Structural, Civil and Transportation Engineers

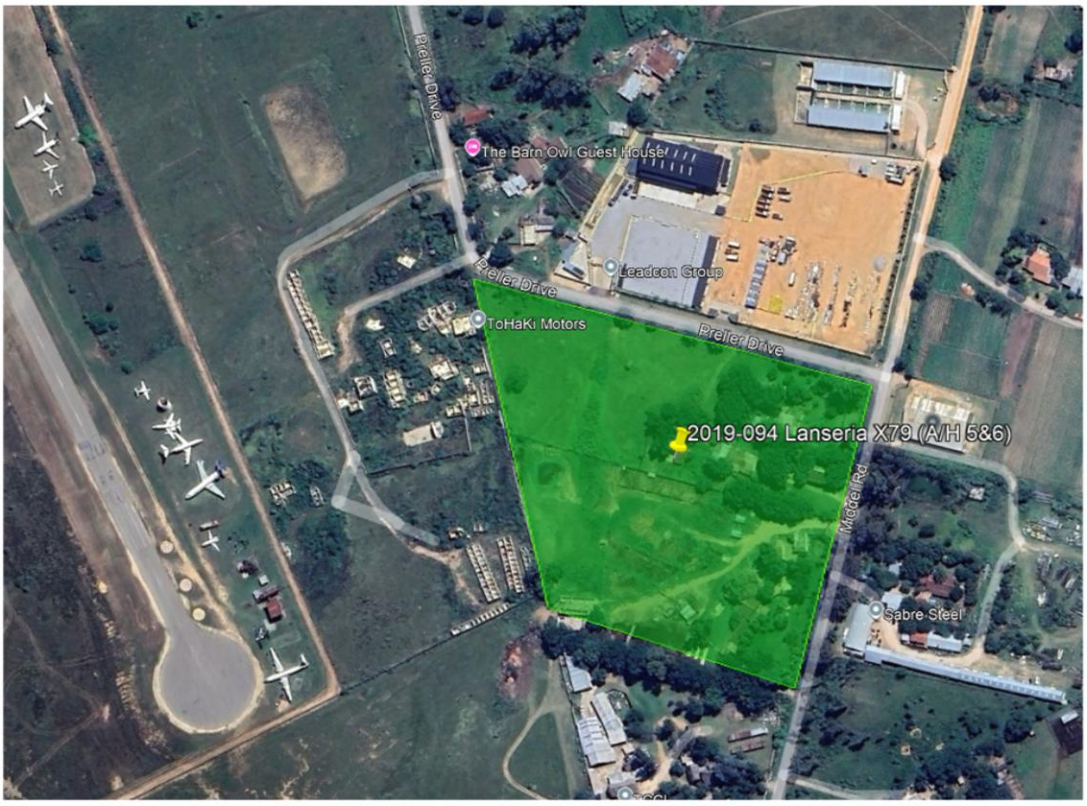
TOWNSHIP ESTABLISHMENT APPLICATION OF PORTION 5 & 6 OF THE FARM SUNRELLA AGRICULTURAL HOLDINGS

OUTLINE SCHEME REPORT
ROADS AND STORMWATER

REPORT 2019-094-22 Rev-1

JUNE 2025

CLIENT: GROWTHPOINT & APETURE PROPERTIES



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Outline Scheme Report Information Sheet

Report number	:	2019-094-22-Rev-1
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
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PORTION 5 AND 6 OF THE FARM SUNRELLA AGRICULTURAL HOLDING OUTLINE SCHEME REPORT ROADS AND STORMWATER

CONTENTS

1 INTRODUCTION

EDS Engineering Design Services (Pty) Ltd (EDS Engineers) was appointed to compile an Outline Scheme 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. For the purposes of this report, the site will hereafter be referred to as Lanseria Extension 79.

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 services in proximity to the application site, and 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)

The location of the proposed township is shown in **Annexure A, Figure 1**.

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. 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 ROADS

5.1 EXISTING ROAD NETWORK AND PROPOSED SITE ACCESS

The existing road network in the precinct to the application site consists of the following:

- R552 to the south of the application site.
- Middle Road to the east of the application site.
- Preller Drive to the north of the application site.

Access to the site will be provided from the following access points:

- A new access on Preller Drive will provide access to the application site.

The existing and the new proposed access points to the application site are shown in **Annexure E**.

5.2 PROPOSED ROAD IMPROVEMENTS

The new proposed site access must be designed and constructed according to the standards and specifications of the Johannesburg Roads Agency.

Lanseria X79 will obtain access from Preller Drive. The access will operate as a side-road stop controlled intersection.

EDS Engineering and Design Services conducted a traffic impact assessment (TIA) on the external roads, the report is provided in **Annexure F**. From the TIA report, the following improvements will be required:

- The applicants must provide lay-bys (drop-off facilities) along 6th Road (R552) where required.
- The applicants must provide walkways along the boundary of the proposed development on Preller Drive (up to the development access).

5.3 BOUNDARY ROAD CONTRIBUTIONS

The applicant will be required to pay boundary road contributions towards Lanseria X11 development. Lanseria X11 will construct the class 5 road for a section of Preller Drive bordering the property.

The estimated boundary road contribution is calculated based on the contribution rate of R 1 650/m² and can be summarised as follows:

- Preller Drive: 270m x 7.4m x R 1 650.00 x 50% = R 1 248 750.00

The boundary road contribution payable with respect to the township is estimated to be R 1 248 750.00.

The Johannesburg Road Agency should calculate the boundary contributions for roads.

5.4 ESTIMATED DEVELOPMENT CONTRIBUTIONS FOR ROADS

The applicant will be required to pay external road development contributions towards the development of Lanseria Extension 11. Lanseria Extension 11 will reconstruct the class 5 road for a section of Preller Drive bordering the property of Extension 11 and Extension 79, ensuring the pavement design is adequate to accommodate vehicle movement and correct realignment of the roadway.

The estimated road and stormwater development contribution is calculated based on **City of Johannesburg Development Contributions Calculator Version 1.8 – July 2021**. The development contribution is summarised as follows:

- Roads: 109 Equivalent trips / peak hour x R 22 150.17 = R2 424 144.39 (Incl. VAT)

- Transport: 189 Passenger trips / peak hour x R 2 310.85 = R437 796.16 (Incl. VAT)

The total development contributions payable with respect to the township is estimated to be R 2 861 940.55 (Including VAT).

Refer to **Annexure J** for development contribution calculation spreadsheet used.

The bulk contributions for roads are calculated based on the trips generated by the proposed development. The Johannesburg Road Agency should calculate the development contributions for roads and should reflect in the Service Level Agreement.

6 STORMWATER

6.1 EXISTING STORMWATER RETICULATION NETWORK

The existing stormwater reticulation consists of the following:

- There are no existing stormwater infrastructure networks in the surrounding area of the application site.
- There is a channel system starting on the north-western corner of the site, running along Preller Road northbound, discharging into a natural watercourse flowing overland.

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

6.2 ESTIMATED EXISTING- AND POST-DEVELOPMENT STORMWATER RUNOFF AND ATTENUATION REQUIREMENTS

The estimated **existing-development** stormwater runoff for the application site is based on the following assumptions with farmland hydrological state:

- MAP of 750mm/year
- C factor of 0.3
- Time of concentration assumed to be 30min.

The expected stormwater discharge of the existing-development conditions for storms with a recurrence interval of 1:5 and 1:25 years are shown in **Table 6.2.1** below.

Table 6.2.1: Estimated stormwater runoff for existing-development conditions.

	Recurrence interval	**Runoff coefficient**	**Catchment area (km²)**	**Rainfall intensity (mm/hr)**	**Stormwater discharge (m³/s)**
Portion 5 and 6	1:5	0.300	0.03879	50	0.230
	1:25			108	0.349

The estimated **post-development** stormwater runoff for the application site, with the full potential hydrological state permissible in the proposed development controls, is based on the following assumptions:

- MAP of 750mm/year
- C factor of 0.900
- Time of concentration assumed to be 15min.

The expected stormwater discharge of the post-development conditions for storms with a recurrence interval of 1:5 and 1:25 years is shown in **Table 6.2.2**.

Table 6.2.2: Estimated stormwater runoff for post-development conditions

	Recurrence interval	Runoff coefficient	Catchment area (km²)	Rainfall intensity (mm/hr)	Stormwater discharge (m³/s)
Lanseria Extension 79	1:5	0.900	0.03879	80	1.038
	1:25			157	1.524

There will be an increase in the stormwater runoff from the existing-development conditions to the post-development conditions for the application site due to the increase in hard surfaces as part of the proposed development.

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

The estimated **attenuation requirements** for the application site, with the full potential hydrological state permissible in the proposed development controls, are based on the following assumptions:

- Attenuation infrastructure of 1.5m depth.

Table 6.2.3: Calculated Stormwater Attenuation

	Area (m²)	Attenuation Requirements (m³/ha)	Attenuation Volume (m³)	Footprint of 1.5m deep pond (m²)
Lanseria Extension 11	38 790	321	1 244.9	829.9

Table 6.2.4: Stormwater Attenuation Requirements

	Area (m²)	JRA Attenuation Requirements (m³/ha)	Minimum Attenuation Volume (m³)	Footprint of 1.5m deep pond (m²)
Lanseria Extension 11	38 790	300 - 350	1 163.7	775.8

The proposed attenuation pond size is **larger** than the recommended JRA 300 m³/ha minimum requirements, hence the attenuation pond size is satisfactory.

6.3 STORMWATER MANAGEMENT AND SITE INTERVENTIONS

6.3.1 Background

A fragmented and degraded unchannelled valley bottom wetland occurs on site. The wetland is clearly impacted by anthropogenic activities including housing, alteration of flow paths and historical use of the site for intensive livestock rearing. The Lanseria Airport has also altered the hydrology of the aquatic ecosystems within 500m of the site. The affected wetland system is currently in an Ecological Category E, representing a seriously modified state. This classification reflects a high level of disturbance, with substantial alteration of natural ecosystem processes, and a significant loss of indigenous biota and habitat integrity across most components assessed — particularly in vegetation, hydrology, and water quality. The ecological importance and sensitivity of the system is also *low*, representing an aquatic ecosystem that is not ecologically important and sensitive at any scale.

EDS Engineers and Galago Environmental worked together to encompass sections of the unchannelled valley bottom wetland, with a single attenuation pond in the northern corner of the site. The *mitigative aspect* of the loss of the wetlands, due to the proposed development, will be the *improvement of the wetland ecological services in the artificial wetland (AW) and attenuation structure.* Galago Environmental recommends that the principles of emulating current wetland ecological goods and services are incorporated into the core design (flood attenuation, stream flow, sediment trapping, erosion control, etc) to ensure *functionality remains and is improved.*

6.3.2 Stormwater Management Principles

The stormwater system is based on Sustainable Urban Drainage Systems (SUDS), focusing on reducing flow velocity, protecting against erosion, and promoting groundwater recharge. Stormwater attenuation is provided in line with Johannesburg Roads Agency (JRA) requirements. The design respects common law obligations to accommodate upstream runoff across lower-lying land. A new wetland system is proposed to support ecological function and downstream wetland connectivity.

6.3.3 Internal Stormwater Infrastructure

The internal stormwater infrastructure includes a combined attenuation dam and wetland to manage runoff and support infiltration. Surface drainage from parking areas and hardstands will be collected via a piped system. Subsurface drains will capture and direct groundwater and seepage to the wetland.

6.3.4 On-Site Stormwater Runoff

Runoff from Lanseria x 79 will be attenuated to pre-development levels using the proposed attenuation structure. Low-frequency storm discharges will be routed through the wetland to enhance infiltration before entering the downstream system.

6.3.5 JRA Stormwater Requirements

The stormwater Management Policy of the Johannesburg Roads Agency (JRA) applies to all new developments and specifies that all developments on land exceeding 4000m² are subject to stormwater attenuation on site. The stormwater runoff for the application site should be attenuated to the satisfaction of the stormwater department of the Johannesburg Metropolitan Municipality.

As there are no current stormwater infrastructure networks in the surrounding area, all stormwater will be drained to a nearby watercourse to the north via pipe flow.

A Stormwater Management Report (SWMR) is compiled (Report no 2019-094-23-rev-

1) and must be submitted to the stormwater department of the Johannesburg Metropolitan Municipality during the SDP phase of the proposed development on the application site. Details regarding the internal stormwater reticulation and the stormwater attenuation facilities will be described in detail in the SWMR.

The proposed combined stormwater and wetland attenuation ponds with all internal stormwater infrastructure will be constructed on the consolidated site Extension 79. The proposed attenuation pond is indicated in **Annexure I**.

6.4 UPSTREAM CATCHMENT AREA REQUIREMENTS

The estimated stormwater for the upstream catchment area of approximately 6.44 ha will be channelled using an underground culvert system, passing on the perimeter of Lanseria Extension 79. Thereafter the stormwater will be discharged into the external stormwater network along Preller Drive, conveying the stormwater to the existing natural watercourse stream.

Design parameters:

- Mean Annual Precipitation – 750 mm/year
- Upstream catchment area – 0.064433 km^2
- Runoff Coefficient – 0.4
- Time of Concentration –94 minutes

Table 6.2.5: Estimated stormwater runoff for upstream conditions

Method	**1:25-year peak flow (m^3/s)**	**1:50-year peak flow (m^3/s)**
Rational Method	3.66	4.51

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

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 as per The Johannesburg Roads Agency (JRA) stormwater management guidelines to design attenuation ponds for the **1:5-year** pre-development runoff. To ensure the optimal functioning of the stormwater network, this policy must be incorporated into the **title deeds** of upstream developments.

A **1,8m x 1,5m** concrete box culvert is proposed to accommodate the **1:25-year** and **1:50-year** storm events under inlet control conditions.

The Johannesburg Roads Agency (JRA) will take ownership of the culvert system, and a 5-meter servitude will be registered over the culvert in favor of the JRA.

The culvert system is included in **Annexure I**.

6.5 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 1800mmΦ conduit pipe network is required to be installed running parallel to Preller Road and discharging to the natural watercourse.

6.6 BOUNDARY CONTRIBUTIONS STORMWATER

Development contributions will be payable in respect of the stormwater.

The applicant will be required to pay boundary stormwater contributions towards Lanseria X11 development. Lanseria X11 will construct the class 5 road for a section of Preller Drive bordering the property.

The estimated boundary stormwater contribution is calculated based on the contribution rate of R 660/m^2 and can be summarised as follows:

- Preller Drive: 270m x 7.4m x R 660 x 50% = R 1 318 680.00 (Incl. VAT)

The boundary stormwater contribution payable with respect to the township is estimated to be R 1 318 680.00.

6.7 ESTIMATED DEVELOPMENT CONTRIBUTION FOR STORMWATER

The applicant will be required to pay external road development contributions towards the development of Lanseria Extension 11. As part of this development, Lanseria Extension 11 will install an external stormwater system along Preller Drive, which borders both Extension 11 and Extension 79.

Additionally, the development contributions will be offset against the construction costs of the culvert system, which forms part of the Extension 79 development. These infrastructure upgrades align with the master plan to accommodate stormwater management for future upstream developments.

The estimated road and stormwater development contribution is calculated based on **City of Johannesburg Development Contributions Calculator Version 1.8 – July 2021**. The development contribution is summarised as follows:

- Roads: 109 Equivalent trips / peak hour x R 22 150.17 = R2 424 144.39 (Incl. VAT)

- Transport: 189 Passenger trips / peak hour x R 2 310.85 = R437 796.16 (Incl. VAT)

The total estimated development contributions payable for the township amount to R2 861 940.55 (Including VAT). This contribution is subject to an offset against the construction costs of the aforementioned infrastructure upgrades.

Refer to **Annexure J** for development contribution calculation spreadsheet used.

7 RECOMMENDATION

Preller Drive will be used to obtain access to the proposed. The TIA report is still in progress and changes will be made to the external roads as per the recommendation of the report results.

For stormwater, the applicable site will have an attenuation infrastructure on Extension 79 as per the JRA guidelines and will be discharged to an external stormwater system running along Preller Drive, where the water will ultimately be discharged into the natural watercourse stream through outlet controlled structures.

It is recommended that the development and boundary contributions be offset against the road and stormwater upgrades implemented under Lanseria Extension 11.

Furthermore, it is recommended that the township establishment application for Portion 5 and Portion 6 of the farm Sunrella Agricultural Holdings be supported by the Johannesburg Roads Agency (JRA), as access to the application site can be provided via the existing road network.

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

Annexures:

- Annexure A: Site Location Map
- Annexure B: Proposed Township layout
- Annexure C: Existing Zoning Certificates
- Annexure D: Conditions of Establishment
- Annexure E: Site Access Layout
- Annexure F: Traffic Impact Assessment
- Annexure G: Existing Stormwater Information
- Annexure H: Stormwater and Attenuation Calculations
- Annexure I: Stormwater Layout
- Annexure J: Development Contributions Spread Sheet

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

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Project:

LANSERIA PROJECT RUNWAY

Description:

LOCALITY PLAN (FIGURE 1)

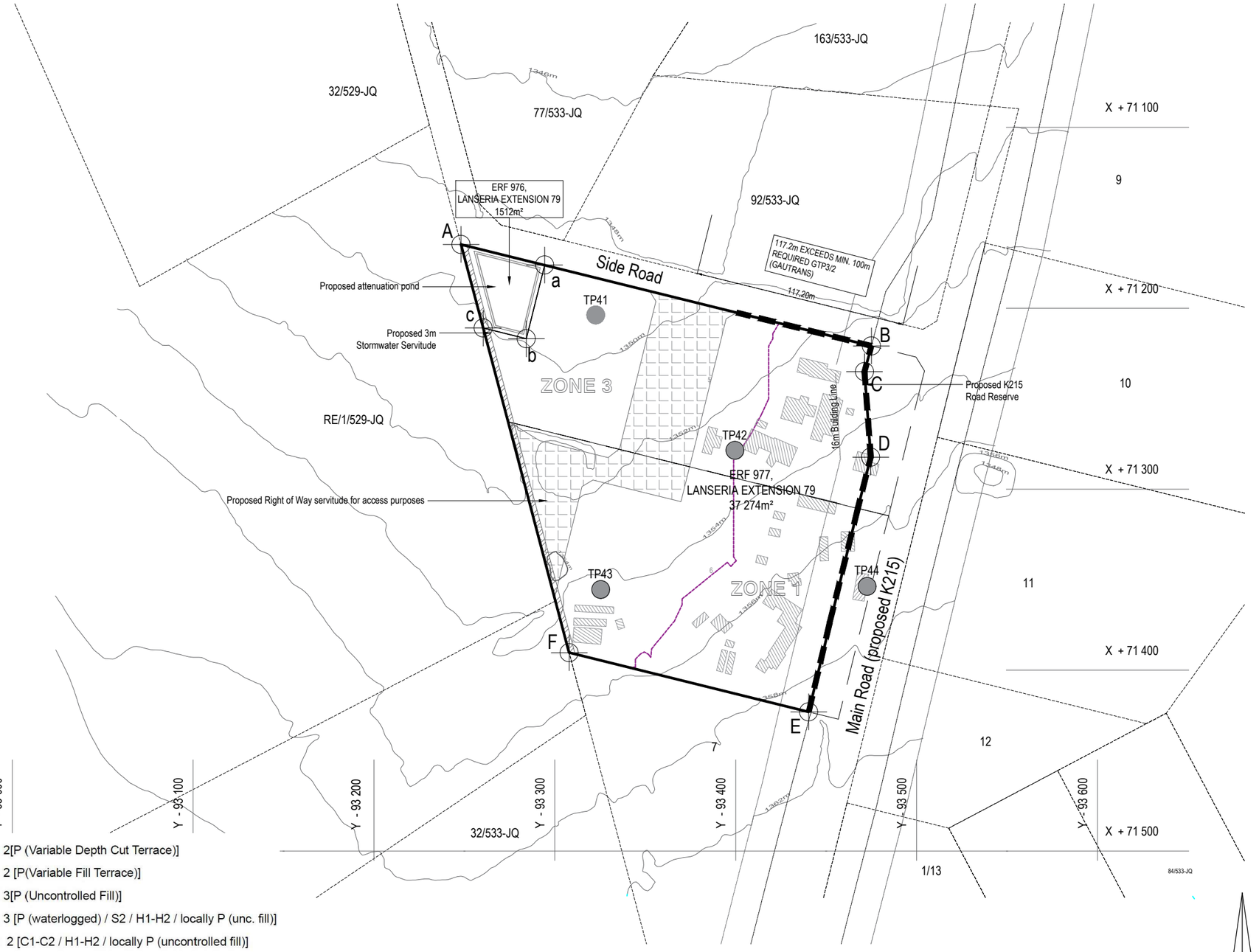
Paper size:	Drawn:	Checked:	Designed:
A3	KB	D vd M	D vd M

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 CERTIFICATE

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.

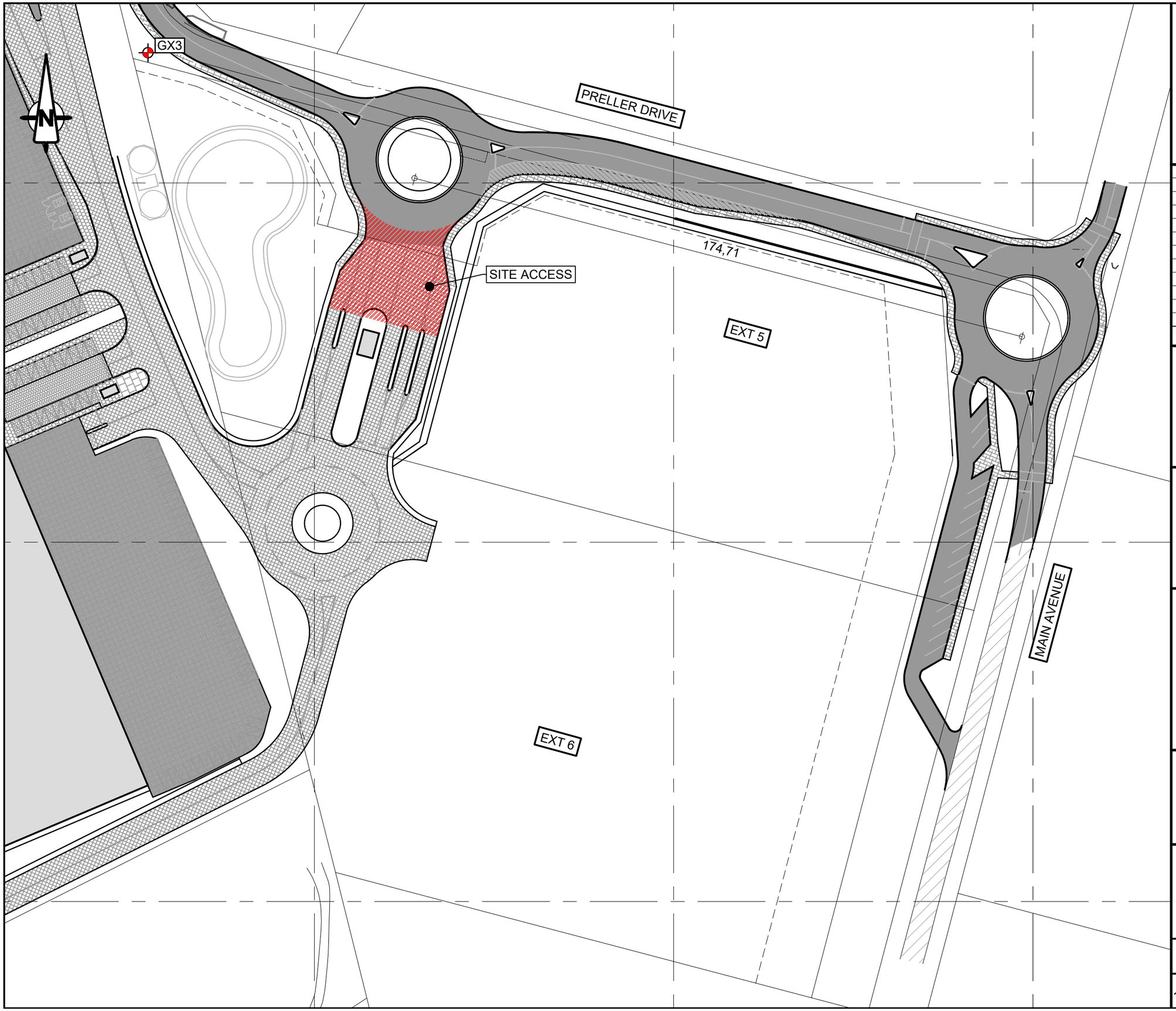
(1) ERVEN 976 AND 977

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: SITE ACCESS LAYOUT



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:

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Project:

LANSERIA
PROJECT RUNWAY

Description:

ACCESS ROADS LAYOUT
(FIGURE 2)

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

Scale:	Project Number:	Drawing Number:	Revision:
1:5000	2019-094	0051	A

ANNEXURE F: TRAFFIC IMPACT ASSESSMENT

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LANSERIA X79 ON SUNRELLA AGRICULTURAL HOLDINGS 5 & 6

TRAFFIC IMPACT ASSESSMENT

REPORT 2024-312-01 Rev 0

FEBRUARY 2025

CLIENT: GROWTHPOINT PROPERTIES (PTY) LTD

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Report Information Sheet

Report number	:	2024-312-01 Rev 0
Development name	:	LANSERIA X79 WAREHOUSING & DISTRIBUTION ON AGRICULTURAL HOLDINGS 5 & 6, SUNRELLA

Report undertaken by:

Name	:	A Maritz Pr. Eng.
Signature	:	
ECSA Registration	:	Pr. Eng. 202402861

Report reviewed by:

Name	:	G van der Walt Pr. Eng.
Signature	:	
Date	:	February 2025
Qualifications	:	B Eng (Civil), B Eng (Hons) (Transportation)
ECSA Registration	:	Pr. Eng. 990171

Lanseria X79 Warehousing and Distribution on Holdings 5 & 6 Sunrella

TRAFFIC IMPACT ASSESSMENT

List of Figures

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1 INTRODUCTION AND BACKGROUND

EDS Engineering Design Services (Pty) Ltd was appointed by Growthpoint Properties (Pty) Ltd to undertake a Traffic Impact Assessment (TIA) as part of the township establishment application for the proposed Lanseria Extension 79 on Holdings 5 and 6 of Sunrella Agricultural Holdings for warehousing and distribution land-use rights during 2024.

The development site, Lanseria Extension (X)79 is situated on Sunrella Agricultural Holdings number 5 & 6 south of Lanseria International Airport. The development is adjacent to Preller Drive (northern boundary), Middel Road (eastern boundary) and the Lanseria International Airport (western boundary).

Regional accessibility to the development is via the N14 freeway, R552 & R512.

This study investigates the existing and future operating conditions at the key intersections within the study area, it estimates the expected development trip generation whilst taking cognisance of the type of development proposed, it determines the anticipated traffic impact on the surrounding road network and determines whether it is necessary to implement any road and/or intersection improvements to mitigate the anticipated traffic impact.

The study was undertaken considering the requirements and guidelines as set out in the *TMH 16 Volume 2 (South African Traffic Impact and Site Impact Assessment Standards and Requirements Manual), COTO, Version 1 dated August 2012*. Comments are also made in respect of the site access as well as the non-motorised & public transport in this study.

This report considers the traffic impact of the proposed warehousing and distribution developments.

1.1 Site Location

The development site is located +-4km north of R512 & N14 interchange and falls within the jurisdiction of the Johannesburg Metropolitan Municipality.

Location of the sites in relation to the surrounding road network is shown in **Figure** 1-1.

1.2 Methodology

The methodology of this TIA included the following:

- A site visit was undertaken to observe the current travel patterns, road geometry, and gain an understanding of the area;
- The relevant roads authority road network planning was considered;
- Traffic counts were obtained at relevant intersections within the study area;
- A trip generation, distribution, and assignment exercise was undertaken;

- The intersections capacity analysis for the AM and PM peak hours were undertaken where the background and development traffic demand was considered for the intersections included in the study;
- Alternatives to improve the road capacity were investigated where required;
- Applicable latent developments and latent road upgrades were taken into account during the study;
- A high-level conceptual layout indicating access requirements, site circulation of heavy vehicles and parking was prepared;
- Public transport and non-motorised facilities were considered based on available information.

All findings, conclusions, and recommendations are captured in this report.

1.3 Existing and Proposed Land-Uses

The proposed Lanseria X79 is located on *Holding 5 and Holding 6, Sunrella Agricultural Holdings.* The development site is currently zoned as "Agricultural Holding". The existing zoning certificate is attached in **Annexure A**.

The proposed rights for Lanseria X79 Holdings 5 & 6 Sunrella consist of "Industrial 3" zoning rights with the following property constraints as per **Table 1-1:**

Table 1-1: Proposed Rights – Holdings 5 & 6 Sunrella

SITE	ZONING	EXTENT (m²)	FAR	COVERAGE (%)	PERMISSIBLE GFA (m²)	ERF NUMBERS
X79 (Holding 5&6)	"Industrial 3"	38 786 m²	0,6	60%	23271,6 m²	976 - 977

The development controls are summarised as follows:

- Zoning: "Industrial 3"
- Coverage: 60% (F.A.R = 0,6 as per scheme)
- Permissible gross floor area: 23 272m²
    - Offices restricted to 2500m^2

The draft conditions of establishment of Lanseria X79 Holdings 5 & 6 Sunrella are included under **Annexure B**.

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TRAFFIC IMPACT STUDY : LANSERIA HOLDINGS 5 & 6

Site Locality Plan

Figure 1-1

2 DATA COLLECTION

The South African Trip Data Manual (TMH 17 – Volume 1 Dated September 2012) has been used to determine the extent of the traffic study. As a result of the proposed development operations, a full detailed Traffic Impact Assessment considering the base year as well as a five-year horizon year is required.

2.1 Study Area

The study area consists of the key intersections within a 2km radius from the development site as summarised in **Table 2-1**:

Manual traffic counts were undertaken at these key intersections for the weekday morning (AM) and afternoon (PM) peak periods on the 23rd of October 2024.

Table 2-1: Intersections included in TIA

No	Intersection	Control Type
1.	Pelindaba Road (R512) / 6th Road (also Elandsdrift Rd) (R552)	Stop controlled to be Signalised in near future
2.	6th Road (R552) / Middel Road	Stop controlled

Locations of these relevant intersections are depicted in **Figure 2-1**.

2.2 Latent Rights

JRA requested the following latent rights be considered for this study:

- Lanseria X35, X36 & X37 by WSP
- Lanseria X7 by Mariteng Consulting Engineers
- Lanseria X32 by Techworld Consulting Engineers
- Lanseria X11 & X12 by EDS Engineering Design Services

2.2.1 Lanseria X35, X36 & X37

After enquiries to WSP with regards to Lanseria X35, 36 & 37's latent development traffic it was concluded that the Traffic Impact Study was never approved by JRA or Gautrans and WSP and the project is currently indefinitely on hold. JRA confirmed that the latent rights for Lanseria X35, 36 & 37 can be disregarded as the TIA was never approved.

2.2.2 Lanseria X7

The proposed Township Lanseria Extension 7 will be established on the Remainder of Portion 9 and Remainder of Portion 69 of the Farm Bultfontein 533-JQ. The site is situated along Bultfontein Road and falls in jurisdiction of the City of Johannesburg. Location of the site in relation to the surrounding road network and application site is shown in **Figure 1-1**.

The development controls are summarised as follows:

Site 1 - Residential:

- Zoning: "Residential 3"
- Density: 60 units/ha
- 963 housing units (intent is inclusionary housing)

Site 2 - Industrial:

- Zoning: "Industrial 1"
- Size: 4.1718 ha
- F.A.R.: 2.1
- 87 608 m²

The proposed development will generate approximately 820 trips during the weekday morning and weekday afternoon peak hours and 424 trips during the Saturday peak hours.

2.2.3 Lanseria X32

The proposed township Lanseria Extension 32 (Lanseria Corporate Estate – North development) will comprise of zoning for "Special for industrial purposes" with critical land uses that include Offices, Showrooms, Manufacturing, and Warehousing and Distribution. The site is situated on the corner of Pelindaba Road (R512) and Ashenti Road and falls in jurisdiction of the City of Johannesburg.

The development controls are summarised as follows:

- Offices, ±19 120 m² GLA

- Showrooms, ±40 300 m² GLA
- Manufacturing, ±65 772 m² GLA
- Warehousing and Distribution, ±65 772 m² GLA
- Filling Station with a convenience store, ±100 m² GLA

The proposed development will generate approximately 1319 and 1520 trips during the weekday morning and weekday afternoon peak hours respectively.

2.2.4 Lanseria X11 and X12

The proposed Lanseria Extension 11 is located on Portion 32 (a Portion of Portion 1) and the Remaining extent of Portion 1 of the Farm Botesdal 529JQ; and Lanseria Extension 12 is located on Holding 1, Sunrella Agricultural Holdings and Portion 80 (a Portion of Portion 55) of the Farm Bultfontein 533JQ. Location of the sites in relation to the surrounding road network and application site is shown in **Figure 1-1**.

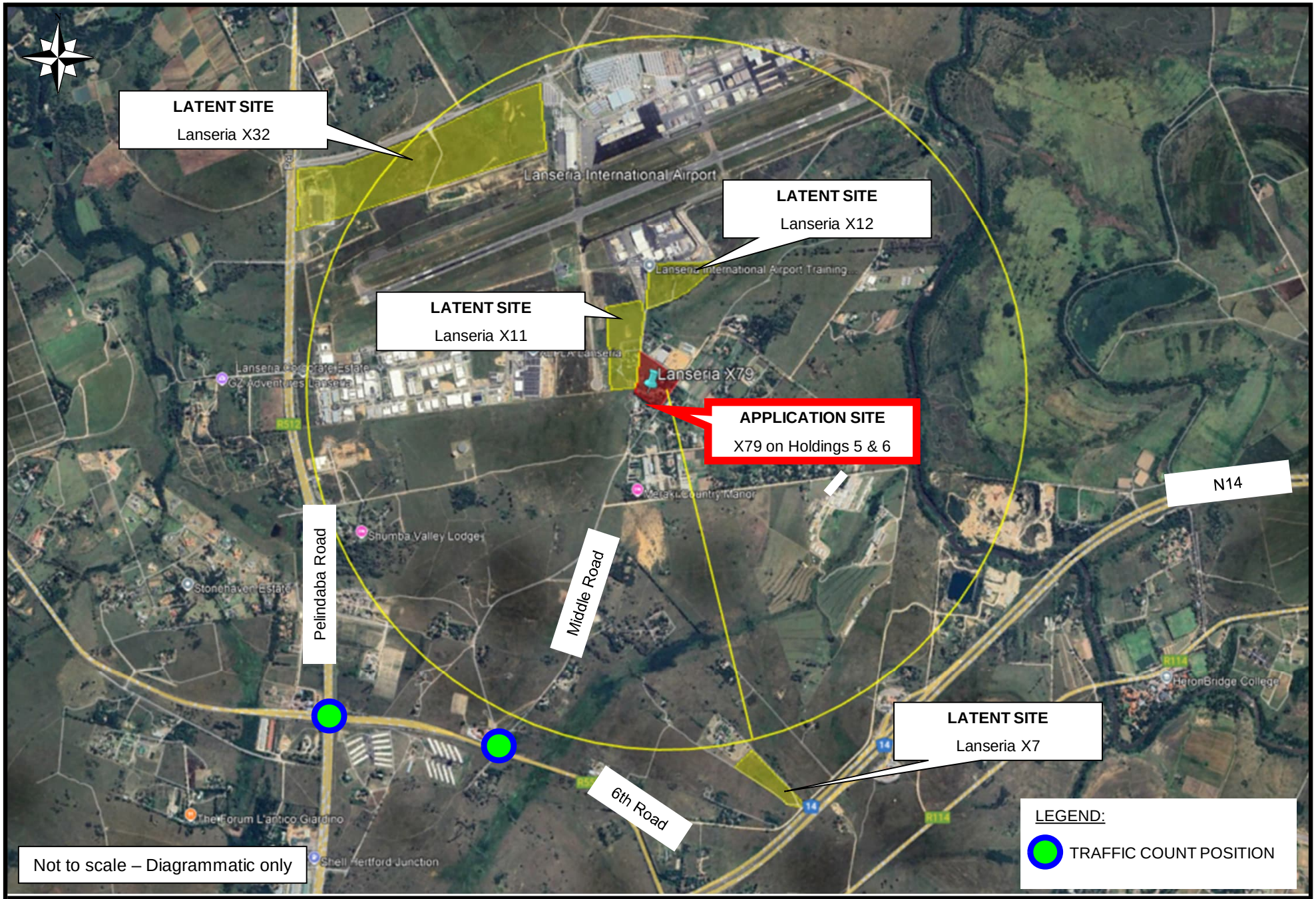
The development controls are summarised as follows:

Extension 11 – Industrial:
- Zoning: “Industrial 3”
- Extent: 84 806 m²
- F.A.R: 0.6
- Coverage: 60%
- Permissible GFA: 50 883,6 m²

Extension 12 - Industrial:
- Zoning: “Industrial 3”
- Extent: 64 569 m²
- F.A.R: 0.6
- Coverage: 60%
- Permissible GFA: 38 741,4 m²

The total permissible floor area for Lanseria X11 (50883,6m² floor area) will generate approximately 335 peak hour development trips in the AM and PM peak hours. The total permissible floor area for Lanseria X12 (38741,4m² floor area) will generate approximately 253 peak hour development trips in the AM and PM peak hours. A total of 588 peak hour development trips will be added to the external road network as a result of the proposed developments on Lanseria Extension 11 & 12.

Figure 2-2 and **Figure 2-3** shows the latent development trip distribution during the AM and PM peak periods for Lanseria X7, X32 and X11 & X12 combined.



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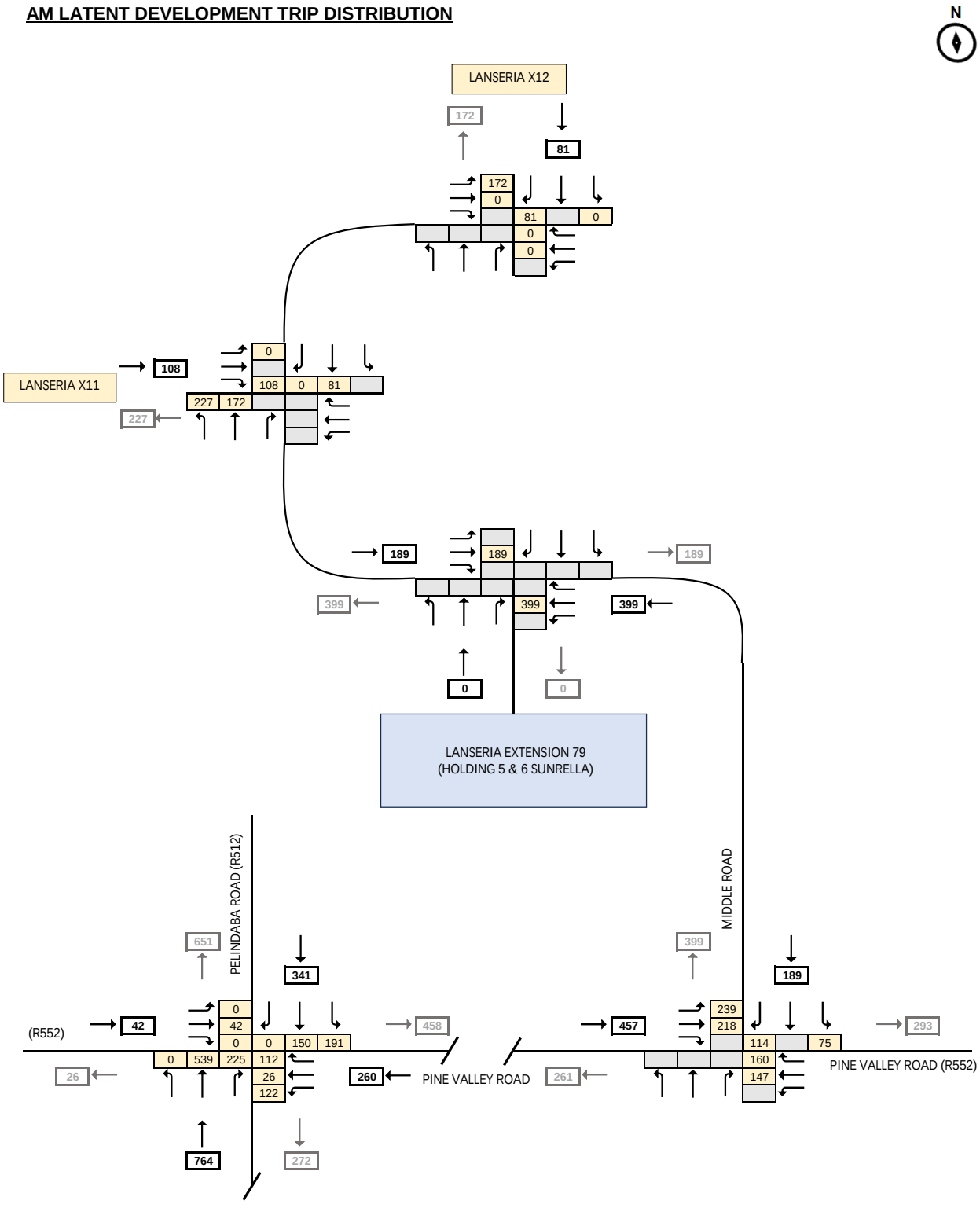
TRAFFIC IMPACT STUDY : LANSERIA HOLDINGS 5 & 6

Site Locality Plan – Counting Stations

Figure 2-1

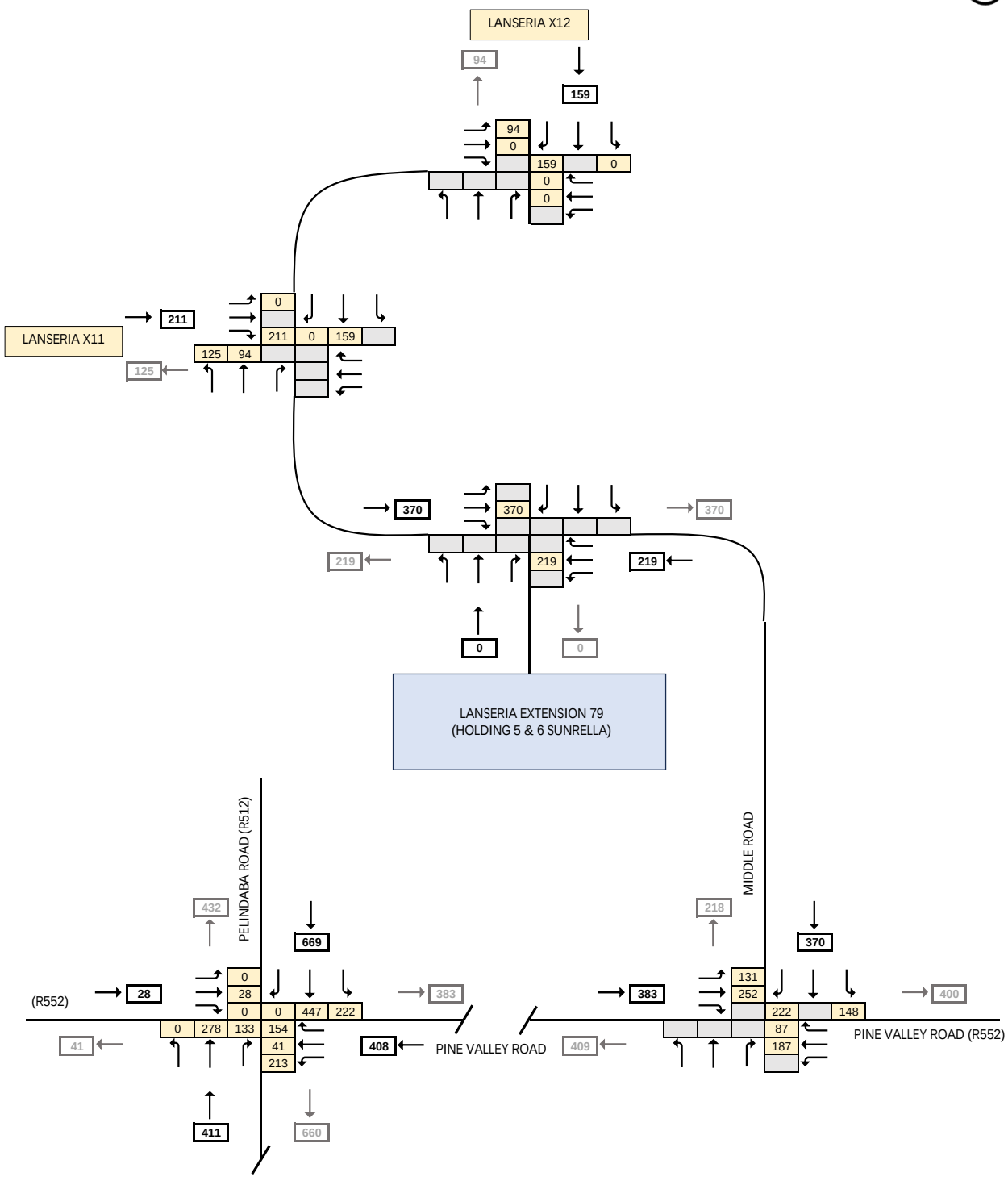
AM LATENT DEVELOPMENT TRIP DISTRIBUTION



TRAFFIC IMPACT STUDY : LANSERIA HOLDINGS 5 & 6
Latent Development Trip Distribution AM

Figure 2.2

PM LATENT DEVELOPMENT TRIP DISTRIBUTION



TRAFFIC IMPACT STUDY : LANSERIA HOLDINGS 5 & 6
Latent Development Trip Distribution PM

Figure 2.3

3 ACCESS AND ROAD NETWORK

3.1 Study Area

The proposed development, Holdings 5 & 6, is situated south of Lanseria International Airport. The northern border of Holding 5 is Preller Drive, with Middel Road the eastern border, Holding 6 the southern border and Lanseria Extension 11 (remaining extent of Portion 1 of the farm Botesdal 529-JQ) the western border.

Holding 6 is situated south of Holding 5 and north of Holding 7 with Middel Road also being the eastern border. The western border of Holding 6 is approximately 240m in length of which 208m is shared with Lanseria Extension 11 (northern part of the border) and the remaining 32m with Portion 72 of the farm Botesdal 529-JQ (southern part of the border).

The Holdings 5 & 6 development will obtain access from Preller Drive. The access will operate as side-road stop-controlled intersection.

3.2 Existing and Planned Road Network

The external road network in proximity to the development consist of the N14 freeway (Class 1 road) to the south, 6th Road (R552) (class 2 road) to the south-east and Pelindaba Road (R512) (Class 2 road) to the west.

Other roadways adjacent to the development include:

- Preller Drive
- Middel Road

Preller Drive (Class 5 Road) is a very low volume road primarily serving the southern buildings and hangers at the Lanseria International Airport. Middel Road (Class 5 Road) is also a low volume road terminating at the Preller Drive / Middel Road / Main Avenue intersection. Main Road (Class 5 Road) is currently a gravel road. These roads are under the jurisdiction of the Johannesburg Roads Agency (JRA). See **Figure 3-1** for the Johannesburg Road Network obtained from *Joburg GIS*.

Pelindaba Road (K29) and 6th Road/Elandsdrift Road (K33) on the external road network are both K-routes in Gauteng Department of Roads and Transport (Gautrans) road network planning. Middel Road will in future be replaced with the planned K215 that will extend from the K33 to the planned K31 running along the eastern boundary of Lanseria International Airport. The eastern boundary of the planned development will be adjacent to the current alignment of the future K215.

As the site is within 200m of the proposed K215 (for which the basic planning has not been undertaken), a Section 7 report will be prepared and submitted to Gautrans.

3.3 Lanseria Master Plan

The Greater Lanseria Masterplan (GLMP) was previously headed by the Gauteng Planning Division but currently falls under Gauteng Department of Cooperative Governance and Traditional Affairs (COGTA).

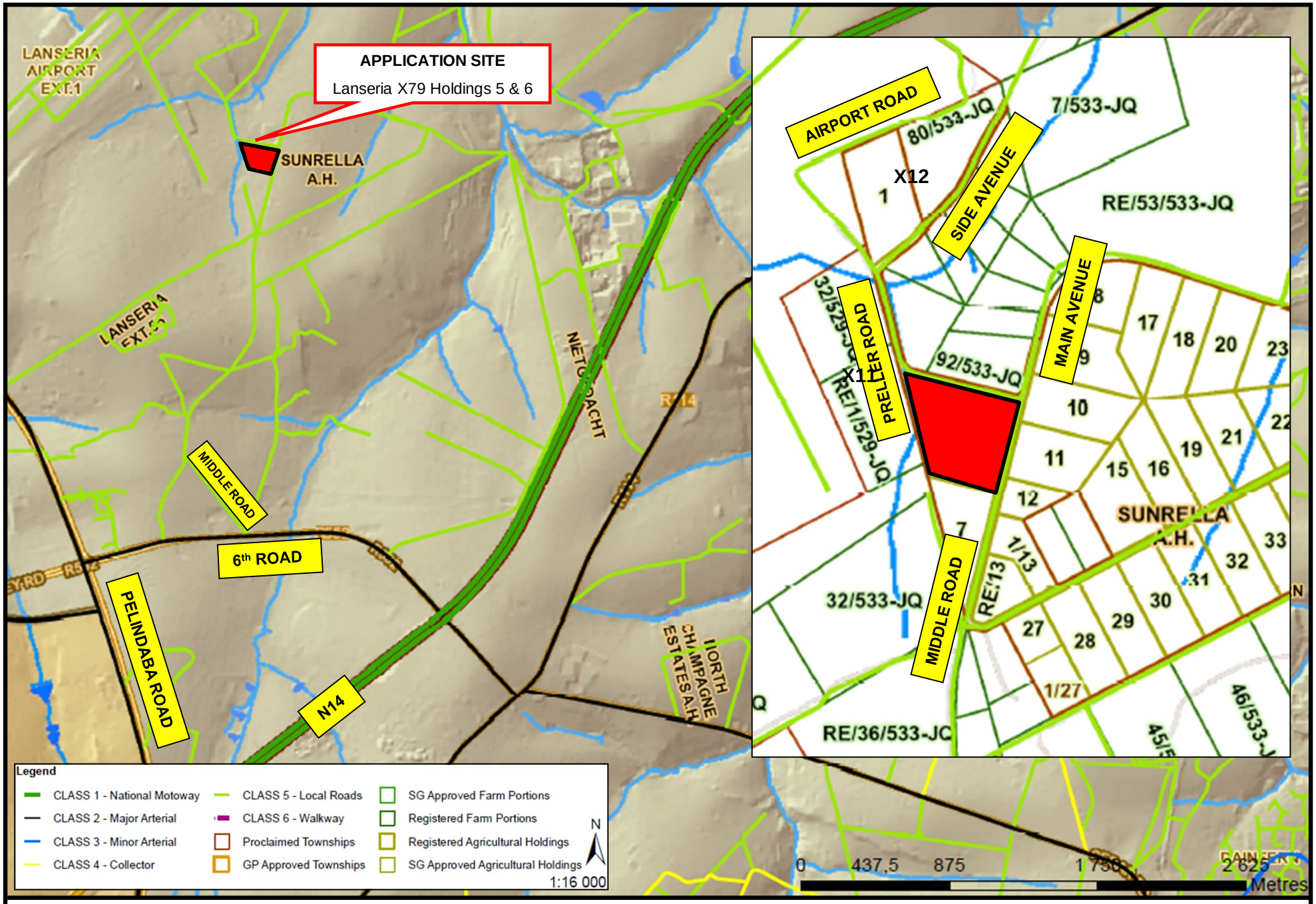
The GLMP is currently only a framework that consist of a grid road network that will interconnect properties and create a link between the new Central Business District (CBD) south and the airport to the north. By creating a resilient movement framework it will enable economic opportunities where properties can maximize their potential through direct access, similar to the Johannesburg CBD, Springs, Pretoria CBD, and others.

Significant commitment is still required from both provincial and local government authorities as well as the active involvement and input of the Real Estate Investment Trust (REIT). A detailed transport framework will need to be developed to safeguard the road reserves, ensuring that the secondary road network can be seamlessly integrated into the broader transport planning efforts. This collaborative approach underscores the need for coordinated efforts among various stakeholders to successfully implement the envisioned grid road network and its associated benefits for economic growth and accessibility.

The GLMP framework as it currently stands, indicates that the proposed Lanseria X79 will be able to obtain access from two separate locations **in future**:

- Via a new proposed road between Boeing Street and the extended Preller Road to the south-east connecting to the primary road network (Pelindaba Road R512)
- Via Preller Road and Middel Road north connecting to the secondary road network south of Lanseria Airport

GLMP road framework as well as the available access roads for the proposed Lanseria X79 is included under **Annexure C** of this report.



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TRAFFIC IMPACT STUDY : LANSERIA HOLDINGS 5 & 6

Joburg GIS

Figure 3-1

4 TRAFFIC DEMAND

4.1 Trip Generation

The proposed warehouses are within proximity to a number of informal and low-income residential areas that include Cosmo City, Diepsloot, the Krugersdorp townships, etc. **Table 4-1** below sets out the trip rates used to determine the trip generation for warehouse & office land-use rights of the proposed X79 warehouse developments:

Table 4-1: Trip Generation Factors

LAND-USE	PEAK HOUR TRIP RATE			DIRECTIONAL SPLIT					
				AM PEAK		PM PEAK		SAT PEAK	
	AM	PM	SAT	IN	OUT	IN	OUT	IN	OUT
Warehousing and Distribution	0,5	0,5	0,15	60	40	45	55	65	35
Offices	2,1	2,1	0,45	85	15	20	80	55	45

The peak hour trip generation for X79 is summarised in **Table 4-2** for the weekday AM and PM as well as the Saturday peak hours.

Table 4-2: Trip Generation for X79

LAND-USE	UNIT FACTOR	GLA (m²)	ADJUSTED PEAK HOUR TRIP RATE			TOTAL TRIPS GENERATED								
						AM PEAK			PM PEAK			SAT PEAK		
			AM	PM	SAT	IN	OUT	TOT	IN	OUT	TOT	IN	OUT	TOT
Warehousing and Distribution	100	20774	0,50	0,50	0,15	62	42	104	47	57	104	21	11	32
Offices	100	2500	2,10	2,10	0,45	45	8	53	11	42	53	7	6	13
TOTAL TRIPS FOR H5&6 WAREHOUSE DEVELOPMENT						107	49	**156**	57	99	**156**	28	17	**45**

The total permissible floor area, as shown in **Table 1-1**, for Lanseria X79 will generate approximately 156 peak hour development trips in the AM and PM peak hours. Therefore, a total of 156 peak hour development trips will be added to the external road network as a result of the proposed developments on Lanseria Extension 79.

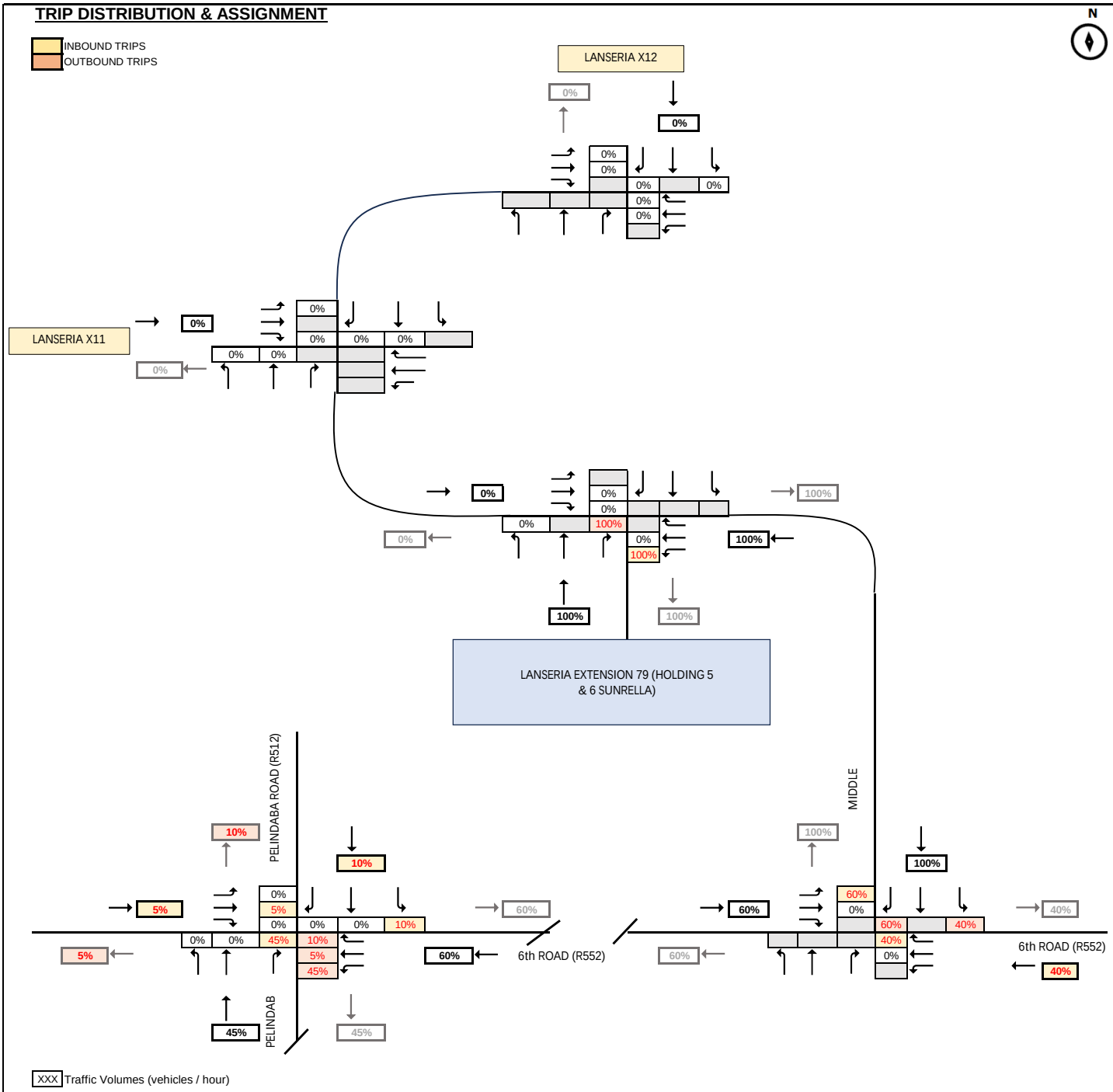
4.2 Trip Distribution

The proposed development would typically contribute to the weekday AM and PM peak hours. The development traffic assignment on the external road network is as follows:

- 5% to/from the West (informal settlements) via the R552
- 10% to/from the North (Blair Atholl area, informal settlements etc.) via Pelindaba Road (R512)
- 45% to/from the N14 freeway (east and west) and Pelindaba Road (R512) including Cosmo City, Krugersdorp and northern Johannesburg residential areas
- 40% to/from south-east areas that include Diepsloot; Steyn City, Fourways residential areas etc.

Figure 4-1 indicate the trip distribution patterns during the peak periods. The development trip distribution during the AM Peak period is shown on **Figure 4-2** and the PM peak period on **Figure 4-3**.

TRIP DISTRIBUTION & ASSIGNMENT

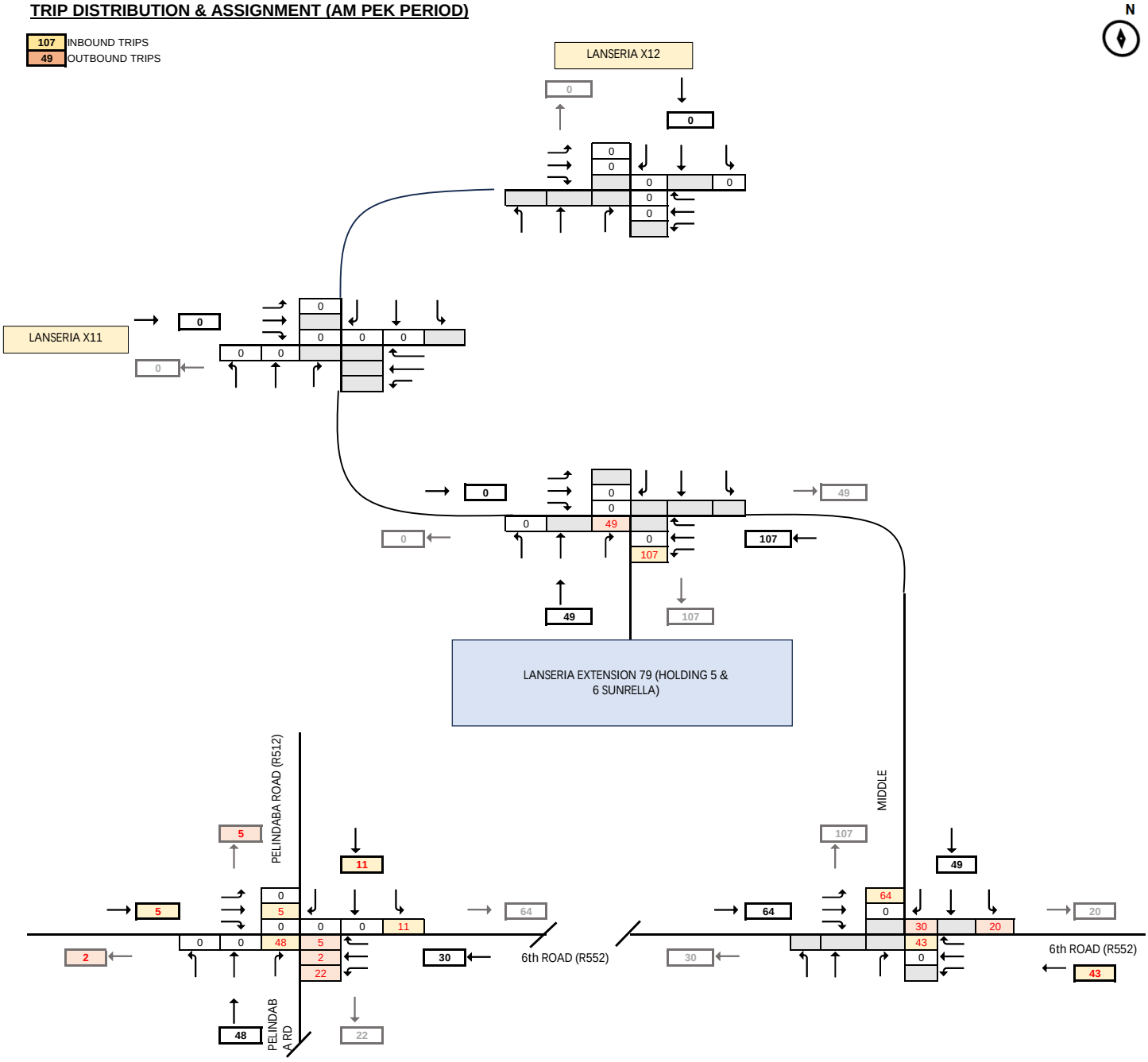


TRAFFIC IMPACT STUDY : LANSERIA HOLDINGS 5 & 6
Trip Distribution Pattern

Figure 4-1

TRIP DISTRIBUTION & ASSIGNMENT (AM PEK PERIOD)

107 INBOUND TRIPS
49 OUTBOUND TRIPS



XXX Traffic Volumes (vehicles / hour)

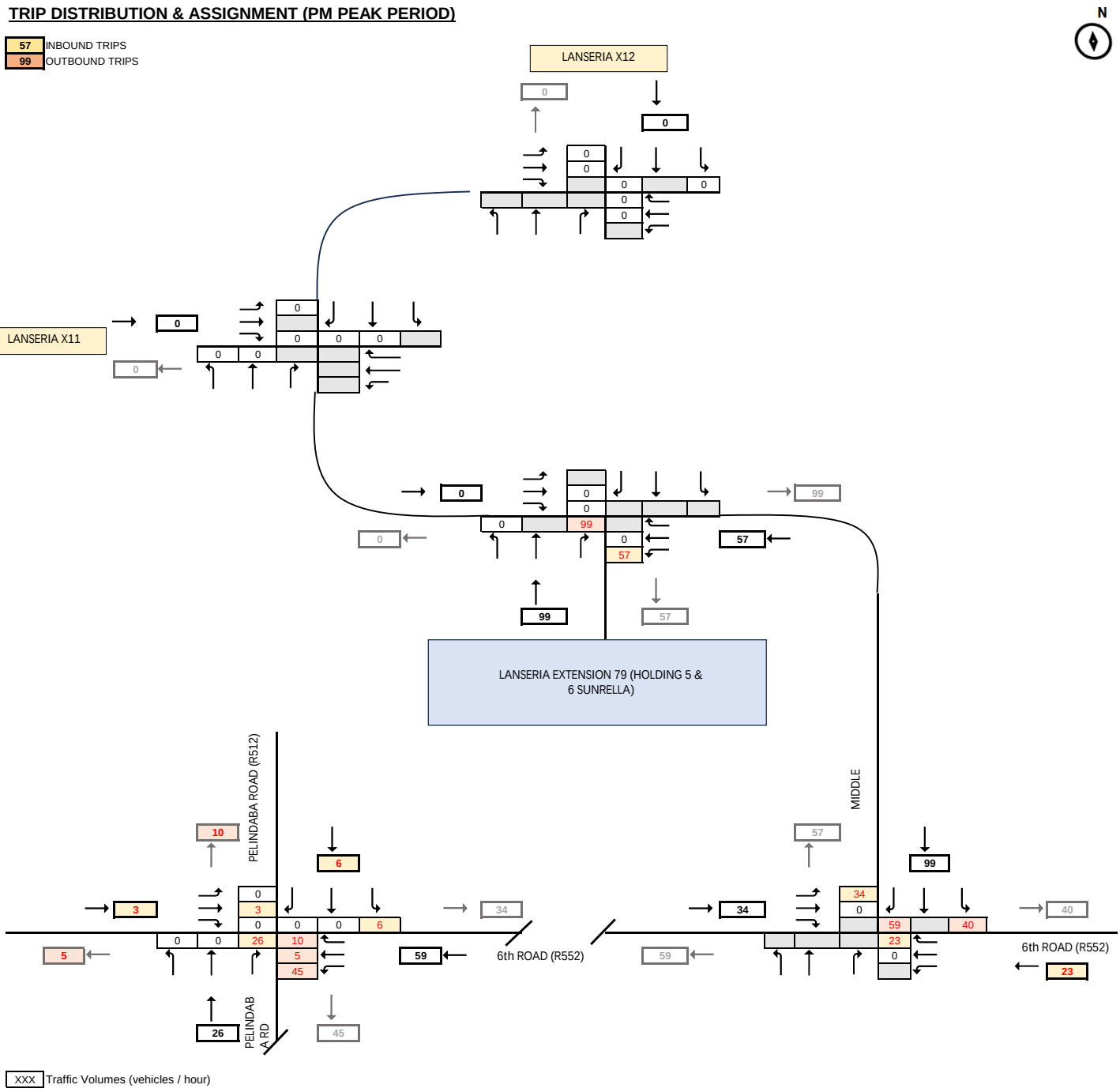
e•d•s Structural, Civil and Transportation Engineers

TRAFFIC IMPACT STUDY : LANSERIA HOLDINGS 5 & 6

Trip Development Distribution (AM Peak)

Figure 4-2

TRIP DISTRIBUTION & ASSIGNMENT (PM PEAK PERIOD)



5 DEVELOPMENT SITE ANALYSIS

5.1 Site Circulation

The design vehicles for this development are as follows:

- Heavy Vehicle: WB-15 & WB-20 (SA)
- Light Vehicle: Passenger car

Loading and offloading will take place on-site as indicated on the site layout plan included under **Annexure D**. Sufficient manoeuvring space is provided for all heavy vehicles to turn around on site in the yard.

5.2 Parking

5.2.1 Parking Requirements

The standard parking requirement for warehouses in accordance with the *City of Johannesburg Land Use Scheme, 2018* for the proposed development on Lanseria X79 (situated in a Parking Zone B) is outlined in **Table 5-1.**

Table 5-1: Required Parking

	LAND-USE	PARKING RATE PROPOSED	GFA (m²)*	REQUIREMENT
Extension 79	Warehouse	1 bays per 100m²	15988 m²	159,9 bays
	Office	2 bays per 100m²	1807 m²	36,1 bays
	Total		**17795 m²**	**196,0 bays**
*** as per site layout plan*				

A parking study conducted by EDS Engineering Design Services (Pty) Ltd for a similar development, Equites Jet Park, highlights that actual parking demand for warehouse and office developments is significantly lower than the prescribed municipal guidelines and town planning schemes. The study found the following effective parking ratios:

- **Warehouses**: 0.47 bays per 100 m² Total Building Floor Area (TBFA), compared to the typical requirement of 1 bay per 100 m² TBFA as per local guidelines.
- **Offices**: 1 bay per 100 m² TBFA, compared to the typical requirement of 2 bays per 100 m² TBFA as per local guidelines.

These findings support the use of reduced parking rates for similar developments, promoting efficient land use and cost savings while maintaining operational functionality. Based on these findings, it is recommended to:

- **Apply a reduced parking ratio of 0.5 bays per 100 m² TBFA** for warehouses, ensuring alignment with observed demand.

- **Apply a reduced parking ratio of 1 bay per 100 m² TBFA** for offices, ensuring alignment with observed demand.

Additionally, it is anticipated that warehouse developments in proximity to airports, such as Lanseria X79, may require even fewer parking bays, as many employees work directly for airport operations (e.g., ground handling services) rather than on the receiving or dispatching side of packages.

Accordingly, the reduced parking ratios were applied to calculate the total parking requirement for Lanseria X79, resulting in **98 parking bays**, as shown in **Table 5-2**. These parking bays are reflected on the site layout plan attached in **Annexure D**.

Table 5-2: Proposed Parking

SITE	LAND-USE	PARKING RATE PROPOSED	GFA (m²)*	REQUIREMENT
Extension 79	Warehouse	0,5 bays per 100m²	15988 m²	80 bays
	Office	1 bays per 100m²	1807 m²	18 bays
	Total		**17795 m²**	**98 bays**

The recommended parking ratios are specified accordingly in the Draft **Conditions of Establishment** (attached in **Annexure B**).

5.2.2 Loading Bays Requirements

The *CoJ LUMS* does not have specific loading bay requirements compared to for instance the *City of Ekurhuleni Land Use Scheme 2021*. The *CoJ LUMS* states that loading and off-loading facilities shall be provided to the satisfaction of the Council.

The proposed warehouse developments on Lanseria Extension 79 will primarily supply and obtain goods to and from Lanseria International Airport, thus resulting in approximately 50% reduction in loading vehicles on the external road network (as vehicles do not pick-up, store and distribute the same goods as a conventional warehouse distribution centre).

18 loading bays are proposed for the warehouse developments on Lanseria Extension 79. This is considered sufficient for the proposed warehouse developments located adjacent to the main supplier and distributer.

5.3 Access Control and Stacking Distance

The required stacking distance required at the access point development was calculated in accordance with the COTO's *TMH 16 South African Traffic Impact and Site Traffic Assessment Standards and Requirements Manual Volume 2*.

The maximum inbound trips, namely **107 during the AM Peak**, were obtained from the trip generation determination of the development (refer to **Table 4-1** and **Table 4-2** for trips generated). **Table 5-3** below summarises the inbound and outbound trips that should be catered for at the development access.

Table 5-3: Maximum Peak Hour Trips

SITE	PERMISSIBLE GFA (m^2)	AM PEAK IN	AM PEAK OUT	PM PEAK IN	PM PEAK OUT
X79 (Holding 5&6)	23271,6 m^2	107	49	57	99

The site layout plan for Lanseria X79 indicates an entrance and exit each with two lanes each. The warehouse yard areas will be closed-off during non-business hours (with large sliding gates) and the parking areas will be accessed with magnetic cards and boom systems. The gates and booms are located far into the property (> 60 meters), thus stacking distance on-site will not be an issue.

See the site layout plan included under **Annexure D** for detail pertaining to the accesses, which is side-road stop controlled and allows heavy vehicle movements.

6 INTERSECTION TRAFFIC ANALYSES

The following intersections were included in the traffic analysis:

1. Pelindaba Road (R512) / 6th Road (R552)
2. 6th Road (R552) / Middel Road

The following scenarios were analysed for the individual intersections and the proposed accesses:

- Scenario 1: 2024 Base Year Background Traffic Operating Conditions
- Scenario 2: 2029 Horizon Year Background Traffic Operating Conditions + Latent Traffic Operating Conditions
- Scenario 3: 2029 Horizon Year Background + Latent + Development Traffic Operating Conditions

The traffic volumes applied for each of the above analysis scenarios are captured in the following Figures presented in **Annexure E**:

- **Figure E-1:** 2024 Base Year – **AM** Background Traffic Counts
- **Figure E-2**: 2024 Base Year – **PM** Background Traffic Counts
- **Figure E-3**: 2029 Horizon Year – **AM** Background + Latent Traffic Volumes
- **Figure E-4**: 2029 Horizon Year – **PM** Background + Latent Traffic Volumes
- **Figure E-5**: 2029 Horizon Year – **AM** Background + Latent + Development Traffic Volumes
- **Figure E-6**: 2029 Horizon Year – **PM** Background + Latent + Development Traffic Volumes

The 2024 background weekday AM and PM peak-hour traffic volumes at the surveyed intersections were projected to 2029 using a 1% annual growth rate. This growth rate was derived as the average of the traffic volume growth observed from traffic counts undertaken in 2022 for Lanseria X11 and X12 TIA and the newly collected traffic counts data for the Holding 5 & 6 TIA.

A uniform heavy vehicle percentage of 5% was used for all traffic volumes in the analyses during the peak hours.

The traffic impact expected from the proposed development at the key intersections within the study area was determined using SIDRA Intersection 9, a traffic engineering software package. The SIDRA outputs are included under **Annexure F.**

6.1 Intersection 1: Pelindaba Road (R512) & 6th Road (R552)

The intersection of Pelindaba Road (R512) and 6th Road (R552) is currently a four-way stop-controlled intersection. In the Traffic Impact Assessment (TIA) conducted for the Lanseria X11 and X12 developments, both Gautrans and the Johannesburg Roads Agency (JRA) confirmed that the intersection will be upgraded to a signalised intersection, as per the Traffic Impact Study conditions of 10 October 2023 (approval letter provided in **Annexure G**). Therefore, it is assumed that the conversion from stop-control to traffic signals is already in place, and Scenario 1 for the base year background traffic operations reflects the operation of a signalised intersection. In this regard it should be noted that the services agreements for Lanseria X11 and X12 is currently in progress. The signal settings used in the analysis are based on the optimised timing plans generated by the SIDRA analysis software. The configuration of the signal-controlled intersection is as per **Figure 6-1**:

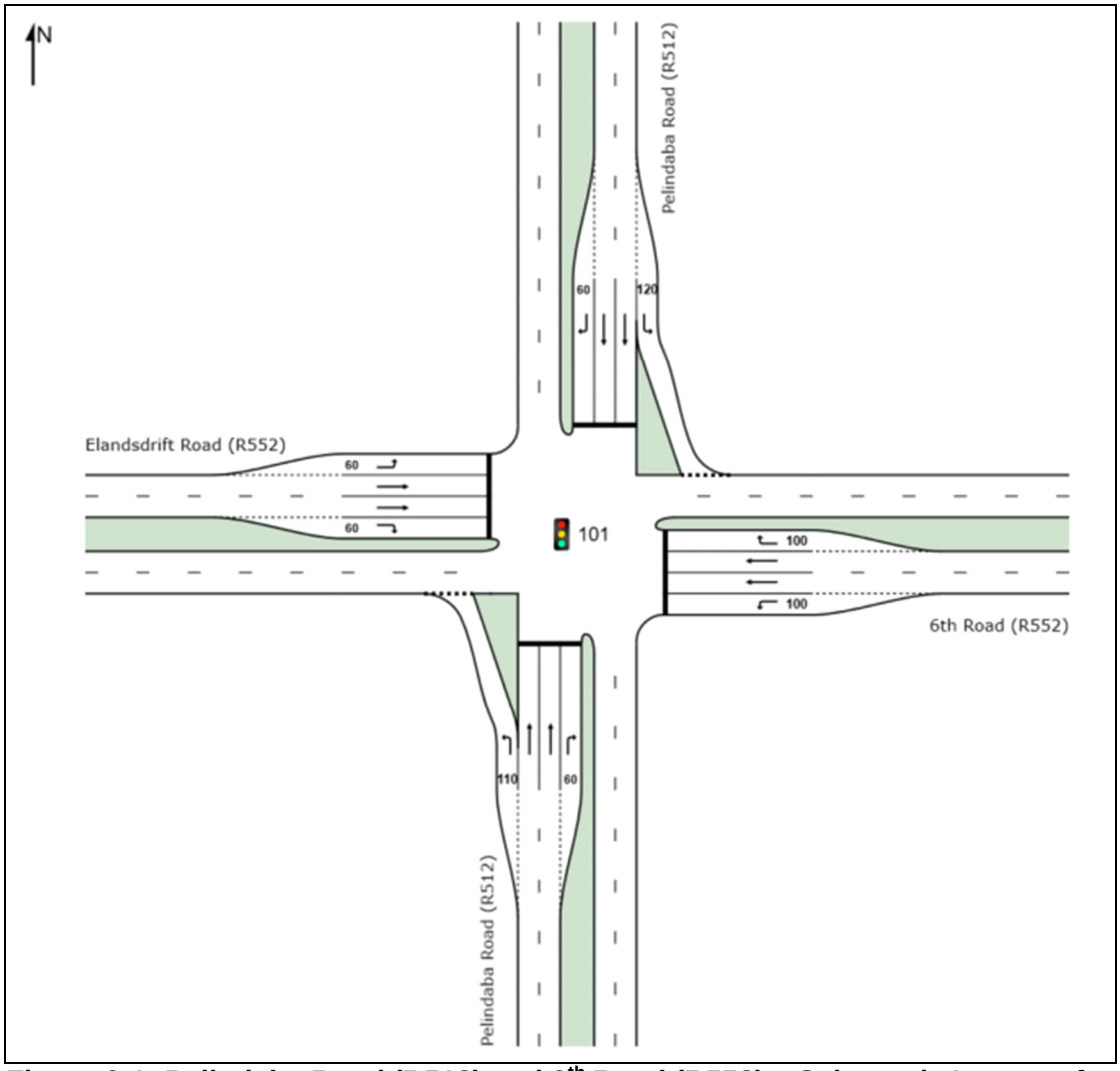


Figure 6-1: Pelindaba Road (R512) and 6th Road (R552) – Schematic Layout of Existing Intersection Geometry, Signalised.

6.1.1 2024 Base Year Background Traffic Operating Conditions

The 2024 existing base year traffic operating conditions for the intersection of Pelindaba Road (R512) & 6th Road (R552) are set out in **Table 6-1** and **Table 6-2,** taking into consideration the conversion of the four-way stop-controlled intersection to a traffic signal-controlled intersection:

Table 6-1: 2024 AM Base Year Background Traffic Operating Conditions – Existing Background Traffic (existing geometry with signalisation)

Approach	Movement	V/C	Delay (s)	LOS
South: Pelindaba Road (R512)	Left	0,008	7,3	LOS A
	Through	0,891	34	LOS C
	Right	0,535	17,3	LOS B
East: 6th Road (R552)	Left	0,47	35,4	LOS D
	Through	0,039	27,6	LOS C
	Right	0,708	28,4	LOS C
North: Pelindaba Road (R512)	Left	0,242	9,6	LOS A
	Through	0,467	21,3	LOS C
	Right	0,008	17	LOS B
West: Elandsdrift Road (R552)	Left	0,241	34,5	LOS C
	Through	0,139	28,3	LOS C
	Right	0,12	23,7	LOS C
Intersection		**0,891**	**26,1**	**LOS C**

Table 6-2: 2024 PM Base Year Background Operating Conditions – Existing Background Traffic (existing geometry with signalisation)

Approach	Movement	V/C	Delay (s)	LOS
South: Pelindaba Road (R512)	Left	0,051	7,4	LOS A
	Through	0,334	19	LOS B
	Right	0,224	19,2	LOS B
East: 6th Road (R552)	Left	0,572	33,5	LOS C
	Through	0,216	37,2	LOS D
	Right	0,615	29	LOS C
North: Pelindaba Road (R512)	Left	0,23	7,8	LOS A
	Through	0,595	21,3	LOS C
	Right	0,114	17,1	LOS B
West: Elandsdrift Road (R552)	Left	0,161	42,6	LOS D
	Through	0,111	36,5	LOS D
	Right	0,156	26,4	LOS C
Intersection		**0,615**	**21,9**	**LOS C**

Conclusion Scenario 1: The SIDRA capacity analyses indicate that the intersection will be able to accommodate the 2024 background traffic demand as traffic signal-controlled intersection. The SIDRA analyses outputs and optimised signal settings' phasing summaries are attached in **Annexure F.**

6.1.2 2029 Horizon Year Background + Latent Traffic Operating Conditions

No road upgrades were proposed at the intersection of Pelindaba Road (R512) & 6th Road (R552) by any of the latent developments other than the conversion of the intersection form a stop-controlled to a signalised intersection.

The 2029 horizon year background and latent traffic operating conditions are set out in **Table 6-3** and **Table 6-4** below taking into consideration the conversion of the four-way stop-controlled intersection to a traffic signal-controlled intersection:

Table 6-3: 2029 AM Horizon Year + Latent Traffic Operating Conditions – (existing geometry with signalisation)

Approach	Movement	V/C	Delay (s)	LOS
South: Pelindaba Road (R512)	Left	0,007	5,8	LOS A
	Through	0,814	18,9	LOS B
	Right	0,969	55	LOS D
East: 6th Road (R552)	Left	0,194	13,4	LOS B
	Through	0,033	20,8	LOS C
	Right	0,857	42,6	LOS D
North: Pelindaba Road (R512)	Left	0,562	20,9	LOS C
	Through	0,617	31,7	LOS C
	Right	0,011	38,6	LOS D
West: Elandsdrift Road (R552)	Left	0,379	52,3	LOS D
	Through	0,397	46,6	LOS D
	Right	0,304	51,6	LOS D
Intersection		**0,969**	**29,4**	**LOS C**

Table 6-4: 2029 PM Horizon Year + Latent Traffic Operating Conditions – (existing geometry with signalisation)

Approach	Movement	V/C	Delay (s)	LOS
South: Pelindaba Road (R512)	Left	0,048	6	LOS A
	Through	0,352	11,2	LOS B
	Right	0,735	31,8	LOS C
East: 6th Road (R552)	Left	0,522	21,9	LOS C
	Through	0,088	23	LOS C
	Right	0,944	58,5	LOS E
North: Pelindaba Road (R512)	Left	0,44	9,6	LOS A
	Through	0,939	49	LOS D
	Right	0,093	25,4	LOS C
West: Elandsdrift Road (R552)	Left	0,214	54,2	LOS D
	Through	0,274	48,8	LOS D
	Right	0,515	55,5	LOS E
Intersection		**0,944**	**32,4**	**LOS C**

Conclusion Scenario 2: The SIDRA capacity analyses indicate that the intersection will operate at acceptable level of services in the AM and PM peak periods with the installation of a traffic signal at the intersection of Pelindaba Road (R512) & 6th Road (R552) and therefore no additional road upgrades are required to accommodate the 2029 horizon year background + latent traffic demand, other than the installation of a

traffic signal. The SIDRA analyses outputs and optimised signal settings' phasing summaries are attached in **Annexure F.**

6.1.3 2029 Horizon Year Background + Latent + Development Traffic Demand

The estimated operating conditions for the 2029 Horizon Year Background + Latent + Development traffic scenario, taking into consideration the traffic signal required to accommodate the background traffic demand, are indicated in **Table 6-5** and **Table** 6-6 below:

Table 6-5: 2029 AM Horizon Year + Latent + Development Traffic Operating Conditions – (existing geometry with signalisation)

Approach	Movement	V/C	Delay (s)	LOS
South: Pelindaba Road (R512)	Left	0,007	6	LOS A
	Through	0,707	10,6	LOS B
	Right	0,838	29,5	LOS C
East: 6th Road (R552)	Left	0,304	13,6	LOS B
	Through	0,2	33,5	LOS C
	Right	0,881	50,5	LOS D
North: Pelindaba Road (R512)	Left	0,537	17,7	LOS B
	Through	0,881	41,8	LOS D
	Right	0,01	32,6	LOS C
West: Elandsdrift Road (R552)	Left	0,316	43,4	LOS D
	Through	0,348	37,8	LOS D
	Right	0,279	43,2	LOS D
Intersection		**0,881**	**24,7**	**LOS C**

Table 6-6: 2029 PM Horizon Year + Latent + Development Traffic Operating Conditions – (existing geometry with signalisation)

Approach	Movement	V/C	Delay (s)	LOS
South: Pelindaba Road (R512)	Left	0,049	6,1	LOS A
	Through	0,345	12,2	LOS B
	Right	0,866	48,2	LOS D
East: 6th Road (R552)	Left	0,614	28	LOS C
	Through	0,189	28,4	LOS C
	Right	0,52	39,1	LOS D
North: Pelindaba Road (R512)	Left	0,512	11,3	LOS B
	Through	0,907	44,7	LOS D
	Right	0,088	26,3	LOS C
West: Elandsdrift Road (R552)	Left	0,041	32,4	LOS C
	Through	0,054	26,9	LOS C
	Right	0,524	58,4	LOS E
Intersection		**0,907**	**30,7**	**LOS C**

Conclusion Scenario 3: The SIDRA capacity analyses indicate that the intersection will operate at acceptable level of services in the AM and PM peak periods with the installation of a traffic signal at the intersection of Pelindaba Road (R512) & 6th Road (R552). No additional road upgrades are required to accommodate the development

traffic demand. The SIDRA analyses outputs and optimised signal settings' phasing summaries are attached in **Annexure F.**

6.2 Intersection of Middel Road & 6th Road (R552)

The intersection of Middel Road and 6th Road (R552) is currently a three-way stop-controlled intersection as seen in **Figure 6-2**:

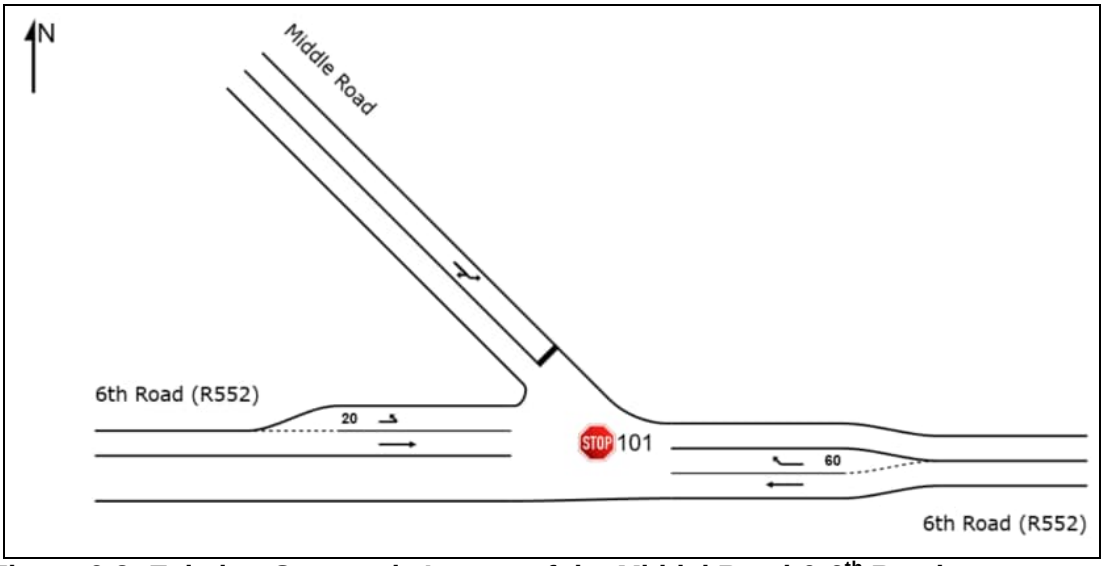


Figure 6-2: Existing Geometric Layout of the Middel Road & 6th Road Intersection

In the Traffic Impact Assessment (TIA) conducted for the Lanseria X11 and X12 developments, both Gautrans and the Johannesburg Roads Agency (JRA) confirmed that the intersection will be upgraded to a signalised intersection and additional geometric improvements will be incorporated, as per the Traffic Impact Study conditions of 10 October 2023 (as per TIA approval letter in **Annexure G**). Therefore, it is assumed that the conversion from stop-control to traffic signals including the additional geometric upgrades are already in place, and Scenario 1 for the base year background traffic operations reflects the operation of the signalised intersection with the upgraded geometry.

The signal settings used in the analysis are based on the optimised timing plans generated by the SIDRA analysis software.

The following geometric road upgrades were recommended at the intersection of Middel Road & 6th Road (R552) to accommodate left-and-right-turning vehicles' queues negatively effecting the main through movements along 6th Road (R552) that is a Class 2 Road:

- 6th Road (R552) western approach:
  - Extend the existing left-turn lane from 20m to 60m
- Middel Road north-western approach:
  - Additional left-turn lane 60m in extent

The configuration of the upgraded signal-controlled intersection is as per **Figure 6-3**:

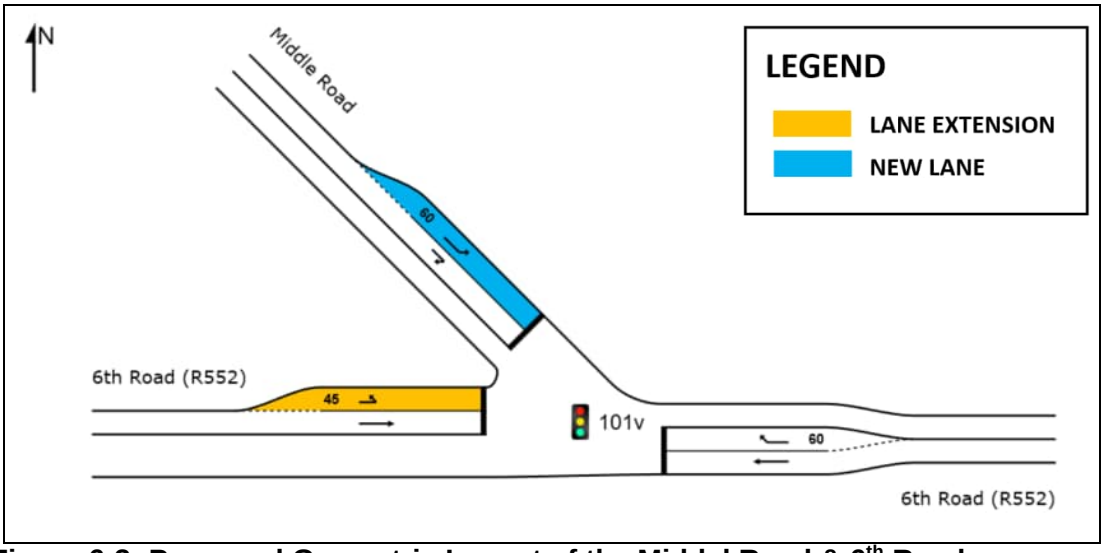


Figure 6-3: Proposed Geometric Layout of the Middel Road & 6th Road intersection (signalised)

6.2.1 2024 Base Year Background Traffic Operating Conditions

The 2024 existing base year traffic operating conditions for the intersection of Middel Road & 6th Road (R552) are set out in **Table 6-7** and **Table 6-8,** taking into consideration the conversion of the intersection to a traffic signal-controlled intersection with the inclusion of the geometric upgrades as indicated on **Figure 6-3**:

Table 6-7: 2024 AM Base Year Background Traffic Operating Conditions – Existing Background Traffic (upgraded geometry with signalisation)

Approach	Movement	V/C	Delay (s)	LOS
East: 6th Road (R552)	Through	0,236	3,2	LOS A
	Right	0,12	9,2	LOS A
NorthWest: Middle Road	Left	0,099	35,9	LOS D
	Right	0,312	38,7	LOS D
West: 6th Road (R552)	Left	0,119	9,4	LOS A
	Through	0,305	3,4	LOS A
Intersection		**0,312**	**6,7**	**LOS A**

Table 6-8: 2024 PM Base Year Background Traffic Operating Conditions – Existing Background Traffic (upgraded geometry with signalisation)

Approach	Movement	V/C	Delay (s)	LOS
East: 6th Road (R552)	Through	0,389	6,8	LOS A
	Right	0,049	12,3	LOS B
NorthWest: Middle Road	Left	0,077	26,6	LOS C
	Right	0,368	29,8	LOS C
West: 6th Road (R552)	Left	0,054	11,8	LOS B
	Through	0,306	6,3	LOS A
Intersection		**0,389**	**10,2**	**LOS B**

Conclusion Scenario 1: The SIDRA capacity analyses indicate that the intersection will be able to accommodate the 2024 background traffic demand as traffic signal-controlled intersection with additional geometric upgrades. The SIDRA analyses outputs and optimised signal settings' phasing summaries are attached in **Annexure F.**

6.2.2 2029 Horizon Year Background + Latent Traffic Operating Conditions

The 2029 horizon year background and latent traffic operating conditions are set out in **Table 6-9** and **Table 6-10** below taking into consideration the conversion of the upgrading and signalisation of the intersection:

Table 6-9: 2029 AM Horizon Year + Latent Traffic Operating Conditions – (upgraded geometry with signalisation)

Approach	Movement	V/C	Delay (s)	LOS
East: 6th Road (R552)	Through	0,392	4,9	LOS A
	Right	0,868	38,3	LOS D
NorthWest: Middle Road	Left	0,393	32,3	LOS C
	Right	0,798	39,4	LOS D
West: 6th Road (R552)	Left	0,376	11,4	LOS B
	Through	0,53	5,6	LOS A
Intersection		**0,868**	**14,3**	**LOS B**

Table 6-10: 2029 PM Horizon Year + Latent Traffic Operating Conditions – (upgraded geometry with signalisation)

Approach	Movement	V/C	Delay (s)	LOS
East: 6th Road (R552)	Through	0,749	14,2	LOS B
	Right	0,525	26,4	LOS C
NorthWest: Middle Road	Left	0,334	23,1	LOS C
	Right	0,754	30,2	LOS C
West: 6th Road (R552)	Left	0,242	15,8	LOS B
	Through	0,728	13,3	LOS B
Intersection		**0,754**	**18,2**	**LOS B**

Conclusion Scenario 2: The SIDRA capacity analyses indicate that the intersection will operate at acceptable level of services in the AM and PM peak periods with the installation of a traffic signal and additional geometric upgrades at the intersection of Middel Road & 6th Road (R552) and therefore no additional road upgrades are required to accommodate the 2029 horizon year background + latent traffic demand. The SIDRA analyses outputs and optimised signal settings' phasing summaries are attached in **Annexure F.**

6.2.3 2029 Horizon Year Background + Latent + Development Traffic Demand

The operating conditions for the 2029 Horizon Year Background + Latent + Development Traffic scenario are indicated in **Table 6-11** and **Table 6-12** below:

Table 6-11: 2029 AM Horizon Year + Latent + Development Traffic Operating Conditions – (upgraded geometry with signalisation)

Approach	Movement	V/C	Delay (s)	LOS
East: 6th Road (R552)	Through	0,379	4,9	LOS A
	Right	0,856	29,7	LOS C
NorthWest: Middle Road	Left	0,453	36,8	LOS D
	Right	0,897	50,8	LOS D
West: 6th Road (R552)	Left	0,566	19,1	LOS B
	Through	0,969	44,1	LOS D
Intersection		**0,969**	**28,6**	**LOS C**

Table 6-12: 2029 PM Horizon Year + Latent + Development Traffic Operating Conditions – (upgraded geometry with signalisation)

Approach	Movement	V/C	Delay (s)	LOS
East: 6th Road (R552)	Through	0,794	16,8	LOS B
	Right	0,71	29,5	LOS C
NorthWest: Middle Road	Left	0,385	19,7	LOS B
	Right	0,83	30	LOS C
West: 6th Road (R552)	Left	0,328	16,7	LOS B
	Through	0,822	18,2	LOS B
Intersection		**0,83**	**20,6**	**LOS C**

Conclusion Scenario 3: The SIDRA capacity analyses indicate that the intersection will operate at acceptable level of services in the AM and PM peak periods with the installation of a traffic signal and additional geometric upgrades at the intersection of Middel Road & 6th Road (R552) and therefore no additional road upgrades are required to accommodate the 2029 horizon year background + latent + development traffic demand. The SIDRA analyses outputs and optimised signal settings' phasing summaries are attached in **Annexure F.**

6.3 Intersection of Preller Drive & Extension 79 Access

A side-road stop-controlled access is proposed along Preller Drive for Lanseria Extension 79.

The proposed access is schematically shown on **Figure 6-4** below:

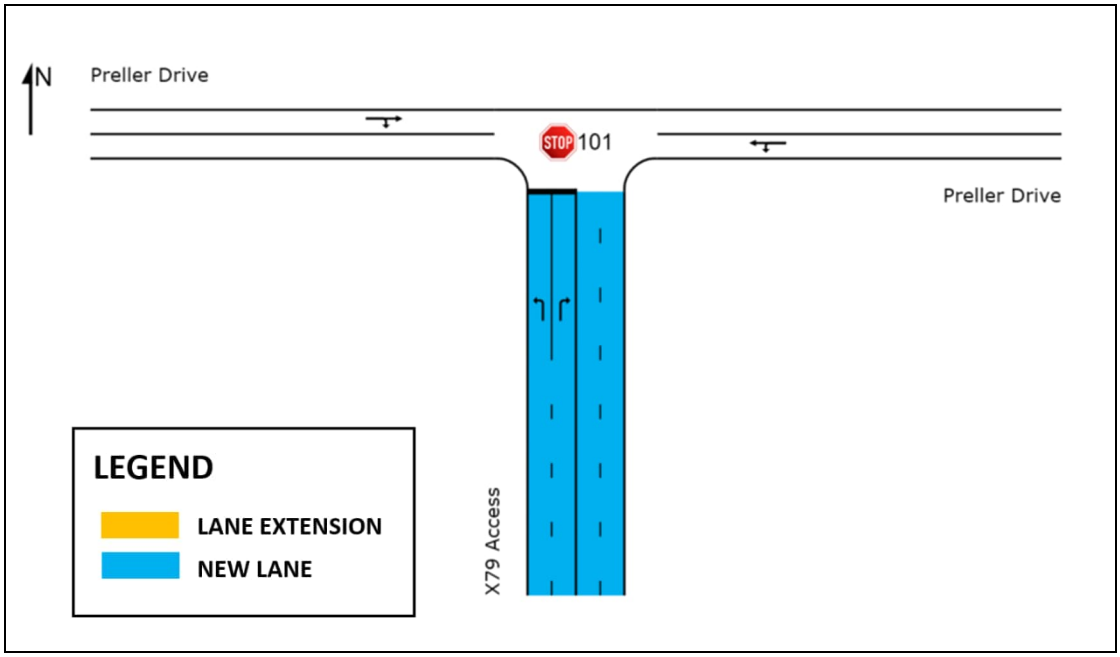


Figure 6-4: Proposed Geometric Access Intersection Layout

It is only required to analyse Scenario 3 for the access intersection as discussed in the following section:

6.3.1 2029 Horizon Year Background + Latent + Development Traffic Demand

The operating conditions for the 2029 Horizon Year Background + Latent + Development Traffic scenario for the proposed intersection of Preller Drive & Extension 79 Access are indicated in **Table 6-13** and **Table 6-14** below:

Table 6-13: 2029 AM Horizon Year + Latent + Development Traffic Operating Conditions – (proposed access)

Approach	Movement	V/C	Delay (s)	LOS
South: X79 Access	Left	0,001	9,9	LOS A
	Right	0,145	15	LOS C
East: Preller Drive	Left	0,361	5,6	LOS A
	Through	0,361	0	LOS A
West: Preller Drive	Through	0,141	0	LOS A
	Right	0,141	9,6	LOS A
Intersection		**0,361**	**1,5**	**NA**

Table 6-14: 2029 PM Horizon Year + Latent + Development Traffic Operating Conditions – (proposed access)

Approach	Movement	V/C	Delay (s)	LOS
South: X79 Access	Left	0,001	8	LOS A
	Right	0,274	15,5	LOS C
East: Preller Drive	Left	0,183	5,6	LOS A
	Through	0,183	0	LOS A
West: Preller Drive	Through	0,287	0	LOS A
	Right	0,287	7,4	LOS A
Intersection		**0,287**	**2**	**NA**

The SIDRA capacity analyses indicate that the intersection will operate at acceptable level of services in the AM and PM peak periods for the proposed intersection of Preller Drive & the Extension 79 Access. The SIDRA analyses outputs are attached in **Annexure F.**

7 NON-MOTORISED & PUBLIC TRANSPORT

7.1 Existing Public Transport Services

Public transport services are currently being provided by means of minibus taxis in the proximity to the development site. The service is provided along Pelindaba Road (R512) and 6th Road (R552). This is one of the most common forms of public transport in this area.

The surrounding area has a lack of lay-by facilities for public transport modes.

The external intersections' pedestrian facilities within the vicinity of the development site are as follows:

- Full pedestrianised intersections at:
    - 6th Road (R552) & Pelindaba Road (R512)
- Pedestrian across Middel Road at the Kwena Molapo High School on the corner of Middel Road and 6th Road (R552)

It is proposed that the applicants of Lanseria Holdings 5 & 6 Sunrella provide walkways along the site boundaries on Preller Drive. Parking bays 1, 2 and 3 at the guardhouse of the development entrance (refer to Site Layout Plan of **Annexure D**) will be utilised as a taxi drop-off facility. Provision is made also for a taxi lay-by along Main Road should it be required.

It is also proposed that taxi lay-bys be provided along 6th Road (R552) at locations where the service is required.

8 CONCLUSIONS

The following conclusions can be made from the Traffic Impact Study:

- This TIA forms part of township establishment application for the proposed Lanseria Extension 79 for “Industrial 3” zoning rights.
- The development site, Lanseria Extension (X) 79 is situated on Sunrella Agricultural Holdings no. 5 & 6. The proposed developments are situated south of Lanseria International Airport. The development is adjacent to Preller Drive (northern boundary), Middel Road (eastern boundary) and the Lanseria International Airport (western boundary).
- The development sites for Lanseria X79 is currently zoned agricultural with an extent of 38 790m².
- The township establishment application for Lanseria Extension 79 will allow for “Industrial 3” zoning rights. The permissible gross floor areas for Lanseria X79 will be 23 274m² floor area with subservient Office floor area restricted to 2500m².
- Latent developments of Lanseria X7, X11, X12 and Lanseria X32 were taken into account for this study.
- Lanseria X79 will obtain access from Preller Drive. The access will operate as a side-road stop-controlled intersection.
- The GLMP framework as it currently stands, indicates that the proposed Lanseria X79 be able to obtain access from two separate locations **in future**:
    - Via a new proposed road between Boeing Street and the extended Preller Road to the south-east connecting to the primary road network (Pelindaba Road R512)
    - Via Preller Road and Middel Road north connecting to the secondary road network south of Lanseria Airport
- A total of 156 AM peak hour and 156 PM peak hour development trips will be added to the external road network as a result of the proposed developments on Lanseria Extension 79.
- The parking provisions for Lanseria Extension 79 are as follows, with the application of a reduced parking ratio:

SITE	LAND-USE	PARKING RATE PROPOSED	GFA (m²)*	REQUIREMENT
Extension 79	Warehouse	0,5 bays per 100m²	15988 m²	80 bays
	Office	1 bays per 100m²	1807 m²	18 bays
	Total		**17795 m²**	**98 bays**

- 98 parking bays are provided for on the site layout plans (**Annexure D**) for Lanseria Extension 79. 18 loading bays are proposed for the warehouse developments on Lanseria Extension 79.
- Sufficient stacking distance is provided at the access of the proposed X79 development (>60m).
- The capacity analyses indicate:
    - Pelindaba Road (R512) / 6th Road (R552) intersection
        - The intersection will be converted to a traffic signal that can accommodate the 2024 background traffic demand

        - If the intersection is converted to a traffic signal-controlled intersection, the intersection will be able to accommodate the development traffic. No additional road upgrades are required as a result of the development traffic
    - 6th Road (R552) / Middel Road intersection
        - With the addition of the latent development traffic, road upgrades are required at this intersection to accommodate the latent development traffic demand.
        - By making changes to the intersection layout, signal settings as well as signal layout, the development traffic can be accommodated.
- The surrounding area has a lack of lay-by facilities for public transport modes.

9 RECOMMENDATIONS

It is recommended that the traffic impact study be approved with the following road improvements:

- The applicants provide lay-by's (drop-off facilities) along 6th Road (R552) where required.
- The applicants provide walkways along the boundary of the proposed development on Preller Drive (up to the development access).

It is proposed that after township establishment approval of Lanseria X79, the township layout plans as well as access positions will be shared with the project managers (Gapp Architects) of the GLMP framework to ensure that a road network be preserved for the townships in future.

The road upgrades *responsibilities* will be addressed in the roads and stormwater services reports and subsequently in the Service Level Agreements.

Yours sincerely

ANNERI MARITZ

PR. ENG. (202401861)

Annexure A: 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 B: Draft 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.

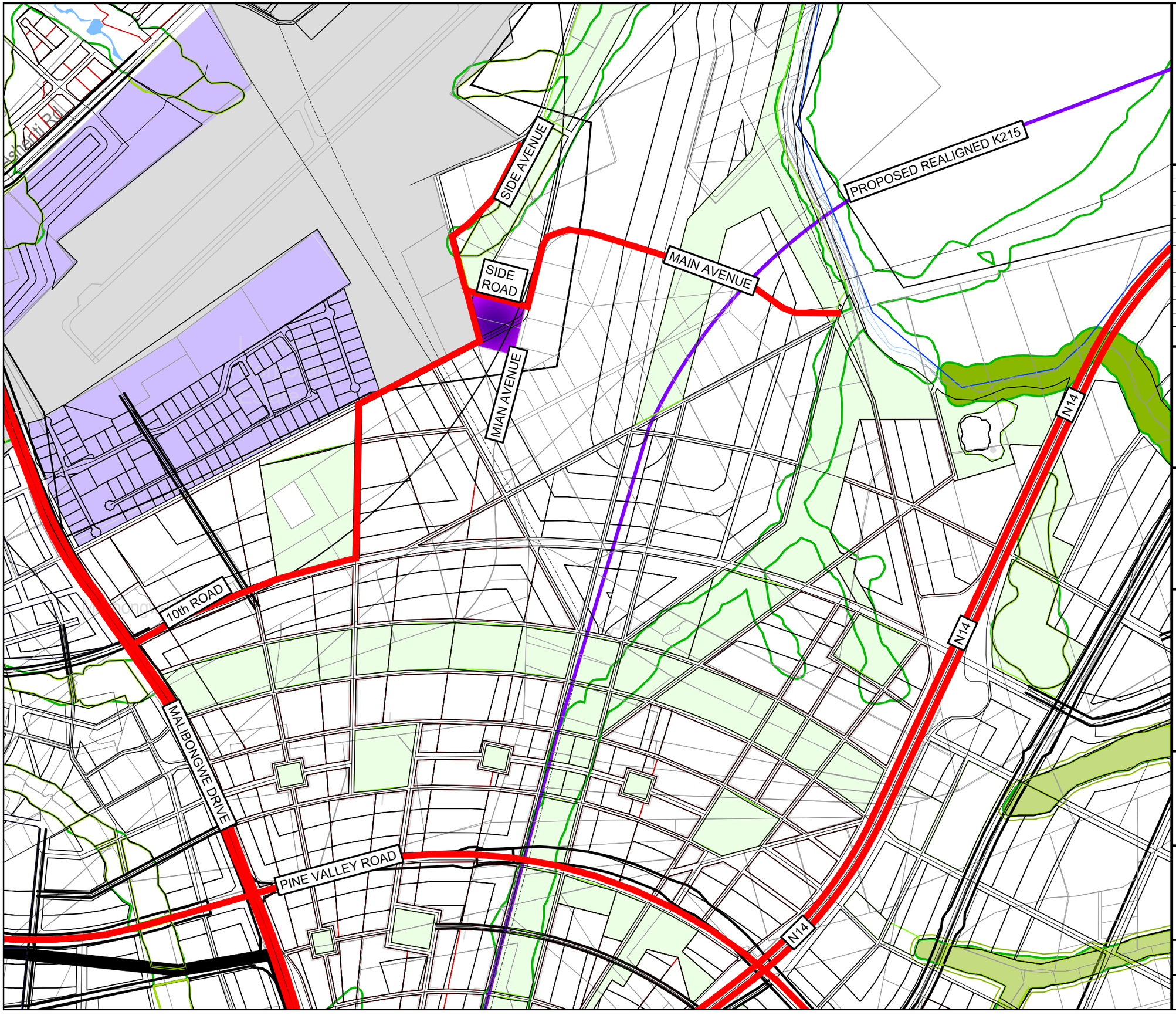
5. CONDITIONS TO BE INCORPORATED IN THE TOWN PLANNING SCHEME IN TERMS OF SECTION 54 OF THE BY-LAW, IN ADDITION TO THE PROVISIONS OF THE CITY OF JOHANNESBURG LAND USE SCHEME, 2018.

(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: 0.5 bays per 100m^2 Offices: 1 bays per 100m^2
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 C: Greater Lanseria Masterplan – Access to Development Site



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	02/12/'24	FOR INFORMATION	JDV

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:

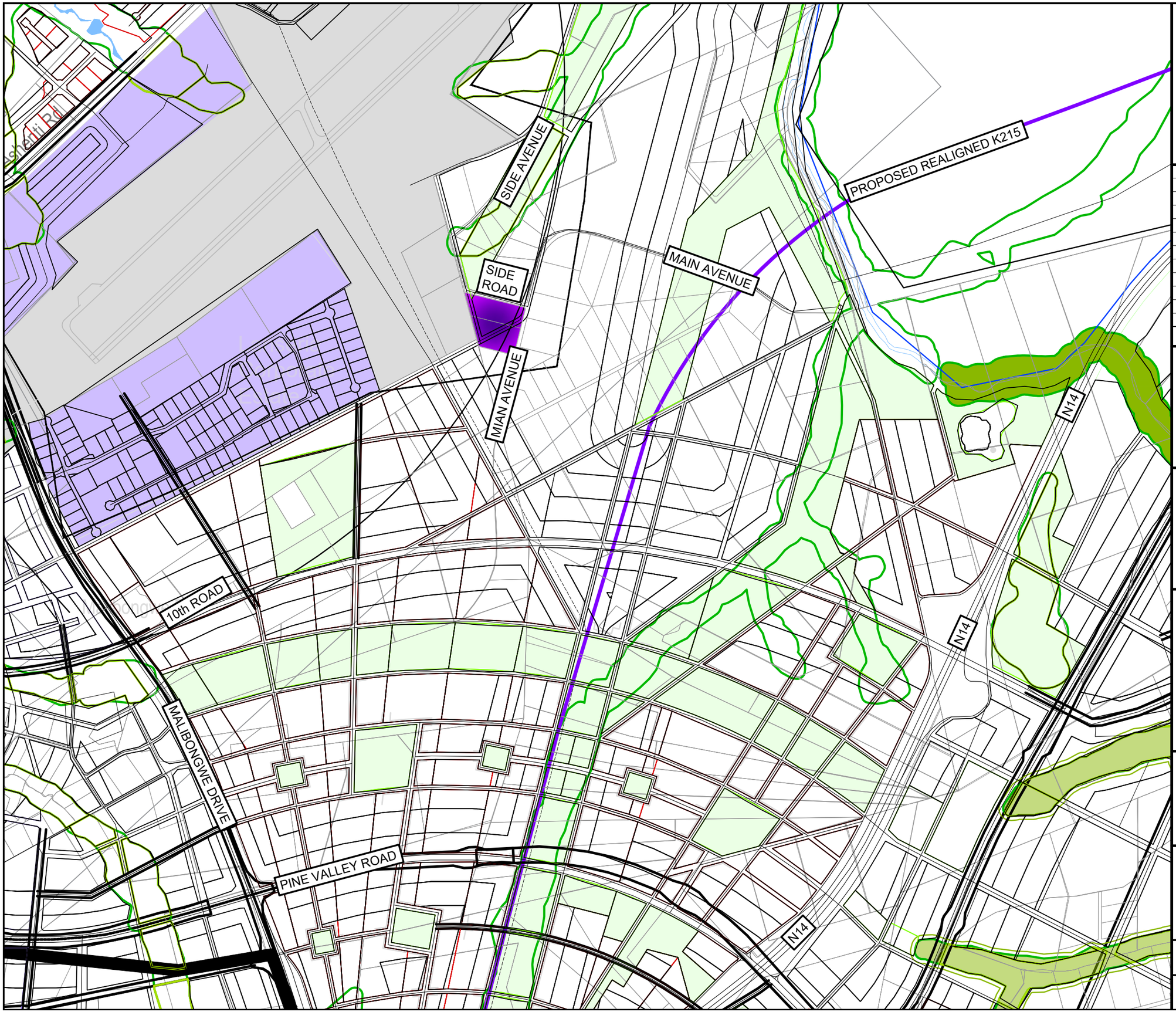
LANSERIA EXTENSION 79

Description:

GREATER LANSERIA MASTERPLAN 2

Paper size:	Drawn:	Checked:	Designed:
A3	JDHV	AM	AM

Scale:	Project Number:	Drawing Number:	Revision:
5000	2024-312	0022	A



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Rev. No:	Date:	Revision Details:	By:
A	02/12/'24	FOR INFORMATION	JDV

Client:

Architect:

e•d•s

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Project:

LANSERIA EXTENSION 79

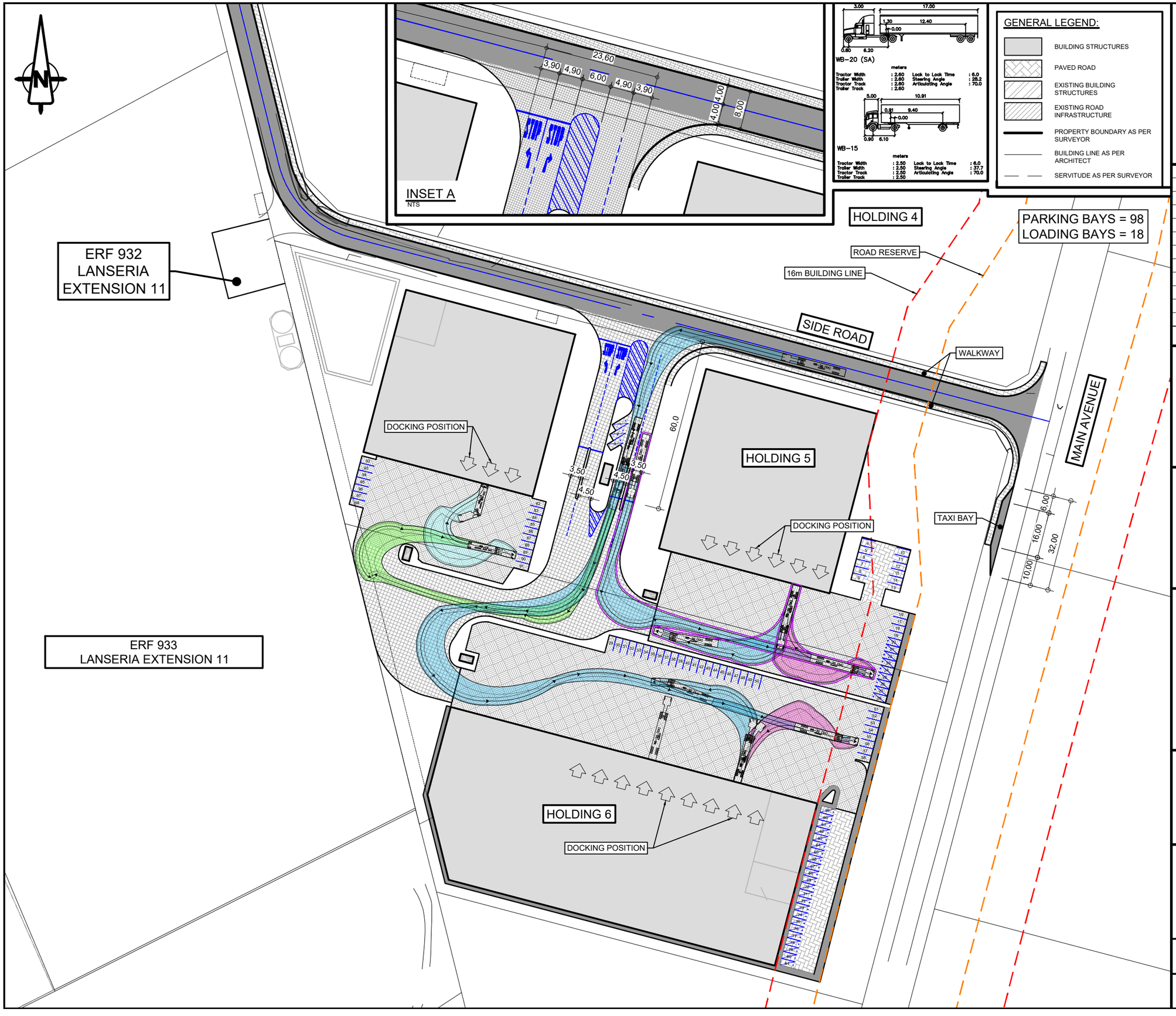
Description:

GREATER LANSERIA MASTERPLAN

Paper size:	Drawn:	Checked:	Designed:
A3	JDHV	AM	AM

Scale:	Project Number:	Drawing Number:	Revision:
5000	2024-312	0021	A

Annexure D: Site Layout Plan



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Rev. No:	Date:	Revision Details:	By:
D	06/02/'25	FOR INFORMATION	JB
C	20/01/'25	FOR INFORMATION	JB
B	16/01/'25	FOR INFORMATION	JB
A	14/01/'25	FOR INFORMATION	JB

Client:

GROWTHPOINT PROPERTIES

Architect:

empowered spaces architects

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e-mail: info@edseng.co.za

Project:

LANSERIA
EXTENSION 79

Description:

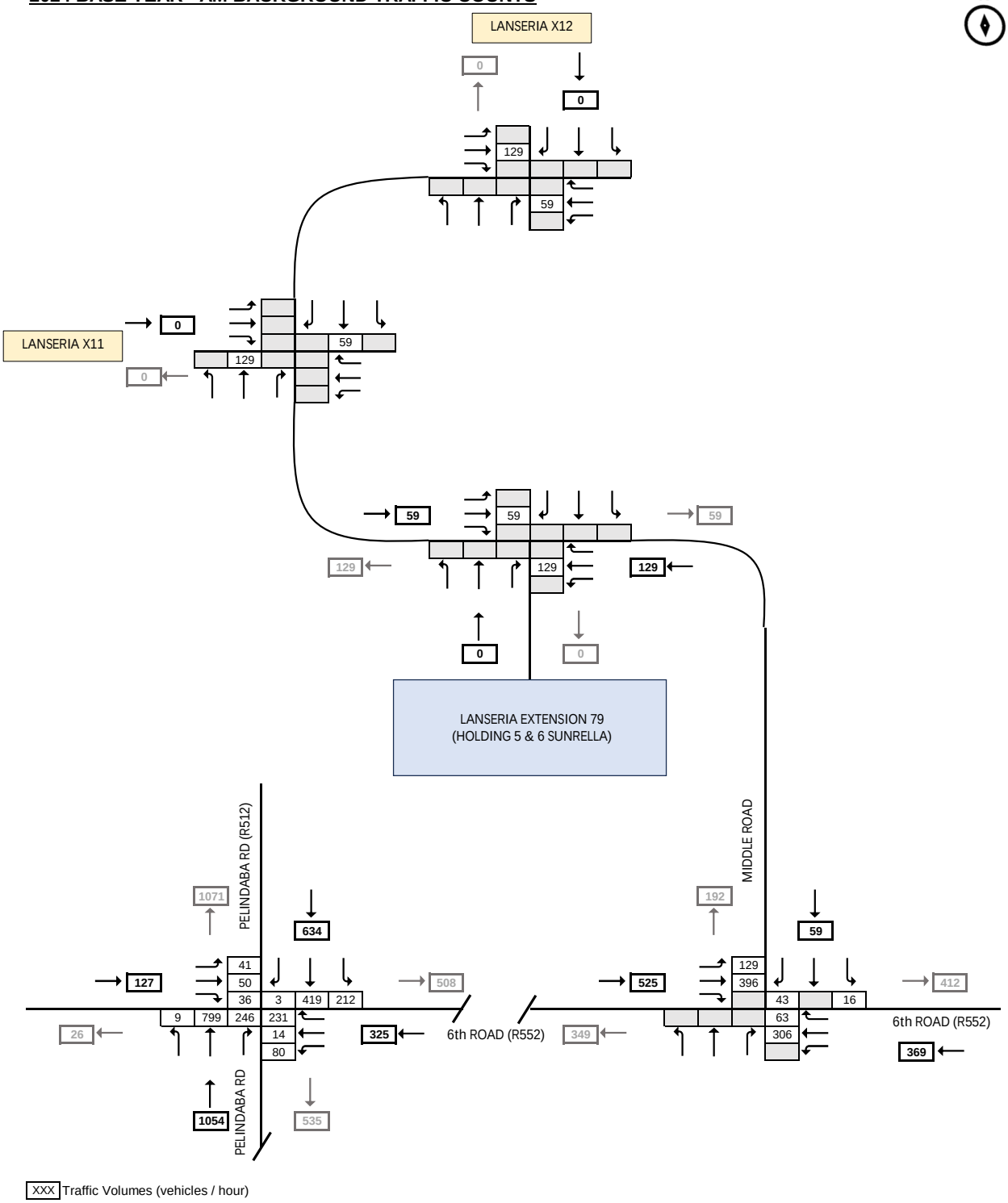
VEHICLE TRACKING, PARKING & ACCESS CONTROL (HOLDING 5 & 6)

Paper size:	Drawn:	Checked:	Designed:
A3	JB	PdL	DvdM

Scale:	Project Number:	Drawing Number:	Revision:
1250	2019-094	3073	D

Annexure E: Traffic Volumes for Analysis Scenarios

2024 BASE YEAR - AM BACKGROUND TRAFFIC COUNTS



XXX Traffic Volumes (vehicles / hour)

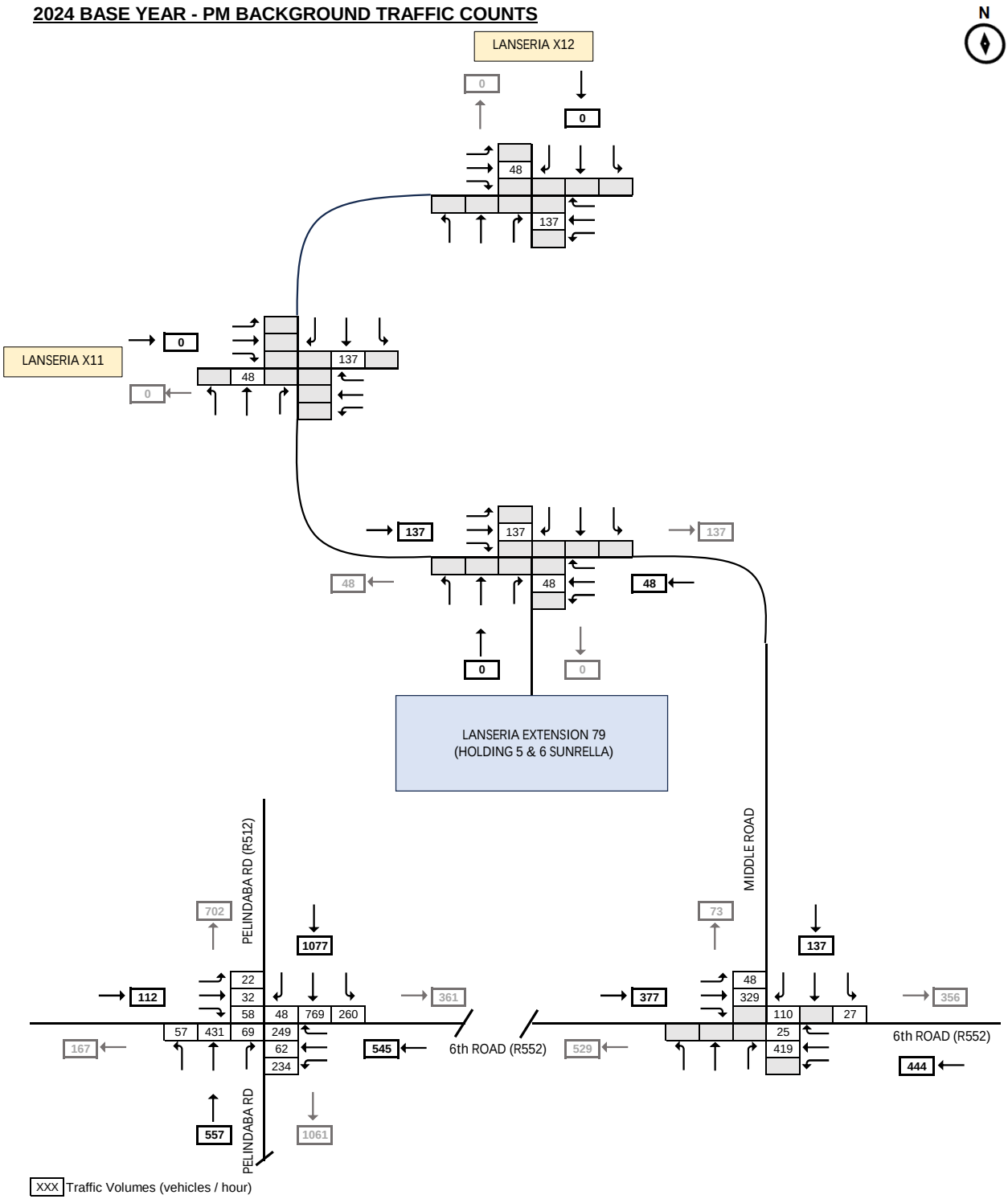
e•d•s Structural, Civil and Transportation Engineers

TRAFFIC IMPACT STUDY : LANSERIA HOLDINGS 5 & 6

2024 Base Year - AM Background Traffic Counts

Figure E-1

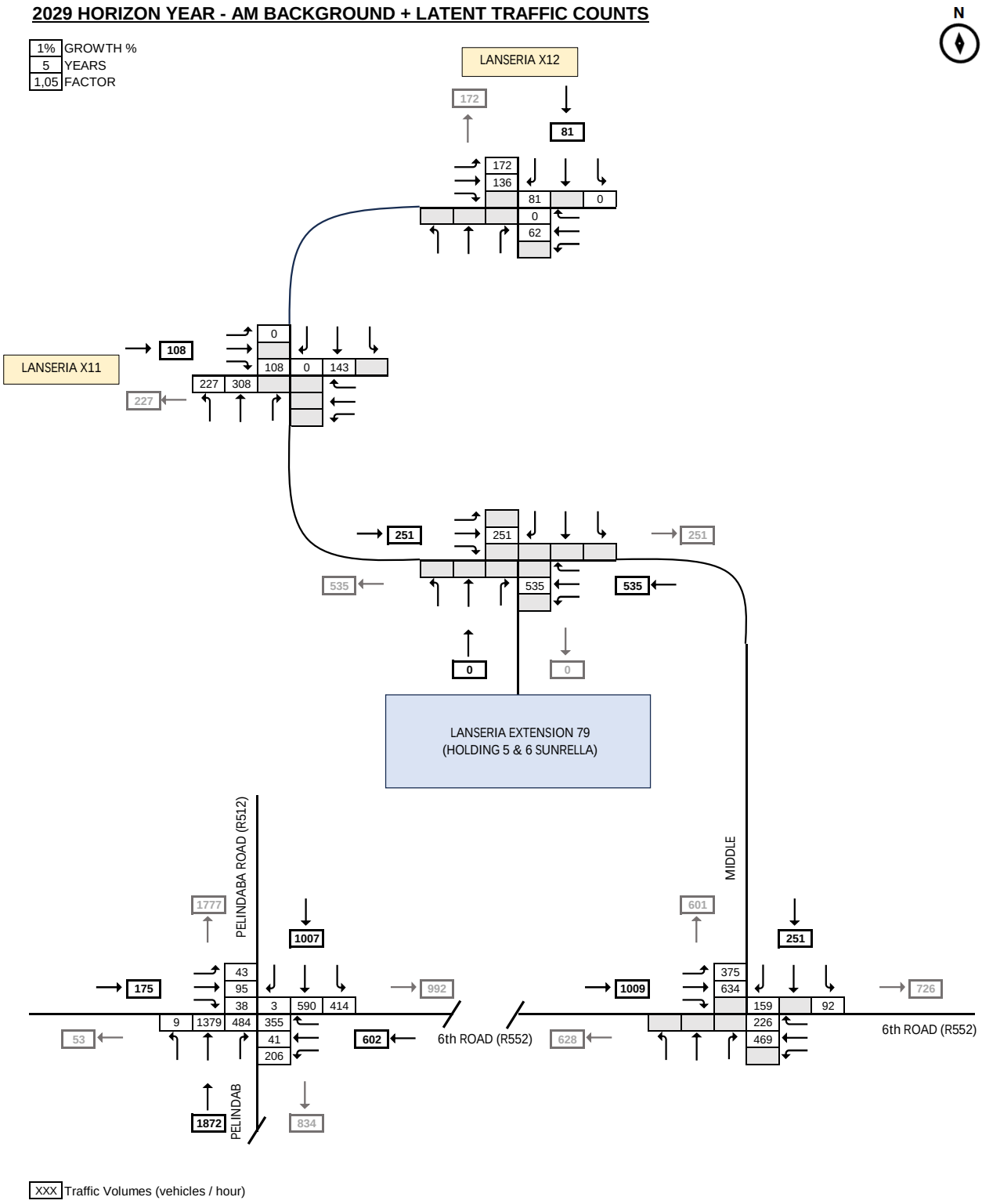
2024 BASE YEAR - PM BACKGROUND TRAFFIC COUNTS



TRAFFIC IMPACT STUDY : LANSERIA HOLDINGS 5 & 6
2024 Base Year - PM Background Traffic Counts

Figure E-2

2029 HORIZON YEAR - AM BACKGROUND + LATENT TRAFFIC COUNTS

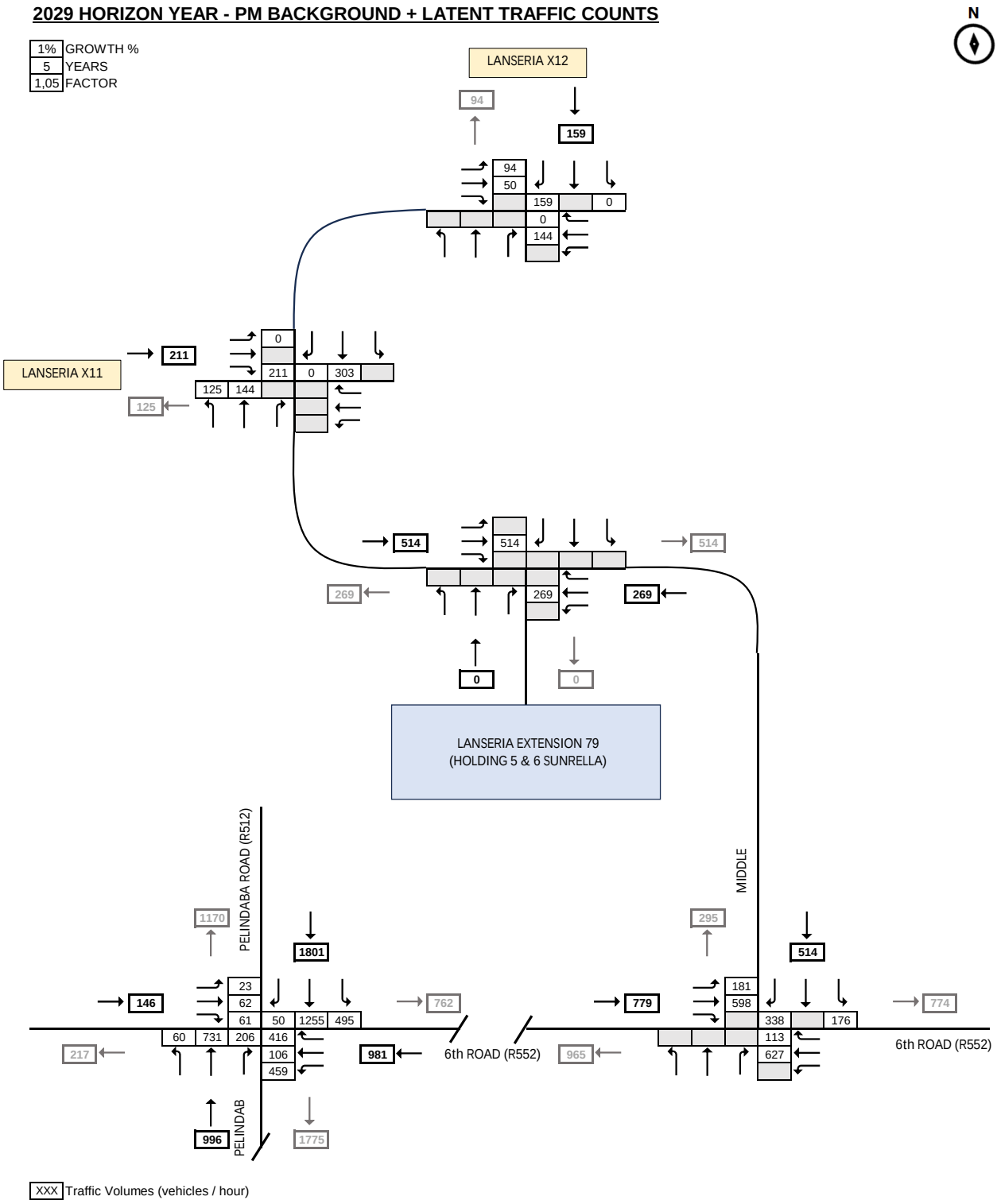


TRAFFIC IMPACT STUDY : LANSERIA HOLDINGS 5 & 6

2029 Horizon Year - AM Background + Latent Development Traffic Volumes

Figure E-3

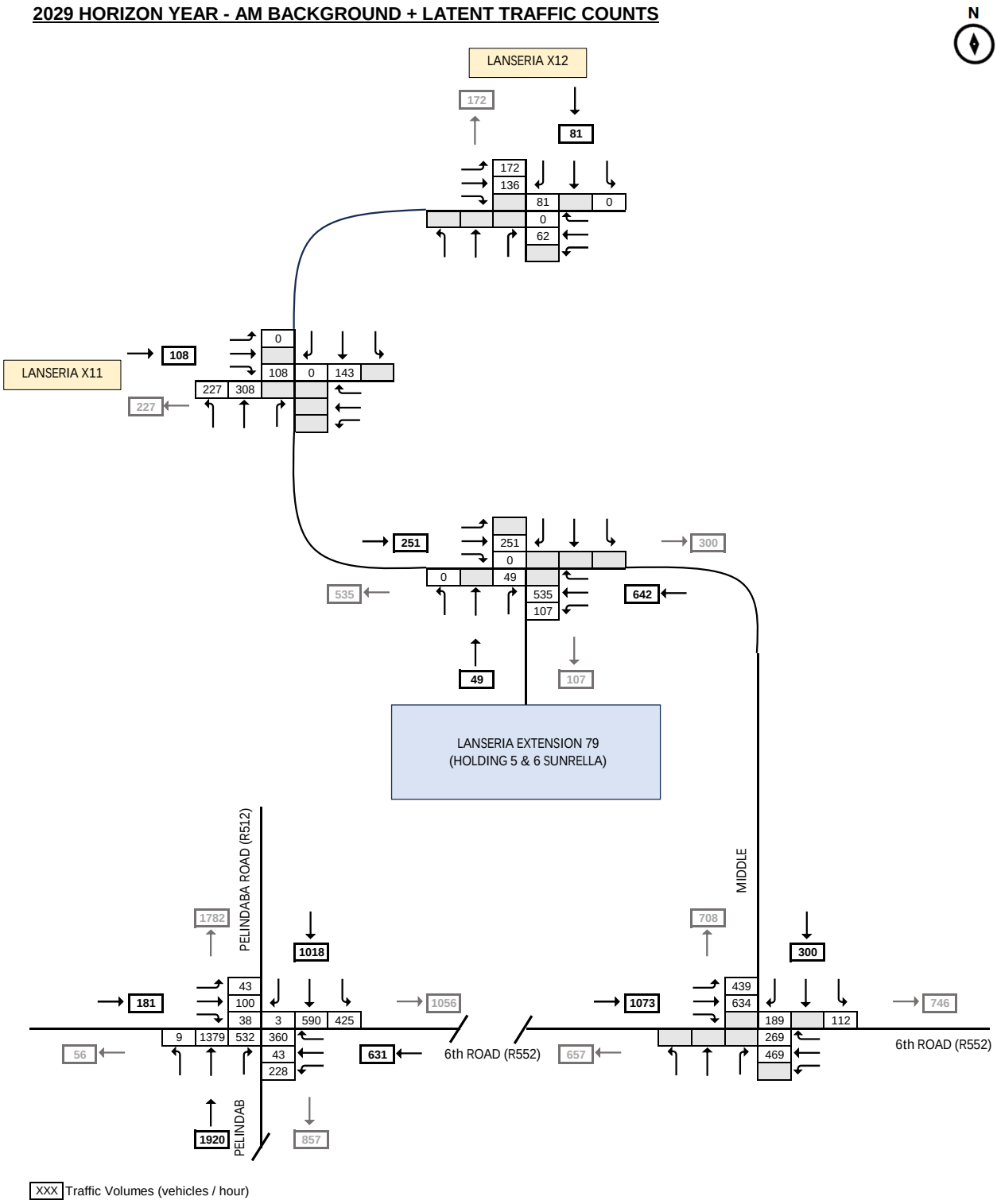
2029 HORIZON YEAR - PM BACKGROUND + LATENT TRAFFIC COUNTS



TRAFFIC IMPACT STUDY : LANSERIA HOLDINGS 5 & 6
2029 Horizon Year - PM Background + Latent Development Traffic Volumes

Figure E-4

2029 HORIZON YEAR - AM BACKGROUND + LATENT TRAFFIC COUNTS



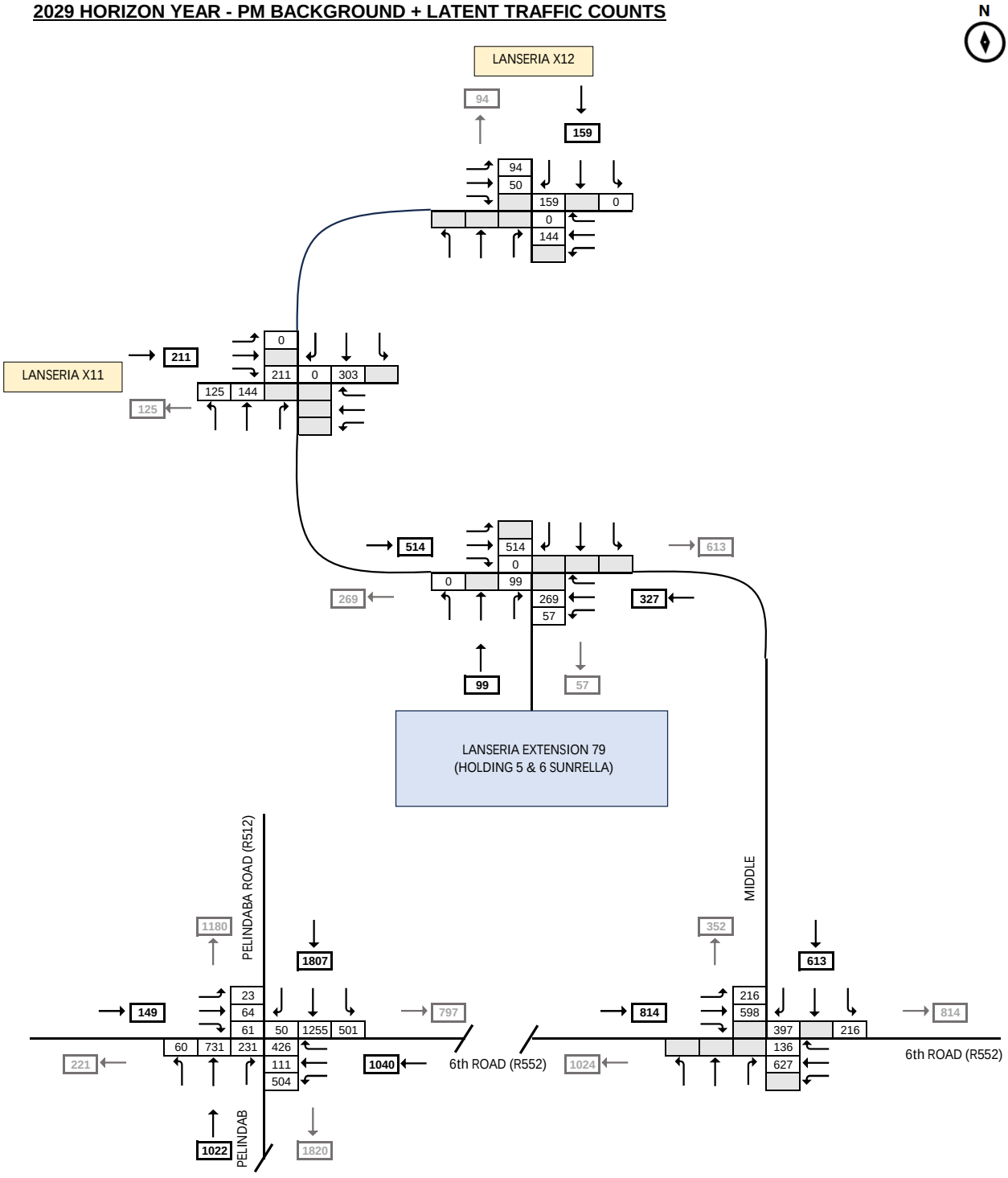
XXX Traffic Volumes (vehicles / hour)

TRAFFIC IMPACT STUDY : LANSERIA HOLDINGS 5 & 6

2029 Horizon Year - AM Background + Latent Development + Development Traffic Volumes

Figure E-5

2029 HORIZON YEAR - PM BACKGROUND + LATENT TRAFFIC COUNTS



XXX Traffic Volumes (vehicles / hour)

TRAFFIC IMPACT STUDY : LANSERIA HOLDINGS 5 & 6

2029 Horizon Year - PM Background + Latent Development + Development Traffic Volumes

Figure E-6

Annexure F: SIDRA Extracts of Intersection Analyses

1. Intersection of Pelindaba Road (R512) & 6th Road (R552)

MOVEMENT SUMMARY

Site: 101 [R552 & R512_2024 BY BACKGROUND (AM) (Signalised) (Site Folder: 2024 BASE YEAR BACKGROUND TRAFFIC)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 60 seconds (Site Optimum Cycle Time - Minimum Delay)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Pelindaba Road (R512)														
1	L2	9	5,0	9	5,0	0,008	7,3	LOS A	0,1	0,4	0,31	0,59	0,31	52,7
2	T1	799	5,0	841	5,0	*0,891	34,0	LOS C	15,1	110,0	1,00	1,08	1,40	38,6
3	R2	246	5,0	259	5,0	*0,535	17,3	LOS B	4,8	34,7	0,86	0,79	0,86	46,1
Approach		1054	5,0	1109	5,0	0,891	29,9	LOS C	15,1	110,0	0,96	1,01	1,26	40,2
East: 6th Road (R552)														
4	L2	80	5,0	84	5,0	*0,470	35,4	LOS D	2,5	18,5	0,98	0,76	0,98	37,2
5	T1	14	5,0	15	5,0	0,039	27,6	LOS C	0,2	1,5	0,93	0,61	0,93	41,4
6	R2	231	5,0	243	5,0	*0,708	28,4	LOS C	6,6	47,9	0,99	0,88	1,12	40,4
Approach		325	5,0	342	5,0	0,708	30,1	LOS C	6,6	47,9	0,99	0,84	1,08	39,6
North: Pelindaba Road (R512)														
7	L2	212	5,0	223	5,0	0,242	9,6	LOS A	2,3	16,9	0,51	0,69	0,51	51,1
8	T1	419	5,0	441	5,0	0,467	21,3	LOS C	5,7	41,5	0,90	0,74	0,90	44,5
9	R2	3	5,0	3	5,0	0,008	17,0	LOS B	0,0	0,3	0,82	0,61	0,82	46,2
Approach		634	5,0	667	5,0	0,467	17,4	LOS B	5,7	41,5	0,77	0,72	0,77	46,5
West: Elandsdrift Road (R552)														
10	L2	41	5,0	43	5,0	0,241	34,5	LOS C	1,3	9,2	0,96	0,73	0,96	37,6
11	T1	50	5,0	53	5,0	0,139	28,3	LOS C	0,7	5,5	0,94	0,67	0,94	41,1
12	R2	36	5,0	38	5,0	0,120	23,7	LOS C	0,9	6,2	0,88	0,71	0,88	42,6
Approach		127	5,0	134	5,0	0,241	29,0	LOS C	1,3	9,2	0,93	0,70	0,93	40,3
All Vehicles		2140	5,0	2253	5,0	0,891	26,1	LOS C	15,1	110,0	0,91	0,88	1,07	41,8

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

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PHASING SUMMARY

Site: 101 [R552 & R512_2024 BY BACKGROUND (AM) (Signalised) (Site Folder: 2024 BASE YEAR BACKGROUND TRAFFIC)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 60 seconds (Site Optimum Cycle Time - Minimum Delay)

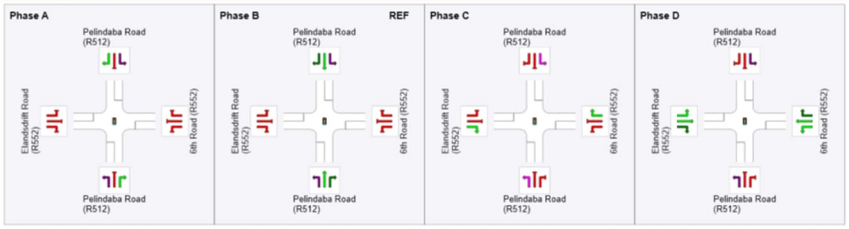
Timings based on settings in the Site Phasing & Timing dialog
Phase Times determined by the program
Phase Sequence: Leading Right Turn
Reference Phase: Phase B
Input Phase Sequence: A, B, C, D
Output Phase Sequence: A, B, C, D

Phase Timing Summary

Phase	A	B	C	D
Phase Change Time (sec)	45	0	21	33
Green Time (sec)	9	15	6	6
Phase Time (sec)	15	21	12	12
Phase Split	25%	35%	20%	20%

See the Timing Analysis report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Minor Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

Output Phase Sequence



MOVEMENT SUMMARY

Site: 101 [R552 & R512_2024 BY BACKGROUND (PM) (Signalised) (Site Folder: 2024 BASE YEAR BACKGROUND TRAFFIC)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 75 seconds (Site Optimum Cycle Time - Minimum Delay)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Pelindaba Road (R512)														
1	L2	57	5,0	60	5,0	0,051	7,4	LOS A	0,4	3,2	0,29	0,61	0,29	52,6
2	T1	431	5,0	454	5,0	0,334	19,0	LOS B	6,1	44,5	0,77	0,64	0,77	45,8
3	R2	69	5,0	73	5,0	*0,224	19,2	LOS B	1,4	10,5	0,81	0,73	0,81	45,0
Approach		557	5,0	586	5,0	0,334	17,8	LOS B	6,1	44,5	0,73	0,65	0,73	46,3
East: 6th Road (R552)														
4	L2	234	5,0	246	5,0	0,572	33,5	LOS C	8,2	59,8	0,93	0,82	0,93	38,0
5	T1	62	5,0	65	5,0	*0,216	37,2	LOS D	1,2	8,7	0,97	0,70	0,97	37,4
6	R2	249	5,0	262	5,0	*0,615	29,0	LOS C	8,1	58,8	0,94	0,81	0,94	40,1
Approach		545	5,0	574	5,0	0,615	31,9	LOS C	8,2	59,8	0,94	0,80	0,94	38,8
North: Pelindaba Road (R512)														
7	L2	260	5,0	274	5,0	0,230	7,8	LOS A	2,3	17,1	0,35	0,65	0,35	52,3
8	T1	769	5,0	809	5,0	*0,595	21,3	LOS C	12,2	89,3	0,87	0,75	0,87	44,5
9	R2	48	5,0	51	5,0	0,114	17,1	LOS B	1,0	7,2	0,69	0,69	0,69	46,2
Approach		1077	5,0	1134	5,0	0,595	17,9	LOS B	12,2	89,3	0,74	0,72	0,74	46,3
West: Elandsdrift Road (R552)														
10	L2	22	5,0	23	5,0	0,161	42,6	LOS D	0,8	6,2	0,96	0,70	0,96	34,7
11	T1	32	5,0	34	5,0	0,111	36,5	LOS D	0,6	4,4	0,96	0,66	0,96	37,6
12	R2	58	5,0	61	5,0	0,156	26,4	LOS C	1,6	11,9	0,86	0,73	0,86	41,4
Approach		112	5,0	118	5,0	0,161	32,4	LOS C	1,6	11,9	0,91	0,71	0,91	38,8
All Vehicles		2291	5,0	2412	5,0	0,615	21,9	LOS C	12,2	89,3	0,79	0,72	0,79	43,9

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

PHASING SUMMARY

Site: 101 [R552 & R512_2024 BY BACKGROUND (PM) (Signalised) (Site Folder: 2024 BASE YEAR BACKGROUND TRAFFIC)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 75 seconds (Site Optimum Cycle Time - Minimum Delay)

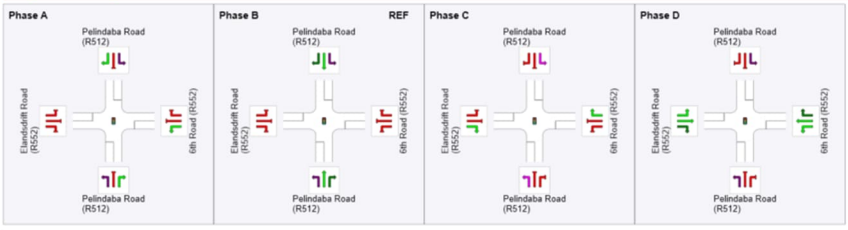
Timings based on settings in the Site Phasing & Timing dialog
Phase Times determined by the program
Phase Sequence: Leading Right Turn
Reference Phase: Phase B
Input Phase Sequence: A, B, C, D
Output Phase Sequence: A, B, C, D

Phase Timing Summary

Phase	A	B	C	D
Phase Change Time (sec)	63	0	33	51
Green Time (sec)	6	27	12	6
Phase Time (sec)	12	33	18	12
Phase Split	16%	44%	24%	16%

See the Timing Analysis report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Minor Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase

MOVEMENT SUMMARY

Site: 101 [R552 & R512_2029 HY BACKGROUND + LATENT (AM)(Signalised) (Site Folder: 2029 HORIZON YEAR BACKGROUND + LATENT TRAFFIC)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 90 seconds (Site User-Given Phase Times)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Pelindaba Road (R512)														
1	L2	9	5,0	9	5,0	0,007	5,8	LOS A	0,0	0,1	0,09	0,56	0,09	53,8
2	T1	1379	5,0	1452	5,0	0,814	18,9	LOS B	32,3	235,8	0,79	0,77	0,85	45,9
3	R2	484	5,0	509	5,0	*0,969	55,0	LOS D	24,6	179,4	1,00	1,09	1,45	31,3
Approach		1872	5,0	1971	5,0	0,969	28,2	LOS C	32,3	235,8	0,84	0,85	1,01	41,0
East: 6th Road (R552)														
4	L2	206	5,0	217	5,0	0,194	13,4	LOS B	4,0	29,5	0,46	0,70	0,46	48,0
5	T1	41	5,0	43	5,0	0,033	20,8	LOS C	0,6	4,5	0,69	0,50	0,69	44,8
6	R2	355	5,0	374	5,0	*0,857	42,6	LOS D	16,6	120,9	1,00	0,95	1,23	35,0
Approach		602	5,0	634	5,0	0,857	31,1	LOS C	16,6	120,9	0,79	0,83	0,93	39,2
North: Pelindaba Road (R512)														
7	L2	414	5,0	436	5,0	0,562	20,9	LOS C	9,0	66,0	0,78	0,85	0,78	44,2
8	T1	590	5,0	621	5,0	*0,617	31,7	LOS C	12,2	88,8	0,93	0,79	0,93	39,6
9	R2	3	5,0	3	5,0	0,011	38,6	LOS D	0,1	0,8	0,84	0,63	0,84	36,3
Approach		1007	5,0	1060	5,0	0,617	27,3	LOS C	12,2	88,8	0,87	0,81	0,87	41,3
West: Elandsdrift Road (R552)														
10	L2	43	5,0	45	5,0	0,379	52,3	LOS D	2,1	15,0	0,99	0,74	0,99	31,8
11	T1	95	5,0	100	5,0	*0,397	46,6	LOS D	2,3	16,5	1,00	0,74	1,00	34,1
12	R2	38	5,0	40	5,0	0,304	51,6	LOS D	1,8	13,0	0,99	0,73	0,99	32,2
Approach		176	5,0	185	5,0	0,397	49,1	LOS D	2,3	16,5	0,99	0,73	0,99	33,1
All Vehicles		3657	5,0	3849	5,0	0,969	29,4	LOS C	32,3	235,8	0,85	0,83	0,95	40,3

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

PHASING SUMMARY

Site: 101 [R552 & R512_2029 HY BACKGROUND + LATENT (AM)(Signalised) (Site Folder: 2029 HORIZON YEAR BACKGROUND + LATENT TRAFFIC)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 90 seconds (Site User-Given Phase Times)

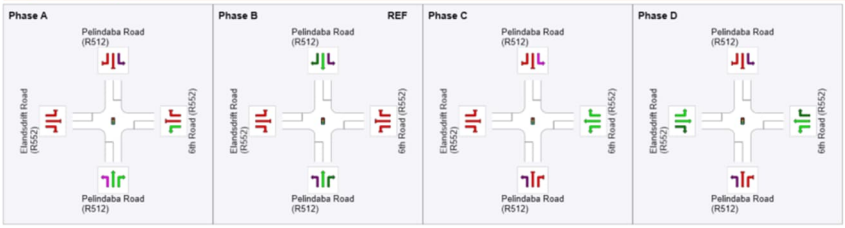
Timings based on settings in the Site Phasing & Timing dialog
Phase Times specified by the user
Phase Sequence: Leading Right Turn
Reference Phase: Phase B
Input Phase Sequence: A, B, C, D
Output Phase Sequence: A, B, C, D

Phase Timing Summary

Phase	A	B	C	D
Phase Change Time (sec)	65	0	30	53
Green Time (sec)	19	24	17	6
Phase Time (sec)	25	30	23	12
Phase Split	28%	33%	26%	13%

See the Timing Analysis report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Minor Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase

MOVEMENT SUMMARY

Site: 101 [R552 & R512_2029 HY BACKGROUND + LATENT (PM)(Signalised) (Site Folder: 2029 HORIZON YEAR BACKGROUND + LATENT TRAFFIC)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 95 seconds (Site User-Given Phase Times)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Pelindaba Road (R512)														
1	L2	60	5,0	63	5,0	0,048	6,0	LOS A	0,2	1,4	0,13	0,58	0,13	53,6
2	T1	731	5,0	769	5,0	0,352	11,2	LOS B	9,3	68,0	0,57	0,50	0,57	50,7
3	R2	206	5,0	217	5,0	*0,735	31,8	LOS C	6,2	45,3	1,00	0,88	1,11	39,0
Approach		997	5,0	1049	5,0	0,735	15,2	LOS B	9,3	68,0	0,63	0,58	0,65	47,9
East: 6th Road (R552)														
4	L2	459	5,0	483	5,0	0,522	21,9	LOS C	14,8	107,8	0,71	0,80	0,71	43,1
5	T1	106	5,0	112	5,0	0,088	23,0	LOS C	1,8	12,8	0,71	0,55	0,71	43,6
6	R2	416	5,0	438	5,0	*0,944	58,5	LOS E	23,8	173,5	1,00	1,05	1,38	30,4
Approach		981	5,0	1033	5,0	0,944	37,5	LOS D	23,8	173,5	0,83	0,88	0,99	36,6
North: Pelindaba Road (R512)														
7	L2	495	5,0	521	5,0	0,440	9,6	LOS A	7,3	53,6	0,48	0,70	0,48	51,2
8	T1	1255	5,0	1321	5,0	*0,939	49,0	LOS D	37,6	274,8	1,00	1,13	1,30	33,4
9	R2	50	5,0	53	5,0	0,093	25,4	LOS C	1,5	11,3	0,66	0,70	0,66	41,8
Approach		1800	5,0	1895	5,0	0,939	37,5	LOS D	37,6	274,8	0,85	1,00	1,06	37,1
West: Elandsdrift Road (R552)														
10	L2	23	5,0	24	5,0	0,214	54,2	LOS D	1,1	8,3	0,98	0,71	0,98	31,2
11	T1	62	5,0	65	5,0	0,274	48,8	LOS D	1,5	11,2	0,99	0,71	0,99	33,4
12	R2	61	5,0	64	5,0	*0,515	55,5	LOS E	3,1	22,6	1,00	0,75	1,01	31,1
Approach		146	5,0	154	5,0	0,515	52,5	LOS D	3,1	22,6	0,99	0,73	0,99	32,1
All Vehicles		3924	5,0	4131	5,0	0,944	32,4	LOS C	37,6	274,8	0,79	0,85	0,94	39,0

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

PHASING SUMMARY

Site: 101 [R552 & R512_2029 HY BACKGROUND + LATENT (PM)(Signalised) (Site Folder: 2029 HORIZON YEAR BACKGROUND + LATENT TRAFFIC)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 95 seconds (Site User-Given Phase Times)

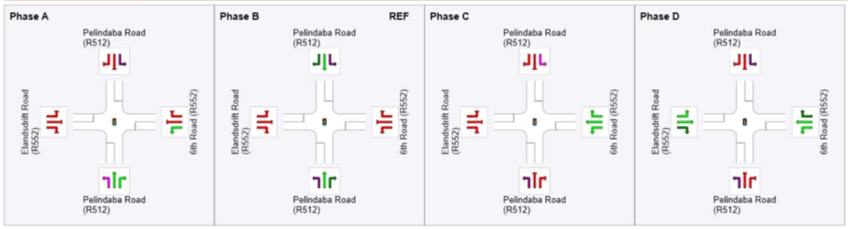
Timings based on settings in the Site Phasing & Timing dialog
Phase Times specified by the user
Phase Sequence: Leading Right Turn
Reference Phase: Phase B
Input Phase Sequence: A, B, C, D
Output Phase Sequence: A, B, C, D

Phase Timing Summary

Phase	A	B	C	D
Phase Change Time (sec)	78	0	42	67
Green Time (sec)	11	37	19	6
Phase Time (sec)	16	43	24	12
Phase Split	17%	45%	25%	13%

See the Timing Analysis report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Minor Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase

MOVEMENT SUMMARY

Site: 101 [R552 & R512_AM - Conversion - Option 1 (Site Folder: 2029 HORIZON YEAR BACKGROUND + LATENT + DEVELOPMENT TRAFFIC)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 75 seconds (Site Optimum Cycle Time - Minimum Delay)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Pelindaba Road (R512)														
1	L2	9	5,0	9	5,0	0,007	6,0	LOS A	0,0	0,2	0,12	0,57	0,12	53,6
2	T1	1379	5,0	1452	5,0	0,707	10,6	LOS B	20,4	148,6	0,71	0,64	0,71	51,2
3	R2	532	5,0	560	5,0	*0,838	29,5	LOS C	18,1	132,0	0,97	0,96	1,14	39,9
Approach		1920	5,0	2021	5,0	0,838	15,8	LOS B	20,4	148,6	0,78	0,73	0,83	47,5
East: 6th Road (R552)														
4	L2	228	5,0	240	5,0	0,304	13,6	LOS B	3,6	26,5	0,68	0,75	0,68	47,8
5	T1	43	5,0	45	5,0	0,200	33,5	LOS C	1,6	11,4	0,94	0,70	0,94	38,8
6	R2	360	5,0	379	5,0	*0,881	50,5	LOS D	8,2	59,8	1,00	1,01	1,44	32,5
Approach		631	5,0	664	5,0	0,881	36,0	LOS D	8,2	59,8	0,88	0,89	1,13	37,2
North: Pelindaba Road (R512)														
7	L2	425	5,0	447	5,0	0,537	17,7	LOS B	9,8	71,4	0,75	0,84	0,75	46,0
8	T1	590	5,0	621	5,0	*0,881	41,8	LOS D	13,3	97,1	1,00	1,03	1,36	35,7
9	R2	3	5,0	3	5,0	0,010	32,6	LOS C	0,1	0,7	0,83	0,63	0,83	38,6
Approach		1018	5,0	1072	5,0	0,881	31,8	LOS C	13,3	97,1	0,90	0,95	1,10	39,4
West: Elandsdrift Road (R552)														
10	L2	43	5,0	45	5,0	0,316	43,4	LOS D	1,7	12,3	0,98	0,73	0,98	34,4
11	T1	100	5,0	105	5,0	*0,348	37,8	LOS D	2,0	14,3	0,98	0,73	0,98	37,1
12	R2	38	5,0	40	5,0	0,279	43,2	LOS D	1,5	10,8	0,98	0,73	0,98	34,8
Approach		181	5,0	191	5,0	0,348	40,3	LOS D	2,0	14,3	0,98	0,73	0,98	35,9
All Vehicles		3750	5,0	3947	5,0	0,881	24,7	LOS C	20,4	148,6	0,84	0,82	0,96	42,5

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

PHASING SUMMARY

Site: 101 [R552 & R512_AM - Conversion - Option 1 (Site Folder: 2029 HORIZON YEAR BACKGROUND + LATENT + DEVELOPMENT TRAFFIC)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 75 seconds (Site Optimum Cycle Time - Minimum Delay)

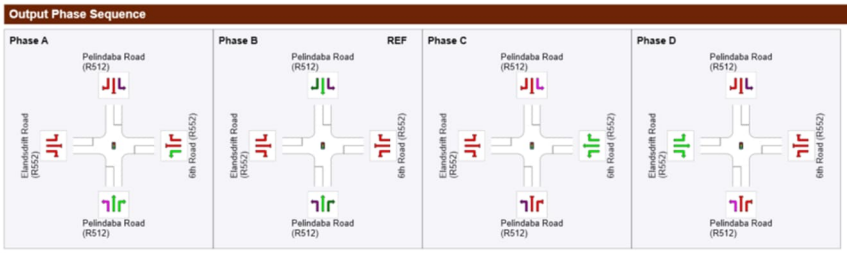
Timings based on settings in the Site Phasing & Timing dialog
Phase Times determined by the program
Phase Sequence: Leading Right Turn
Reference Phase: Phase B
Input Phase Sequence: A, B, C, D
Output Phase Sequence: A, B, C, D

Phase Timing Summary

Phase	A	B	C	D
Phase Change Time (sec)	45	0	19	34
Green Time (sec)	24	14	9	6
Phase Time (sec)	29	20	14	12
Phase Split	39%	27%	19%	16%

See the Timing Analysis report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Minor Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase

MOVEMENT SUMMARY

Site: 101 [R552 & R512_PM - Conversion - Option 1 (Site Folder: 2029 HORIZON YEAR BACKGROUND + LATENT + DEVELOPMENT TRAFFIC)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 110 seconds (Site User-Given Phase Times)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Pelindaba Road (R512)														
1	L2	60	5,0	63	5,0	0,049	6,1	LOS A	0,3	1,9	0,13	0,58	0,13	53,6
2	T1	731	5,0	769	5,0	0,345	12,2	LOS B	10,4	76,2	0,55	0,48	0,55	50,0
3	R2	231	5,0	243	5,0	*0,866	48,2	LOS D	10,3	75,3	1,00	0,99	1,27	33,2
Approach		1022	5,0	1076	5,0	0,866	20,0	LOS C	10,4	76,2	0,63	0,60	0,69	45,0
East: 6th Road (R552)														
4	L2	504	5,0	531	5,0	0,614	28,0	LOS C	20,8	151,9	0,79	0,83	0,79	40,2
5	T1	111	5,0	117	5,0	0,189	28,4	LOS C	4,5	32,6	0,76	0,61	0,76	41,0
6	R2	426	5,0	448	5,0	0,520	39,1	LOS D	10,0	72,8	0,87	0,81	0,87	36,2
Approach		1041	5,0	1096	5,0	0,614	32,6	LOS C	20,8	151,9	0,82	0,80	0,82	38,5
North: Pelindaba Road (R512)														
7	L2	501	5,0	527	5,0	0,512	11,3	LOS B	9,7	70,6	0,58	0,75	0,58	50,0
8	T1	1255	5,0	1321	5,0	*0,907	44,7	LOS D	39,5	288,3	0,97	1,02	1,16	34,7
9	R2	50	5,0	53	5,0	0,088	26,3	LOS C	1,7	12,4	0,63	0,70	0,63	41,4
Approach		1806	5,0	1901	5,0	0,907	34,9	LOS C	39,5	288,3	0,85	0,93	0,98	38,1
West: Elandsdrift Road (R552)														
10	L2	23	5,0	24	5,0	0,041	32,4	LOS C	0,9	6,4	0,71	0,69	0,71	38,4
11	T1	64	5,0	67	5,0	0,054	26,9	LOS C	1,2	8,9	0,71	0,53	0,71	41,7
12	R2	61	5,0	64	5,0	*0,524	58,4	LOS E	3,5	25,4	0,98	0,78	0,99	30,4
Approach		148	5,0	156	5,0	0,524	40,7	LOS D	3,5	25,4	0,82	0,66	0,83	35,8
All Vehicles		4017	5,0	4228	5,0	0,907	30,7	LOS C	39,5	288,3	0,78	0,80	0,86	39,7

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

PHASING SUMMARY

Site: 101 [R552 & R512_PM - Conversion - Option 1 (Site Folder: 2029 HORIZON YEAR BACKGROUND + LATENT + DEVELOPMENT TRAFFIC)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 110 seconds (Site User-Given Phase Times)

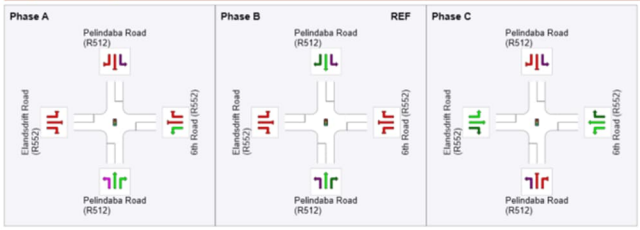
Timings based on settings in the Site Phasing & Timing dialog
Phase Times specified by the user
Phase Sequence: Leading Right Turn
Reference Phase: Phase B
Input Phase Sequence: A, B, C
Output Phase Sequence: A, B, C

Phase Timing Summary

Phase	A	B	C
Phase Change Time (sec)	93	0	51
Green Time (sec)	12	46	36
Phase Time (sec)	17	52	41
Phase Split	15%	47%	37%

See the Timing Analysis report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Minor Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase

2. Intersection of Middel Road & 6th Road (R552)

MOVEMENT SUMMARY

Site: 101v [R552 & MIDDLE ROAD_2024 BY BACKGROUND (AM) (Signalised - Upgraded) (Site Folder: 2024 BASE YEAR BACKGROUND TRAFFIC)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 65 seconds (Site Optimum Cycle Time - Minimum Delay)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
East: 6th Road (R552)														
5	T1	306	5,0	322	5,0	0,236	3,2	LOS A	3,4	24,7	0,36	0,31	0,36	57,0
6a	R1	63	5,0	66	5,0	0,120	9,2	LOS A	0,8	6,0	0,40	0,61	0,40	51,5
Approach		369	5,0	388	5,0	0,236	4,2	LOS A	3,4	24,7	0,36	0,36	0,36	56,0
NorthWest: Middle Road														
27a	L1	16	5,0	17	5,0	0,099	35,9	LOS D	0,5	3,8	0,94	0,69	0,94	36,8
29b	R3	43	5,0	45	5,0	*0,312	38,7	LOS D	1,5	10,7	0,97	0,74	0,97	36,0
Approach		59	5,0	62	5,0	0,312	38,0	LOS D	1,5	10,7	0,96	0,72	0,96	36,2
West: 6th Road (R552)														
10b	L3	129	5,0	136	5,0	0,119	9,4	LOS A	1,3	9,5	0,32	0,68	0,32	51,0
11	T1	396	5,0	417	5,0	*0,305	3,4	LOS A	4,7	34,1	0,38	0,33	0,38	56,8
Approach		525	5,0	553	5,0	0,305	4,9	LOS A	4,7	34,1	0,37	0,42	0,37	55,2
All Vehicles		953	5,0	1003	5,0	0,312	6,7	LOS A	4,7	34,1	0,40	0,41	0,40	53,7

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

PHASING SUMMARY

Site: 101v [R552 & MIDDLE ROAD_2024 BY BACKGROUND (AM) (Signalised - Upgraded) (Site Folder: 2024 BASE YEAR BACKGROUND TRAFFIC)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 65 seconds (Site Optimum Cycle Time - Minimum Delay)

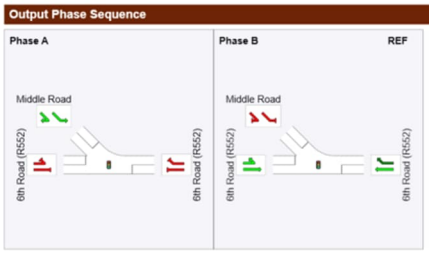
Timings based on settings in the Site Phasing & Timing dialog
Phase Times determined by the program
Phase Sequence: Convert Function Default
Reference Phase: Phase B
Input Phase Sequence: A, B
Output Phase Sequence: A, B

Phase Timing Summary

Phase	A	B
Phase Change Time (sec)	53	0
Green Time (sec)	6	47
Phase Time (sec)	12	53
Phase Split	18%	82%

See the Timing Analysis report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Minor Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase

MOVEMENT SUMMARY

Site: 101v [R552 & MIDDLE ROAD_2024 BY BACKGROUND (PM) (Signalised - Upgraded) (Site Folder: 2024 BASE YEAR BACKGROUND TRAFFIC)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 60 seconds (Site Optimum Cycle Time - Minimum Delay)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
East: 6th Road (R552)														
5	T1	419	5,0	441	5,0	*0,389	6,8	LOS A	6,8	49,3	0,56	0,49	0,56	54,0
6a	R1	25	5,0	26	5,0	0,049	12,3	LOS B	0,4	2,8	0,52	0,63	0,52	49,1
Approach		444	5,0	467	5,0	0,389	7,1	LOS A	6,8	49,3	0,56	0,50	0,56	53,7
NorthWest: Middle Road														
27a	L1	27	5,0	28	5,0	0,077	26,6	LOS C	0,7	5,1	0,84	0,70	0,84	40,6
29b	R3	110	5,0	116	5,0	*0,368	29,8	LOS C	3,1	22,5	0,91	0,78	0,91	39,3
Approach		137	5,0	144	5,0	0,368	29,2	LOS C	3,1	22,5	0,89	0,76	0,89	39,5
West: 6th Road (R552)														
10b	L3	48	5,0	51	5,0	0,054	11,8	LOS B	0,6	4,4	0,43	0,68	0,43	49,3
11	T1	329	5,0	346	5,0	0,306	6,3	LOS A	5,0	36,3	0,52	0,45	0,52	54,3
Approach		377	5,0	397	5,0	0,306	7,0	LOS A	5,0	36,3	0,51	0,48	0,51	53,6
All Vehicles		958	5,0	1008	5,0	0,389	10,2	LOS B	6,8	49,3	0,59	0,53	0,59	51,0

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

PHASING SUMMARY

Site: 101v [R552 & MIDDLE ROAD_2024 BY BACKGROUND (PM) (Signalised - Upgraded) (Site Folder: 2024 BASE YEAR BACKGROUND TRAFFIC)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 60 seconds (Site Optimum Cycle Time - Minimum Delay)

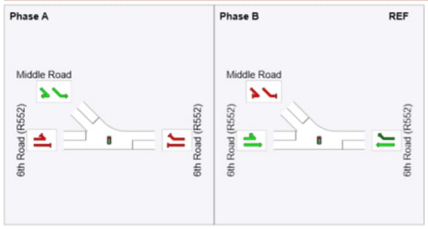
Timings based on settings in the Site Phasing & Timing dialog
Phase Times determined by the program
Phase Sequence: Convert Function Default
Reference Phase: Phase B
Input Phase Sequence: A, B
Output Phase Sequence: A, B

Phase Timing Summary

Phase	A	B
Phase Change Time (sec)	42	0
Green Time (sec)	12	36
Phase Time (sec)	18	42
Phase Split	30%	70%

See the Timing Analysis report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Minor Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase

MOVEMENT SUMMARY

Site: 101v [R552 & MIDDLE ROAD_2029 HY BACKGROUND + LATENT (AM)(Signalised - Upgraded) (Site Folder: 2029 HORIZON YEAR BACKGROUND + LATENT TRAFFIC)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 60 seconds (Site Optimum Cycle Time - Minimum Delay)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
East: 6th Road (R552)														
5	T1	469	5,0	494	5,0	0,392	4,9	LOS A	6,5	47,6	0,48	0,43	0,48	55,5
6a	R1	226	5,0	238	5,0	*0,868	38,3	LOS D	9,4	69,0	0,94	1,10	1,48	36,5
Approach		695	5,0	732	5,0	0,868	15,7	LOS B	9,4	69,0	0,63	0,65	0,81	47,5
NorthWest: Middle Road														
27a	L1	92	5,0	97	5,0	0,393	32,3	LOS C	2,8	20,2	0,96	0,77	0,96	38,2
29b	R3	159	5,0	167	5,0	*0,798	39,4	LOS D	5,6	40,6	1,00	0,94	1,35	35,8
Approach		251	5,0	264	5,0	0,798	36,8	LOS D	5,6	40,6	0,98	0,87	1,20	36,6
West: 6th Road (R552)														
10b	L3	375	5,0	395	5,0	0,376	11,4	LOS B	5,2	37,8	0,48	0,74	0,48	49,7
11	T1	634	5,0	667	5,0	0,530	5,6	LOS A	10,1	73,7	0,56	0,50	0,56	55,0
Approach		1009	5,0	1062	5,0	0,530	7,7	LOS A	10,1	73,7	0,53	0,59	0,53	52,8
All Vehicles		1955	5,0	2058	5,0	0,868	14,3	LOS B	10,1	73,7	0,62	0,64	0,71	48,2

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

PHASING SUMMARY

Site: 101v [R552 & MIDDLE ROAD_2029 HY BACKGROUND + LATENT (AM)(Signalised - Upgraded) (Site Folder: 2029 HORIZON YEAR BACKGROUND + LATENT TRAFFIC)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 60 seconds (Site Optimum Cycle Time - Minimum Delay)

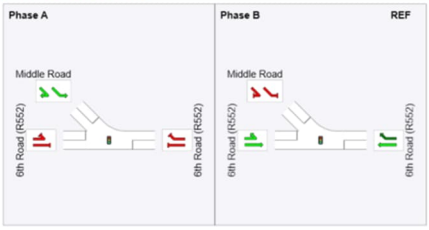
Timings based on settings in the Site Phasing & Timing dialog
Phase Times determined by the program
Phase Sequence: Convert Function Default
Reference Phase: Phase B
Input Phase Sequence: A, B
Output Phase Sequence: A, B

Phase Timing Summary

Phase	A	B
Phase Change Time (sec)	46	0
Green Time (sec)	8	40
Phase Time (sec)	14	46
Phase Split	23%	77%

See the Timing Analysis report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Minor Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase

MOVEMENT SUMMARY

Site: 101v [R552 & MIDDLE ROAD_2029 HY BACKGROUND + LATENT (PM)(Signalised - Upgraded) (Site Folder: 2029 HORIZON YEAR BACKGROUND + LATENT TRAFFIC)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 60 seconds (Site Optimum Cycle Time - Minimum Delay)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
East: 6th Road (R552)														
5	T1	627	5,0	660	5,0	*0,749	14,2	LOS B	16,0	116,8	0,83	0,78	0,88	48,6
6a	R1	113	5,0	119	5,0	0,525	26,4	LOS C	3,2	23,6	0,90	0,79	0,90	41,3
Approach		740	5,0	779	5,0	0,749	16,1	LOS B	16,0	116,8	0,84	0,78	0,89	47,3
NorthWest: Middle Road														
27a	L1	176	5,0	185	5,0	0,334	23,1	LOS C	4,3	31,6	0,82	0,78	0,82	42,3
29b	R3	338	5,0	356	5,0	*0,754	30,2	LOS C	10,6	77,3	0,96	0,90	1,11	39,1
Approach		514	5,0	541	5,0	0,754	27,8	LOS C	10,6	77,3	0,91	0,86	1,01	40,1
West: 6th Road (R552)														
10b	L3	181	5,0	191	5,0	0,242	15,8	LOS B	3,2	23,4	0,60	0,75	0,60	46,8
11	T1	598	5,0	629	5,0	0,728	13,3	LOS B	14,6	106,6	0,81	0,74	0,84	49,2
Approach		779	5,0	820	5,0	0,728	13,9	LOS B	14,6	106,6	0,76	0,74	0,79	48,6
All Vehicles		2033	5,0	2140	5,0	0,754	18,2	LOS B	16,0	116,8	0,83	0,79	0,88	45,7

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

PHASING SUMMARY

Site: 101v [R552 & MIDDLE ROAD_2029 HY BACKGROUND + LATENT (PM)(Signalised - Upgraded) (Site Folder: 2029 HORIZON YEAR BACKGROUND + LATENT TRAFFIC)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 60 seconds (Site Optimum Cycle Time - Minimum Delay)

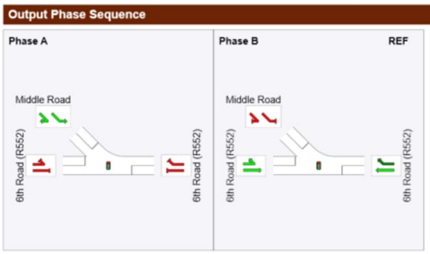
Timings based on settings in the Site Phasing & Timing dialog
Phase Times determined by the program
Phase Sequence: Convert Function Default
Reference Phase: Phase B
Input Phase Sequence: A, B
Output Phase Sequence: A, B

Phase Timing Summary

Phase	A	B
Phase Change Time (sec)	36	0
Green Time (sec)	18	30
Phase Time (sec)	24	36
Phase Split	40%	60%

See the Timing Analysis report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Minor Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase

MOVEMENT SUMMARY

Site: 101v [R552 & MIDDLE ROAD_AM - Conversion - Upgraded (Site Folder: 2029 HORIZON YEAR BACKGROUND + LATENT + DEVELOPMENT TRAFFIC)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 71 seconds (Site Optimum Cycle Time - Minimum Delay)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
East: 6th Road (R552)														
5	T1	469	5,0	494	5,0	0,379	4,9	LOS A	7,1	52,0	0,45	0,40	0,45	55,5
6a	R1	269	5,0	283	5,0	*0,856	29,7	LOS C	8,8	64,1	1,00	1,00	1,37	39,8
Approach		738	5,0	777	5,0	0,856	14,0	LOS B	8,8	64,1	0,65	0,62	0,79	48,5
NorthWest: Middle Road														
27a	L1	112	5,0	118	5,0	0,453	36,8	LOS D	3,9	28,8	0,96	0,78	0,96	36,5
29b	R3	189	5,0	199	5,0	*0,897	50,8	LOS D	8,5	61,9	1,00	1,00	1,51	32,0
Approach		301	5,0	317	5,0	0,897	45,6	LOS D	8,5	61,9	0,99	0,92	1,30	33,5
West: 6th Road (R552)														
10b	L3	439	5,0	462	5,0	0,566	19,1	LOS B	11,0	80,1	0,73	0,81	0,73	45,0
11	T1	634	5,0	667	5,0	*0,969	44,1	LOS D	29,2	213,1	0,80	1,07	1,31	34,7
Approach		1073	5,0	1129	5,0	0,969	33,9	LOS C	29,2	213,1	0,77	0,96	1,07	38,3
All Vehicles		2112	5,0	2223	5,0	0,969	28,6	LOS C	29,2	213,1	0,76	0,84	1,00	40,5

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

PHASING SUMMARY

Site: 101v [R552 & MIDDLE ROAD_AM - Conversion - Upgraded (Site Folder: 2029 HORIZON YEAR BACKGROUND + LATENT + DEVELOPMENT TRAFFIC)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 71 seconds (Site Optimum Cycle Time - Minimum Delay)

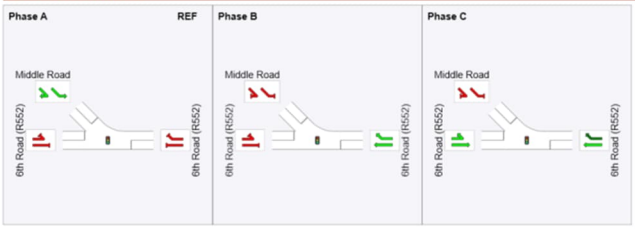
Timings based on settings in the Site Phasing & Timing dialog
Phase Times determined by the program
Phase Sequence: Convert Function Default
Reference Phase: Phase A
Input Phase Sequence: A, B, C
Output Phase Sequence: A, B, C

Phase Timing Summary

Phase	A	B	C
Phase Change Time (sec)	0	16	28
Green Time (sec)	10	6	37
Phase Time (sec)	16	12	43
Phase Split	23%	17%	61%

See the Timing Analysis report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Minor Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase

MOVEMENT SUMMARY

Site: 101v [R552 & MIDDLE ROAD_PM - Conversion - Upgraded (Site Folder: 2029 HORIZON YEAR BACKGROUND + LATENT + DEVELOPMENT TRAFFIC)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 50 seconds (Site Optimum Cycle Time - Minimum Delay)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
East: 6th Road (R552)														
5	T1	627	5,0	660	5,0	0,794	16,8	LOS B	16,1	117,5	0,92	0,92	1,07	47,0
6a	R1	136	5,0	143	5,0	*0,710	29,5	LOS C	3,9	28,2	0,99	0,90	1,25	39,9
Approach		763	5,0	803	5,0	0,794	19,1	LOS B	16,1	117,5	0,93	0,91	1,10	45,5
NorthWest: Middle Road														
27a	L1	216	5,0	227	5,0	0,385	19,7	LOS B	4,4	32,5	0,82	0,78	0,82	44,0
29b	R3	397	5,0	418	5,0	*0,830	30,0	LOS C	11,7	85,3	0,99	0,97	1,29	39,2
Approach		613	5,0	645	5,0	0,830	26,3	LOS C	11,7	85,3	0,93	0,90	1,13	40,8
West: 6th Road (R552)														
10b	L3	216	5,0	227	5,0	0,328	16,7	LOS B	3,7	27,2	0,69	0,77	0,69	46,3
11	T1	598	5,0	629	5,0	0,822	18,2	LOS B	15,8	115,2	0,90	0,93	1,11	46,1
Approach		814	5,0	857	5,0	0,822	17,8	LOS B	15,8	115,2	0,85	0,89	1,00	46,2
All Vehicles		2190	5,0	2305	5,0	0,830	20,6	LOS C	16,1	117,5	0,90	0,90	1,07	44,3

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

PHASING SUMMARY

Site: 101v [R552 & MIDDLE ROAD_PM - Conversion - Upgraded (Site Folder: 2029 HORIZON YEAR BACKGROUND + LATENT + DEVELOPMENT TRAFFIC)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 50 seconds (Site Optimum Cycle Time - Minimum Delay)

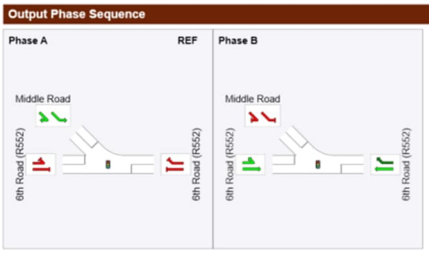
Timings based on settings in the Site Phasing & Timing dialog
Phase Times determined by the program
Phase Sequence: Convert Function Default
Reference Phase: Phase A
Input Phase Sequence: A, B
Output Phase Sequence: A, B

Phase Timing Summary

Phase	A	B
Phase Change Time (sec)	0	22
Green Time (sec)	16	22
Phase Time (sec)	22	28
Phase Split	44%	56%

See the Timing Analysis report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Minor Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase

3. Intersection of Preller Drive & Extension 79 Access

MOVEMENT SUMMARY

Site: 101 [PRELLER DRIVE & X79 ACCESS_2029 HY BACKGROUND + LATENT + DEV (AM) (Site Folder: 2029 HORIZON YEAR BACKGROUND + LATENT + DEVELOPMENT TRAFFIC)]

New Site
Site Category: (None)
Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: X79 Access														
1	L2	1	5,0	1	5,0	0,001	9,9	LOS A	0,0	0,0	0,53	0,80	0,53	28,7
3	R2	49	5,0	52	5,0	0,145	15,0	LOS C	0,5	3,3	0,72	1,00	0,72	23,2
Approach		50	5,0	53	5,0	0,145	14,9	LOS B	0,5	3,3	0,72	1,00	0,72	23,3
East: Preller Drive														
4	L2	107	5,0	113	5,0	0,361	5,6	LOS A	0,0	0,0	0,00	0,10	0,00	44,9
8	T1	535	5,0	563	5,0	0,361	0,0	LOS A	0,0	0,0	0,00	0,10	0,00	55,8
Approach		642	5,0	676	5,0	0,361	1,0	NA	0,0	0,0	0,00	0,10	0,00	54,0
West: Preller Drive														
2	T1	251	5,0	264	5,0	0,141	0,0	LOS A	0,0	0,1	0,01	0,00	0,01	59,7
12	R2	1	5,0	1	5,0	0,141	9,6	LOS A	0,0	0,1	0,01	0,00	0,01	47,4
Approach		252	5,0	265	5,0	0,141	0,1	NA	0,0	0,1	0,01	0,00	0,01	59,6
All Vehicles		944	5,0	994	5,0	0,361	1,5	NA	0,5	3,3	0,04	0,12	0,04	52,3

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [PRELLER DRIVE & X79 ACCESS_2029 HY BACKGROUND + LATENT + DEV (PM) (Site Folder: 2029 HORIZON YEAR BACKGROUND + LATENT + DEVELOPMENT TRAFFIC)]

New Site
Site Category: (None)
Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: X79 Access														
1	L2	1	5,0	1	5,0	0,001	8,0	LOS A	0,0	0,0	0,37	0,80	0,37	31,0
3	R2	99	5,0	104	5,0	0,274	15,5	LOS C	1,0	7,1	0,73	1,03	0,84	22,9
Approach		100	5,0	105	5,0	0,274	15,4	LOS C	1,0	7,1	0,73	1,03	0,84	22,9
East: Preller Drive														
4	L2	57	5,0	60	5,0	0,183	5,6	LOS A	0,0	0,0	0,00	0,10	0,00	44,8
8	T1	269	5,0	283	5,0	0,183	0,0	LOS A	0,0	0,0	0,00	0,10	0,00	55,8
Approach		326	5,0	343	5,0	0,183	1,0	NA	0,0	0,0	0,00	0,10	0,00	53,8
West: Preller Drive														
2	T1	514	5,0	541	5,0	0,287	0,0	LOS A	0,0	0,1	0,00	0,00	0,00	59,9
12	R2	1	5,0	1	5,0	0,287	7,4	LOS A	0,0	0,1	0,00	0,00	0,00	47,5
Approach		515	5,0	542	5,0	0,287	0,0	NA	0,0	0,1	0,00	0,00	0,00	59,9
All Vehicles		941	5,0	991	5,0	0,287	2,0	NA	1,0	7,1	0,08	0,15	0,09	50,7

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Annexure G: JRA TIA Approval for Lanseria X11 and X12

a world class African city

City of Johannesburg
Johannesburg Roads Agency

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Johannesburg
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2017

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Email: skgetsi@jra.org.za

Ref: 14/3/2/1/1/L35-11 AND 12
S. Kgetsi

EDS Engineering Design Services (Pty) Ltd
PO Box 34878
Glenstantia
0010

Date: 10 October 2023

Email: info@edseng.co.za

Sir, Madam,

SUBJECT **TRAFFIC IMPACT ASSESSMENT ADDENDUM: PROPOSED TOWNSHIP ESTABLISHMENT TO ALLOW "WAREHOUSING AND DISTRIBUTION" DEVELOPMENT SITUATED ON PORTION 32 (A PORTION OF PORTION 1) AND THE REMAINING EXTENT OF PORTION 1 OF THE FARM BOTESDAL 529JQ & HOLDING 1, SUNRELLA AGRICULTURAL HOLDINGS AND PORTION 80 (A PORTION OF PORTION 55) OF THE FARM BULTFONTEIN 533JQ LANSERIA EXTENSION 11 & 12**

Reference is made to the Traffic Impact Assessment Addendum submitted by EDS Engineering Design Services (Pty) Ltd on the 28 September August 2023 in response to comments issued by this department on the 28 August 2023. The report was assessed by the Traffic Engineering Department and the following comments are offered:

- The report was undertaken for the proposed township establishment to allow "warehousing and distribution" development situated on **PORTION 32 (A PORTION OF PORTION 1) AND THE REMAINING EXTENT OF PORTION 1 OF THE FARM BOTESDAL 529JQ & HOLDING 1, SUNRELLA AGRICULTURAL HOLDINGS AND PORTION 80 (A PORTION OF PORTION 55) OF THE FARM BULTFONTEIN 533JQ LANSERIA EXTENSION 11 & 12.**
- The development sites are currently zoned **"Agricultural"** with extents of 84 806m² and 64 569m² respectively.
- The proposed developments are earmarked for township establishment to allow **"Industrial 3"** with Extents of 84 806m² and 64 569m²; FAR of 0,6; Coverage of 60%; Permissible GFA of 50 883,6m² and 38 741,4m² and Office land-use rights are limited to 5050m² and 3716 m² floor area respectively.
- A conceptual Site Development Plan of the area have been included in the report in **Annexure C.**
- Several latent land use rights (Lanseria Extension 7 and Extension 32) were identified within the study area, that could have an impact in the vicinity of the applicant site.
- The proposed development will generate an additional 335 and 253 trips, during the weekday morning and weekday afternoon peak hours respectively.
- The applicant site is affected by Mogale City road planning, Gautrans provincial roads and the future GLMP framework comments have been included in the report.
- Gautrans requested a **Section 7 report** as the sites are within 200m of the proposed K215 for which the basic planning and) indicating that the proposed Lanseria Extension 11 and Extension 12 is not

affected by the future K215. The Gautrans approval letter dated February 2023 is included under **Annexure F** of this report.

- The development will be undertaken in a single phase, and it is anticipated that the full development will be completed within the next five (5) years.

The development is supported from a traffic point of view subject to the following conditions.

- Access to the proposed Lanseria Extension 11 is located west of Preller Drive and Lanseria Extension 12 is located between Airport Road (north) and Side Avenue (south) and access arrangements are proposed as follows:
  - Lanseria Extension 11
    - Access will operate as side-road stop-controlled intersections
    - Two inbound lanes with a minimum width of 4,5
    - Two outbound lanes with a minimum width of 4.5m
    - Access set back at a minimum of 25m.
    - Access control (booms) plus guardhouse provided at the entrance/exit.
    - Booms system with magnetic cards and will closed-off during non-business hours
    - Provide a large sliding gates
    - Provide minimum bellmouth of 12,5m
    - No overhead structures that could affected the flow to and from the site. However, should the need arise during the detail planning phase then provision should be made for a minimum vertical clearance of 5.2m.
  - Lanseria Extension 12
    - Access will operate as side-road stop-controlled intersections
    - One inbound lane with a minimum width of 4,5
    - One outbound lane with a minimum width of 4.5m
    - Access set back at a minimum of 25m.
    - Access control (booms) plus guardhouse provided at the entrance/exit.
    - Booms system with magnetic cards and will closed-off during non-business hours
    - Provide a large sliding gate
    - Provide minimum bellmouth of 12,5m
    - No overhead structures that could affected the flow to and from the site. However, should the need arise during the detail planning phase then provision should be made for a minimum vertical clearance of 5.2m.
- Access based on the GLMP framework for the proposed Lanseria Extension 11 and Extension 12 will be able to obtain access from two separate locations and are detailed as follows:
  - **Lanseria Extension 11**
    - Via a new proposed road between Boeing Street and the extended Preller Road to the south-east connecting to the primary road network (Pelindaba Road R512) and
  - **Lanseria Extension 12**
    - Via Preller Road and Middle Road north connecting to the secondary road network south of Lanseria Airport
- It is proposed that after township establishment approval of Lanseria Extension 11 and Extension 12, the township layout plans as well as access positions we shared with the project managers (Gapp Architects) of the GLMP framework to ensure that a road network be preserved for the townships in future.
- External road upgrades required to accommodate the proposed development traffic are as follows:
  - **Due to the developer**
    - **Intersection - Pelindaba Road (R512) / Pine Valley Road (R552)**
      - Converted to a traffic signal-controlled intersection

- **Intersection - Pine Valley Road (R552) / Middle Road**
  - Converted to a traffic signal-controlled intersection
  - Provide pedestrian facilities across Middle Road and Pine Valley Road at the intersection
- Developer of Lanseria Extension 12 to construct Side Avenue as part of boundary roads from Preller Road along the boundary of the township up to the development access (length and width of road to be indicated on SDP)
- **Due to the background traffic**
  - **Intersection - Middle Road and Pine Valley Road**
  - Extend the existing left-turn lane from 20m to 60m western approach Pine Valley Road (R552)
  - Additional left-turn lane 60m in extent north-western approach Middle Road

- Signal installation/change of settings shall be carried out with written consent from the appropriate road authorities (JRA) after submission of the traffic signal plans by the developer. The developer will be responsible for the signal revision and the implementation cost with regards to any hardware changes.
- This Department agrees that some of the upgrades identified (**Section: 12.3**) are required and that the developer cannot be held totally accountable. Road authorities however have the responsibility of ensuring a road infrastructure that can safely and efficient to cope with existing background traffic as well as growth in traffic volumes in the long term. It is clear form the report that the development cannot function without the upgrading.
- Detailed design drawings by a Professional Engineer must be submitted to JRA for assessment prior to the start of construction work and other relevant authority (if applicable)
- Separate pedestrian gates shall be provided.
- A 2.0m paved sidewalk to be provided along the full frontage of the proposed site and reinstate any damaged pave walkways along the site on both Extension 11 and 12
- The area is well served by frequent public transport throughout the day. Developer to provide lay-by's (drop-off facilities) along Pine Valley Road (R552) downstream of the Middle Road intersection.
- 558 and 342 parking bays are provided for on the site layout plans **(Annexure C)** for Lanseria Extension 11 and Extension 12 respectively with 37 and 49 loading bays are proposed for the warehouse developments on Lanseria Extension 11 and 12.
- The aspects of access configuration, internal circulation; refuse removal, parking provision, emergency vehicle accommodation etc are required to be addressed prior to the finalization of the Site Development Plan (SDP) stage.

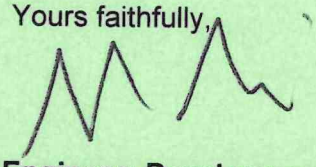
- ***The development can be supported from a traffic engineering perspective, provided that the abovementioned requirements / recommendations are implemented.***
- ***These comments only pertain to traffic engineering aspects. The issues of Land Use, the Site Layout and the SDP must be confirmed by CoJ LUM and Development Planning and Control.***
- ***All road upgrades to be undertaken by the developer or his representatives, the cost thereof, will not be refunded back to the developer by the Johannesburg Roads Agency (JRA) or the City of Johannesburg (CoJ) unless these upgrades were discussed and agreed upon in writing by both parties upfront, before any construction commences. The mere fact that the detail design drawings or Traffic Impact Studies have been approved, does not bind the JRA or the CoJ to any agreement. It is the responsibility of the developer or his representative to always stay up to date with the latest guidelines and Standards. This is especially applicable to Universal Design (UD) principals. JRA Development Control references the following national and municipal standards for minimum compliance, and will require developments conform to them in planning, design and construction, whether included in the original approved drawings or not. These are:***
  - ✓ ***Minimum requirements for the preparation of integrated transport plans: 29July 2016 (CoJ CITP) Published under the NLTA. Act No.5 of 2009. Requires the application of minimum standards on UD to transport and public space.***
  - ✓ ***Building Regulations and Building Standards Act 1977, as amended 2008***
  - ✓ ***SANS 10400 Part S: 2011 - Facilities for Persons with Disabilities***
  - ✓ ***National Technical Requirements 1 (NTR1) – Pedestrian Crossings, 2016 (Specification of Tactiles SANS 784: 2008)***

- ✓ *JRA standard book of Drawings – 2015 including 2017 UA Update*

- *Failing to eliminate obstacles that unfairly limit or restrict persons with disabilities from enjoying equal opportunities or failing to take steps to accommodate the needs of such persons can result in litigation.*
- *It should also be noted that if any upgrades are undertaken by the developer to any roads or storm-water on behalf of CoJ or the JRA, the developer will be entitled to an off-set against their external engineering services contributions as per section 49(4) of SPLUMA, provided these services are required to be upgraded to resolve background capacity problems, and not as a result of his/her impact of the development. These upgrades are to be discussed with the officials of the JRA and agreement in writing is to be obtained from the JRA to the off-set of such contributions, before any construction commences on site.*
- *If the amount for the upgrade/construction exceeds the contributions payable, the balance thereof will not be refunded to the developer and the construction is then carried out at the developers own cost.*
- *These comments are only valid for 5 years as per COTO TMH 16 Vol 1.*

Please note the your Site Traffic Assessment was independently assessed by the JRA, Traffic Engineering and Analysis Department and for any related queries contact Ms. Andiswa at (011) 491-5776 or adubula@jra.org.za.

Yours faithfully,



Engineer: Development Control
sk/jn

ANNEXURE G: 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 H: STORMWATER AND ATTENUATION CALCULATIONS

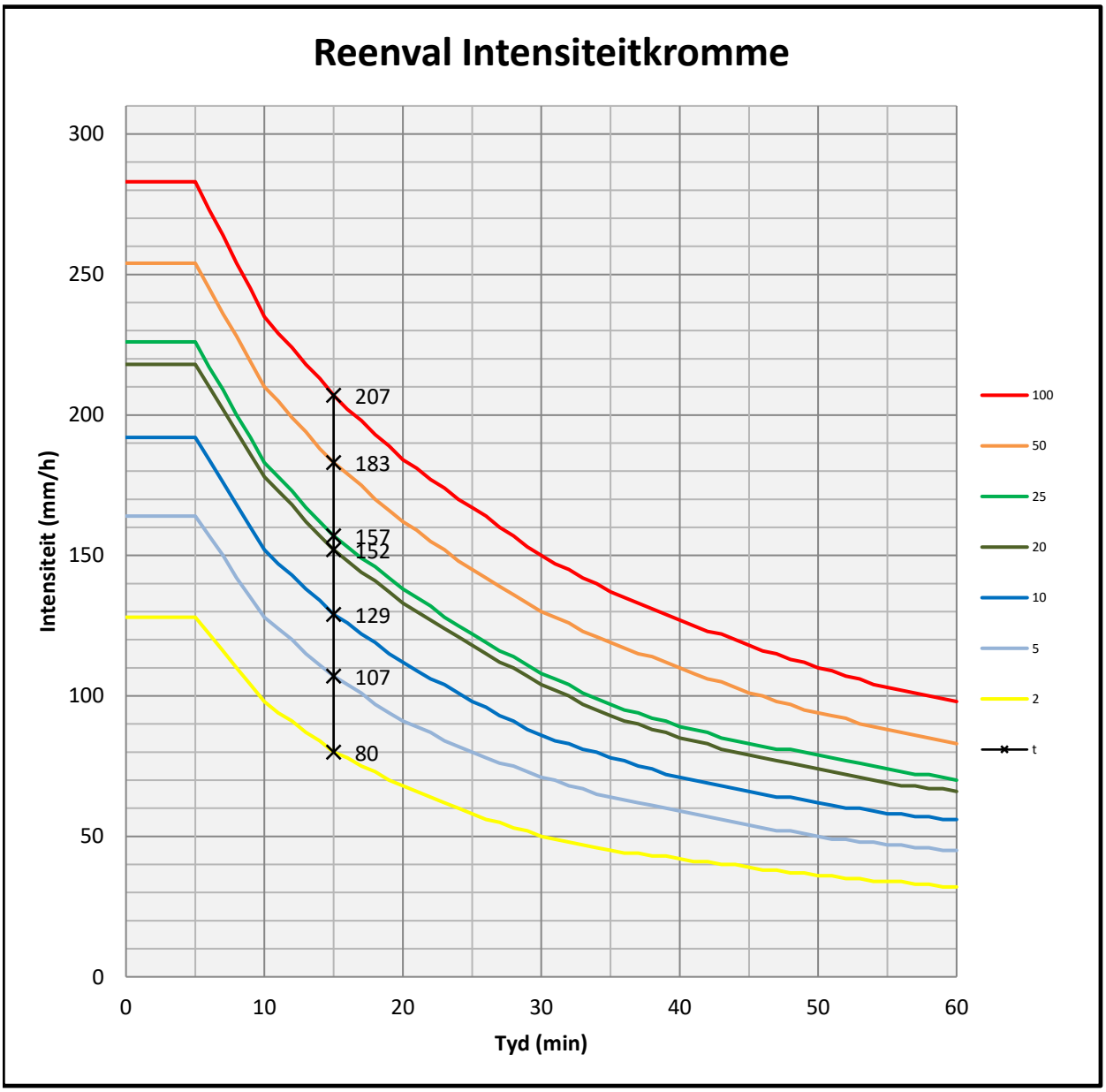
Stormwater - Standaard Intensiteitskrommes

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



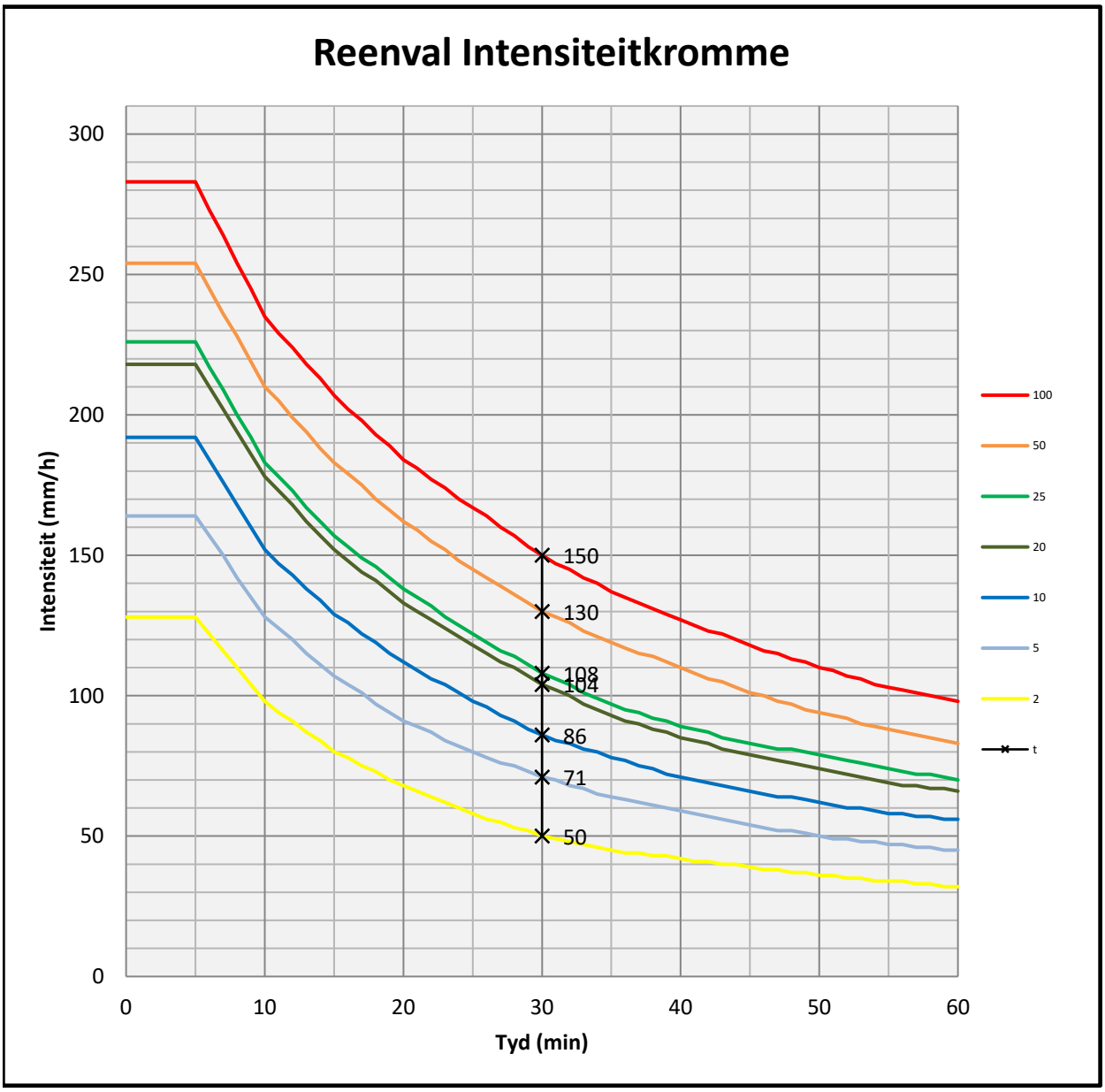
Stormwater - Standaard Intensiteitskrommes

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	

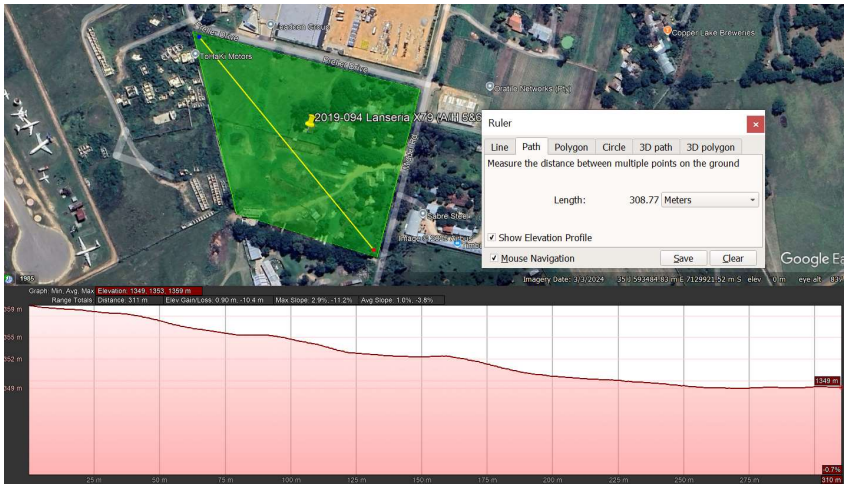
RUN-OFF COEFFICIENT								
Return period (years), T	**2**	**5**	**10**	**20**	**25**	**50**	**100**	
Run-off coefficient, C_1 ($C_1 = C_S + C_P + C_V$)	0.3	0.3	0.3	0.3	0.3	0.3	0.3	
Adjusted for dolomitic areas, C_{1D} ($= C_1(1 - D_{\%}) + C_1D_{\%}(\Sigma(D_{factor} \times C_{G\%}))$ ④	0.3	0.3	0.3	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:

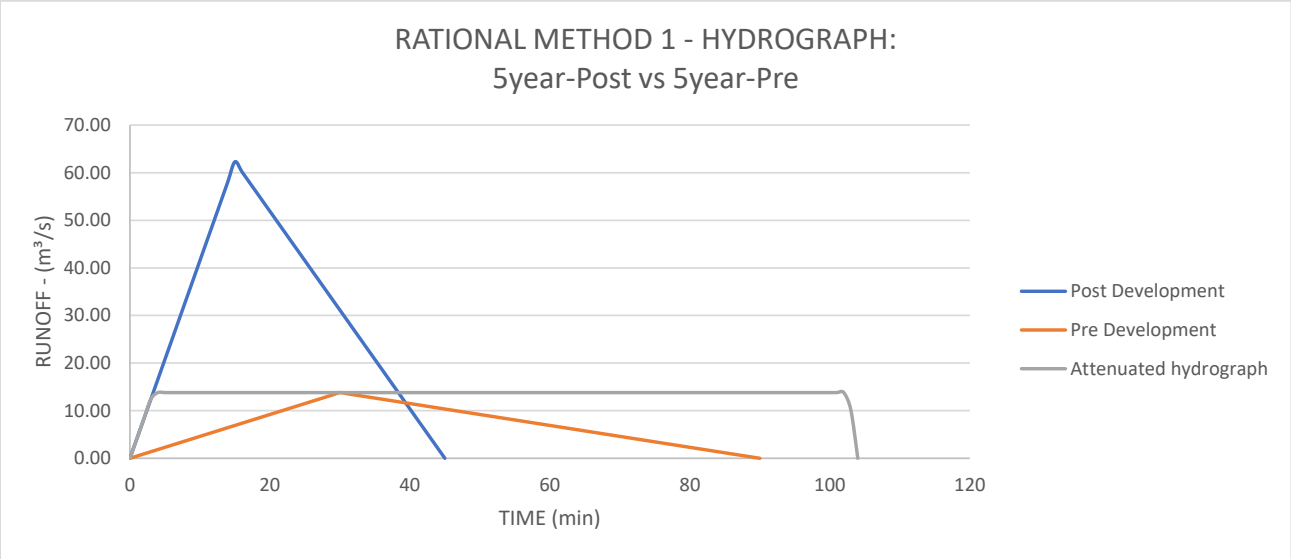
RURAL①			
Surface Slope	**%**	**Factor**	**C_S**
Wetlands and pans	0%	0.03	0
Flat areas	90%	0.08	0.072
Hilly	10%	0.16	0.016
Steep areas	0%	0.26	0
Total	**100%**	**-**	**0.1**
Permeability	**%**	**Factor**	**C_P**
Very permeable	0%	0.04	0
Permeable	70%	0.08	0.056
Semi-permeable	30%	0.16	0.048
Impermeable	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	

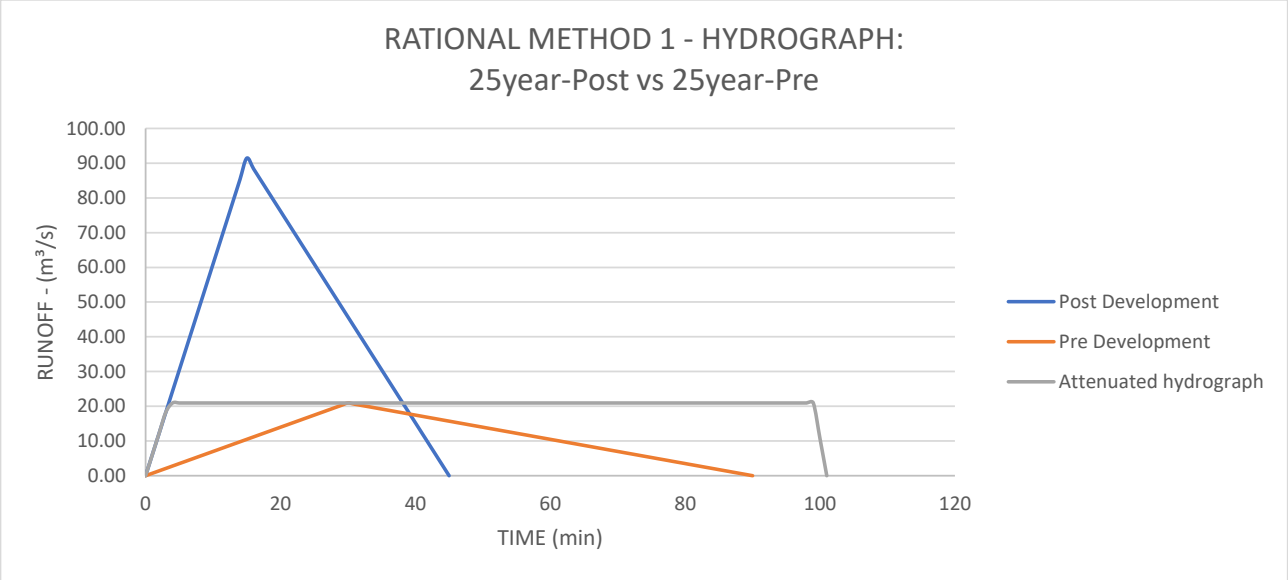


Attenuation Pond Volume	863.59	m³	
Attenuation	222.6326	m³/ha	(JRA Requirements: 300-350m³/ha)
Attenuation Pond Height	1.5	m	
Attenuation Pond Area	575.728	m²	

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	

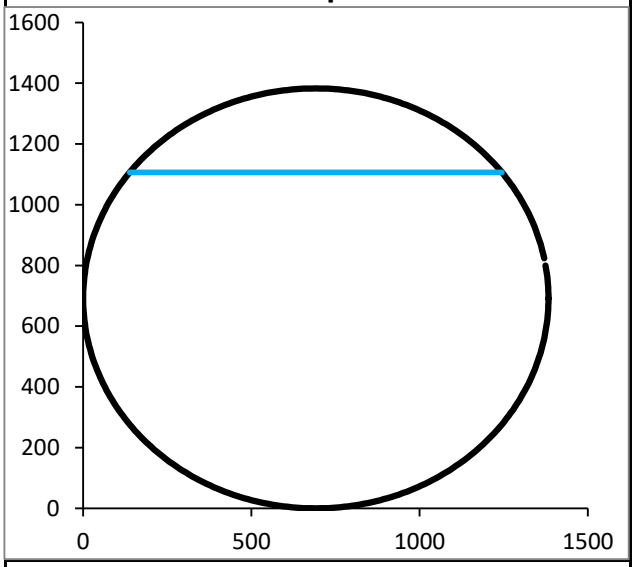


Attenuation Pond Volume	1244.86	m³	
Attenuation	320.9219	m³/ha	(JRA Requirements: 300-350m³/ha)
Attenuation Pond Height	1.5	m	
Attenuation Pond Area	829.904	m²	

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

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

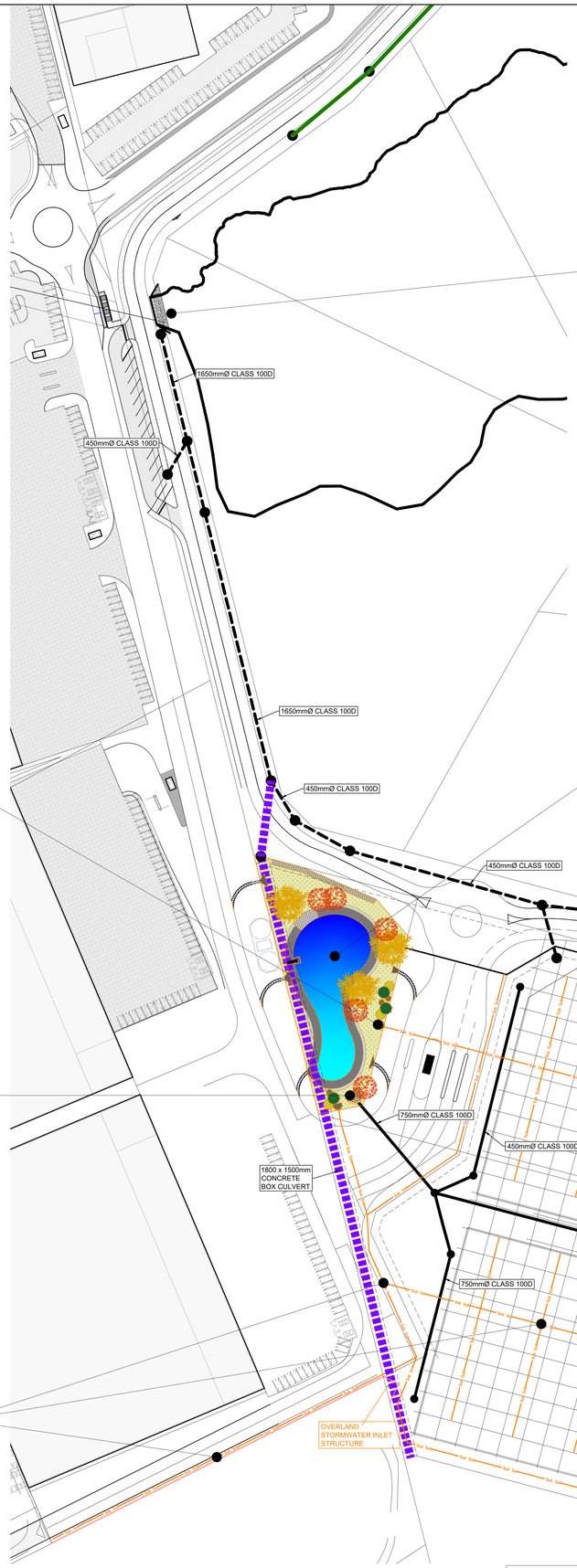
R= Returning period	R=	5 years
A= Area	A=	644330 m²
C=Run-off. Coeficient	C=	0.4
Map=Mean Annual Presipitation	Map=	646 mm
tc= Time Of Concentration	tc=	0.250 h
I= Intensity To Be Calculated	I=	90 mm/h
	Q=	6.450 m³/s
	l/S=	6450.213 L/s

ANNEXURE I: STORMWATER LAYOUT

SUBSOIL OUTLET TO RECONSTRUCTED WETLANDS

STORMWATER OUTLET TO RECONSTRUCTED WETLANDS

SUBSOIL PIPE SYSTEM



SITE LAYOUT

TYPICAL CULVERT OUTLET STRUCTURE TO NATURAL WATER COURSE

ATTENUATION STRUCTURE AND RECONSTRUCTED WETLANDS AREA ONS SITE

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 ENGINEER.
3. ALL DIMENSIONS AND LEVELS TO BE CHECKED ON SITE BEFORE CONSTRUCTION COMMENCES.
4. ANY SOFTWARE MODEL SHARED BY EDS ENGINEERS TO ANY EXTERNAL COMPANY OR PARTY TO BE USED FOR INFORMATION ONLY.
5. ALL CONSTRUCTION INFORMATION TO BE USED AS INDICATED ON DRAWINGS THAT WERE ISSUED FOR CONSTRUCTION.

NOTES: EARTHWORKS

1. THE STANDARD SPECIFICATION SANS 1200 C, D, DM, M, ME (EXCLUDING PAYMENT CLAUSES) IS APPLICABLE.
2. EARTHWORKS OPERATION MUST BE PLANNED IN SUCH A WAY THAT CUT TO FILL WILL BE A SIMULTANEOUS OPERATION. TEMPORARY STOCKPILING OF MATERIAL WILL NOT BE MEASURED OR PAID FOR SEPARATELY, BUT WILL ONLY BE MEASURED ONCE AS CUT TO FILL.
3. CLASSES OF EXCAVATION NOTWITHSTANDING THE REQUIREMENTS OF CLAUSE 3.1 OF SANS 1200 D OR ANYTHING TO THE CONTRARY IN THE PROJECT SPECIFICATIONS OR THE SCHEDULE OF QUANTITIES, EXCAVATIONS WILL BE CLASSIFIED ONLY AS EXCAVATIONS IN HARD OR SOFT MATERIAL, WHICH CLASSES OF EXCAVATIONS SHALL BE DEFINED AS FOLLOWS:
   - HARD EXCAVATION
     HARD EXCAVATION IS DEFINED AS WEATHERED OR UNWEATHERED BOULDERS EXCEEDING 0.5 m³ IN VOLUME, OR WEATHERED AND SOLID ROCK WHERE THAT APPEARS IN BULK IN BANKS, WHICH REQUIRES BLASTING, PNEUMATIC WEDGE DRIVING OR SPLITTING TO EFFECT EXCAVATION THEREOF. THE CONTRACTOR MUST NOTIFY THE ENGINEER WHEN HARD EXCAVATION IS ENCOUNTERED IN ORDER TO ALLOW MEASUREMENT THEREOF BEFORE EXCAVATION.
   - SOFT EXCAVATION
     SOFT EXCAVATION COMPRISES EXCAVATION IN ALL MATERIAL NOT CLASSIFIED AS HARD EXCAVATION.

   THE ENGINEER SHALL DECIDE UNDER WHICH OF THE ABOVEMENTIONED CLASSES OF EXCAVATION ANY MATERIAL WILL BE CLASSIFIED AND PAID FOR AND HIS DECISION SHALL BE FINAL AND BINDING.
4. THE TOPSOIL MUST BE REMOVED AND SPREAD OR STORED ON SITE AS REQUIRED FOR LANDSCAPING. THE EXCESS TO BE SPOILED OFF SITE.
5. ALL EARTHWORK BATTERS TO BE AT 1:2 SLOPES UNLESS OTHERWISE INDICATED.
6. ALL LEVELS INDICATED ARE FINISHED FLOOR OR ROAD LEVELS.
7. TOLERANCE OF SUB BASE TO BE + ZERO -10mm.TO BE SURVEYED ON 3m X 3m GRID BEFORE CASTING OF CONCRETE.

Rev No:	Date:	Revision Details:	By:

Client:

GROWTHPOINT PROPERTIES

Architect:

empowered spaces architects

e·d·s

Structural, Civil and Transportation Engineers

Sussex Office Park
473 Lynnwood Road
Lynnwood
Pretoria, Gauteng
Tel: 012 991 1205

20 On Kirge Building
20 Kirge Road
Stellenbosch
Western Cape
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e-mail: info@edseng.co.za

Project:

LANSERIA
EXTENSION 79

Description:

RECONSTRUCTED WETLANDS
MASTER PLAN

Paper size:	Drawn:	Checked:	Designed:
A0	PdL	GvdW	GvdW
Scale:	**Project Number:**	**Drawing Number:**	**Revision:**
750	2019-094	3850	A

ANNEXURE J: DEVELOPMENT CONTRIBUTIONS SPREAD SHEET

Date (YYYY/MM/DD):*	March 11, 2025	City of Johannesburg			
Current Financial Year:	2024/25	Development Contributions Calculator		Electricity provider *:	Eskom
Erf Number *	Erf 976 & 977	Version 1.8 - July 2021			
Suburb *	Lanseria	DISCLAIMER: THIS CALCULATOR IS STRICTLY FOR ESTIMATES!			
Developer/Owner *	Growth Point				
Erf Size (m^2) *	38 790				
Approved Building Plan No.	N/A			TIA approved by JRA?	No
Transport zone *	No special zoning				
Prioritised area	No				

Please specify the development type: ☐ Mixed Use ☑ Low vehicle ownership ☐ Very low vehicle ownership ☐ Public transit node

Will the development have on-site stormwater attenuation? Yes

Land Use	Definitions	Unit	Existing Right	Total New Right
A.1. Dwelling house*		Dwelling Unit		
A.2. Dwelling units*		Dwelling Unit		
A.3. State Funded Housing		Dwelling Unit		
A.4. Inclusionary Housing		Dwelling Unit		
A.5. Other Accommodation		$100m^2$ GLA		
B.1. Industrial Undefined		$100m^2$ GLA		
B.2. Light Industry		$100m^2$ GLA	-	232.74
B.3. All Other Industry		$100m^2$ GLA		
C.1. Business / Commercial Undefined		$100m^2$ GLA		
C.2. Offices		$100m^2$ GLA		
C.3. Commerce		$100m^2$ GLA		
C.4. Low Impact Entertainment		$100m^2$ GLA		
C.5. High Impact Entertainment		$100m^2$ GLA		
C.6. Hotel		$100m^2$ GLA		
D.1. Institutional or Educational Undefined		$100m^2$ GLA		
D.2. Care Facilities		$100m^2$ GLA		
D.3. Community Facilities		$100m^2$ GLA		
D.4. Tertiary Education		$100m^2$ GLA		
D.5. General Education		$100m^2$ GLA		
E. Agricultural Holding		per Holding/Farm Portion		
F. Open Space/Agriculture		$100m^2$		
G. Other	Specify other land use:	Actual Impact	Enter other land use impact	

Bulk engineering services component of development contribution

Service	Units	Additional Impact	Unit Cost	Amount	VAT @ 15%	Sub-Total
Water	kl/day	47	R 11 553.43	R 537 789.01	R 80 668.35	R 618 457.36
Sanitation	kl/day	37	R 23 997.55	R 893 630.31	R 134 044.55	R 1 027 674.86
Electricity	kVA ADMD	1 164	R -	R -	R -	R -
Roads	Equivalent trips/peak hour	109	R 19 261.02	R 2 107 951.64	R 316 192.75	R 2 424 144.39
Stormwater (Brownfield)	$C*m^2$	-	R 502.40	R -	R -	R -
Transport	Passenger trips/peak hour	189	R 2 009.43	R 380 692.31	R 57 103.85	R 437 796.16
Calculated bulk engineering services development contribution ESTIMATE						**R 4 508 072.77**

Open space contribution Estimate:	**(manual entry)**	**R0.00**
Total Development Contribution Estimate		**R 4 508 072.77**

NOTE : THIS CALCULATION ESTIMATE IS BASED ON THE DEVELOPMENT INFORMATION PROVIDED AND UNIT COSTS APPLICABLE FOR THE FINANCIAL YEAR IN WHICH THE DEVELOPMENT APPLICATION IS MADE. UNIT COSTS ARE ESCALATED ANNUALLY ON 1 JULY AND THE ACTUAL AMOUNT DUE WILL BE BASED ON THE UNIT COST APPLICABLE ON THE DATE PAYMENT BECOMES DUE.