	1162.5	69.5	2.01	5.13
G9	6.5	0.065	0.747	158	0.16	2.63	1232	1159	73	2.15	5.48
G10	10.5	0.105	0.852	283	0.28	2.92	1232	1154	78	2.34	5.98
G11	14.8	0.148	1.000	330	0.33	3.25	1232	1148.5	83.5	2.62	6.69
G12	7.6	0.076	1.076	118	0.12	3.36	1232	1146	86	2.78	7.10
G13	9.9	0.099	1.175	236	0.24	3.60	1232	1142	90	2.95	7.52
G14	7.8	0.078	1.253	273	0.27	3.87	1232	1138	94	3.04	7.71
G15	26.9	0.269	1.522	752	0.75	4.63	1232	1130.5	101.5	3.40	8.67
HT	46.8	0.468	0.468	2192	2.19	2.19	1172.5	1130.5	42	1.34	3.43
I1	9.5	0.095	0.095	620	0.62	0.62	1169.5	1158	11.5	0.42	1.07
I2	22.2	0.222	0.317	523	0.52	1.14	1169.5	1151	18.5	1.12	2.87
I3	10.5	0.105	0.422	320	0.32	1.46	1169.5	1141.5	28	1.41	3.59
I4 + I5	10	0.10	0.522	197	0.20	1.66	1169.5	1133	36.5	1.70	4.33
J1	3.9	0.039	0.039	205	0.21	0.21	1174	1170	4	0.23	0.60
J2	12.5	0.125	0.164	389	0.39	0.59	1174	1162.5	11.5	0.74	1.89
J3	10.2	0.102	0.266	281	0.28	0.88	1174	1157.5	16.5	1.05	2.67
J4	3.3	0.033	0.299	50	0.05	0.93	1174	1155	19	1.17	2.98
J5	15.5	0.155	0.454	308	0.31	1.23	1174	1151	23	1.59	4.05
J6	7	0.07	0.524	183	0.18	1.42	1174	1148	26	1.74	4.43
J7	4.2	0.042	0.566	156	0.16	1.57	1174	1144	30	1.82	4.66
J8	6.6	0.066	0.632	175	0.18	1.75	1174	1139.5	34.5	1.97	5.03

ANNEXURE 4

LOCATION OF PROJECT:

BULTFONTEIN DEVELOPMENT

DESCRIPTION OF PROJECT

CATCHMENT AREAS & RUN-OFF (m³/s)

CONSULTANTS DETAILS

ENCOTECH CONSULTING ENGINEERS

CONSULTING CIVIL ENGINEERS AND PROJECT MANAGERS

21 JOHANNES DRIVE
HENNOPS PARK
CENTURION
TEL (012) 653 8089/653 7546
FAX (012) 653 8541

PO BOX 9304
CENTURION
0046
e-mail: info@encotech.co.za

LEGEND:

SUBSURFACE DRAIN AREA

ANNEXURE 5

LOCATION OF PROJECT:

BULTFONTEIN DEVELOPMENT

DESCRIPTION OF PROJECT

STORMWATER RETICULATION SYSTEM PROPOSAL

CONSULTANTS DETAILS

ENCOTECH CONSULTING ENGINEERS

CONSULTING CIVIL ENGINEERS AND PROJECT MANAGERS

21 JOHANNES DRIVE
HENNOPS PARK
CENTURION
TEL (012) 653 8089/653 7546
FAX (012) 653 8541

PO BOX 9304
CENTURION
0046
e-mail: info@encotech.co.za