e·d·s

Structural, Civil and Transportation Engineers

TOWNSHIP ESTABLISHMENT APPLICATION OF PORTION 5 & 6 OF THE FARM SUNRELLA AGRICULTURAL HOLDINGS

STORMWATER MANAGEMENT REPORT

REPORT 2019-094-23 Rev-0

MARCH 2025

CLIENT: GROWTHPOINT & APETURE PROPERTIES

PREPARED BY:
EDS Engineering Design Services (Pty) Ltd
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Outline Scheme Report Information Sheet

Report number	:	2019-094-23-Rev-0
Local authority	:	City of Johannesburg Metropolitan Municipality
Proposed change	:	Township Establishment Application
Development type	:	Industrial 3, Warehouses
Property description	:	Portion 5 and Portion 6 of the farm Sunrella Agricultural Holdings (Lanseria Ext 79, erf 976 and erf 977)

Report undertaken by:

Name	:	D.H. van der Merwe
Signature	:	
Qualifications	:	B.Eng (Civil)
Email address	:	dean@edseng.co.za

Report reviewed by:

Name	:	F.H.B van Eyk Pr. Eng
Signature	:	
Qualifications	:	B.Eng (Civil), B.Eng (Hons) (Water Resources)
ECSA Registration	:	Pr. Eng. 20160826
Email address	:	derik@edseng.co.za

PORTION 5 AND 6 OF THE FARM SUNRELLA AGRICULTURAL HOLDING
OUTLINE SCHEME REPORT
STORMWATER MANAGEMENT REPORT

CONTENTS

1 INTRODUCTION

EDS Engineering Design Services (Pty) Ltd (EDS Engineers) was appointed to compile an Stormwater Management Report for the township application of Erf 976 and Erf 977, Lanseria Extension 79 on Portion 5 and Portion 6 of the farm Sunrella Agricultural Holdings Township.

The application site is located in Lanseria and falls in the area of jurisdiction of the City of Johannesburg Metropolitan Municipality.

This report describes the existing civil engineering stormwater management in proximity to the application site, the expected demands as a result of the change of the zoning rights and evaluates the capacity of the existing networks to accommodate the expected demands.

2 DETAILS OF THE APPLICANT

The details of the applicant:

Company Name:	GROWTHPOINT PROPERTIES
Physical Address:	The place 1 Sandton Drive Sandton Gauteng 2196
Contact Person:	Polla Scholtz
Telephone Number:	(011) 944 6050

Company Name:	APERTURE PROPERTIES
Physical Address:	89 Bute Lane, Sandown Sandton South Africa
Contact Person:	Hilton Carty
Telephone Number:	(079) 916 3982

The details of the town planner:

Company Name:	The Town Planning Hub cc
Physical Address:	Lombardy Corporate Park Block B, Unit M, Cole Rd, Shere Pretoria
Contact Person:	Adele Coertze
Telephone Number:	(012) 809 2229

3 SITE INFORMATION

3.1 SITE LOCATION

The site is located within the municipal boundaries of the City of Johannesburg.

The site details are as follows:

Site		Portions 5 and 6 of the farm Sunrella Agricultural Holdings
Size		3.879 ha
Boundaries	North	Side Road
	East	Main Road (Proposed K215)
	West	Lanseria Airport Extension 1

The location of the proposed township is shown in **Annexure A**.

3.2 PROPERTY DESCRIPTION

The application site is on portions 5 and 6 of the farm Sunrella Agricultural Holdings.

The physical combined size of portions 5 and 6 of the farm Sunrella Agricultural Holdings is 3.879 ha. A request to the city of Johannesburg Metropolitan Municipality for the approval of the township establishment of Lanseria Extension 79 of Erf 976 with Erven 977 measuring 3.879 ha in extent has been submitted.

Erf 976 and Erf 977 of Lanseria Extension 79 will be consolidated. For the purposes of this report, the site will hereafter be referred to as Lanseria Extension 79.

The proposed subdivision layout is included in **Annexure B**.

4 DEVELOPMENT INFORMATION

4.1 EXISTING LAND-USE RIGHTS

Portion 5 and Portion 6 of the farm Sunrella A/H are currently zoned “Agriculture” permitting land and building use for any bona fide farming activity. A copy of the zoning certificates is included in **Annexure C**.

The existing land use rights are summarised in **Table 4.1.1** below.

Table 4.1.1: Existing land use rights

Erf nr	Existing zoning	Size (ha)	Density	Coverage	FAR	Height (m)
Portion 5 and 6	Agriculture	3.879	N/A	N/A	N/A	N/A

4.2 PROPOSED LAND-USE RIGHTS

The zoning of the application site will change to “Industrial 3”.

The schedule of rights as well as an extract of the motivation memorandum as submitted by the town planner, indicating the proposed development controls, are included in **Annexure D.**

The proposed land use rights are summarised in **Table 4.2.1** below.

Table 4.2.1: Proposed land use rights

Erf nr	Proposed zoning	Size (ha)	Density	Coverage	FAR	Height (m)
Lanseria Extension 79	Industrial 3	3.879	N/A	60%	0.6	25

5 OBJECTIVES OF THE STORMWATER MANAGEMENT PLAN

The objectives of the stormwater management plan are as follows:

- To determine the stormwater runoff for the pre-development site conditions.
- To determine the stormwater runoff for the post-development conditions.
- To ensure that the stormwater runoff for a 100-year storm can discharge through a flood escape route to ensure that no flooding on site occurs.
- To ensure that the quantity and the rate of stormwater runoff from the site is controlled as per the requirements of the Johannesburg Roads Agency (JRA).
- Calculate and allow for external stormwater management as no external system is available in the facility of the proposed development.

6 PLANNING AND DESIGN CONSIDERATIONS

6.1 REQUIREMENTS OF THE JOHANNESBURG ROADS AGENCY (JRA)

The Stormwater Management Report and design considerations are based on the requirements of the following policies and design guidelines:

- The City of Johannesburg Metropolitan Municipality – *Stormwater Management By-Law*.
- Johannesburg Roads Agency SOC Limited (JRA) – *Roads & Stormwater Manual – Volume 1 Code of Procedure*.
- The South African National Roads Agency SOC Limited – *Drainage Manual*
- Stormwater design manual for the City of Johannesburg 2019.

7 CURRENT STORMWATER SYSTEM

The existing stormwater reticulation consists of the following:

- There are no existing stormwater infrastructure networks in the surrounding area of the application site.

The existing stormwater information was received from the Johannesburg Roads Agency and is included in **Annexure E**.

8 PROPOSED STORMWATER SYSTEM

The *Stormwater Management By-Laws* of the City of Johannesburg specifies that an on-site stormwater drainage facility must be provided on every development site and must have sufficient capacity to convey stormwater without flooding or damaging any existing or proposed structure.

Stormwater attenuation facilities are required to reduce the post-development runoff rates to be the same as the pre-development runoff rates. The stormwater would discharge through flow constricting outlet structures and will be discharged into a new stormwater system next to Preller Drive, which will discharge into the natural water course.

The site will be shaped to enable the stormwater runoff for the 100-year storm event to discharge via surface flow into the nearby stream on the eastern side of the application site.

The proposed positions of the stormwater attenuation facilities are included in **Annexure F**.

9 DESIGN CALCULATIONS

The area of the application site for the stormwater calculation is 3.879 ha.

9.1 ESTIMATED PRE-DEVELOPMENT STORMWATER RUNOFF

The simplified rational method was used to determine the estimated pre-development runoff for the application site. The design data for determining the stormwater runoff for the 2- to 50-year recurrence interval design storm events for the pre-development conditions are summarised in **Table 9.1.1**.

Table 9.1.1: Pre-development runoff data

		Portion 5 and 6 of the Farm Sunrella A/H	
Catchment Area (A)		38 790	m²
MAP		750	mm/year
Runoff Factor (C)		0.3	
Time of Concentration (Tc)		30	minutes
Rainfall Intensity (I)	1-2 year	50	mm/hr
	1-5 year	71	mm/hr
	1-10 year	86	mm/hr
	1-20 year	104	mm/hr
	1-25 year	108	mm/hr
	1-50 year	130	mm/hr

The following formula applies:

$$Q = CIA/3.6$$

Where,

Q = Peak flow (m³/s)
C = run-off coefficient
I = Average rainfall intensity over the catchment (mm/hr)
A = Catchment area (m²)

The estimated pre-development stormwater runoff for the 2- to 50-year recurrence interval design storm events is summarised in Table 9.1.2 below.

Table 9.1.2 Estimated pre-development stormwater runoff

		Portion 5 and 6 of the Farm Sunrella A/H	
Peak Flow (Q)	1-2 year	0.162	m³/s
	1-5 year	0.230	m³/s
	1-10 year	0.278	m³/s
	1-20 year	0.336	m³/s
	1-25 year	0.349	m³/s
	1-50 year	0.421	m³/s

The pre-development stormwater calculations are included in **Annexure G**.

9.2 ESTIMATED POST-DEVELOPMENT STORMWATER RUNOFF

The simplified rational method was used to determine the estimated post-development runoff for the application site. The design data for determining the stormwater runoff for the 2- to 50-year recurrence interval design storm events for the post-development conditions are summarised in **Table 9.2.1**.

Table 9.2.1: Post-development runoff data

		Erf 976 & 977 (Lanseria Extension 79)	
Catchment Area (A)		38 790	m²
MAP		750	mm/year
Runoff Factor (C)		0.9	
Time of Concentration (Tc)		15	minutes
Rainfall Intensity (I)	1-2 year	80	mm/hr
	1-5 year	107	mm/hr
	1-10 year	129	mm/hr
	1-20 year	152	mm/hr
	1-25 year	157	mm/hr
	1-50 year	183	mm/hr

The following formula applies:

$$Q = CIA/3.6$$

Where,

Q = Peak flow (m³/s)
C = run-off coefficient
I = Average rainfall intensity over the catchment (mm/hr)
A = Catchment area (m²)

The estimated post-development stormwater runoff for the 2- to 50-year recurrence interval design storm events are summarised in **Table 9.2.2**.

Table 9.2.2 Estimated post-development stormwater runoff

		Erf 976 & 977 (Lanseria Extension 79)	
Peak Flow (Q)	1-2 year	0.776	m³/s
	1-5 year	1.038	m³/s
	1-10 year	1.252	m³/s
	1-20 year	1.475	m³/s
	1-25 year	1.524	m³/s
	1-50 year	1.776	m³/s

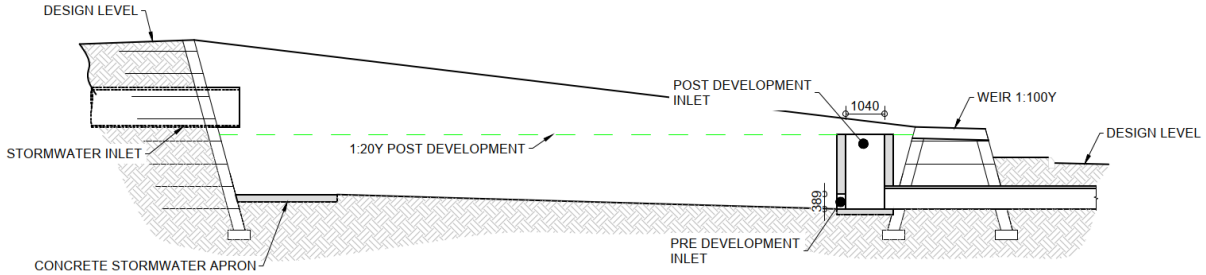
The post-development stormwater calculations are included in **Annexure G**.

9.3 ATTENUATION PONDS

From Tables 9.1.2 and 9.2.2 above, there would be an increase in the stormwater runoff for the pre-development conditions of the application site.

The runoff associated with the development is to be attenuated such that the pre-development flow for the 5- to 25-year storm events is not exceeded. The attenuation facility must also be capable of withstanding the 50-year storm event.

The proposed typical attenuation pond detail is shown below, the final drawings will be submitted with the Site Development application for approval to local authorities.



TYPICAL ATTENUATION POND SECTION
SCALE: 1:100

9.3.1 SIMPLIFIED HYDROGRAPH METHOD

The simplified hydrograph method, as stipulated in the *SANRAL Drainage Manual* was used to calculate the estimated required stormwater attenuation volume for the application site and is summarised in Tables 9.3.1

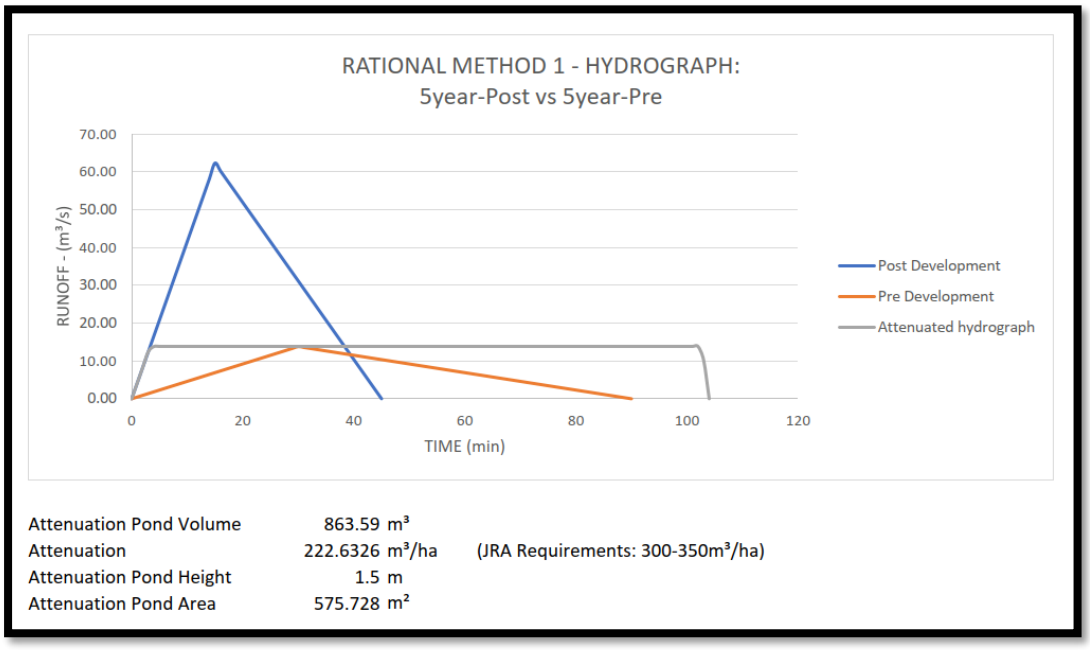


Figure 3: 5y-Pre vs 5y-Post Hydrograph

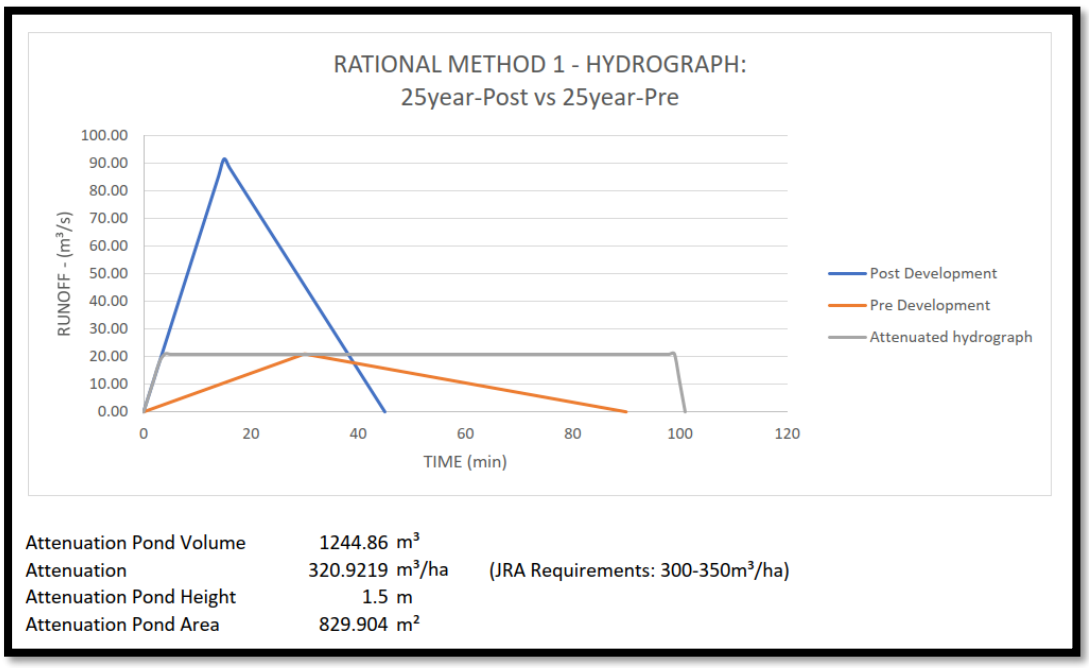


Figure 4: 25y-Pre vs 25y-Post Hydrograph

Table 9.3.1 Estimated stormwater attenuation volumes – Simplified Hydrograph

		Pre-development (m^3)	Post-development (m^3)	Attenuation Pond Volume (m^3)
Lanseria Extension 79	**1:5 year**	621	1401.3	863.6
	1:25 year	942.3	2057.4	1244.9

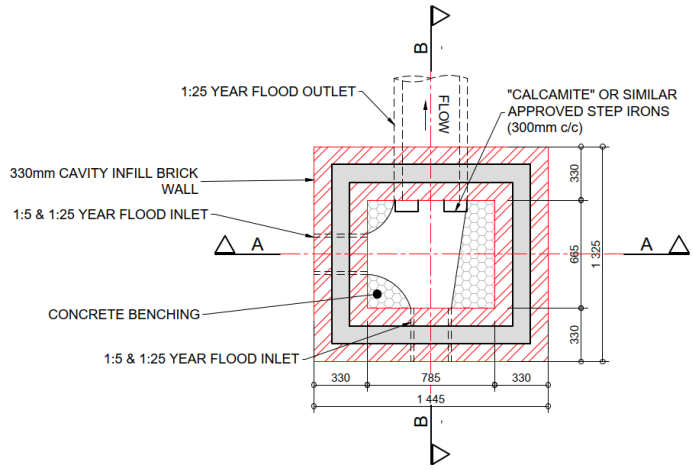
* Simplified Hydrograph – 3TC

The estimated design summary is included in **Annexure G.**

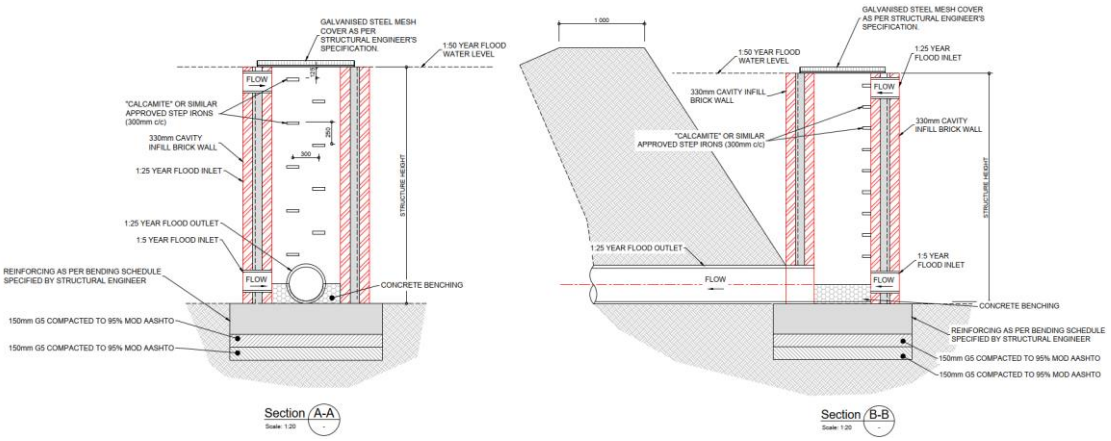
The designs of the attenuation facilities were done to size the pond for optimum storage volume. The proposed approximate positions of the attenuation facilities are located in the north-eastern corner of the application site and are indicated on the layout in **Annexure F**.

9.3.2 ATTENUATION POND OUTLET CONTROL STRUCTURE

The post-development stormwater will be managed and discharged in accordance with pre-development conditions through the attenuation pond outlet structure. This system will effectively control flood events with return periods of 1 in 5 years, and 1 in 25 years and a pond overflow weir structure will control the 1 in 100 years storm event.



PLAN VIEW OF INLET STRUCTURE
SCALE 1:20



9.3.3 STORMWATER OUTLET CONTROL STRUCTURE

The attenuation pond outlet will include an erosion and energy dissipation structure as approved by the JRA and designed in accordance with the NTC Road Drainage Manual. This will ensure that the concentrated flow at the road culvert will be dissipated and hence have no detrimental effect on the downstream watercourse. A typical example is shown below, the design and final drawings will be submitted for approval with the external road design to the local authorities.

9.4 UPSTREAM CATCHMENT AREA REQUIREMENTS

The estimated stormwater runoff from the upstream catchment area, originating from Lanseria, will be conveyed through an underground culvert system located on Erf 977.

The stormwater will then be discharged into the external stormwater system constructed as part of the Lanseria Extension 11 development external road upgrades. The culvert outlet will be equipped with an erosion and energy dissipation structure, which must be approved by the Johannesburg Roads Agency (JRA) and designed in accordance with the **NTC Road Drainage Manual** and the **NHI Hydraulic Design of Energy Dissipators for Culverts and Channels**. This structure will ensure that the concentrated flow at the culvert outlet is effectively dissipated, thereby preventing any adverse impact on the downstream watercourse.

Table 9.4.1: Upstream Catchment runoff data

Catchment Area (A)	644 330	m^2
MAP	750	mm/year
Runoff Factor (C)	0.4	
Time of Concentration (Tc)	94	minutes

Table 9.4.2: Estimated stormwater runoff for upstream flow

Method	**1:25 year peak flow (m^3/s)**	**1:50 year peak flow (m^3/s)**
Rational Method	2.23	3.15
Alternative Rational	3.66	4.51
Adopted	**3.66**	**4.51**

The culvert has been designed to accommodate the **1:50-year** pre-development conditions, which is considered sufficient, as all future upstream developments will be required to design attenuation ponds for the **1:5-year** pre-development runoff.

A **1,800mm x 1,500mm** box culvert will be constructed at the location indicated in **Annexure F**.

A representative example is provided below, while the final design and drawings will be submitted to the relevant local authorities for approval.

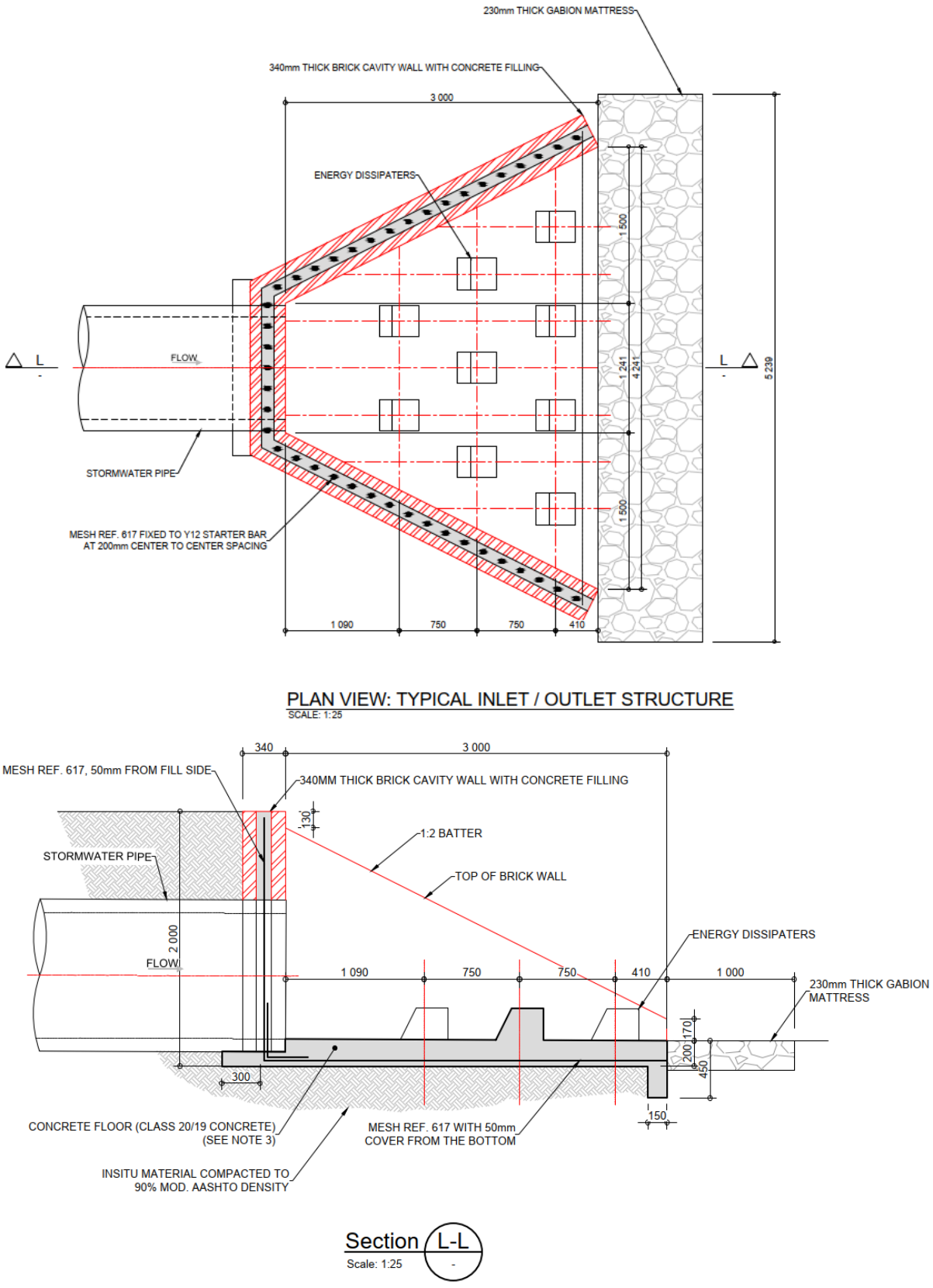


Figure 3: Typical outlet structure

9.5 EXTERNAL STORMWATER REQUIREMENTS

The road stormwater network will be installed next to Preller Road, as part of Extension 11 development.

The stormwater system will be designed to accommodate the 1:25 year storm event for the external road and surrounding areas flow, and including the flow discharged from the culvert system channelling the upstream catchment area.

The total estimated flow from the catchments is:

- 1:25-year Culvert Discharge Flow = 3.66 m^3/s
- 1:25-year Road Flow = C*I*A/3.6 = (0.9*157*0.003352) / 3.6 = 0.132 m^3/s
- 1:5-year Pre-development Lanseria X11 Discharge Flow = 0.250 m^3/s

Total accumulated flow is 4.042 m^3/s.

A 1500mmΦ conduit pipe network is required to be installed running parallel to Preller Road and discharging to the natural watercourse.

The stormwater calculations are included in **Annexure G**.

10 CONCLUSIONS

It can be concluded that:

- The stormwater runoff would increase due to the proposed development.
- The stormwater runoff for the 1:100 year storm event can be discharged from the site by means of surface flow into the natural watercourse on the north-eastern side to ensure no flooding occurs on site.
- The quantity and rate of stormwater runoff from the site will be buffered and controlled as per the requirements of the Johannesburg Roads Agency by means of attenuation facilities.
- The attenuation pond outlet will include an erosion and energy dissipation structure as approved by the JRA and designed in accordance with the NTC Road drainage Manual.
- Upstream catchment stormwater management will be channelled through culvert that has been designed to accommodate the **1:50-year** pre-development conditions, which is considered sufficient, as all future upstream developments will be required to design attenuation ponds for the **1:5-year** pre-development runoff.

11 RECOMMENDATION

It is recommended that the Stormwater Management Report for the township establishment of Erf 976 and Erf 977, Lanseria Extension 79 on Portion 5 and Portion 6 of the farm Sunrella Agricultural Holdings Township be supported by the Johannesburg Roads Agency (JRA) as the quantity and the rate of stormwater runoff from the site can be controlled as per the requirements of JRA.

F.H.B van Eyk Pr. Eng. (**20160826)**

Annexures:

- Annexure A: Site Location Map
- Annexure B: Proposed Township Layout
- Annexure C: Existing Zoning Certificate
- Annexure D: Conditions of Contract
- Annexure E: Existing Stormwater Information
- Annexure F: Stormwater Management Layout Drawing
- Annexure G: Stormwater Calculations
- Annexure H: Culvert Calculations

ANNEXURE A: SITE LOCATION MAP

GENERAL NOTES:

1. REFER TO ALL RELEVANT DRAWINGS & SPECIFICATIONS, DO NOT SCALE ANY DIMENSIONS.
2. WHERE DISCREPANCIES OCCUR BETWEEN THE PROJECT DRAWINGS OR SPECIFICATIONS, THESE SHOULD BE REPORTED IMMEDIATELY TO THE PRINCIPAL AGENT.
3. ALL DIMENSIONS AND LEVELS TO BE CHECKED ON SITE AND CORRELATED WITH THE ARCHITECTS DRAWING BEFORE CONSTRUCTION COMMENCES.
4. ALL WATERPROOFING AND EARTH POISONING DETAILS TO BE IN ACCORDANCE WITH THE ARCHITECT'S SPECIFICATION AND INSTRUCTIONS.

Rev. No:	Date:	Revision Details:	By:
A	26/11/'24	FOR INFORMATION	KB

Client:

Architect:

e•d•s

Structural, Civil and Transportation Engineers

Sussex Office Park
473 Lynnwood Road
Lynnwood
Pretoria

Tel: 012 991 1205
Fax: 012 991 1373
e-mail: info@edseng.co.za

Project:

LANSERIA PROJECT RUNWAY

Description:

LOCALITY PLAN (FIGURE 1)

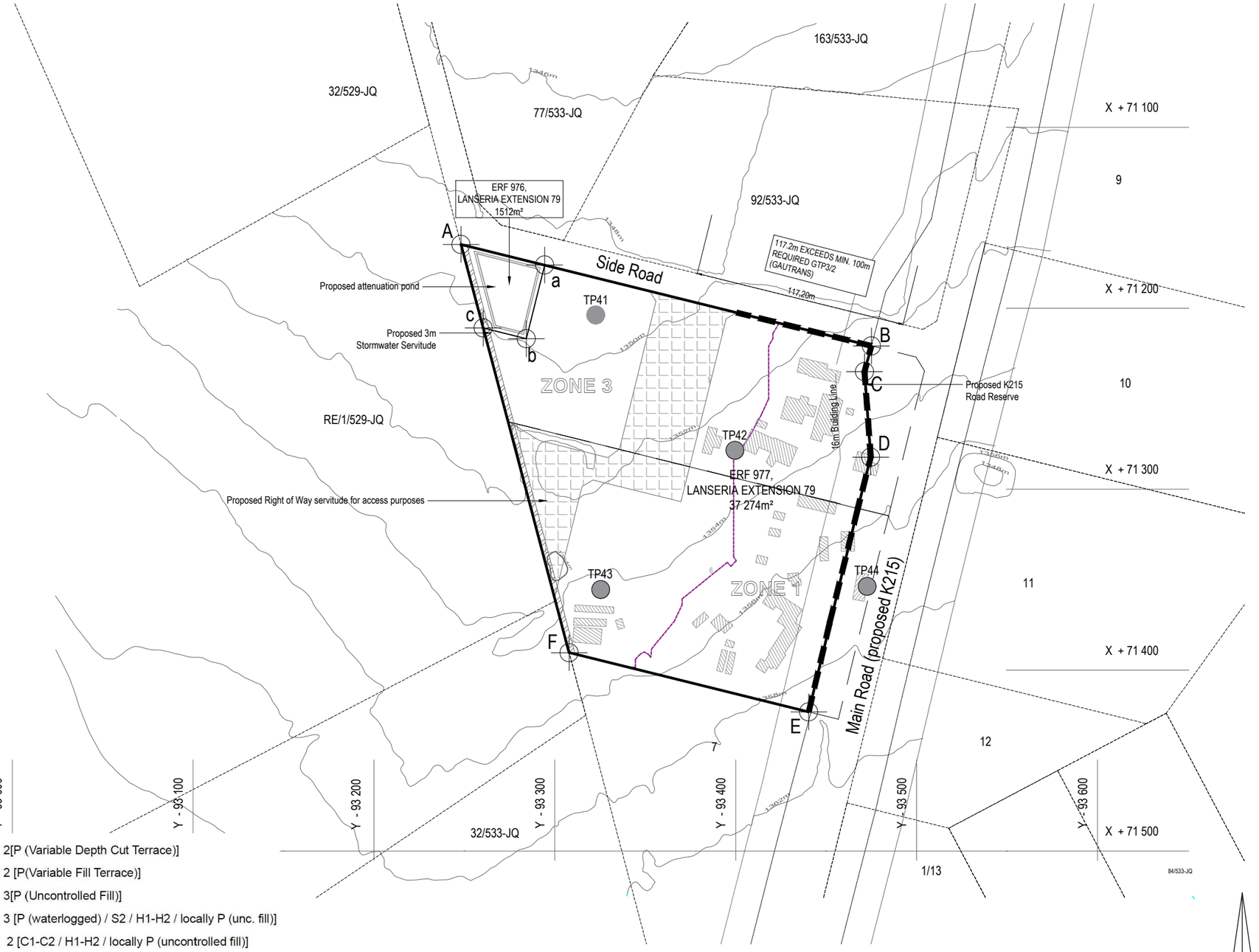
Paper size:	Drawn:	Checked:	Designed:
A3	KB	D vd M	D vd M

Scale:	Project Number:	Drawing Number:	Revision:
1:5000	2019-094	0050	A

ANNEXURE B: PROPOSED TOWNSHIP LAYOUT

NOTES continued:

6. Erven 976 and 977 are affected by a servitudes as indicated.
7. All existing buildings to be demolished.
8. Line of no access indicated by ■ ■ ■ ■



Zone 6: 2[P (Variable Depth Cut Terrace)]
Zone 5: 2 [P(Variable Fill Terrace)]
Zone 4: 3[P (Uncontrolled Fill)]
Zone 3: 3 [P (waterlogged) / S2 / H1-H2 / locally P (unc. fill)]
Zone 2: 2 [C1-C2 / H1-H2 / locally P (uncontrolled fill)]
Zone 1: 2 [C1-C2 / locally P (uncontrolled fill)]

IT IS HEREBY CERTIFIED THAT THE TOWNSHIP LAYOUT HAS BEEN COMPILED IN ACCORDANCE WITH THE FINDINGS LISTED IN THE GEOTECHNICAL INVESTIGATION REPORT NUMBER GGE/23031/2 DATED APRIL 2024

PR. SCI NAT. REG NO. _____ DATE _____

LOCALITY PLAN

SCALE 1 : 50 000

0m 250m 500m 1km 2km 3km

NOTES:

1. The township boundaries are indicated by points ABCDEFA.
2. Proposed K215 Provincial Road Alignment and line of no access indicated.
3. Erf 976 is indicated by points AabcA and measures 1 512m² in extent.
4. Erf 977 is indicated by points aBCDEFcba and measures 37 274m² in extent.
5. All areas and distances are estimated, subject to final survey for General Plan purposes.

PROPOSED TOWNSHIP: **LANSERIA EXTENSION 79**

SITUATED ON: **HOLDINGS 5 AND 6**

OF THE FARM: **SUNRELLA AGRICULTRUAL HOLDINGS**

LOCAL AUTHORITY: **CITY OF JOHANNESBURG METROPOLITAN MUNICIPALITY**

LAND USE TABLE

USE	AREA	OF TOWNSHIP	# OF ERVEN	ERF NUMBERS
"INDUSTRIAL 3"	38 786m²	100.00 %	2	976 - 977
"ROADS"	0 m²	0.00 %		
TOTAL	38 786m²	100 %	2	976 - 977

SIZE OF ERVEN

USE	MINIMUM	RULING

STREETS

MINIMUM GRADIENT: N / A
MAXIMUM GRADIENT: N / A
TOTAL LENGHT: N / A

SCALE: **1 : 2500 on A 3**

LA VEW: **CPD/LSA X79/1**

DATE	SUBMISSION / AMENDMENT
12.2024	1/SUBMISSION

CONTOUR INTERVAL:	2m
GEODETIC SYSTEM:	WGS 84
CONTOUR SURVEY:	City of Johannesburg GIS
DESIGNED BY:	B. Oosthuizen
APPLICANT:	B.E. Fletcher

tph THE TOWN PLANNING HUB cc *changing landscapes*

IT IS HEREBY CERTIFIED THAT THE PROPERTY SHOWN ON THIS DRAWING IS NOT AFFECTED BY FLOODWATER 1:50 AND 1:100 YEAR RECURRENCE INTERVAL EVENT DETERMINED IN ACCORDANCE WITH SECTION 144 OF THE NATIONAL WATER ACT (ACT 36 OF 1998).

INITIAL AND SURNAME _____ PR. ENG. REG NO. _____ DATE _____

ANNEXURE C: EXISTING ZONING CERTIFICATES

ZONING INFORMATION
CERTIFICATE PAD
FOR APPLICATION SUBMISSIONS

a world class African city

Date: 12/03/2024

Requested by:	Sandy Ngwenya
Town Planning Scheme:	City of Johannesburg Land Use Scheme 2018
Name of Applicant:	THE TOWN PLANNING HUB CC
Erf/Holding Name/Farm Portion:	Holdings 5 and 6
Township/Holding Name/Farm Name:	Sunrella A.H.
Street Name and No:	Main avenue
ZONING INFORMATION	
Use Zone:	Undetermined
Height Zone:	A (As per attached table 4)
Floor Area Ratio:	As per attached table 6
Coverage:	As per attached table 5
Density:	No Density
Building Line:	As per attached table 7
Parking:	As per scheme
AMENDMENT SCHEME APPLICABLE:	N/A
Served By:	Sandy Ngwenya

Terms and Conditions:
The Town Planning Scheme is open for inspection on the 8th Floor 158 Loveday Street Braamfontein between 8:00 and 15:30 weekdays. The applicant must verify the information contained herein by inspection of the scheme. Whilst the utmost is done to ensure accuracy the City of Johannesburg does not accept responsibility for any incorrect information given on this form. The applicant's attention is drawn to the general provisions of the Town Planning Scheme. It should be noted that the provisions of the Town Planning Scheme do not override any restrictive conditions that may be contained in the Title Deeds. PLEASE NOTE: No Information will be given telephonically due to the technical and interpretive complications.

ANNEXURE D: CONDITIONS OF ESTABLISHMENT

STATEMENT OF THE CONDITIONS UNDER WHICH THE APPLICATION MADE BY GROWTHPOINT PROPERTIES LIMITED (REGISTRATION NUMBER 1987/004988/06) (HEREINAFTER REFERRED TO AS THE TOWNSHIP OWNER) IN TERMS OF THE PROVISIONS OF PART 3 OF CHAPTER 5 OF THE CITY OF JOHANNESBURG MUNICIPAL PLANNING BY-LAW, 2016 (AS AMENDED 2023) (HEREINAFTER REFERRED TO AS THE BY-LAW), FOR PERMISSION TO ESTABLISH A TOWNSHIP ON HOLDINGS 5 AND 6, SUNRELLA AGRICULTURAL HOLDINGS, GAUTENG PROVINCE, HAS BEEN APPROVED.

1. CONDITIONS TO BE COMPLIED WITH PRIOR TO THE OPENING OF THE TOWNSHIP REGISTER AND THE DECLARATION OF THE TOWNSHIP AS AN APPROVED TOWNSHIP.

(1) CANCELLATION OF EXISTING CONDITIONS OF TITLE

The township owner shall at its own costs, cause the following restrictive conditions and/or servitudes to be cancelled or the township area to be freed there from:

T53698/2024 (Holding 5 Sunrella Agricultural Holdings)

A.(a); A.(b); A.(c); A.(c)(i); A.(c)(ii); A.(d); A.(d)(i); A.(d)(ii); A.(d)(iii); A.(d)(iv); A.(d)(v); A.(d)(vi); A.(e); A.(f); A.(g); A. (h); A.(i); A.(j); A.(j)(i); A.(j)(ii); A.(j)(iii); A.(j)(iv)

T27363/2024 (Holding 6, Sunrella Agricultural Holdings)

A.(a); A.(b); A.(c); A.(c)(i); A.(c)(ii); A.(d); A.(d)(i); A.(d)(ii); A.(d)(iii); A.(d)(iv); A.(d)(v); A.(d)(vi); A.(e); A.(f); A.(g); A.(h); A.(i); A.(j); A.(j(i); A.(j)(ii); A.(j)(iii); A.(j)(iv)

(2) GENERAL

(a) The township owner shall, prior to approval of the General Plan, make arrangements with Corporate Geo-Informatics (CGIS) for the allocation of a street name to the public road (or street names to the public roads) in the township (to be indicated on the layout plan so that it forms part of the General Plan).

(b) The local authority shall, after approval of the General Plan, make arrangements with Corporate Geo-Informatics (CGIS) for the allocation of street numbers to the newly created erven in the township.

(c) Excision in terms of section 69 of the By-law

The holding on which the township is being established has been excised and the description of the land has been submitted as being farmland.

(d) A satisfactory geo-technical report (in triplicate) shall be submitted to the local authority and the Amendment Scheme shall not be considered/approved by the local authority until such time as the comments on the said report, have been obtained and included in the mentioned Amendment Scheme.

(e) The township owner shall submit acceptable proof that all outline scheme reports have been submitted to the Municipal Entities (Johannesburg Water and Johannesburg Roads Agency).

(f) Authorisation/exemption to establish the township in terms of the National Environmental Management Act (No 107 of 1998) shall be obtained from the Department of Agriculture and Rural Development and shall be submitted to the local authority.

(g) The comments of the South African National Roads Agency Limited on the establishment of the township, shall be obtained and shall be submitted to the local authority.

(h) The comments of the Department: Mineral Resources on the establishment of the township, shall be obtained and shall be submitted to the local authority.

(i) The comments of the Department of Roads and Transport (Gauteng Provincial Government) on the establishment of the township, shall be obtained and shall be submitted to the local authority.

(j) The township owner shall obtain and submit a certificate from Eskom that electricity supply to the township, is available. Provided that if supply is not available and the township has been approved by the local authority 5 years or more than 5 years ago, a letter from Eskom shall be submitted confirming that supply is not available.

(k) The township owner shall, after approval of the General Plan of the township, submit the relevant Amendment Scheme to the local authority for approval, in order that it can be published simultaneously with the declaration of the township as an approved township.

(l) The township owner shall comply with the provisions of sections 28(5), (9), (10) and (11) of the By-Law.

2. CONDITIONS OF ESTABLISHMENT

(1) NAME

The name of the township is **Lanseria Extension 79**.

(2) DESIGN

The township consists of erven and roads as indicated on layout plan CPD/LSAX79/1.

(3) DESIGN AND PROVISION OF ENGINEERING SERVICES IN AND FOR THE TOWNSHIP

The township owner shall, to the satisfaction of the local authority, make the necessary arrangements for the design and provision of all engineering services of which the local authority is the supplier.

(4) ELECTRICITY

The local authority is not the bulk supplier of electricity to or in the township. The township owner shall in terms of Chapter 6 Part 1 of the By-law make the necessary arrangements with ESKOM, the licensed supplier of electricity for the provision of electricity.

(5) GAUTENG PROVINCIAL GOVERNMENT (DEPARTMENT OF AGRICULTURE AND RURAL DEVELOPMENT)

Should the development of the township not been commenced with before …… the application to establish the township, shall be resubmitted to the Department of Agriculture and Rural Development for exemption/authorisation in terms of the National Environmental Management Act, 1998 (Act 107 of 1998), as amended.

(6) GAUTENG PROVINCIAL GOVERNMENT (DEPARTMENT OF ROADS AND TRANSPORT)

(a) Should the development of the township not be completed before ….. the application to establish the township, shall be resubmitted to the Department of Roads and Transport for reconsideration.

(b) If however, before the expiry date mentioned in (a) above, circumstances change in such a manner that roads and/or PWV routes under the control of the said Department are affected by the proposed layout of the township, the township owner shall resubmit the application for

the purpose of fulfilment of the requirements of the controlling authority in terms of the provisions of Section 48 of the Gauteng Transport Infrastructure Act, 2001 (Act 8 of 2001).

(c) The township owner shall comply with the conditions of the Department as set out in the Department's letter dated ……...

(7) NATIONAL GOVERNMENT (DEPARTMENT: MINERAL RESOURCES)

Should the development of the township not been completed before …….. the application to establish the township, shall be resubmitted to the Department: Mineral Resources for reconsideration.

(8) ACCESS

Access to or egress from the township shall be provided to the satisfaction of the local authority and/or Johannesburg Roads Agency (Pty) Ltd and/or the Department of Roads and Transport.

(9) ACCEPTANCE AND DISPOSAL OF STORMWATER DRAINAGE

The township owner shall arrange for the stormwater drainage of the township to fit in with that of the adjacent road/roads and all stormwater running off or being diverted from the road/roads shall be received and disposed of.

(10) REFUSE REMOVAL

The township owner shall provide sufficient refuse collection points in the township and shall make arrangements to the satisfaction of the local authority for the removal of all refuse.

(11) REMOVAL OR REPLACEMENT OF EXISTING SERVICES

If, by reason of the establishment of the township, it should be necessary to remove or replace any existing municipal, TELKOM and/or ESKOM services, the cost of such removal or replacement shall be borne by the township owner.

(12) DEMOLITION OF BUILDINGS AND STRUCTURES

The township owner shall at its own costs cause all existing buildings and structures situated within the building line reserves, side spaces or over common boundaries to be demolished to the satisfaction of the local authority, when requested thereto by the local authority.

(13) OBLIGATIONS WITH REGARD TO THE CONSTRUCTION AND INSTALLATION OF ENGINEERING SERVICES AND RESTRICTIONS REGARDING THE TRANSFER OF ERVEN

(a) The township owner shall, after compliance with clause 2.(3) above, at its own costs and to the satisfaction of the local authority, construct and install all engineering services including the internal roads and the stormwater reticulation, within the boundaries of the township. Erven and/or units in the township may not be transferred into the name of a purchaser, prior to the local authority certifying to the Registrar of Deeds that these engineering services had been constructed and installed.

(b) The township owner shall fulfil its obligations in respect of the installation of electricity, water and sanitary services as well as the construction of roads and stormwater drainage and the installation of systems therefor, as agreed between the township owner and the local authority in terms of clause 2.(3) above. Erven and/or units in the township, may not be transferred into the name of a purchaser, prior to the local authority certifying to the Registrar of Deeds that sufficient guarantees/cash contributions in respect of the engineering services have been submitted or paid to the said local authority.

(14) OBLIGATIONS WITH REGARD TO THE PROTECTION OF ENGINEERING SERVICES

The township owner shall, at its costs and to the satisfaction of the local authority, survey and register all servitudes required to protect the constructed/installed services. Erven and/or units in the township may not be or transferred into the name of a purchaser, prior to the local authority certifying to the Registrar of Deeds that these engineering services had been or will be protected to the satisfaction of the local authority.

(15) CONSOLIDATION OF ERVEN

The township owner shall, at its own costs, after proclamation of the township, submit an application for consent to consolidate Erven 976 and 977, to the local authority for approval.

3. DISPOSAL OF EXISTING CONDITIONS OF TITLE.

All erven shall be made subject to existing conditions and servitudes, if any:-

4. CONDITIONS OF TITLE

(A) Conditions of Title imposed by the local authority in terms of the provisions of Chapter 5 Part 3 of the By-Law

(1) ALL ERVEN

(a) Each erf is subject to a servitude, 2m wide, in favour of the local authority, for sewerage and other municipal purposes, along any two boundaries other than a street boundary and in the case of a panhandle erf, an additional servitude for municipal purposes 2m wide across the access portion of the erf, if and when required by the local authority: Provided that the local authority may dispense with any such servitude.

(b) No building or other structure shall be erected within the aforesaid servitude area and no large rooted trees shall be planted within the area of such servitude or within 2m thereof.

(c) The local authority shall be entitled to deposit temporarily on the land adjoining the aforesaid servitude such material as may be excavated by it during the process of the construction, maintenance or removal of such sewerage mains and other works as it, in its discretion may deem necessary and shall further be entitled to reasonable access to the said land for the aforesaid purpose subject to any damage done during the process of the construction, maintenance or removal of such sewerage mains and other works being made good by the local authority.

(2) ERVEN 976 AND 977

The erven are subject to a 3m wide servitude for stormwater services in favour of the local authority, along the western boundary as indicated on layout plan CPD/LSA X79/1.

5. CONDITIONS TO BE INCORPORATED IN THE TOWN PLANNING SCHEME IN TERMS OF SECTION 54 OF THE BY-LAW, IN ADDITION TO THE PROVISIONS OF THE CITY OF JOHANNESBURG LAND USE SCHEME, 2018.

(1) ERVEN 976 AND 977

COLUMN 1: USE ZONE

"Industrial 3"

COLUMN 2:	DESCRIPTION OF PORTION OF LAND Erven 976 and 977, Lanseria Extension 79
COLUMN 3:	PRIMARY RIGHTS As per Scheme, Industrial purposes, commercial purposes, business purposes (excluding restaurants, motor showrooms, showrooms, medical consulting rooms, domestic service industries), builders yard, building material storage.
COLUMN 4:	USES WITH CONSENT (LAND USE TABLE 2) As per Scheme
COLUMN 5:	USES NOT PERMITTED (LAND USE TALBE 2) As per Scheme
COLUMN 6:	WIDTH OF SERVITUDE AREA 3m Stormwater Servitude along the western boundary
COLUMN 7:	STOREYS OR HEIGHT IN METERS 25m (3 storeys)
COLUMN 8:	COVERAGE As per Scheme, 60%
COLUMN 9:	F.A.R OR FLOOR AREA As per Scheme, 0.6 Offices restricted to 2500 m^2
COLUMN 10:	PARKING PROVISION As per Scheme, Adequate, paved parking spaces, together with the necessary manoeuvring area, shall be provided on the erf to the satisfaction of the Council, in the following ratios: Commercial: 0.3 bays per 100m^2 Offices: 2 bays per 100m
COLUMN 11:	DENSITY Not applicable
COLUMN 12:	BUILDING LINE PROVISION As per Scheme Street: 3m Main Road (K215): 16m (may be relaxed to 10m with approval)
COLUMN 13:	GENERAL PROVISIONS 1. A Site Development Plan to the satisfaction of the council, shall be submitted for evaluation and approval prior to the submission of building plans and/or the development of the erf.
COLUMN 14:	AMENDMENT SCHEME NUMBER

ANNEXURE E: EXISTING STORMWATER INFORMATION

JRA Stormwater Reticulation

LANSERIA AIRPORT EXT.1
LANSERIA EXT.48
SUNRELLA A.H.
Region A

PRELLER DRIVE
SIDE AVENUE
MAIN AVENUE
SKIMMER LANE
AMELIA LANE
CRANE LANE

RE/T0JQ0118001
RE/7/529-JQ
RE/8/529-JQ
RE/5/529-JQ
RE/1/529-JQ
RE/53/533-
RE/53/533-JQ
32/529-JQ
39/529-JQ
38/529-JQ
77/533-JQ
72/533-JQ
32/533-JQ
84/533-JQ

80/533-JQ
155/533-JQ
7/533-JQ
154/533-JQ
153/533-JQ
166/533-JQ
152/533-JQ
165/533-JQ
151/533-JQ
164/533-JQ
163/533-JQ
92/533-JQ

1 2 3 4 5 6 7 8 9 10 11 12 15
183 679 680 681 682 685 686 692 693 694 695 696 697 698 699 700 706 707 708 709 710 711 712 713 714

Legend

ROADS
NATIONAL
PROVINCIAL
MOTORWAY
MAJOR ROADS
INDUSTRIAL
LOCAL ROADS
GRAVEL
PRIVATE

Rea Vaya (BRT)
ROUTECODE
TRUNK ROUTE
COMPLIMENTARY
FEEDER ROUTE
Gauteng_Road_Reserve

S'water Inlets
ASSET
CATCH PIT
END CAP
INLET
GRID
HEADWALL

INLET MANHOLE
JUNCTION BOX
KERB OUTLET
MANHOLE
OUTLET MANHOLE
UNDEFINED

Stormwater_Assets
Category, SubCategory
Channels
Natural Channels
Conduit
Erosion Protection Structure
Inlets
Manholes

CULVERTS
CULVERT
LINED CHANNED
UNLINED CHANNEL
DRAIN
UNDEFINED

Hazards
HAZARD
High Hazard
Medium Hazard
Low Hazard
Floodline_100yr

Joburg
a world class African City
JRA

1:3,300

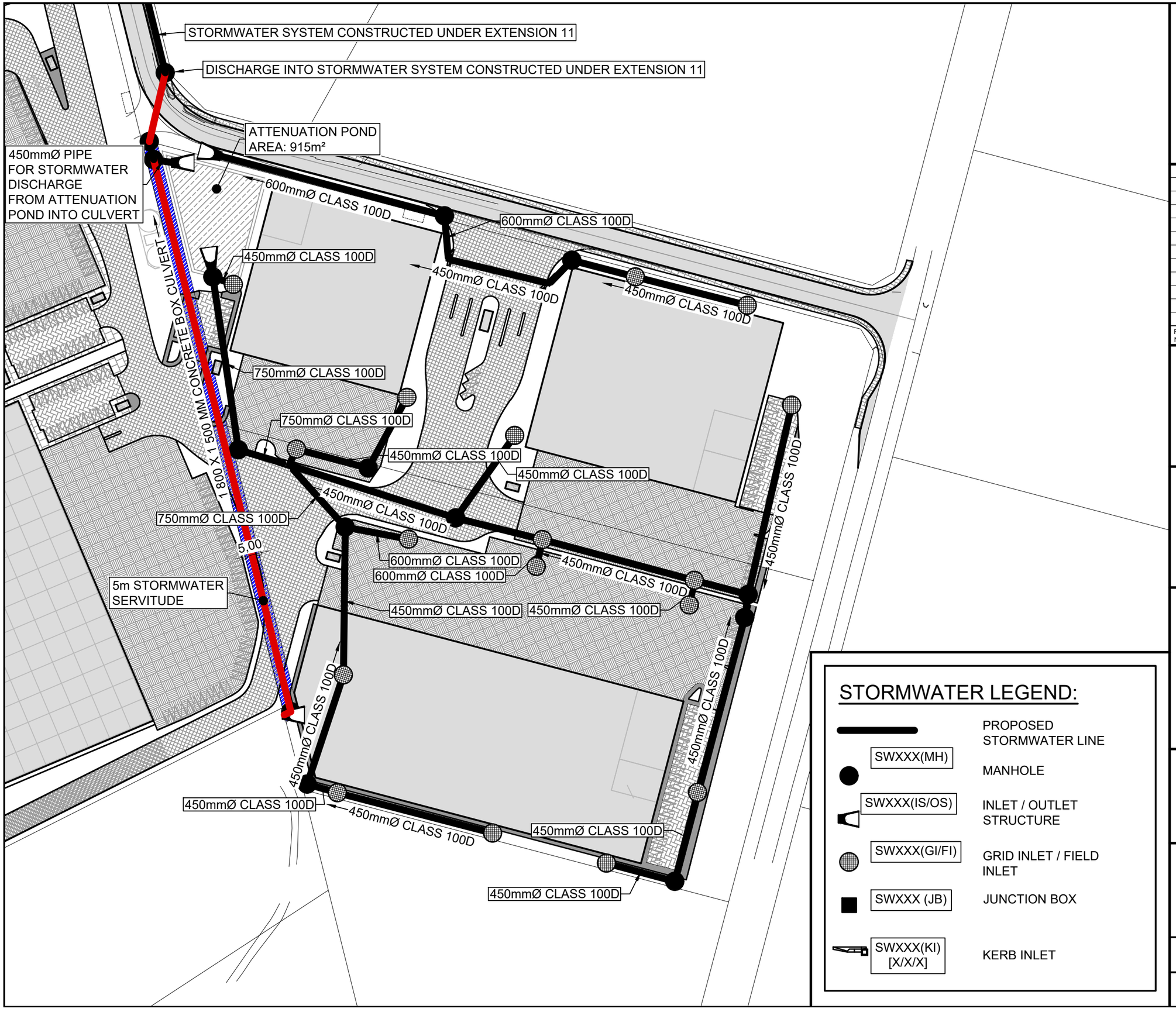
0.05 0.025 0 0.05 0.1 0.15 Kilometers

** PLEASE NOTE:
THIS IS NOT A WAY-LEAVE APPROVAL
INFORMATION SUPPLIED BY THIS OFFICE IS NOT GAURENTEED. ALL INFORMATION MUST BE CONFIRMED ON SITE BEFORE WORK COMMENCES.

City of Johannesburg
Johannesburg Roads Agency
Road Asset Management Systems:
Telephone : +2711 298 5019
e-mail : servicesinfo@jra.org.za
Compiler : Ron Segenhout

Projection: Transverse Mercator (Lo 29)
Datum: Hartebeeshoek 94 (WGS84 Ellipsoid)
Map Size: A3
Workspace : L:\GIS\0000 - ArcMap Templates\A3 (landscape) - Way-leaves.mxd
07/10/2022 09:43:15

ANNEXURE F: STORMWATER MANAGEMENT LAYOUT DRAWING



GENERAL NOTES:

1. REFER TO ALL RELEVANT DRAWINGS & SPECIFICATIONS, DO NOT SCALE ANY DIMENSIONS.
2. WHERE DISCREPANCIES OCCUR BETWEEN THE PROJECT DRAWINGS OR SPECIFICATIONS, THESE SHOULD BE REPORTED IMMEDIATELY TO THE PRINCIPAL AGENT.
3. ALL DIMENSIONS AND LEVELS TO BE CHECKED ON SITE AND CORRELATED WITH THE ARCHITECTS DRAWING BEFORE CONSTRUCTION COMMENCES.
4. ALL WATERPROOFING AND EARTH POISONING DETAILS TO BE IN ACCORDANCE WITH THE ARCHITECT'S SPECIFICATION AND INSTRUCTIONS.

Rev. No:	Date:	Revision Details:	By:
A	26/11/'24	FOR INFORMATION	KB

Client:

Architect:

STORMWATER LEGEND:

	PROPOSED STORMWATER LINE
SWXXX(MH)	MANHOLE
SWXXX(IS/OS)	INLET / OUTLET STRUCTURE
SWXXX(GI/FI)	GRID INLET / FIELD INLET
SWXXX (JB)	JUNCTION BOX
SWXXX(KI) [X/X/X]	KERB INLET

e•d•s
Structural, Civil and Transportation Engineers

Sussex Office Park
473 Lynnwood Road
Lynnwood
Pretoria

Tel: 012 991 1205
Fax: 012 991 1373
e-mail: info@edseng.co.za

Project:

LANSERIA
PROJECT RUNWAY

Description:

STORMWATER LAYOUT
(FIGURE 3)

Paper size:	Drawn:	Checked:	Designed:
A3	KB	DvdM	DvdM

Scale:	Project Number:	Drawing Number:	Revision:
1000	2019-094	0052	A

ANNEXURE G: STORMWATER CALCULATIONS

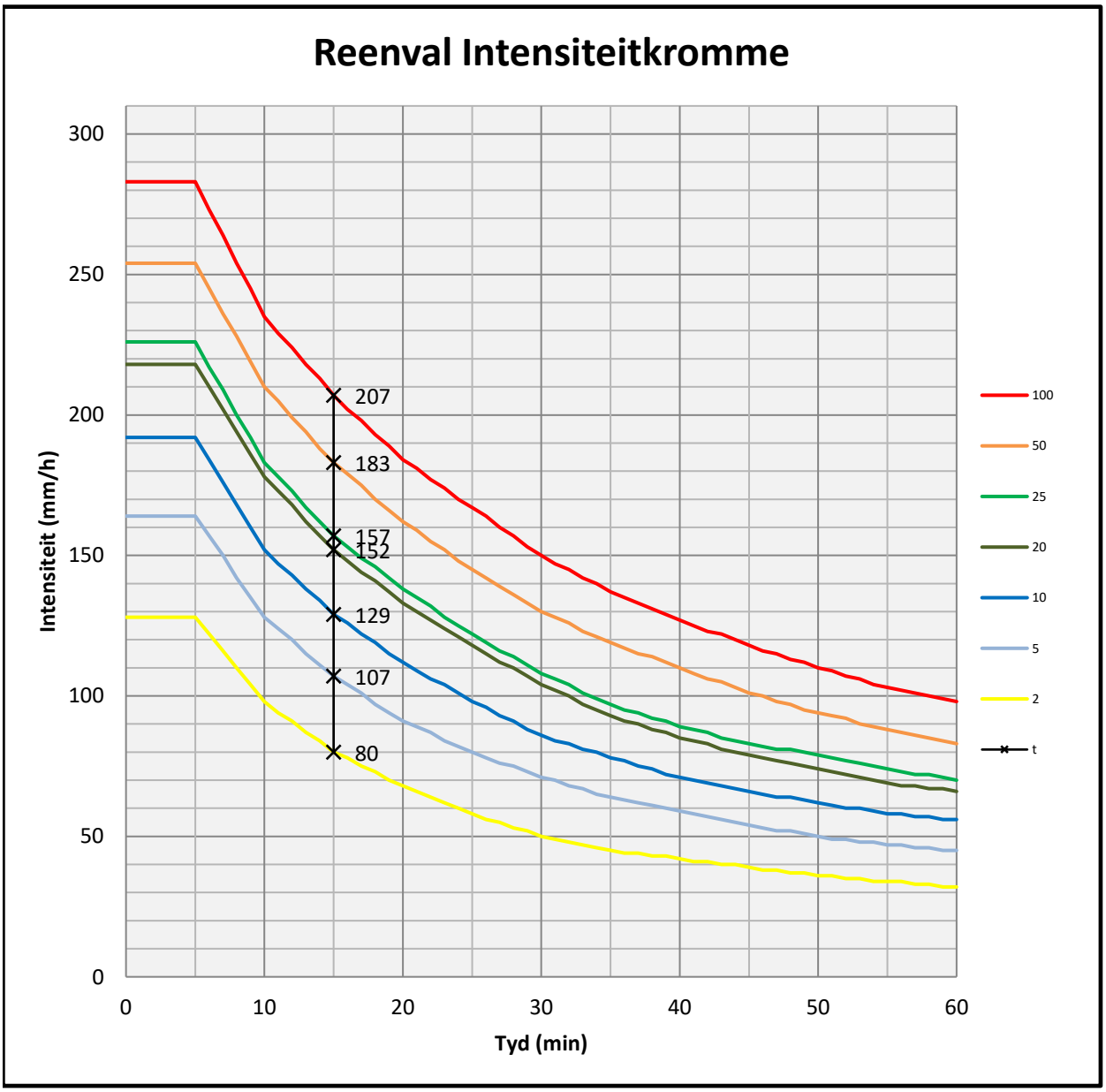
Stormwater - Standaard Intensiteitskrommes

Klas =	B
t =	15

Carolina, Cedara,Estcourt, Jan Smuts, Kokstad, Krugersdorp, Mafeking, Piet Retief, Potchefstroom, Pretoria, Roodeplaat, Rustenburg, Sheeprun, Towoomba

Tyd waarvoor die Intensiteit bepaal word (min)

Herhaalings Periode T	100	50	25	20	10	5	2
Tyd t (min)	15	15	15	15	15	15	15
Reenval Intensiteit I (mm/hr)	207	183	157	152	129	107	80



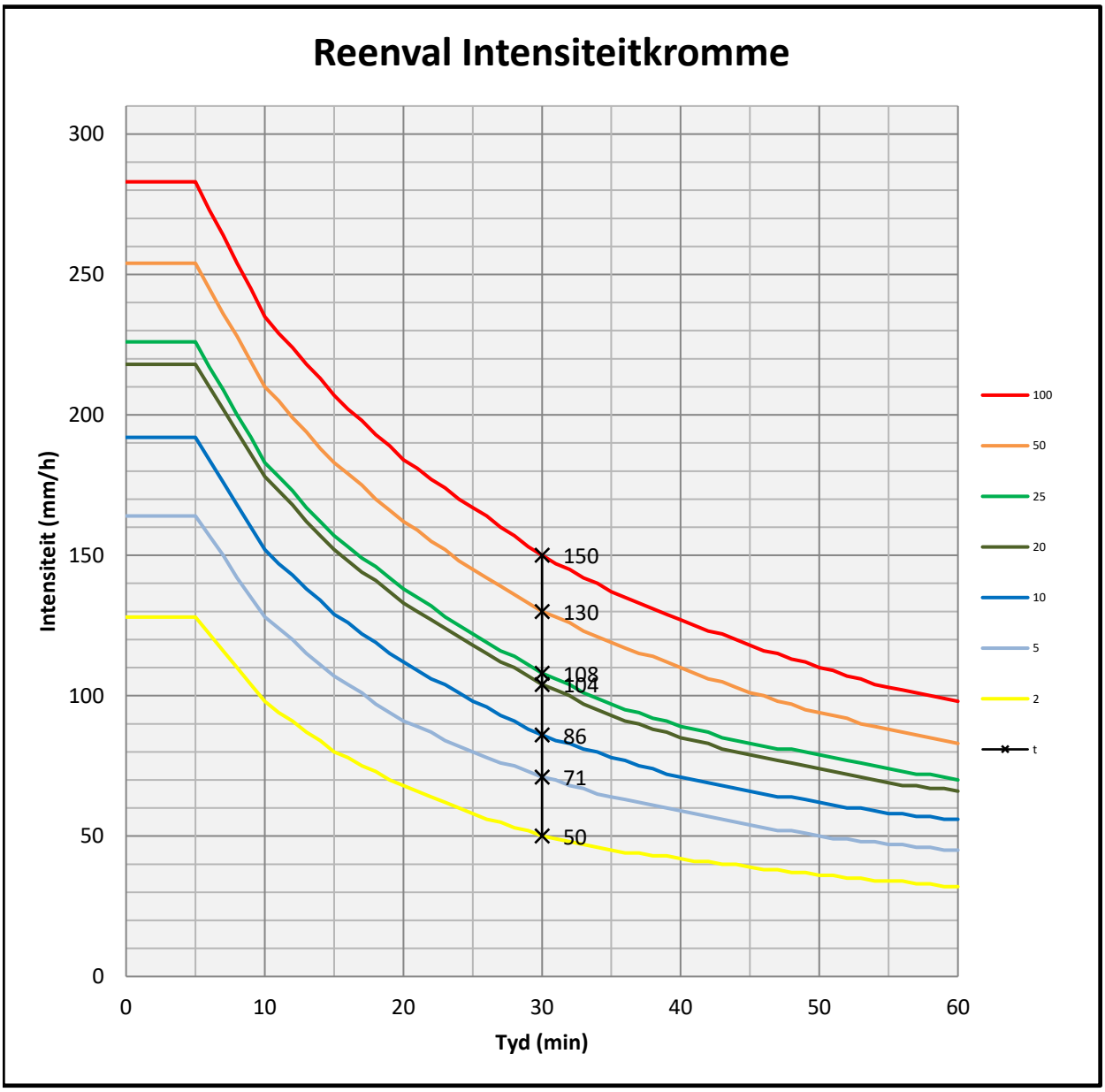
Stormwater - Standaard Intensiteitskrommes

Klas =	B
t =	30

Carolina, Cedara,Estcourt, Jan Smuts, Kokstad, Krugersdorp, Mafeking, Piet Retief, Potchefstroom, Pretoria, Roodeplaat, Rustenburg, Sheeprun, Towoomba

Tyd waarvoor die Intensiteit bepaal word (min)

Herhaalings Periode T	100	50	25	20	10	5	2
Tyd t (min)	30	30	30	30	30	30	30
Reenval Intensiteit I (mm/hr)	150	130	108	104	86	71	50



RATIONAL METHOD (ALTERNATIVE 1)

Description of Catchment	2021-094-23 Lanseria X5&6							
Calculated By	DvdM			**Date**	28/02/2025			
PHYSICAL CHARACTERISTICS								
Size of catchment (A)	0.03879	km^2		Choose type of flow	Overland flow			
Longest watercourse (L)	0.31	km		Rainfall region	Lanceria - Johannesburg			
Average slope (S_{av})	0.032258	m/m		**AREA DISTRIBUTION FACTORS**				
Dolomite area ($D_{\%}$)	0%			Rural (α)	Urban (β)			
Mean annual precipitation (MAP) ⑥#	705	mm		100%	0%			
RURAL ①				**URBAN ②**				
Surface Slope	**%**	**Factor**	**C_S**	**Description**	**%**	**Factor**	**C_2**	
Wetlands and pans	0%	0.03	0	**Lawns**				
Flat areas	100%	0.08	0.08	Sandy, flat (<2%)		0.1	0	
Hilly	0%	0.16	0	Sandy, steep (>7%)		0.2	0	
Steep areas	0%	0.26	0	Heavy soil, flat (<2%)		0.17	0	
Total	**100%**	-	**0.08**	Heavy soil, steep (>7%)		0.35	0	
Permeability	**%**	**Factor**	**C_P**	**Residential areas**				
Very permeable	50%	0.04	0.02	Houses		0.5	0	
Permeable	50%	0.08	0.04	Flats		0.7	0	
Semi-permeable	0%	0.16	0	**Industry**				
Impermeable	0%	0.26	0	Light Industrial		0.8	0	
Total	**100%**	-	**0.06**	Heavy Industrial		0.9	0	
Vegetation	**%**	**Factor**	**C_V**	**Business**				
Thick bush and plantation	0%	0.04	0	City centre		0.95	0	
Light bush and farm-lands	50%	0.11	0.055	Suburban		0.7	0	
Grasslands	50%	0.21	0.105	Streets		0.95	0	
No vegetation	0%	0.28	0	Maximum flood		1	0	
Total	**100%**	-	**0.16**	**Total (C_2)**	**0%**	-	**0**	

TIME OF CONCENTRATION (T_C)				**Notes:**
Overland flow ③		Defined watercourse		If T_C < 0.25 hours, use T_C = 0.25 hours.
r	0.4			
L	0.31	L	0.31	$T_C = 0{,}604\left(\frac{rL}{\sqrt{S_{av}}}\right)^{0{,}467}$ $\quad T_C = \left(\frac{0.87L^2}{1000S_{av}}\right)^{0{,}385}$
Sav	0.032258065	Sav	0.032258065	
Tc	30.48239 min	Tc	6.058832 min	
Tc	0.50804 hours	Tc	0.100981 hours	

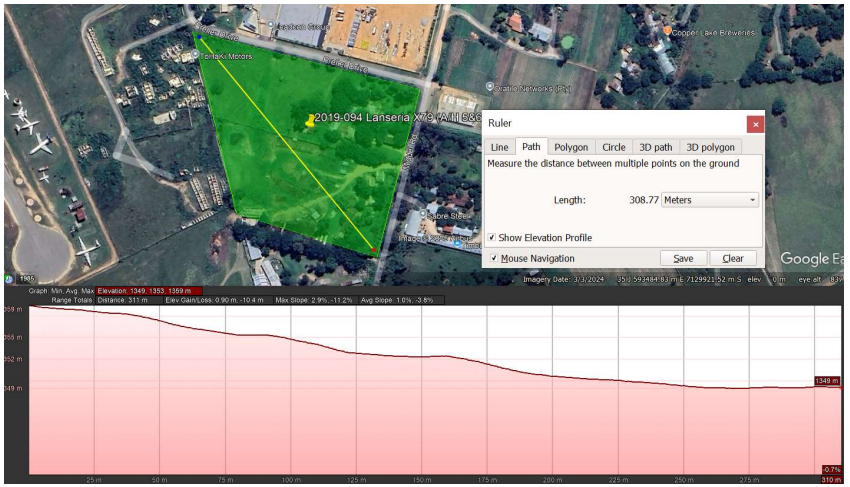
RUN-OFF COEFFICIENT								
Return period (years), T	**2**	**5**	**10**	**20**	**25**	**50**	**100**	
Run-off coefficient, C_1 ($C_1 = C_S + C_P + C_V$)	0.3	0.3	0.3	0.3	0.3	0.3	0.3	
Adjusted for dolomitic areas, C_{1D} ($= C_1(1 - D_{\%}) + C_1D_{\%}(\Sigma(D_{factor} \times C_{G\%}))$ ④	0.3	0.3	0.3	0.3	0.3	0.3	0.3	
Adjustment factor for initial saturation, F_1 ⑤	0.50	0.55	0.60	0.67	0.70	0.83	1.00	
Adjusted run-off coefficient, C_{1T} ($= C_{1D} \times F_1$)	0.15	0.165	0.18	0.201	0.209	0.249	0.3	
Coombined run-off coefficiret, C_T ($= \alpha C_{1T} + \beta C_2 + \gamma C_3$)	0.15	0.17	0.18	0.20	0.21	0.25	0.30	
RAINFALL								
Return period (years), T	**2**	**5**	**10**	**20**	**25**	**50**	**100**	
Point rainfall (mm), P_T ⑥								
Point intensity (mm/hour), P_{IT} ($= P_T/T_C$)	80	107	129	152	157	183	207	Intensity Curve
Area reduction factor (%), ARF_T ⑦	100%	100%	100%	100%	100%	100%	100%	
Average intensity (mm/hour), I_T ($= P_{IT} \times ARF_T$)	80	107	129	152	157	183	207	
Return period (years), T	**2**	**5**	**10**	**20**	**25**	**50**	**100**	
Peak flow (m^3/s), Q=CIA/3.6	0.13	0.19	0.25	0.33	0.35	0.49	0.67	

Types of flow:	
	Overland flow
	Defined watercourse

SLOPE CALCULATION	
Overland flow	
Hhigh (m)	1359
Hlow (m)	1349
H (m)	10
S (m/m)	0.032258065
Defined watercourse	
$H_{0.10L}$ (m)	
$H_{0.85L}$ (m)	
S (m/m)	0.00

C

Tc



RATIONAL METHOD (ALTERNATIVE 1)

Description of Catchment	**2021-094-23 Lanseria X5&6**		
Calculated By	**DvdM**	**Date**	28/02/2025

PHYSICAL CHARACTERISTICS

Size of catchment (A)	0.03879 km^2	Choose type of flow	Overland flow
Longest watercourse (L)	0.31 km	Rainfall region	Lanceria - Johannesburg
Average slope (S_{av})	0.032258 m/m	**AREA DISTRIBUTION FACTORS**	
Dolomite area ($D_{\%}$)	0%	Rural (α)	Urban (β)
Mean annual precipitation (MAP) ⑥#	705 mm	0%	100%

Types of flow:	
	Overland flow
	Defined watercourse

SLOPE CALCULATION	
Overland flow	
Hhigh (m)	1359
Hlow (m)	1349
H (m)	10
S (m/m)	0.032258065
Defined watercourse	
$H_{0.10L}$ (m)	
$H_{0.85L}$ (m)	
S (m/m)	0.00

RURAL①

Surface Slope	**%**	**Factor**	**C_S**
Wetlands and pans		0.03	0
Flat areas		0.08	0
Hilly		0.16	0
Steep areas		0.26	0
Total	**0%**	**-**	**0**
Permeability	**%**	**Factor**	**C_P**
Very permeable		0.04	0
Permeable		0.08	0
Semi-permeable		0.16	0
Impermeable		0.26	0
Total	**0%**	**-**	**0**
Vegetation	**%**	**Factor**	**C_V**
Thick bush and plantation		0.04	0
Light bush and farm-lands		0.11	0
Grasslands		0.21	0
No vegetation		0.28	0
Total	**0%**	**-**	**0**

URBAN②

Description	**%**	**Factor**	**C_2**
Lawns			
Sandy, flat (<2%)		0.1	0
Sandy, steep (>7%)		0.2	0
Heavy soil, flat (<2%)		0.17	0
Heavy soil, steep (>7%)		0.35	0
Residential areas			
Houses		0.5	0
Flats		0.7	0
Industry			
Light Industrial	0%	0.8	0
Heavy Industrial	100%	0.8	0.8
Business			
City centre		0.95	0
Suburban		0.7	0
Streets		0.95	0
Maximum flood		1	0
Total (C_2)	**100%**	**-**	**0.8**

TIME OF CONCENTRATION (T_C)

Overland flow③		Defined watercourse		
r	0.02			
L	0.31	L	0.31	
Sav	0.032258065	Sav	0.032258065	
Tc	7.524334 min	Tc	6.058832	min
Tc	0.125406 hours	Tc	0.100981	hours

Notes:

If T_C < 0.25 hours, use T_C = 0.25 hours.

$$T_C = 0{,}604\left(\frac{rL}{\sqrt{S_{av}}}\right)^{0{,}467} \qquad T_C = \left(\frac{0.87L^2}{1000S_{av}}\right)^{0{,}385}$$

RUN-OFF COEFFICIENT

Return period (years), T	**2**	**5**	**10**	**20**	**25**	**50**	**100**
Run-off coefficient, C_1 ($C_1 = C_S + C_P + C_V$)	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Adjusted for dolomitic areas, C_{1D} (= $C_1(1 - D_{\%}) + C_1D_{\%}(\Sigma(D_{factor} \times C_{S\%}))$④	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Adjustment factor for initial saturation, F_t⑤	0.75	0.80	0.85	0.90	0.91	0.95	1.00
Adjusted run-off coefficient, C_{1T} (= $C_{1D} \times F_t$)	0.6	0.64	0.68	0.72	0.7266667	0.76	0.8
Coombined run-off coefficiret, C_T (= $\alpha C_{1T} + \beta C_2 + \gamma C_3$)	0.80	0.80	0.80	0.80	0.80	0.80	0.80

RAINFALL

Return period (years), T	**2**	**5**	**10**	**20**	**25**	**50**	**100**	
Point rainfall (mm), P_T⑥								
Point intensity (mm/hour), P_{IT} (= P_T/T_C)	80	107	129	152	157	183	207	Intensity Curve
Area reduction factor (%), ARF_T⑦	100%	100%	100%	100%	100%	100%	100%	
Average intensity (mm/hour), I_T (= $P_{IT} \times ARF_T$)	80	107	129	152	157	183	207	
Return period (years), T	**2**	**5**	**10**	**20**	**25**	**50**	**100**	
Peak flow (m^3/s), Q=CIA/3.6	0.69	0.92	1.11	1.31	1.35	1.58	1.78	

STORMWATER RUN-OFF - Post Development

Project: Portion 5 and 6 of the Farm Sunrella A/H

Date: 2025/02/28

Tc (minutes) 15

Q = CIA/3.6

C	0.9
I (mm/hr)	Return Period
80	2
107	5
129	10
152	20
157	25
183	50
207	100
A (km²)	0.038790

Return Period (years)	**Q (m³/s)**
2	0.776
5	1.038
10	1.252
20	1.475
25	1.524
50	1.776
100	2.009

Determine Run-off Coefficient:

URBAN ②			
Description	**%**	**Factor**	**C_2**
Lawns			
Sandy, flat (<2%)	0%	0.1	0
Sandy, steep (>7%)	0%	0.2	0
Heavy soil, flat (<2%)	0%	0.17	0
Heavy soil, steep (>7%)	0%	0.35	0
Residential areas			
Houses	0%	0.5	0
Flats	0%	0.7	0
Industry			
Light Industrial	0%	0.8	0
Heavy Industrial	100%	0.9	0.9
Business			
City centre	0%	0.95	0
Suburban	0%	0.7	0
Streets	0%	0.95	0.000
Maximum flood	0%	1	0.000
Total (C_2)	**100%**		**0.90**

STORMWATER RUN-OFF - Pre Development

Project: Portion 5 and 6 of the Farm Sunrella A/H

Date: 2025/02/28

Tc (minutes) 30

Q = CIA/3.6

C	0.3
I (mm/hr)	Return Period
50	2
71	5
86	10
104	20
108	25
130	50
150	100
A (km²)	0.038790

Return Period (years)	**Q (m³/s)**
2	0.162
5	0.230
10	0.278
20	0.336
25	0.349
50	0.421
100	0.485

Determine Run-off Coefficient:

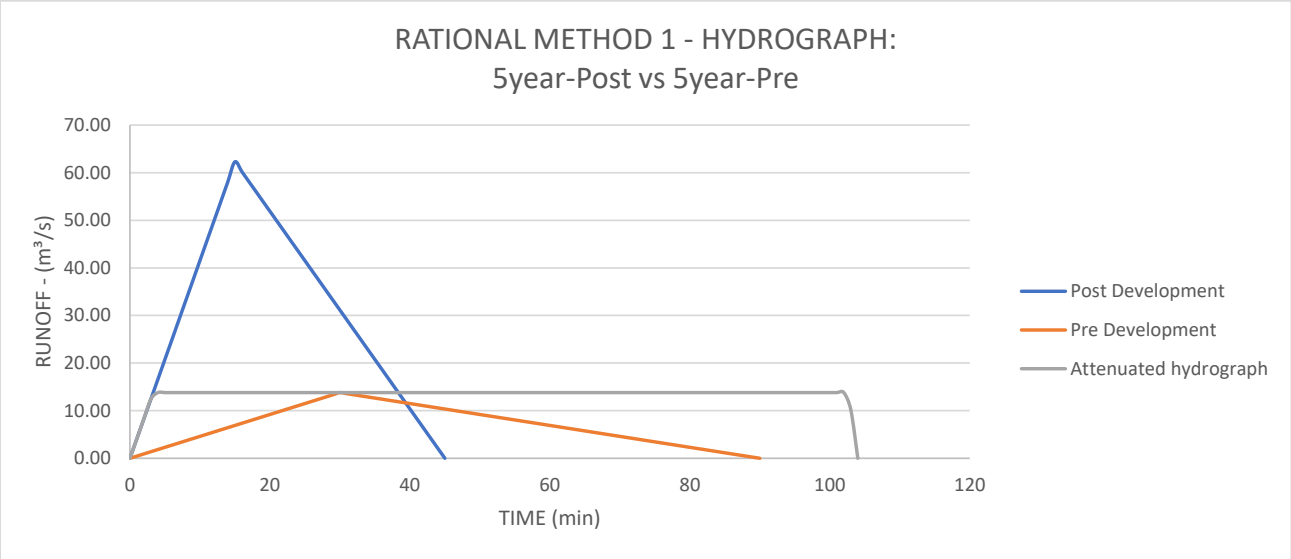
RURAL①			
Surface Slope	**%**	**Factor**	**C_S**
Wetlands and pans	0%	0.03	0
Flat areas	90%	0.08	0.072
Hilly	10%	0.16	0.016
Steep areas	0%	0.26	0
Total	**100%**	**-**	**0.1**
Permeability	**%**	**Factor**	**C_P**
Very permeable	0%	0.04	0
Permeable	70%	0.08	0.056
Semi-permeable	30%	0.16	0.048
Impermeable	0%	0.26	0
Total	**100%**	**-**	**0.1**
Vegetation	**%**	**Factor**	**C_V**
Thick bush and plantation	15%	0.04	0.006
Light bush and farm-lands	70%	0.11	0.077
Grasslands	15%	0.21	0.032
No vegetation	0%	0.28	0
Total	**100%**	**-**	**0.1**
Total			**0.3**

HYDROGRAPH - RATIONAL METHOD 1

Location: Portion 5 and 6 of the Farm Sunrella A/H

Date: 28/02/2025

Site	3.879	ha
Tc(Pre-development)	30	min
Tc(Post-development)	15	min
Tc Factor	3	

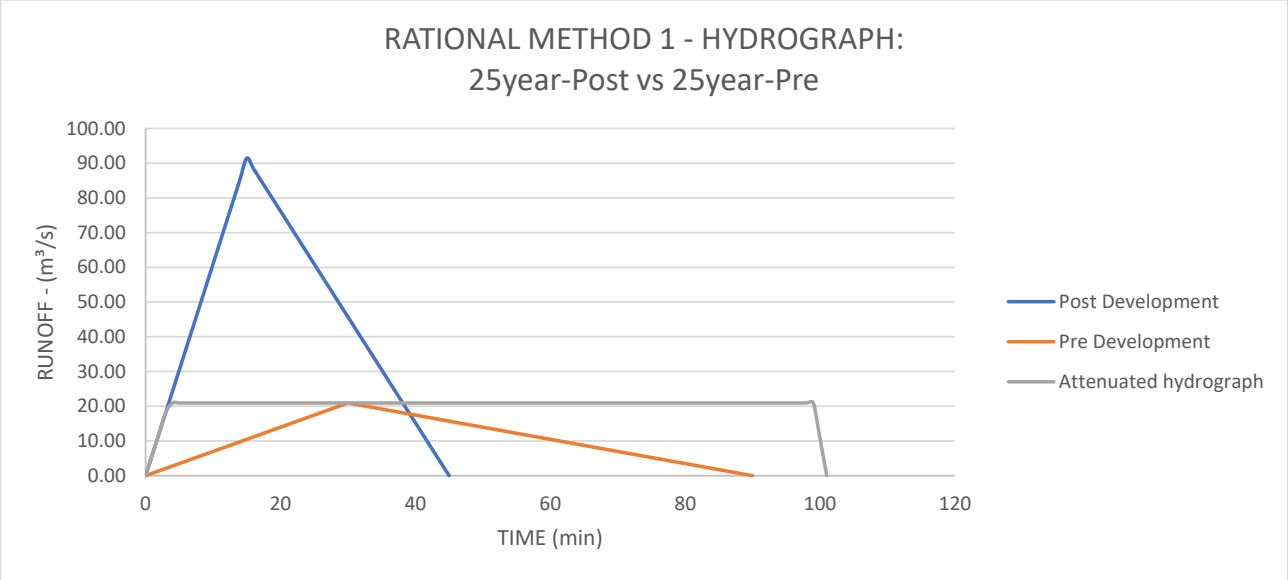


Attenuation Pond Volume	863.59	m³	
Attenuation	222.6326	m³/ha	(JRA Requirements: 300-350m³/ha)
Attenuation Pond Height	1.5	m	
Attenuation Pond Area	575.728	m²	

HYDROGRAPH - RATIONAL METHOD 1

Location: Portion 5 and 6 of the Farm Sunrella A/H
Date: 28/02/2025

Site	3.879	ha
Tc(Pre-development)	30	min
Tc(Post-development)	15	min
Tc Factor	3	

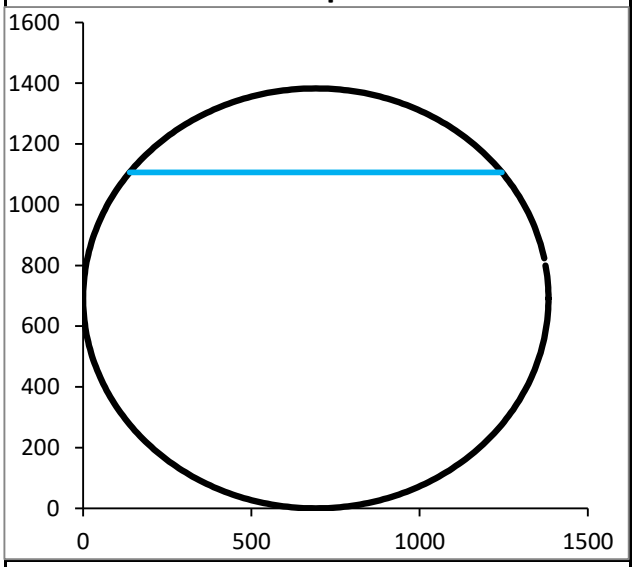


Attenuation Pond Volume	1244.86	m³	
Attenuation	320.9219	m³/ha	(JRA Requirements: 300-350m³/ha)
Attenuation Pond Height	1.5	m	
Attenuation Pond Area	829.904	m²	

EXTERNAL PRELLER ROAD STORMWATER PIPE

Pipe list	
100D Concrete (ND)	ID
150	153
225	229
300	292
375	369
450	445
525	514
600	585
675	647
750	718
825	788
900	853
1050	986
1200	1127
1350	1262
1500	1383
1650	1524
1800	1665
1950	1800

Graph



Calculation Input		
Pipe Size	1500	mm
Slope (1:x)	125	
Slope	0.008	m/m
Flow Depth	1106.4	mm
Diameter	1383	mm
Manning	0.012	

Calculation		
h	1.106	m
r	-0.4149	m
R	0.6915	m
s	3.062	m
a	1.106	m
Θ	253.74	deg

Results		
A	1.288338	m^2
V	4.18	m/s
$Q_{Calculated}$	5.391	m^3/s
$Q_{Calculated}$	5391	ℓ/s
% Full	80%	
$Q_{Required}$	2400	ℓ/s

ANNEXURE H: CULVERT CALCULATIONS

RATIONAL METHOD (ALTERNATIVE 1)

Description of Catchment	**2019-094-Lanseria X5&6 Culvert Catchment Area**		
Calculated By	**DvdM**	**Date**	05/03/2025

PHYSICAL CHARACTERISTICS

Size of catchment (A)	0.64433 km^2	Choose type of flow	Overland flow
Longest watercourse (L)	2.35 km	Rainfall region	
Average slope (S_{av})	0.014894 m/m	**AREA DISTRIBUTION FACTORS**	
Dolomite area ($D_{\%}$)	0%	Rural (α)	Urban (β)
Mean annual precipitation (MAP) ⑥#	675 mm	100%	0%

Types of flow:	
	Overland flow
	Defined watercourse

SLOPE CALCULATION	
Overland flow	
Hhigh (m)	1395
Hlow (m)	1360
H (m)	35
S (m/m)	0.014893617
Defined watercourse	
$H_{0.10L}$ (m)	235
$H_{0.85L}$ (m)	1997.5
S (m/m)	1.00

0.4

RURAL①				**URBAN②**			
Surface Slope	**%**	**Factor**	**C_S**	**Description**	**%**	**Factor**	**C_2**
Wetlands and pans	0%	0.03	0	**Lawns**			
Flat areas	50%	0.08	0.04	Sandy, flat (<2%)	12%	0.1	0.012
Hilly	50%	0.16	0.08	Sandy, steep (>7%)	0%	0.2	0
Steep areas	0%	0.26	0	Heavy soil, flat (<2%)	0%	0.17	0
Total	**100%**	**-**	**0.12**	Heavy soil, steep (>7%)	0%	0.35	0
Permeability	**%**	**Factor**	**C_P**	**Residential areas**			
Very permeable	0%	0.04	0	Houses	35%	0.5	0.175
Permeable	50%	0.08	0.04	Flats	0%	0.7	0
Semi-permeable	50%	0.16	0.08	**Industry**			
Impermeable	0%	0.26	0	Light Industrial	5%	0.8	0.04
Total	**100%**	**-**	**0.12**	Heavy Industrial	0%	0.9	0
Vegetation	**%**	**Factor**	**C_V**	**Business**			
Thick bush and plantation	0%	0.04	0	City centre	15%	0.95	0.1425
Light bush and farm-lands	50%	0.11	0.055	Suburban	0%	0.7	0
Grasslands	50%	0.21	0.105	Streets	33%	0.95	0.3135
No vegetation	0%	0.28	0	Maximum flood	0%	1	0
Total	**100%**	**-**	**0.16**	**Total (C_2)**	**100%**	**7.32**	**0.683**

TIME OF CONCENTRATION (T_C)

Overland flow③		Defined watercourse		**Notes:**
r	0.4			If T_C < 0.25 hours, use T_C = 0.25 hours.
L	2.35	L	2.35	
Sav	0.014893617	Sav	0.014893617	$T_C = 0{,}604(\frac{rL}{\sqrt{S_{av}}})^{0{,}467}$ $T_C = (\frac{0.87L^2}{1000S_{av}})^{0{,}385}$
Tc	1.567 hours	Tc	0.647 hours	
Tc	**94.025** min	Tc	38.814 min	

RUN-OFF COEFFICIENT

Return period (years), T	**2**	**5**	**10**	**20**	**25**	**50**	**100**
Run-off coefficient, C_1 ($C_1 = C_S + C_P + C_V$)	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Adjusted for dolomitic areas, C_{1D} (= $C_1(1 - D_{\%}) + C_1D_{\%}(\Sigma(D_{factor} \times C_{S\%}))$ ④	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Adjustment factor for initial saturation, F_t ⑤	0.50	0.55	0.60	0.67	0.70	0.83	1.00
Adjusted run-off coefficient, C_{1T} (= $C_{1D} \times F_t$)	0.2	0.22	0.24	0.268	0.278667	0.332	0.4
Coombined run-off coefficiret, C_T (= $\alpha C_{1T} + \beta C_2 + \gamma C_3$)	0.20	0.22	0.24	0.27	0.28	0.33	0.40

RAINFALL

Return period (years), T	**2**	**5**	**10**	**20**	**25**	**50**	**100**
Point rainfall (mm), P_T ⑥	32	45	56	66	70	83	98
Point intensity (mm/hour), P_{iT} (= P_T/T_C)	20.4201	28.71577	35.73518	42.11646	44.66897	52.96464	62.53656
Area reduction factor (%), ARF_T ⑦	100%	100%	100%	100%	100%	100%	100%
Average intensity (mm/hour), I_T (= $P_{iT} \times ARF_T$)	20.4201	28.71577	35.73518	42.11646	44.66897	52.96464	62.53656
Return period (years), T	**2**	**5**	**10**	**20**	**25**	**50**	**100**
Peak flow (m^3/s), Q=CIA/3.6	0.73	1.13	1.54	2.02	2.23	3.15	4.48
Peak flow (l/s), Q=CIA/3.7	731.0	1130.7	1535.0	2020.2	2227.9	3147.2	4477.1

Stormwater - Standaard Intensiteitskrommes

Klas =	B	Carolina, Cedara,Estcourt, Jan Smuts, Kolkstad, Krugersdorp, Mafeking, Piet Retief, Potchefstroom, Pretoria, Roodeplaat, Rustenburg, Sheeprun, Towoomba
t =	94	Tyd waarvoor die Intensiteit bepaal word (min)

Herhaalings Periode T	100	50	25	20	10	5	2
Tyd t (min)	94	94	94	94	94	94	94
Reenval Intensiteit I (mm/hr)	98	83	70	66	56	45	32

CULVERT DESIGN CHECK

MAP	750	mm	A	0.64433	km2
I20	125	mm/hr	C	0.4	
I50	165	mm/hr	Q5	2.30	m3/s
			Q25	3.70	m3/s
			Q50	4.50	m3/s
Freeboard above culvert	0.6	m			
B - Width (m)	1.8	m			
D - Height (m)	1.5	m			

Inlet Control					
Q25	3.70		Q50	4.50	
Cb	0.9		Cb	0.9	
B	1.8		B	1.8	
D	1.5		D	1.5	
g	9.81		g	9.81	
H1	1.8	m	H1	1.8	m
H1/D	1.2	<1.2	H1/D	1.2	<1.2
Q(check)	6.669932		Q(check)	6.669932	

Outlet Control					
Q25	3.70		Q50	4.50	
Ch	0.8		Ch	0.8	
B	1.8		B	1.8	
D	1.5		D	1.5	
g	9.81		g	9.81	
H1	2.1	m	H1	2.1	m
H1/D	1.4	>1.2	H1/D	1.4	>1.2
Q(check)	9.076627		Q(check)	9.076627	

Rational Method used for pipe sizing

R= Returning period	R=	50 years
A= Area	A=	644330 m²
C=Run-off. Coeficient	C=	0.4
Map=Mean Annual Presipitation	Map=	750 mm
tc= Time Of Concentration	tc=	1.570 h
I= Intensity To Be Calculated	I=	63 mm/h
	Q=	4.505 m³/s
	l/S=	4505.436 L/s

Rational Method used for pipe sizing

R= Returning period	R=	25 years
A= Area	A=	644330 m²
C=Run-off. Coeficient	C=	0.4
Map=Mean Annual Presipitation	Map=	750 mm
tc= Time Of Concentration	tc=	1.570 h
I= Intensity To Be Calculated	I=	51 mm/h
	Q=	3.660 m³/s
	l/S=	3659.551 L/s

Rational Method used for pipe sizing

R= Returning period	R=	5 years
A= Area	A=	644330 m²
C=Run-off. Coeficient	C=	0.4
Map=Mean Annual Presipitation	Map=	750 mm
tc= Time Of Concentration	tc=	1.570 h
I= Intensity To Be Calculated	I=	32 mm/h
	Q=	2.258 m³/s
	l/S=	2258.067 L/s

RATIONAL METHOD (ALTERNATIVE 1)

Description of Catchment	2019-094-Lanseria				
Calculated By	DvdM		Date	05/03/2025	
PHYSICAL CHARACTERISTICS					
Size of catchment (A)	0.64433	km²	Choose type of flow	Overland flow	
Longest watercourse (L)	2.35	km	Rainfall region		
Average slope (S_{av})	0.014894	m/m	AREA DISTRIBUTION FACTORS		
Dolomite area ($D_%$)	0%		Rural (α)	Urban (β)	
Mean annual precipitation (MAP) ③#	675	mm	100%	0%	

RURAL ①				URBAN ②			
Surface Slope	**%**	**Factor**	**C_S**	**Description**	**%**	**Factor**	**C_2**
Wetlands and pans	0%	0.03	0	**Lawns**			
Flat areas	50%	0.08	0.04	Sandy, flat (<2%)	12%	0.1	0.012
Hilly	50%	0.16	0.08	Sandy, steep (>7%)	0%	0.2	0
Steep areas	0%	0.26	0	Heavy soil, flat (<2%)	0%	0.17	0
Total	**100%**	-	**0.12**	Heavy soil, steep (>7%)	0%	0.35	0
Permeability	**%**	**Factor**	**C_P**	**Residential areas**			
Very permeable	0%	0.04	0	Houses	35%	0.5	0.175
Permeable	50%	0.08	0.04	Flats	0%	0.7	0
Semi-permeable	50%	0.16	0.08	**Industry**			
Impermeable	0%	0.26	0	Light Industrial	5%	0.8	0.04
Total	**100%**	-	**0.12**	Heavy Industrial	0%	0.9	0
Vegetation	**%**	**Factor**	**C_V**	**Business**			
Thick bush and plantation	0%	0.04	0	City centre	15%	0.95	0.1425
Light bush and farm-lands	50%	0.11	0.055	Suburban	0%	0.7	0
Grasslands	50%	0.21	0.105	Streets	33%	0.95	0.3135
No vegetation	0%	0.28	0	Maximum flood	0%	1	0
Total	**100%**	-	**0.16**	**Total (C_2)**	**100%**	**7.32**	**0.683**

TIME OF CONCENTRATION (T_C)			
Overland flow ③		Defined watercourse	
r	0.4		
L	2.35	L	2.35
Sav	0.014893617	Sav	0.014893617
Tc	1.567 hours	Tc	0.647 hours
Tc	94.025 min	Tc	38.814 min

Notes:

If T_C < 0.25 hours, use T_C = 0.25 hours.

$$T_C = 0{,}604\left(\frac{rL}{\sqrt{S_{av}}}\right)^{0.467} \qquad T_C = \left(\frac{0.87L^2}{1000S_{av}}\right)^{0.385}$$

Types of flow:	Overland flow
	Defined watercourse

SLOPE CALCULATION	
Overland flow	
Hhigh (m)	1395
Hlow (m)	1360
H (m)	35
S (m/m)	0.014893617
Defined watercourse	
$H_{0.10L}$ (m)	235
$H_{0.85L}$ (m)	1997.5
S (m/m)	1.00

0.4

Rational Method used for pipe sizing

R= Returning period	R=	50 years
A= Area	A=	644330 m²
C=Run-off. Coeficient	C=	0.4
Map=Mean Annual Presipitation	Map=	646 mm
tc= Time Of Concentration	tc=	0.250 h
I= Intensity To Be Calculated	I=	180 mm/h
	Q=	12.870 m³/s
	l/S=	12869.866 L/s

Rational Method used for pipe sizing

R= Returning period	R=	25 years
A= Area	A=	644330 m²
C=Run-off. Coeficient	C=	0.4
Map=Mean Annual Presipitation	Map=	646 mm
tc= Time Of Concentration	tc=	0.250 h
I= Intensity To Be Calculated	I=	146 mm/h
	Q=	10.454 m³/s
	l/S=	10453.580 L/s

Rational Method used for pipe sizing

R= Returning period	R=	5 years
A= Area	A=	644330 m²
C=Run-off. Coeficient	C=	0.4
Map=Mean Annual Presipitation	Map=	646 mm
tc= Time Of Concentration	tc=	0.250 h
I= Intensity To Be Calculated	I=	90 mm/h
	Q=	6.450 m³/s
	l/S=	6450.213 L/s