Civil Concepts (Pty) Ltd, Reg Number: 95/12428/07
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PO Box 36148, Menlo Park, 0102
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Email: mail@civilconcepts.co.za

Our Ref:
C33284/FL/002

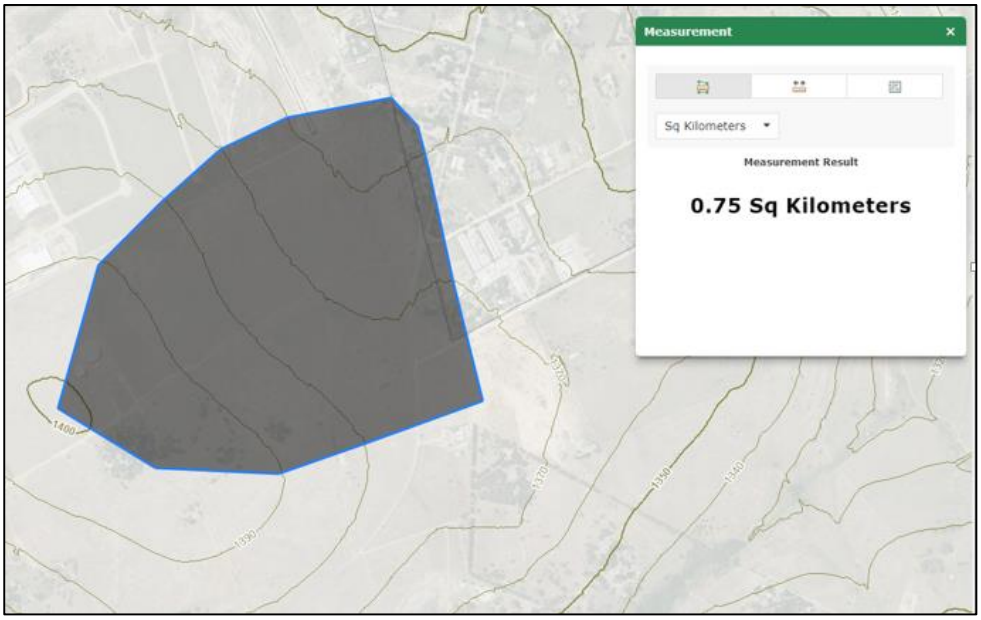
Date:
6 December 2023

To whom it concern

LANSERIA X81
REGISTRATION OF FLOODLINES ON PROPERTY

After conducting a desktop study of the possible floodlines affecting the proposed township Lanseria X81 situated on Portion 72 of the Farm Bultfontein 533-JQ we hereby include a summary our findings for record.

The catchment area contributing to the natural low point on the most eastern side of the townships (Catchment 2) can be confirmed as 0.75 km^2 with an average slope of 3.75%. Refer to **Figure 1** for a layout showing the catchment area.



The anticipated pre-development run-off for major storm events for the catchment is:

1:50 = 7.9 m^3/s
1:100 = 10.2 m^3/s

With

C = 0.42
I_{50} = 95 mm/h
I_{100} = 117 mm/h

Refer to **Annexure A** for a copy of the hydrological calculations.

This result in typical flow depths of y_{50} = 280mm over a width of 29m and y_{100} = 310mm over a width of 32m, average flow velocities expected are +/- 1.9m/s. Refer to **Annexure B** for a typical cross section extracted and used for hydraulic calculation purposes.

The calculated flow conditions does not constitute conditions we would associate with floods but rather conform to typical “Sheet flow” conditions. As such we cannot classify the area as a floodline but rather as a “natural low point”.

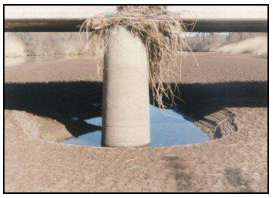
We propose that the stormwater system be designed to cater for a return period of 1:25 years with allowance in terms of freeboard for up to a 1:50 year event.

Yours faithfully

JP WELMAN Pr Eng (20180172).
for: CIVIL CONCEPTS (PTY) LTD

ANNEXURE A

Utility Programs for Drainage
Flood calculations



Sinotech

Project name: Lanseria X81
Analysed by: JP Welman
Name of river:
Description of site: Ptn 72 Bultfontein 533-JQ
Filename: W:\CC-Projects\C PROJECTS\C3284 (HW) SMALL PROJECTS 2023\1. Client and Related Bodies\1.11 Hydrology, SIA, SMP's\Ptn 72 Bultfontein.fld
Date: 27 November 2023

Flood Frequency Analysis: Rational Method 1

Project	= Lanseria X81
Analysed by	= JP Welman
Name of river	=
Description of site	= Ptn 72 Bultfontein 533-JQ
Date	= 2023/11/27
Area of catchment	= 0.75 km²
Dolomitic area	= 0.0 %
Mean annual rainfall (MAR)	= 700.00 mm
Length of longest watercourse	= 1.25 km
Flow of water	= Overland flow
Height difference	= 47.0 m
Value of r for over land flow	= Moderate grass (r=0,4)
Rainfall region	= Inland
Area distribution	= Rural: 100 %, Urban: 0 %, Lakes: 0 %

Catchment description - Urban area (%)

Lawns		Residential and industry		Business	
Sandy, flat (<2%)	0	Houses	0	City centre	0
Sandy, steep (>7%)	0	Flats	0	Suburban	0
Heavy soil, flat (<2%)	0	Light industry	0	Streets	0
Heavy soil, steep (>7%)	0	Heavy industry	0	Maximum flood	0

Catchment description - Rural area (%)

Surface slopes		Permeability		Vegetation	
Lakes and pans	10	Very permeable	20	Thick bush & forests	0
Flat area	40	Permeable	50	Light bush & cultivated land	10
Hilly	50	Semi-permeable	30	Grasslands	80
Steep areas	0	Impermeable	0	Bare	10

Average slope	= 0.0376 m/m
Time of concentration	= 56.4 min
Run-off factor	
Rural - C1	= 0.418
Urban - C2	= 0.000
Lakes - C3	= 0.000
Combined - C	= 0.418

The HRU, Report 2/78, Depth-Duration-Frequency diagram was used to determine the point rainfall.

Return Period (years)	Time of concentration (hours)	Point rainfall (mm)	ARF (%)	Average intensity (mm/h)	Factor Ft	Runoff coefficient (%)	Peak flow (m³/s)
1:2	0.94	32.5	99.9	34.5	0.75	31.4	2.256
1:5	0.94	44.2	99.9	47.0	0.80	33.4	3.276
1:10	0.94	56.0	99.9	59.5	0.85	35.5	4.404
1:20	0.94	69.1	99.9	73.4	0.90	37.6	5.756
1:50	0.94	89.9	99.8	95.4	0.95	39.7	7.895
1:100	0.94	110.6	99.8	117.4	1.00	41.8	10.22

Run-off coefficient percentage includes adjustment saturation factors (Ft) for steep and impermeable catchments

Calculated using Utility Programs for Drainage 2.0.0

ANNEXURE B

1:50 Year Typical Section Results

Name of project: Lanseria X81
River/channel name: Floodplain
Date: 6 December 2023
Description of site: Ptn 72 Bultfontein 533-JQ
Designer: JP Welman

Channel shape: Irregular section (river)
Friction calculation method: Manning formula

Solve for: Normal depth (Yn) — Solve

Irregular section (river channel)

Cross section X-Y coordinates (Station-Elevation)

Station (m)	Elevation (m)	n (s/m^1/3)
0	1354.68	0.03
0.5	1354.68	0.03
1.73	1354.7	0.03
2.06	1354.71	0.03
3	1354.83	0.03
4.2	1354.57	0.03
5.85	1354.23	0.03
8.96	1354.14	0.03

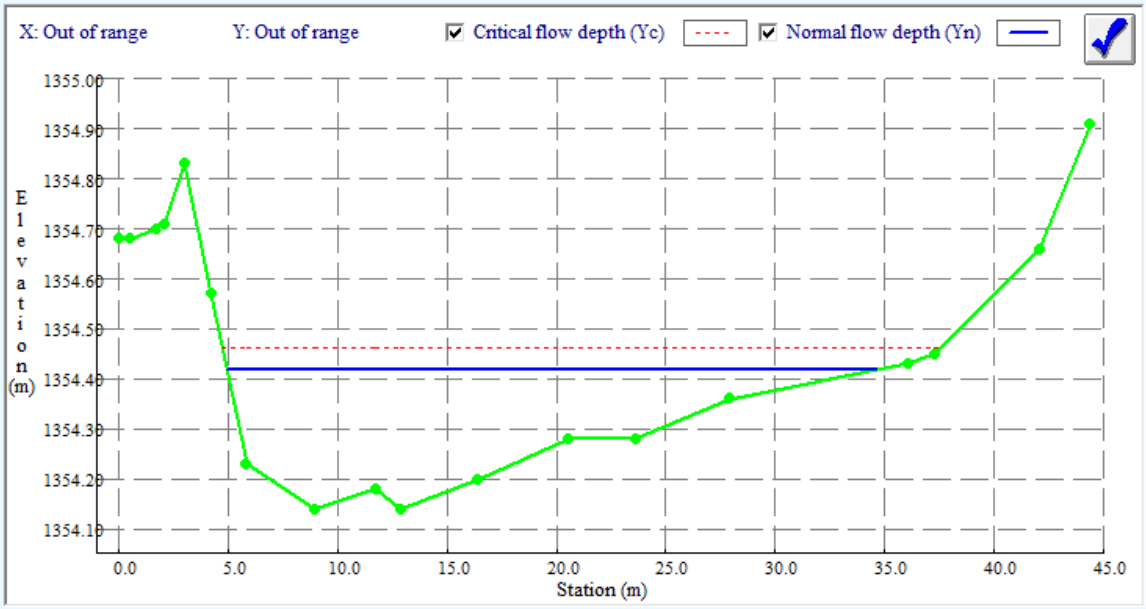
Flow rate (Q): 7.9 m³/s
Channel slope (S): 0.025 m/m
Normal depth (Yn): 0.278 m

Results

Flow area (A)	4.467	m²
Wetted perimeter (P)	29.712	m
Hydraulic radius (R)	0.150	m
Top width (B)	29.689	m
Critical depth (Yc)	0.324	m
Critical slope (Sc)	0.01566	m/m
Velocity (V)	1.768	m/s
Velocity head (Hv)	0.159	m
Specific energy (Es)	0.437	m
Froude number (Fr)	1.4556	
Flow type	Supercritical	

Name of project: Lanseria X81
River/channel name: Floodplain
Date: 6 December 2023
Description of site: Ptn 72 Bultfontein 533-JQ
Designer: JP Welman

Cross section



1:100 Year Typical Section Results

Name of project: Lanseria X81
River/channel name: Floodplain
Date: 6 December 2023
Description of site: Ptn 72 Bultfontein 533-JQ
Designer: JP Welman

Channel shape: Irregular section (river)
Friction calculation method: Manning formula

Solve for: Normal depth (Yn) — Solve

Irregular section (river channel)

Cross section X-Y coordinates (Station-Elevation)

Station (m)	Elevation (m)	n (s/m^1/3)
0	1354.68	0.03
0.5	1354.68	0.03
1.73	1354.7	0.03
2.06	1354.71	0.03
3	1354.83	0.03
4.2	1354.57	0.03
5.85	1354.23	0.03
8.96	1354.14	0.03

Flow rate (Q): 10.2 m³/s
Channel slope (S): 0.025 m/m
Normal depth (Yn): 0.308 m

Results

Flow area (A)	5.417	m²
Wetted perimeter (P)	32.415	m
Hydraulic radius (R)	0.167	m
Top width (B)	32.388	m
Critical depth (Yc)	0.359	m
Critical slope (Sc)	0.01490	m/m
Velocity (V)	1.883	m/s
Velocity head (Hv)	0.181	m
Specific energy (Es)	0.489	m
Froude number (Fr)	1.4701	
Flow type	Supercritical	

Name of project: Lanseria X81
River/channel name: Floodplain
Date: 6 December 2023
Description of site: Ptn 72 Bultfontein 533-JQ
Designer: JP Welman

Cross section