

OUTENIQUA VIEW RESIDENTIAL DEVELOPMENT, ERF 19741, DANA BAY

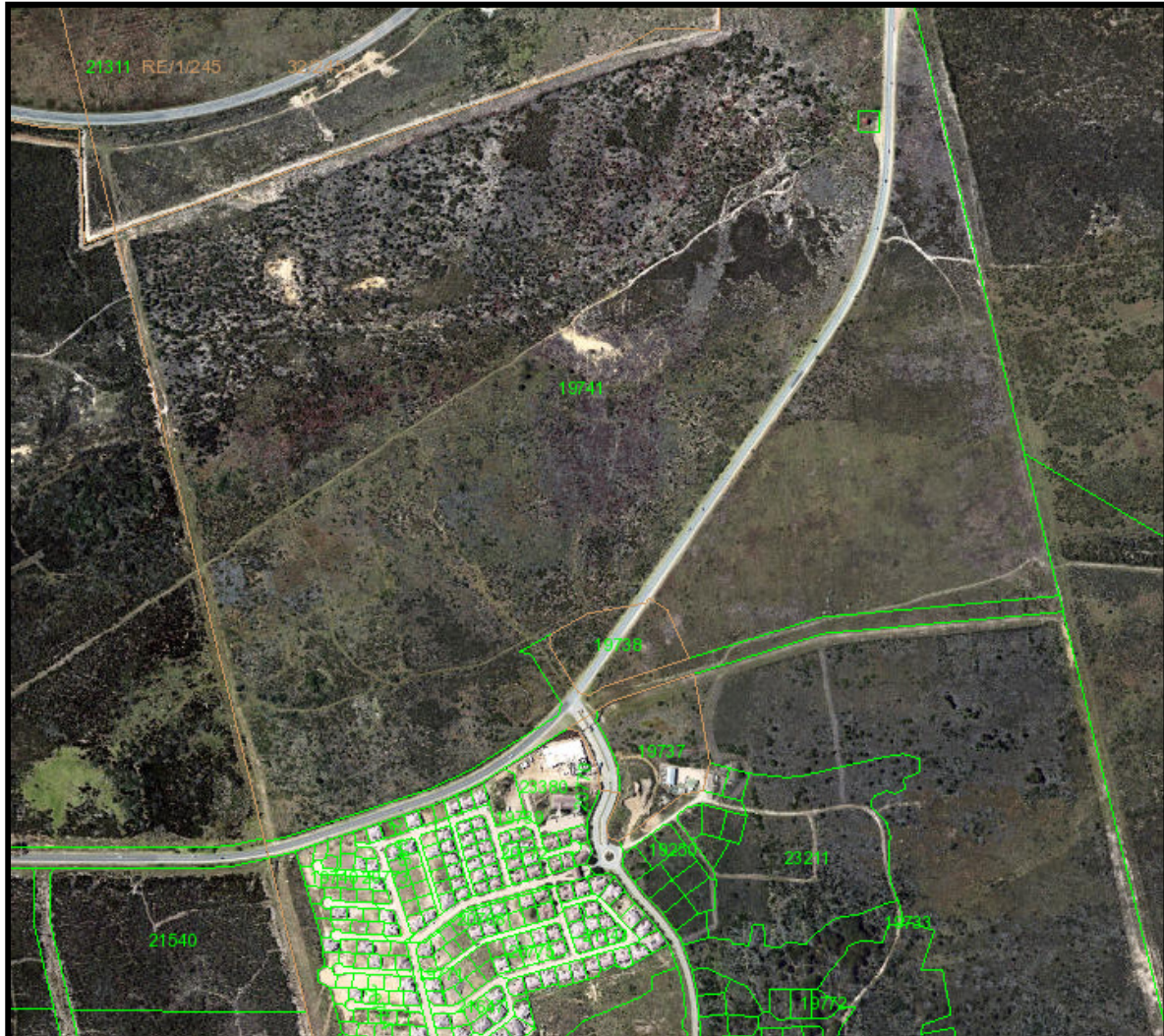
DANA DEVCO

C23021

CIVIL ENGINEERING SERVICES REPORT

AUGUST 2024

VERSION 4.0



INTEGRATE

STRUCTURAL AND CIVIL ENGINEERING

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OUTENIQUA VIEW ERF 19741 DANA BAY

CIVIL ENGINEERING SERVICES REPORT – REVISION 4

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REVISIONS

Revision 4 superceeds Revision 3 with the following amendments;

The OSMOND LANGE masterplan has been replaced by Revision 10.

The position of the 180 kl Watertower , Sewage Pumpstation and Rising Main is indicated on INTEGRATE drawings contained in Appendix 5.

1. INTRODUCTION

DANA DEVCO appointed INTEGRATE Structural and Civil Engineering (Pty) Ltd as the Consulting Engineers for the proposed development of Outeniqua View Erf 19741 Dana Bay and to compile a Civil Engineering Services Report required for the Environmental Impact Assessment Process.

The services report has been compiled based on the Masterplan as prepared by OSMOND LANGE Architects and Planners well as the following specialist studies that have been commissioned to assess the suitability of the site for the intended development from an Engineering perspective:

- Traffic Impact Assessment by SMEC Consulting Engineers.
- Bulk Water and Sewer Capacity Analysis by GLS Consulting Engineers.

Copies of the Masterplan, Reports and Assessments are appended.

2. PROJECT DESCRIPTION AND DEVELOPMENT PROPOSALS

The project consists of the proposed densification and subdivision of Erf 19741 that was previously zoned for 226 single residential erven and a Business Site into;

- 88 Single Residential Erven
- 385 Town Houses
- 288 Flats.

3. SITE GEOMORPHOLOGY AND GEOLOGY

A comprehensive Geotechnical Investigation will be undertaken by Professional Geologists and the findings will guide the foundation and structural design of the buildings as well as the design of the Civil Infrastructure.

INTEGRATE are the Civil Consulting Engineers for the infrastructure that has already been installed on previous phases on the Paradise Coast Development and have a fair knowledge of the underground geotechnical conditions and material characteristics that can be expected.

No adverse underground conditions are expected.

The site is underlain by calcrete at varying depths and has a SABS excavation classification of intermediate.

Flora Road forms the southern boundary of the site and the site falls with a fairly uniform slope of 1 in 15 in a northerly direction. The slope is sufficient to allow for shallow cost efficient gravity stormwater and sewer pipework.

4. CIVIL ENGINEERING INFRASTRUCTURE DESIGN PARAMETERS

The internal and external civil infrastructure will be designed to comply with the minimum standards contained in the “Guidelines for Installation of Engineering Services in Residential Areas”, also known as the “Red Book”, as well as, standards and requirements of the Department of Water Affairs (DWA), the Mossel Bay Municipal Guidelines and Standards, and the Provincial Roads Engineer.

All construction drawings will be subject to approval by the Mossel Bay Municipality prior to construction.

5. ROADWORKS

5.1. Traffic Impact Assessment

A comprehensive Traffic Impact Assessment (TIA) was undertaken by SMEC Consulting Engineers and a copy is contained in Appendix 4.

Based on the future traffic volumes generated by this development and together with the anticipated traffic volumes expected on Flora Road and the surrounding road network the Traffic Engineers determined that a dual lane traffic circle at the Flora Road intersection is best suited to maximise the traffic flow rates and to reduce the high speeds on Flora Road.

A signalised intersection as an alternative option has also been considered but due to the high traffic volumes on Flora Road and the resultant long delays expected during red light periods this option was found to operate at a disqualifying level.

The entrance/exit lanes to and from Outeniqua View will be dualled and a stacking distance of 24 m at the controlled entrance gate has been determined.

The traffic circle will be built in its final position, slightly offcentre on the current Flora Road and later adjusted when the eastern leg of Flora Road is relocated in its final alignment as determined by the proposed structure plan of the Mossel Bay Municipality. The existing Flora Road from the Outeniqua View entrance to Louis Fourie Avenue will then be demolished and the redundant road reserve will form part of the Outeniqua View Development footprint.

5.2. Internal roads

Internal roads will be surfaced with a combination of tar, paving and cobbling to suite the architectural theme. The road widths will be determined by the expected generated traffic and traffic calming measures will be implemented throughout to create an environment safe and inviting for pedestrians and cyclists.

The proposed Road Reserve Widths are adequate for the installation of underground civil infrastructure.

6. POTABLE WATER

GLS Consulting Engineers have been appointed by the Mossel Bay municipality to on their behalf assess the impact that this development will have on their bulk supply in the area and to confirm that adequate spare capacity exists in their potable water reservoirs and reticulation system. The GLS report dated 6 June 2024 is contained in Appendix 2.

It was confirmed that adequate spare capacity exist in the Raw Water Supply, Water Treatment, Potable Water Storage and Conveyance Systems to supply the development and no upgrading of the storage or conveyance system is required. The area however suffers from poor water pressures and an additional 180 kL Water Tower adjacent to the existing tower in Dana Bay is required. There is adequate space within the reservoir precinct to accommodate this requirement.

The position of the proposed 180 kl Water Tower within the municipal precinct of erven 6356 and 6357 is indicated on INTEGRATE Drg Nr C23021.120 Rev A contained in Appendix 5.

The Bulk External Connection Point is indicated on Figure 1 of the GLS report. The bulk connection will be made on the existing 250 mm dia watermain located within the Flora Road reserve and will terminate with a bulk water meter.

The Annual Average Daily Demand (AADD) of the proposed development is calculated as 350 kl/day with an Instantaneous Peak Flow of 25 ℓ/ s to cater for fireflows .

7. SEWERAGE

GLS Consulting Engineers have been appointed by the Mossel Bay municipality to on their behalf assess the impact that this development will have on their bulk sewage conveyance systems and treatment facilities and to confirm whether adequate spare capacities exist. The GLS report dated 31 January 2024 is contained in Appendix 2. It was confirmed that adequate spare capacities exist in the conveyance and treatment systems and no upgrading is required.

The Peak Day Dry Weather Flow [PDDWF] of the proposed development is calculated as 245 kl/day.

The development will connect to the existing main outfall gravity sewer line that was installed on Paradise Coast south of Flora Road from where it gravitates down to the main outfall gravity sewer running parallel to the coast. Two small 5 to 10 l/s sewer pump stations are required at the lowest points of the proposed development [northern boundary] to collect effluent under gravity from where it will be pumped to the high lying southern boundary, cross Flora Road and connect to the Paradise Coast gravity outfall sewer.

The position of the sewage pump stations and rising mains within the development is indicated on INTEGRATE Drg Nr C23021.130 Rev A contained in Appendix 5. During the Detailed Design of the sewage reticulation and once more topographical survey information becomes available an attempt will be made to make use of a single sewage pump station to serve the development.

The pump stations will be equipped with standby battery power and diesel generators. Battery power is recommended due to the high frequency of power interruptions and noise disturbance of the generators. The battery power can cope for up to 4 hours before the generator activates.

8. SOLID WASTE

Solid Waste generated by the development will be collected from the dwellings by the Home Owners Association and transported to the entrance gate where it will be temporarily stored for collection by the Municipality.

Municipal Refuse Removal Trucks will not enter the development.

Adequate spare volume exists at the Municipal Waste Site to accommodate this development.

9. STORM WATER

Stormwater run-off up to the 5 year storm event from hardened areas will be collected via catch pits and inlet grids and conveyed via a combination of open concrete channels and underground concrete pipework. A Stormwater Management Plan will be compiled during the Detailed Design Process and submitted to the Mossel Bay Municipality together with the Civil Infrastructure Construction Drawings for approval. Stormwater attenuation facilities will be provided and will be designed such that the post development runoff rates do not exceed the predevelopment runoff rates, intercept solids and provide water polishing effects prior to release into the environment. Adequate escape avenues exists for storms exceeding the 5 year event.

10. CONCLUSION

INTEGRATE has investigated the proposed development layout and engineering constraints of the site and are satisfied that the site is suitable for the intended development from an engineering point of view.

A handwritten signature in black ink, appearing to be 'AJ Burrows', written over a circular stamp or seal.

AJ BURROWS

For INTEGRATE Structural and Civil Engineering (Pty) Ltd

Appendix 1

**MASTERPLAN COMPILED BY OSMOND LANGE ARCHITECTS
AND PLANNERS**

APPENDIX 2

GLS CONSULTING ENGINEERS BULK WATER AND SEWER BULK
CAPACITY ANALYSIS AND CONFIRMATION OF CAPACITY DATED 6
JUNE 2024

06 June 2024

Integrate Structural and Civil Engineering
Sippel & de Lange Building
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Matieland
7602

Attention: Mr André Burrows

Dear Sir

DEVELOPMENT OF ERF 19741, DANA BAY: CAPACITY ANALYSIS OF THE BULK WATER & SEWER SERVICES

The request by Mr André Burrows of Integrate Structural and Civil Engineering regarding comments on the bulk water and sewer supply to the proposed development (residential development on Erf 19741, Dana Bay), refers.

This document should inter alia be read in conjunction with the following reports:

- “*Mossel Bay Municipality Water Master Plan*” dated April 2017.
- “*Mossel Bay Municipality Sewer Master Plan*” dated April 2017.

Future development area A01, which includes the proposed development, was conceptually taken into consideration for the April 2017 master plans for the water and sewer networks.

GLS is currently in the process to update the April 2017 water and sewer master plans for Mossel Bay Municipality and the result of this bulk water and sewer capacity investigation report for development on Erf 19741 will be included in the updated master plans.

1. WATER DISTRIBUTION SYSTEM

1.1. Distribution zone

The proposed development is located on Erf 19741 in Dana Bay. It is proposed that the development will be accommodated in the Dana Bay tower water distribution zone. The tower capacity and top water levels (TWL) are as follows:

- Dana Bay tower: 180 kL with TWL = 229 m

The development is situated inside the water priority area.

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1.2. Water demand

The original water analysis for the master plan was performed with a total annual average daily demand (AADD) for the proposed development area (portion of future development area A01 in the water master planning) of 107,1 kL/d.

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

- | | | |
|---|---------|-------------------|
| • 90 Single Residential units @ 0,6 kL/ unit/ d ⁽¹⁾ | = | 54,0 kL/d |
| • 288 Flats / Apartment units @ 0,35 kL/ unit/ d ⁽¹⁾ | = | 100,8 kL/d |
| • 391 Group / Cluster housing @ 0,5 kL/ unit/ d ⁽¹⁾ | = | <u>195,5 kL/d</u> |
| | Total = | 350,3 kL/d |
| • Fire flow criteria (Moderate risk) | = | 25 L/s @ 10 m |

⁽¹⁾ As per Table J.2 from Section J - Water Supply of "The Neighbourhood Planning and Design Guide" (so called "Red book").

The AADD for the existing stands (fully occupied) as well as the proposed development in the Dana Bay tower water distribution zone were calculated as follows:

- | | | |
|---|---------|-----------------|
| • Dana Bay tower supply zone fully occupied | = | 445 kL/d |
| • Proposed development | = | <u>350 kL/d</u> |
| | Total = | 795 kL/d |

In the April 2017 master plans for the water and sewer systems, it was proposed that future development area U26 and a portion of A01 (which also includes the proposed development) would be accommodated in the Dana Bay tower water distribution zone. Therefore, the AADD for the potential future developments, the existing stands (fully occupied) as well as the proposed development in the Dana Bay tower water distribution zone were calculated as follows:

- | | | |
|--|---------|-----------------|
| • Dana Bay tower supply zone fully occupied | = | 445 kL/d |
| • Proposed development | = | 350 kL/d |
| • Future development area U26 & A01 (Excluding proposed development) | = | <u>580 kL/d</u> |
| | Total = | 1 375 kL/d |

1.3. Present situation

1.3.1. Bulk supply system

There is sufficient capacity in the existing bulk supply system to accommodate the proposed development.

1.3.2. Reticulation network

It is proposed that the development connects to the existing 250 mm diameter supply pipeline in Flora Road, as shown on Figure 1. The 250 mm diameter supply pipeline in Flora Road is supplied with water pressure from the Dana Bay tower and booster PS and the pipeline has sufficient spare capacity to accommodate the proposed development.

It is however proposed in the Water Master Plan for Mossel Bay Municipality that the future development areas east of the Dana Bay reservoirs that fall below the 160 m contour (refer to Figure 1) should in future be supplied with water directly from the Dana Bay reservoirs (as apposed to supply from the tower/booster pump).

An additional link services pipeline will therefore be required in future along Flora Road to connect the lower lying erven south of the proposed development (erven below the 160 m contour) to the Dana Bay reservoirs no.1 and no.2. This link services pipeline is however not required now to accommodate the proposed development in the existing water system.

1.3.3. Reservoirs

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

According to the re-analysis of the fully occupied AADD scenario for the Dana Bay reservoir and tower water distribution zones, the AADD can potentially increase to approximately 1 646 kL/d when the development has been fully developed. The current combined storage capacity of the existing Dana Bay reservoirs and tower is 4 980 kL, which results in a current storage capacity of 73 hours of the AADD.

There is sufficient capacity available at the Dana Bay reservoirs and tower to accommodate the proposed development.

1.3.4. Towers

The criteria for total tower volume used in the Mossel Bay Water Master Plan is 6 hours of the AADD (of the Tower supply zone) for gravity and pumped supply to the reservoir.

According to the re-analysis of the fully occupied AADD scenario for the Dana Bay tower water distribution zone, the AADD can potentially increase to approximately 795 kL/d when the development has been fully developed. Furthermore, the AADD can potentially increase to approximately 1 375 kL/d should future development area's A01 and U26 (as proposed for the April 2017 master plans for the water and sewer systems) fully develop.

The current storage capacity of the existing Dana Bay tower is 180 kL, which results in a storage capacity of ± 10 hours of the AADD served (Fully occupied AADD = 445 kL/d).

In the case where the AADD of the tower zone increases to 795 kL/d (Fully occupied and proposed development) results in a storage capacity of ± 5 hours of the AADD.

The potential full future development of the Dana Bay tower zone (as proposed for the April 2017 master plans for the water and sewer systems) will result in a storage capacity of ± 3 hours of the AADD served (Potential AADD = 1 375 kL/d).

There is insufficient capacity available at the Dana Bay tower to accommodate the proposed development and other potential developments in the future.

1.4. *Proposed upgrades*

The following additional tower storage is proposed to augment tower storage capacity for the Dana Bay Tower zone.

Additional storage capacity:

- Item 1 : Additional 180 L tower at Dana Bay Tower site = R 4 311 000 *

* Including P & G, Contingencies and Fees, but excluding VAT – Year 2023/24 Rand Value. (This is a rough estimate, which does not include major unforeseen costs)

1.5. *Minimum requirements*

The minimum requirement to accommodate the proposed development in the existing water system are item 1 to augment tower storage capacity for Dana Bay Tower zone.

2. SEWER NETWORK

2.1. Drainage area

It is proposed that the development on Erf 19741 is accommodated within the existing Pinnacle Point main outfall pumping station (PS) drainage area. The proposed connection point for the development is to the existing gravity sewer in Flora Road (sewer pipeline gravitating through Paradise Coast Beach and Eco Estate), as shown in Figure 2 attached.

2.2. Sewer flow

In the original sewer master plan, the peak day dry weather flow (PDDWF) for the proposed development area (portion of future development area A01 in the sewer master planning) was calculated as 67,5 kL/d.

For this re-analysis of the sewer master plan, the PDDWF for the proposed development was calculated as 245 kL/d.

2.3. Present situation

2.3.1. Gravity Sewers

The existing gravity system between the proposed connection point in Flora Road and the Pinnacle Point Main Outfall PS has sufficient spare capacity to accommodate the proposed development.

2.3.2. Pumping stations and rising mains

Pinnacle Point Main Outfall PS

The existing Pinnacle Point Main Outfall PS with a capacity of 71 L/s and accompanying 355 mm Ø rising main have sufficient capacity to accommodate the proposed development on Erf 19741.

2.3.3. Connection to the existing sewer system

The following link services items will be required to connect the proposed development to the Pinnacle Point Main Outfall PS drainage area, as shown on Figure 2:

Link Services:

• MOS-A01.1	: New Pump Station (5 L/s)	=	R 2 111 000 *
• MOS-A01.2	: 1 190 m x 110 mm Ø New rising main	=	<u>R 1 454 000 *</u>
		Total =	R 3 565 000 *

* Including P & G, Contingencies and Fees, but excluding VAT – Year 2023/24 Rand Value. (This is a rough estimate, which does not include major unforeseen costs).

Take note that the position of the pumping station and the route of the rising main are schematically shown in Figure 2 but must be finalised after a detailed pipeline route investigation and pump station location investigation have been performed.

3. CONCLUSION

The developer of Erf 19741 in Dana Bay will be liable for the payment of a Development Contribution (as calculated by Mossel Bay Municipality) for bulk water and sewer infrastructure as per Council Policy.

The existing water reticulation system has insufficient capacity to accommodate the proposed development.

The existing tower storage volume available in the Dana Bay Tower is only 3 hours of the AADD served and therefore insufficient to accommodate the proposed development.

The minimum requirement to accommodate the proposed development in the existing water system are item 1 to augment tower storage capacity for Dana Bay Tower zone.

There is sufficient capacity in the existing sewer reticulation system to accommodate the proposed development.

Link services items MOS-A01.1 & MOS-A01.2 are however required to connect the proposed development on Erf 19741 to the existing Pinnacle Point Main Outfall PS drainage area.

We trust that you find this of value.

Yours sincerely

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



Per: PC DU PLESSIS

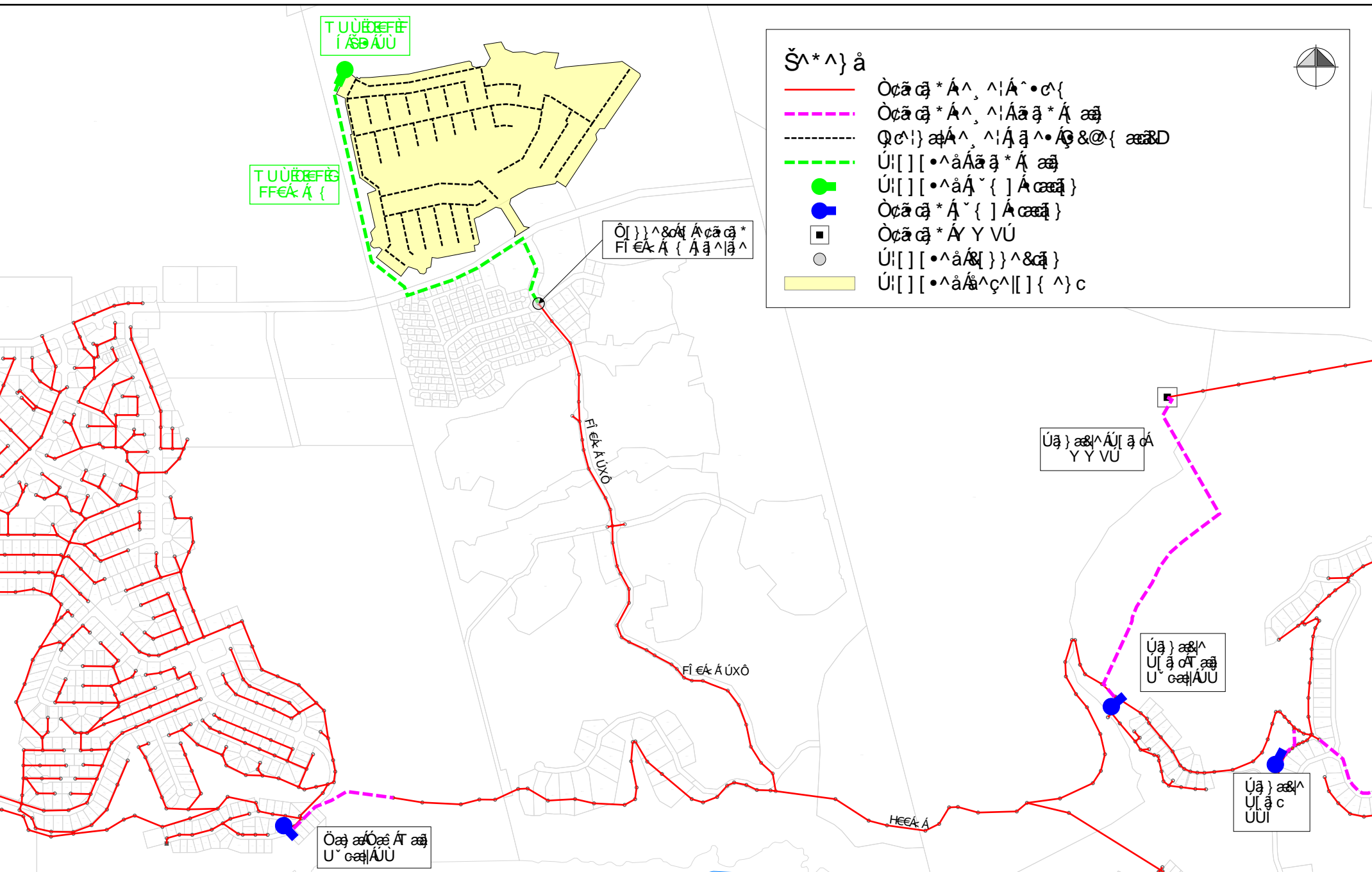
cc. The Manager: Civil Engineering Services
Mossel Bay Municipality
Private Bag X29
MOSSEL BAY
6500

Attention: Mr Eric Louw

APPENDIX 3

GLS BULK WATER LAYOUT 6 JUNE 2024

GLS BULK SEWER LAYOUT 6 JUNE 2024



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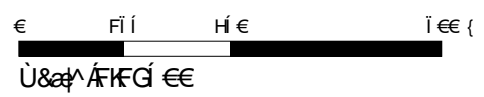
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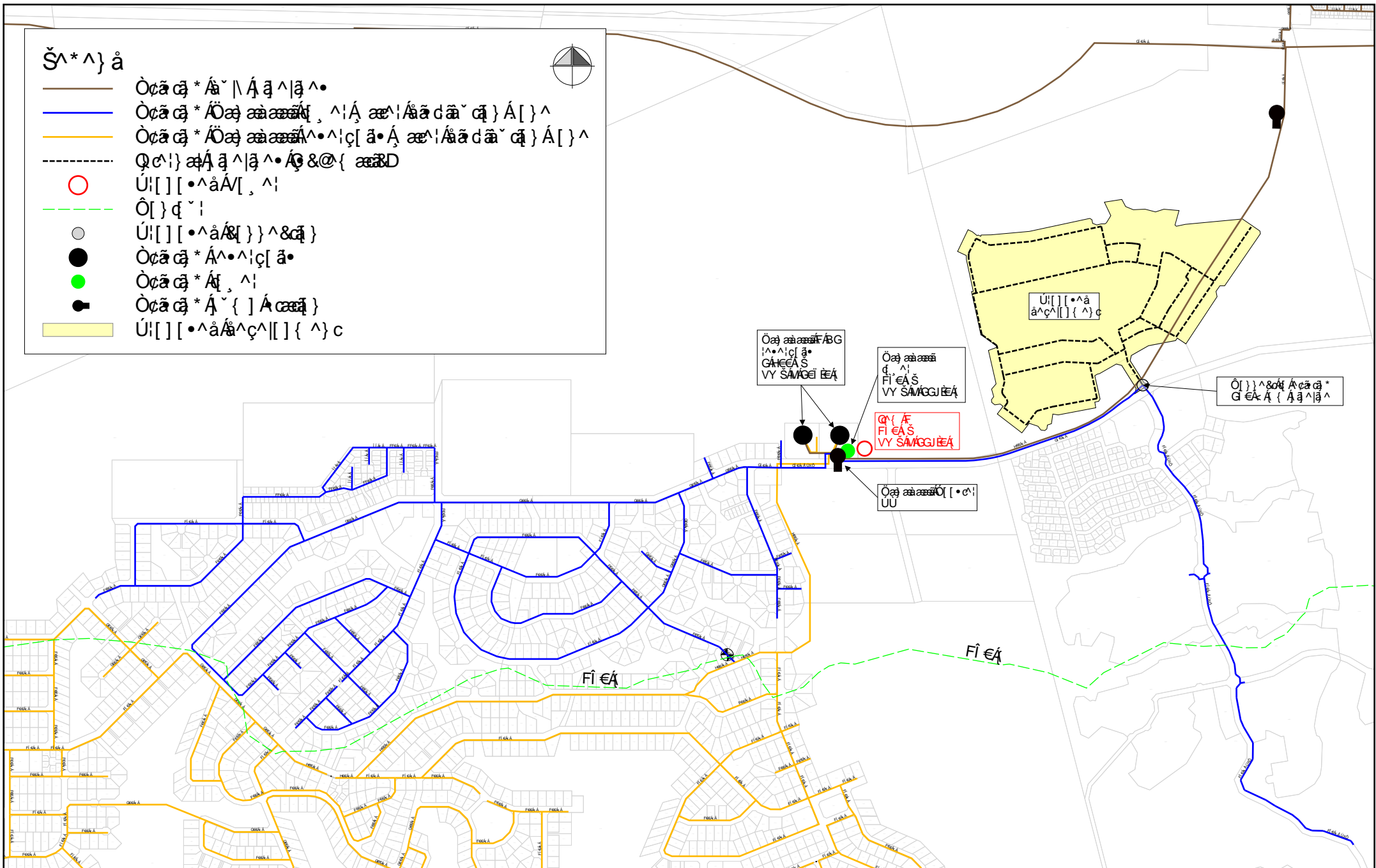


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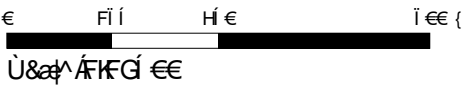
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APPENDIX 4

SMEC CONSULTING ENGINEERS TRAFFIC IMPACT ASSESSMENT
REVISION 1 DATED 8 MARCH 2024



SMEC INTERNAL REF. C3329

Traffic Impact Assessment Report

Outeniqua View Residential Development - Erf 19741, Dana Bay

Reference No. C3329

Prepared for Integrate Structural and Civil Engineering (Pty) Ltd

8 March 2024

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Revision No.	Date	Prepared By	Reviewed By	Approved for Issue By
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Important Notice

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1 Introduction

SMEC South Africa (Pty) Ltd was appointed by Integrate Structural and Civil Engineering (Pty) Ltd to conduct a Traffic Impact Assessment for the proposed Outeniqua View Residential Development on Erf 19741, Dana Bay, Western Cape. The site is bounded by Flora Road to the east. A locality plan is shown in **Figure 1-1**.



Figure 1-1: Locality Plan (Source: OpenStreetMap)

The subject site measures approximately 75.3 hectares in extent and will comprise of 90 single dwelling units, 288 flats, and 391 townhouses. The development site development plan is shown in **Figure 1-2**.

The purpose of the Traffic Impact Assessment is to quantify the anticipated impact of the development traffic on the surrounding road network, and recommend remedial measures as required. The study was conducted in accordance with the Committee of Transport Officials South African Traffic Impact and Site Traffic Assessment Manual (COTO, TMH 16 Volume 1).

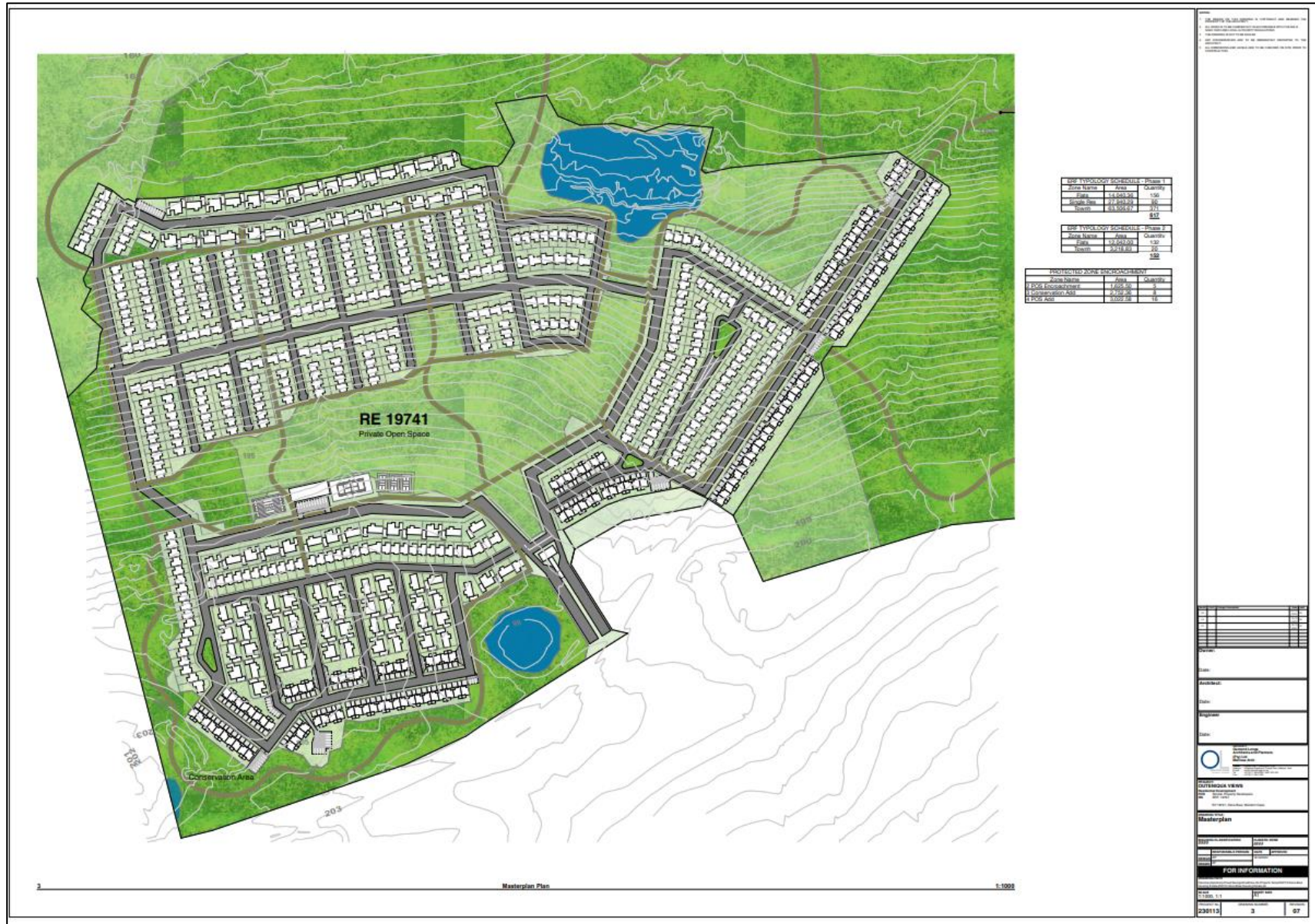


Figure 1-2: Draft Outeniqua View SDP (Source: Osmond Lange)

2 Background Information

2.1 Existing Roads

Flora Road is classified as a Class 4b Residential Collector Street providing access to the surrounding residential area. In the vicinity of the site, it comprises of one lane per direction and experiences moderate traffic flows during peak hours.

Louis Fourie Road (R102) is classified as a Class 2 Major Arterial within the Mossel Bay Municipality Road Master Plan. In the vicinity of the site, it comprises of two lanes per direction and experiences moderate traffic flows during peak hours.

Crotz Road is classified as a Class 3 Minor Arterial within the Mossel Bay Municipality Road Master Plan. It comprises of one lane per direction and experiences moderate traffic flows during peak hours.

Refer to **Figure 2-1**.

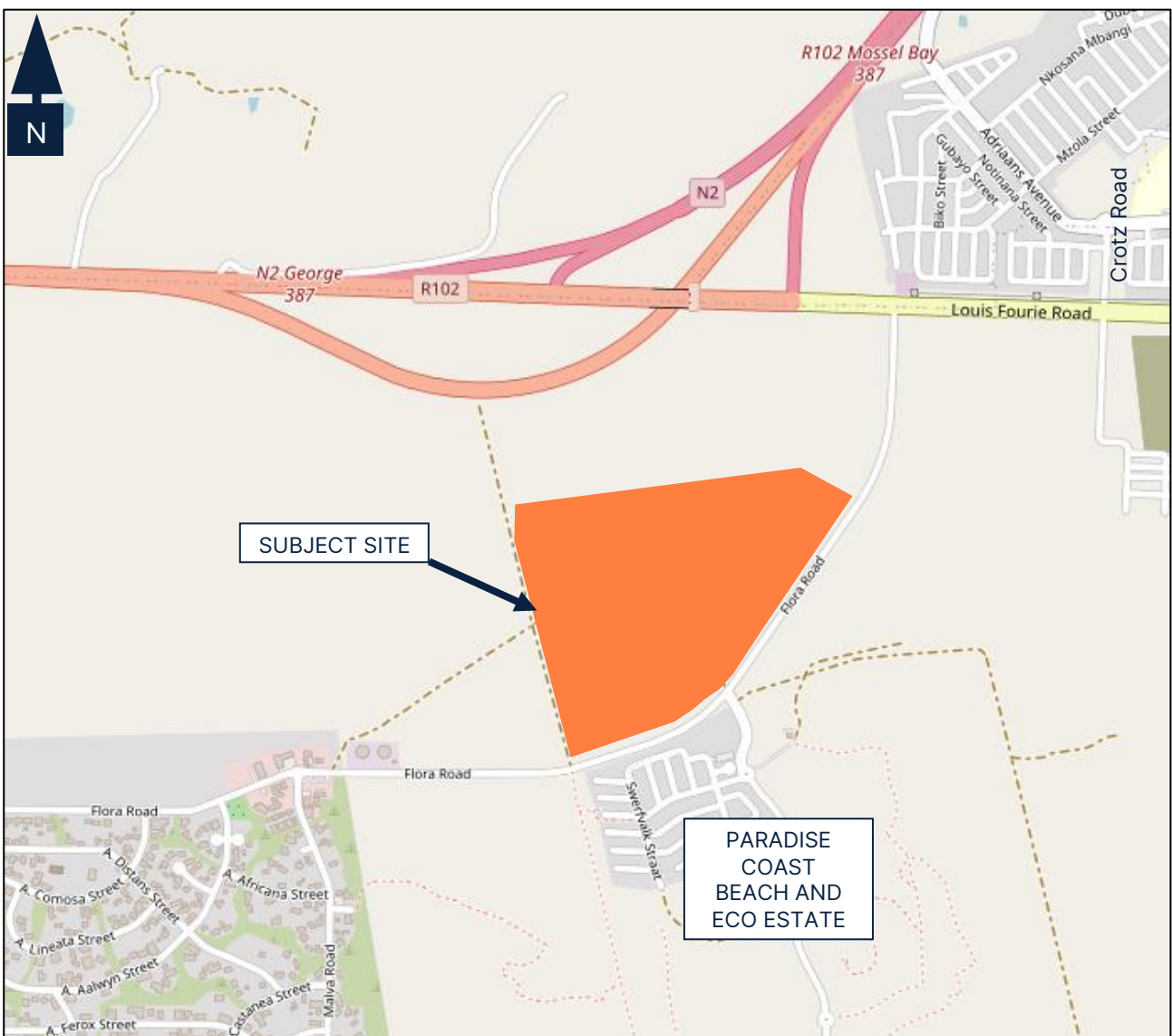


Figure 2-1: Existing Road Network (Source: OpenStreetMap)

2.2 Planned Roads

2.2.1 Proposed Dana Bay Emergency Access

An emergency access to serve Dana Bay is planned to join onto the National Road N2 directly opposite R327 Herbertsdale. Refer to **Figure 2-2**.

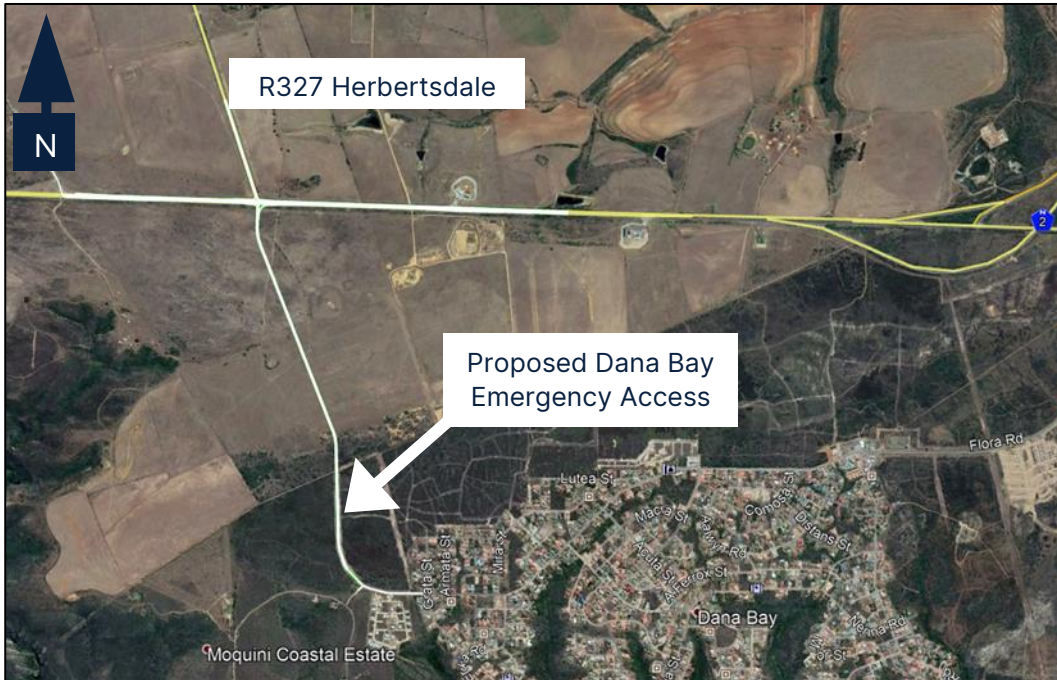


Figure 2-2: Planned Dana Bay Emergency Access

2.2.2 IDP Priority Projects

The following priority projects were recommended in the Fourth Generation IDP 2017 – 2022 (CNdV Africa, 2018):

- Upgrade of Flora Road, including public transport and non-motorised transport routes using the “complete streets” approach. Paving of sidewalks in Flora Road is also included
- Re-align Flora Road and link to the existing Crotz Road / R102 Louie Fourie Road intersection and signalise the new four-way intersection
- Extend Kreupelhout Street to Flora Road to provide access to the proposed Technikon site
- Extend Apiesdoring Street from Spekboom Street to Flora Road

Refer to **Figure 2-3**.

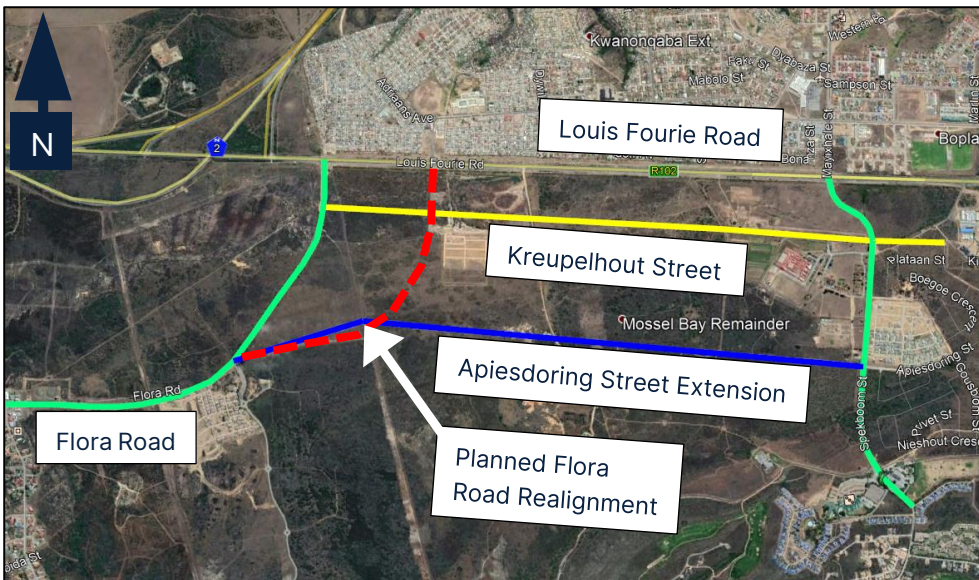


Figure 2-3: Planned Flora Road Realignment

2.3 Public Transport Facilities

There are no public transport facilities provided within the vicinity of the site.

Taking into consideration the planned land use type and extent, it is anticipated that a significant number of domestic workers and gardeners would make use of the development access during peak periods. It is therefore recommended that the development access makes provision for public transport as part thereof. Alternatively, a layby should be constructed along Flora Road on the downstream sides of the development access.

2.4 Non-Motorised Transport Facilities

There are no pedestrian sidewalks along the existing roads in the vicinity of the site.

In the event that public transport laybys are constructed along Flora Road on the downstream sides of the development access, it is recommended that pedestrian walkways be provided to link the laybys with the development access.

2.5 Site Access

The access spacing requirements were derived from the Western Cape Government (WCG) Access Management Guidelines (2020). The minimum spacing requirement for a Class 4 Road within a suburban roadside development environment is as follows:

- 180 m from an unsignalized full intersection to a signalized full intersection along a Class 4b Collector Road
- 115 m from an unsignalized full intersection to an unsignalized full intersection along a Class 4b Collector Road

It is planned for the development to be served by a single access along Flora Road directly opposite the existing Paradise Coast Beach and Eco Estate.

Taking into consideration the existing Flora Road alignment, the access is ~ 1 km east of the intersection with Malva Road and ~1 km south of the intersection with Louis Fourie Road.

Taking into consideration the planned Flora Road realignment, the access is ~ 860m west of the intersection with Crotz Road. Refer to **Figure 2-4**.



Figure 2-4: Proposed Site Access (Source: OpenStreetMap)

The proposed access is classified as an Equivalent Collector (thus the junction is seen as an unsignaled full intersection), as it is anticipated to serve between 60 - 500 vehicles per hour per direction. Taking into consideration both the existing Flora Road alignment as well as the planned Flora Road realignment, it is our submission that the proposed development access conforms to the WCG access spacing requirements.

3 Traffic Demand Estimation

3.1 Assessment Years

A base year assessment was undertaken to identify shortcomings in the road-based capacity in the short term, if any. In addition, it is required to grow traffic flows to an acceptable forecast year in order to ensure that the proposed road network would be able to operate satisfactorily once the development traffic is added to the surrounding road network.

TMH 16 Volume 1 Version 1.0, states that transportation improvements for developments must be designed for a forecast year of 5 years. Taking the above into consideration, a 2023 Base Year and a 2028 Forecast Year was used for this TIA.

3.2 Assessment Hours

The assessment has been undertaken considering the periods during which development traffic would result in the highest traffic demand. Hence, it was deemed suitable to assess the Weekday AM and PM Peak Hours.

3.3 Traffic Counts

Taking into consideration the location and extent of the proposed development with relation to the surrounding road network, the following historic traffic count surveys are relevant to this project assignment:

- Counting Station 1: Intersection of Louis Fourie (R102) and Flora Road
- Counting Station 2: Intersection of Louis Fourie (R102) and Crotz Road
- Counting Station 3: Intersection of Flora Road and Site Access (opposite Paradise Coast)

Traffic count locations are shown in **Figure 3-1**.

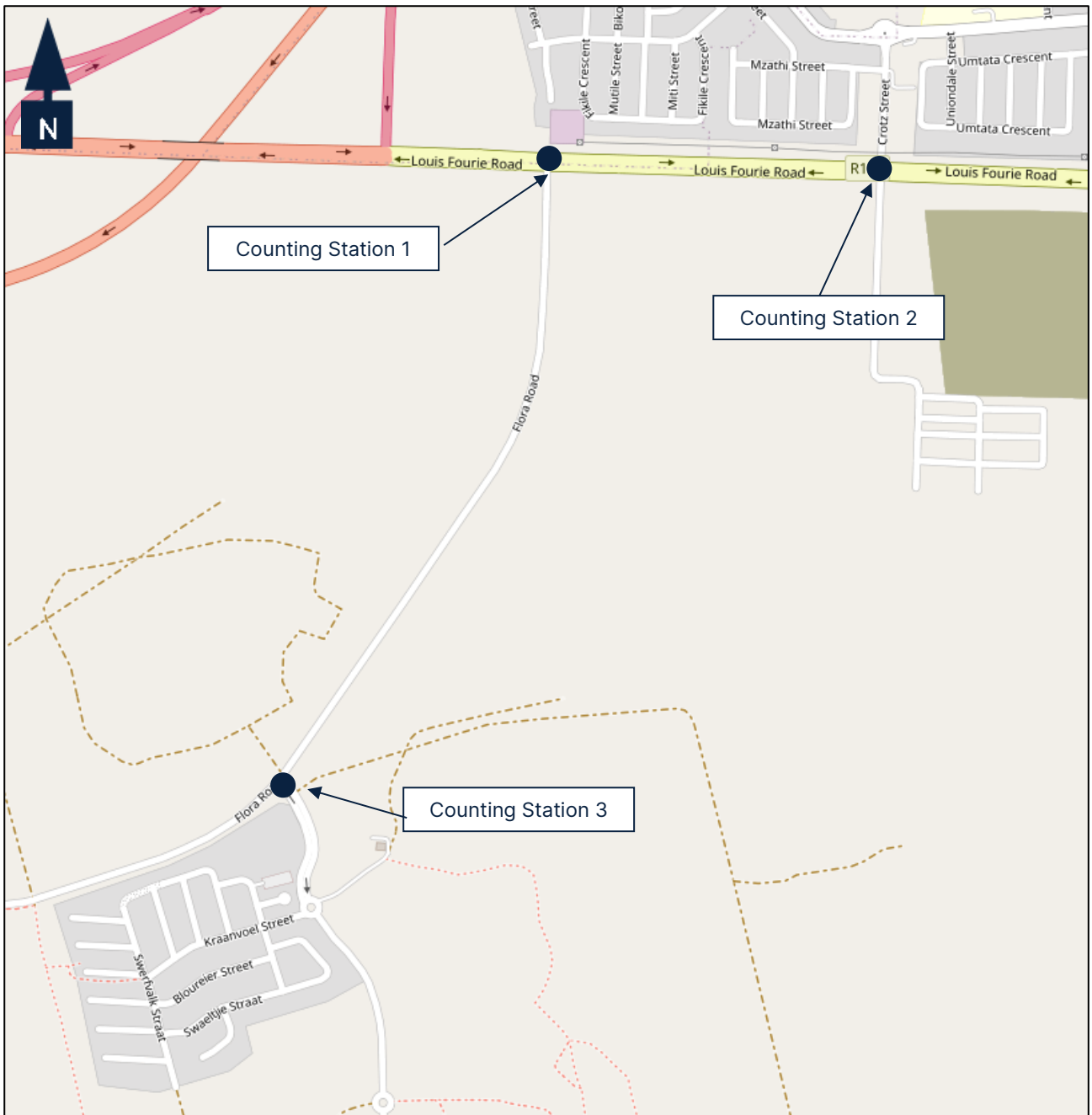


Figure 3-1: Traffic Count Locations

Details of the traffic survey are provided below:

- Date counted 6 April 2022
- Day Weekday AM and Weekday PM
- Congestion levels Moderate
- Enumerator Unitraf (Pty) Ltd

The detailed traffic survey data is provided in **Annexure A**.

Typical peak hours for the intersections under discussion are as follows:

- Weekday AM Peak Hour 07h00 – 08h00
- Weekday PM Peak Hour 16h30 – 17h30

The 2022 Background traffic flows are shown in **Figure 3-2**.

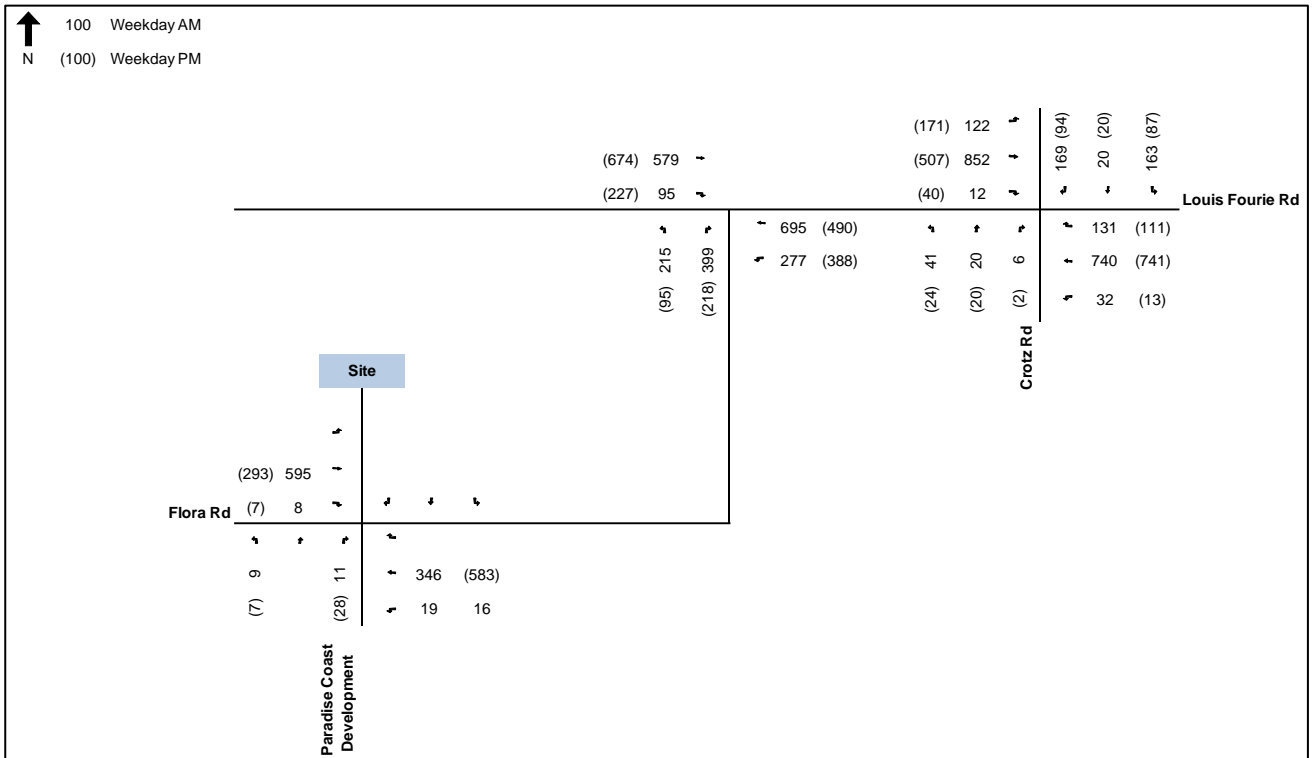


Figure 3-2: 2022 Background Traffic Flows

3.4 Traffic Growth Rates

A traffic growth rate is applied to background traffic in order to determine the anticipated growth in this traffic besides that relating to planned and new developments. The Committee of Transport Officials Trip Data Manual (COTO, TMH 17 Volume 1 Version 1.01) provides typical growth rates to be used for growth areas based on the existing/anticipated rate of growth. Refer to **Table 3-1**.

Table 3-1: Typical Growth Rates

Development Area	Growth Rate
Low Growth Areas	0% - 3%
Average Growth Areas	3% - 4%
Above Average Growth Areas	4% - 6%
Fast Growing Areas	6% - 8%
Exceptionally High Growth	> 8%

Taking into consideration the nature and extent of development within this area, an annual compounded traffic growth rate of 3.0% was applied to the 2022 Background traffic flows in order to derive the 2023 Base Year traffic flows.

The 2023 Base Year traffic flows are shown in **Figure 3-3**.

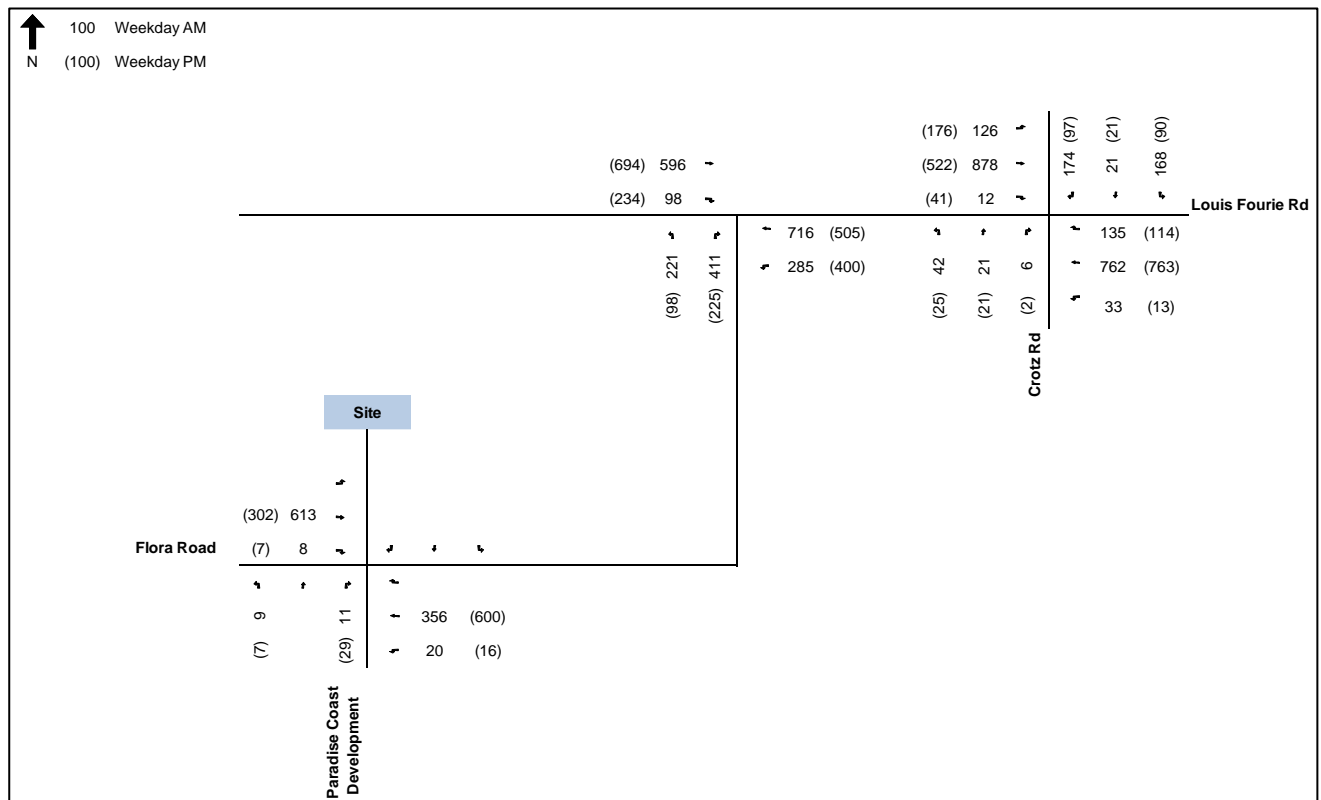


Figure 3-3: 2023 Base Year Traffic Flows

It is our submission that the anticipated development trips forming part of this study would represent growth in background traffic, therefore no further traffic growth is considered when deriving the 2028 Forecast Year traffic flows.

4 Trip Generation, Distribution and Assignment

4.1 Trip Generation

The Trip Generation Rates for the land use types forming part of the development were obtained from the COTO TMH 17 South African Trip Data Manual dated September 2013.

4.1.1 Outeniqua View Development

Trip generation was determined in accordance with the planned development phasing. Refer to **Table 4-1**.

Table 4-1: Planned Development Phasing: Outeniqua View

Phase	Year	Outeniqua View Development Build-Out (Residential Units)
Phase 1	2024	150
Phase 2	2025	300
Phase 3	2026	450
Ultimate	2027	769

Taking into consideration the 2028 Forecast Year, the trip generation potential of the proposed Outeniqua View Development is shown in **Table 4-2**.

Table 4-2: Development Trip Generation: Outeniqua View

Land Use	Quantity	Trip Generation Rates		Traffic Generation (vph)			
		Weekday		Weekday AM		Weekday PM	
		AM	PM	IN	OUT	IN	OUT
		Single Dwelling Units	90 units	1.0	1.0	23	68
Apartments and Flats	288 units	0.65	0.65	47	140	131	56
Townhouses (Simplexes & Duplexes)	391 units	0.85	0.85	83	249	233	100
New Trips				152	457	427	183
				610		610	

It is anticipated that the proposed development would generate 610 new vehicular trips during both the 2028 Weekday AM and PM Peak Hours.

4.1.2 Paradise Coast Development

Given the proximity of Paradise Coast Development (refer to **Figure 1-1**), the future trip generation potential of this development was taken into consideration for the 2028 Forecast Year. Trip generation was determined in accordance with the planned development phasing. Refer to **Table 4-3**.

Table 4-3: Planned Development Phasing: Paradise Coast

Phase	Year	Paradise Coast Development Build-Out (Dwelling Units)
Phase 1	2024	N/A
Phase 2	2025	50
Phase 3	2026	100
Phase 4	2027	150
Phase 5	2028	200
Ultimate	2032	400

Taking into consideration the 2028 Forecast Year, the trip generation potential of the proposed Paradise Coast Development is shown in **Table 4-4**.

Table 4-4: Development Trip Generation: Paradise Coast

Land Use	Quantity	Trip Generation Rates		Traffic Generation (vph)			
		Weekday		Weekday AM		Weekday PM	
		AM	PM	IN	OUT	IN	OUT
		Single Dwelling Units	200 units	1.0	1.0	50	150
New Trips				50	150	140	60
				200		200	

It is anticipated that the Paradise Coast Development would generate 200 new vehicular trips during both the 2028 Weekday AM and PM Peak Hours.

4.2 Trip Distribution

Trip distribution was estimated manually based on existing traffic flows, traffic generators in the surrounding areas and the development access location. The trip distribution was determined for both the existing Flora Road alignment as well as the planned realigned Flora Road. The trip distribution figures provided are as follows:

- Figure 4-1: Trip Distribution – Existing Flora Road Alignment (New Trips: Outeniqua View)
- Figure 4-2: Trip Distribution – Existing Flora Road Alignment (New Trips: Paradise Coast)
- Figure 4-3: Trip Distribution – Realigned Flora Road (New Trips – Outeniqua View)
- Figure 4-4: Trip Distribution – Realigned Flora Road (New Trips – Paradise Coast)

4.3 Traffic Assignment

Traffic assignment involves determining the amount of traffic that will use specific routes in the network based on the associated trip distribution. Traffic assignment was determined for both the existing Flora Road alignment as well as the planned Realigned Flora Road. The traffic assignment figures provided are as follows:

- Figure 4-5: Traffic Assignment – Existing Flora Road Alignment (New Trips: Outeniqua View)
- Figure 4-6: Traffic Assignment – Existing Flora Road Alignment (New Trips: Paradise Coast)
- Figure 4-7: Traffic Assignment – Realigned Flora Road (New Trips – Outeniqua View)
- Figure 4-8: Traffic Assignment – Realigned Flora Road (New Trips – Paradise Coast)

4.4 Total Traffic Demand

Total traffic demand is provided for each forecast year and peak hour that is assessed. The total traffic demand figures provided are as follows:

- Figure 4-9: 2023 Base Year Traffic Flows: Existing Flora Road Alignment
- Figure 4-10: 2028 Forecast Year Traffic Flows + Development Trips: Existing Flora Road Alignment
- Figure 4-11: 2023 Base Year Traffic Flows: Realigned Flora Road
- Figure 4-12: 2028 Forecast Year Traffic Flows + Development Trips: Realigned Flora Road

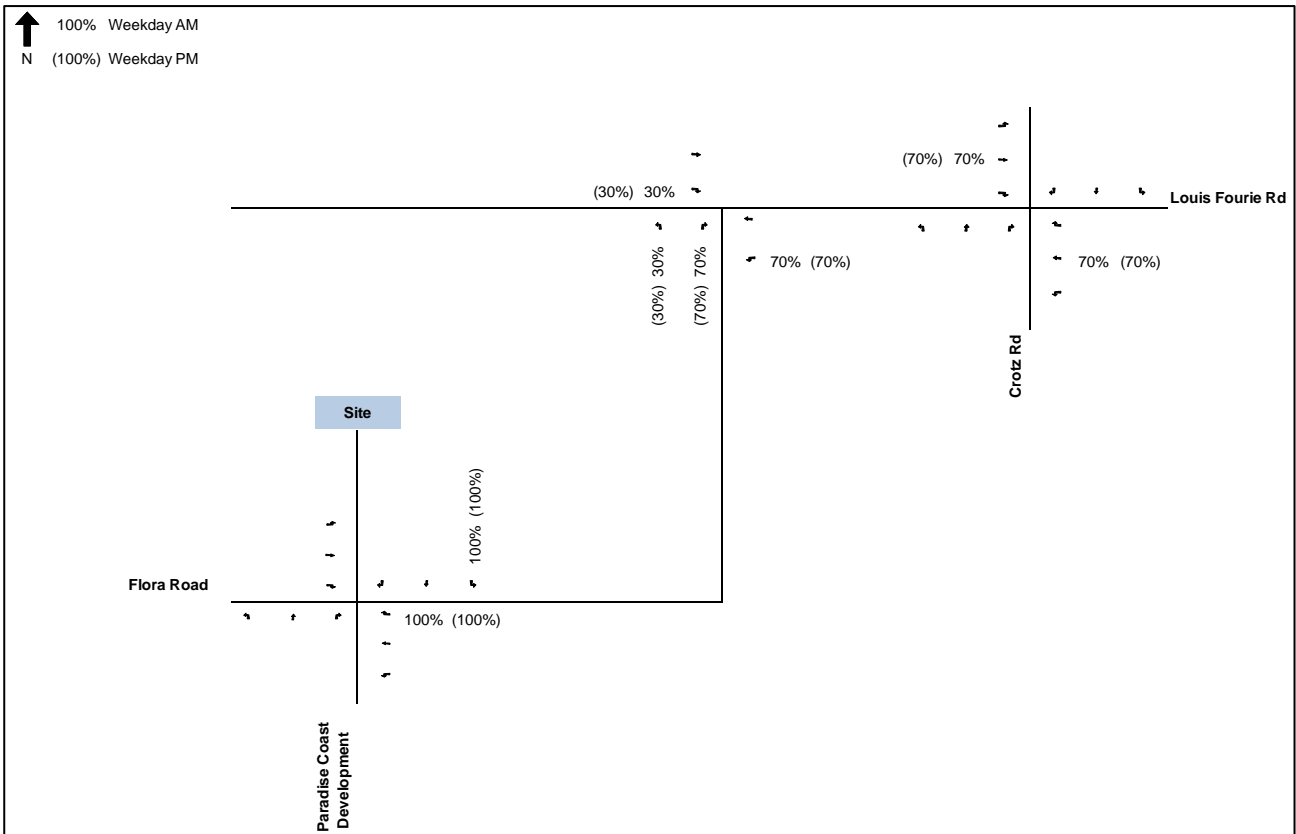


Figure 4-1: Trip Distribution – Existing Flora Road Alignment (New Trips: Outeniqua View)

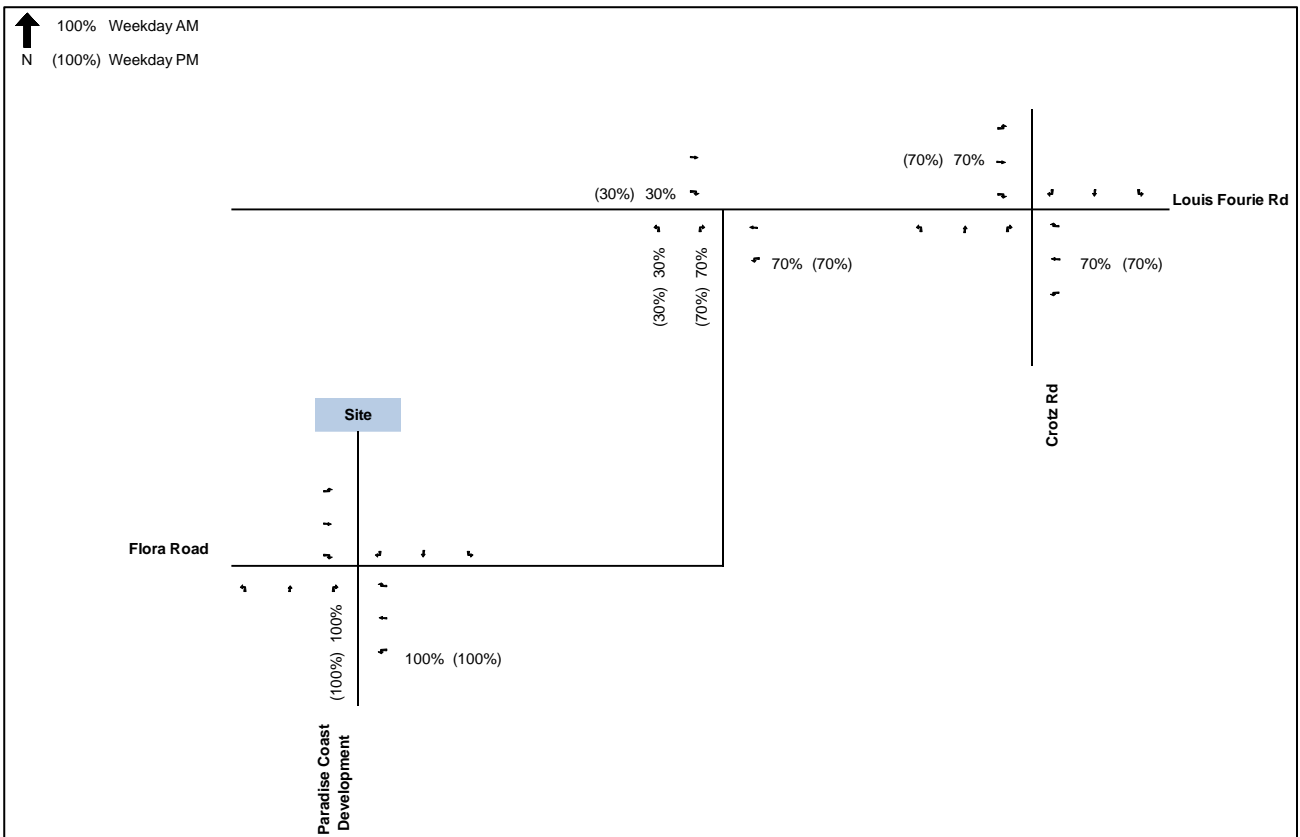


Figure 4-2: Trip Distribution – Existing Flora Road Alignment (New Trips: Paradise Coast)

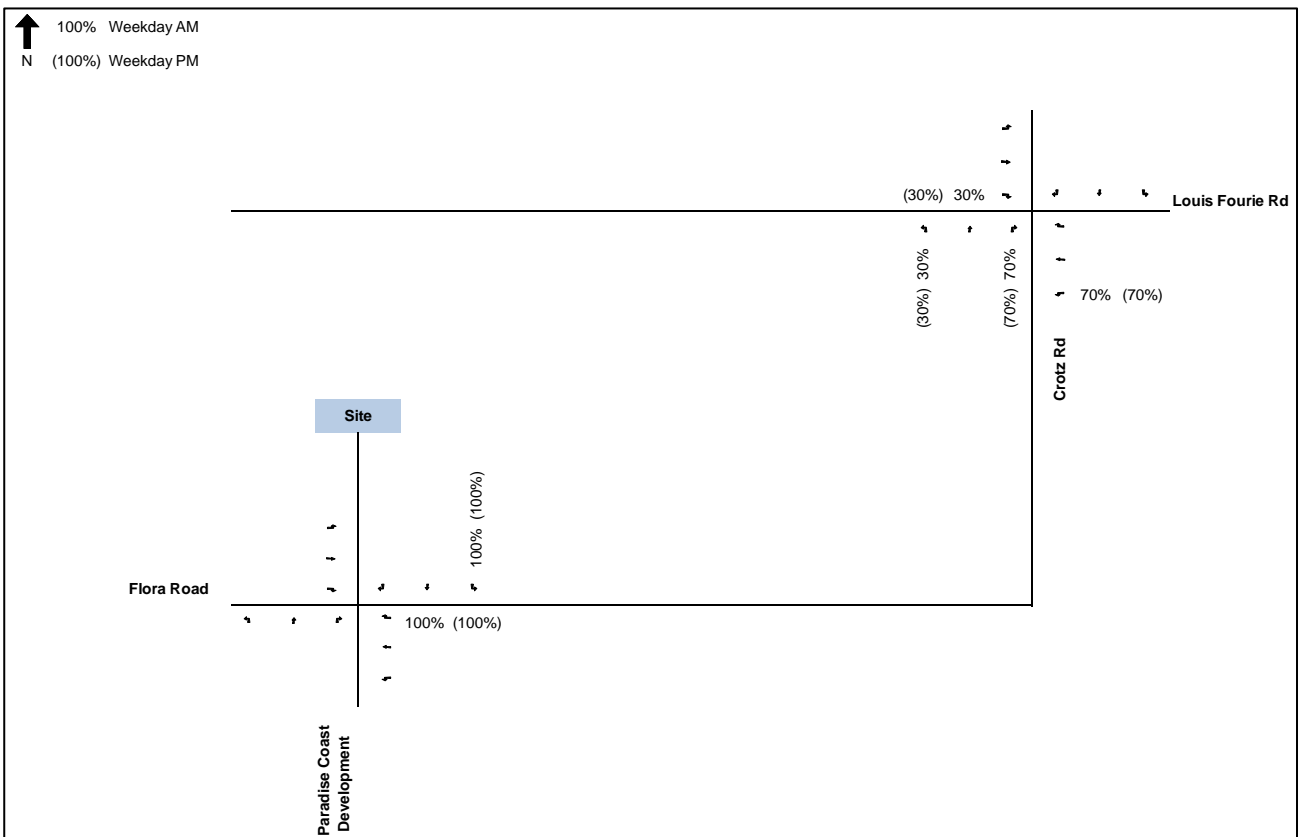


Figure 4-3: Trip Distribution – Realigned Flora Road (New Trips – Outeniqua View)

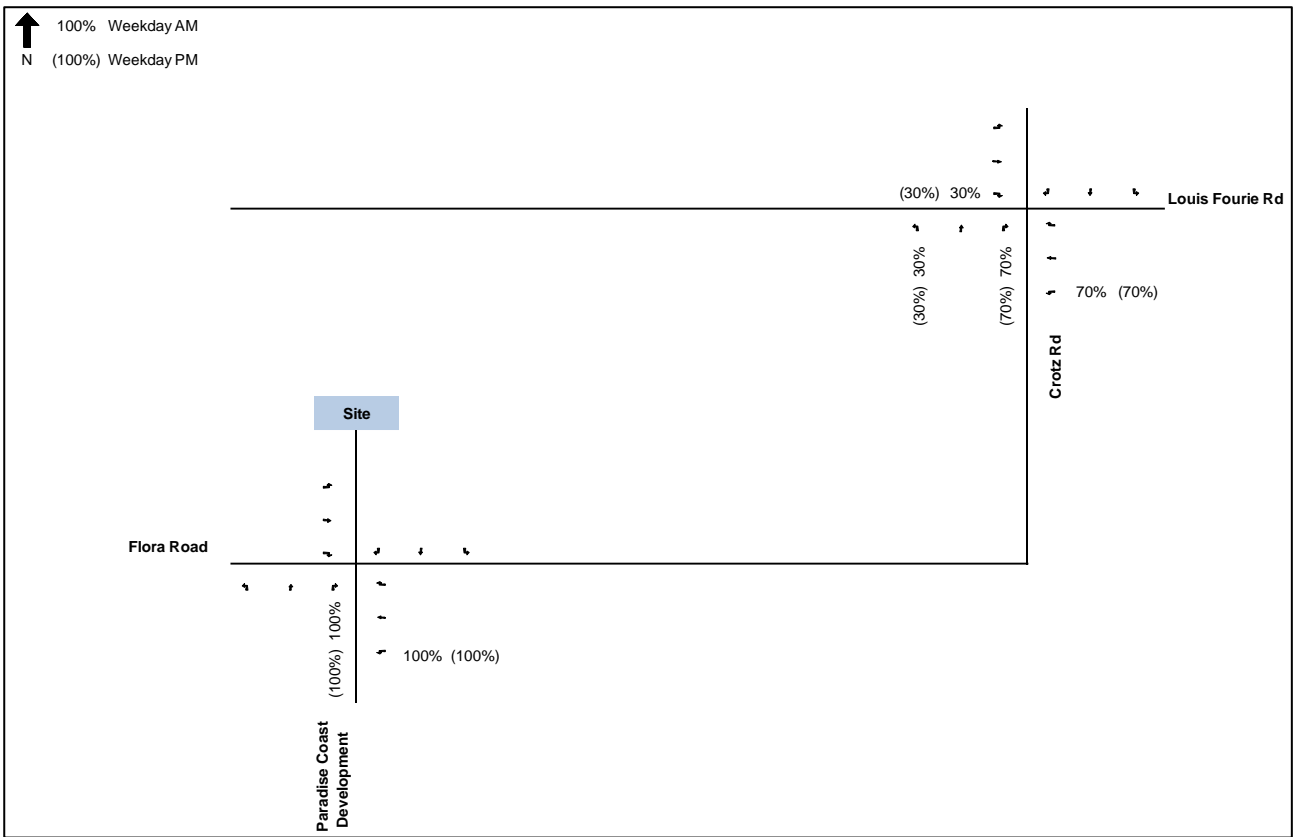


Figure 4-4: Trip Distribution – Realigned Flora Road (New Trips – Paradise Coast)

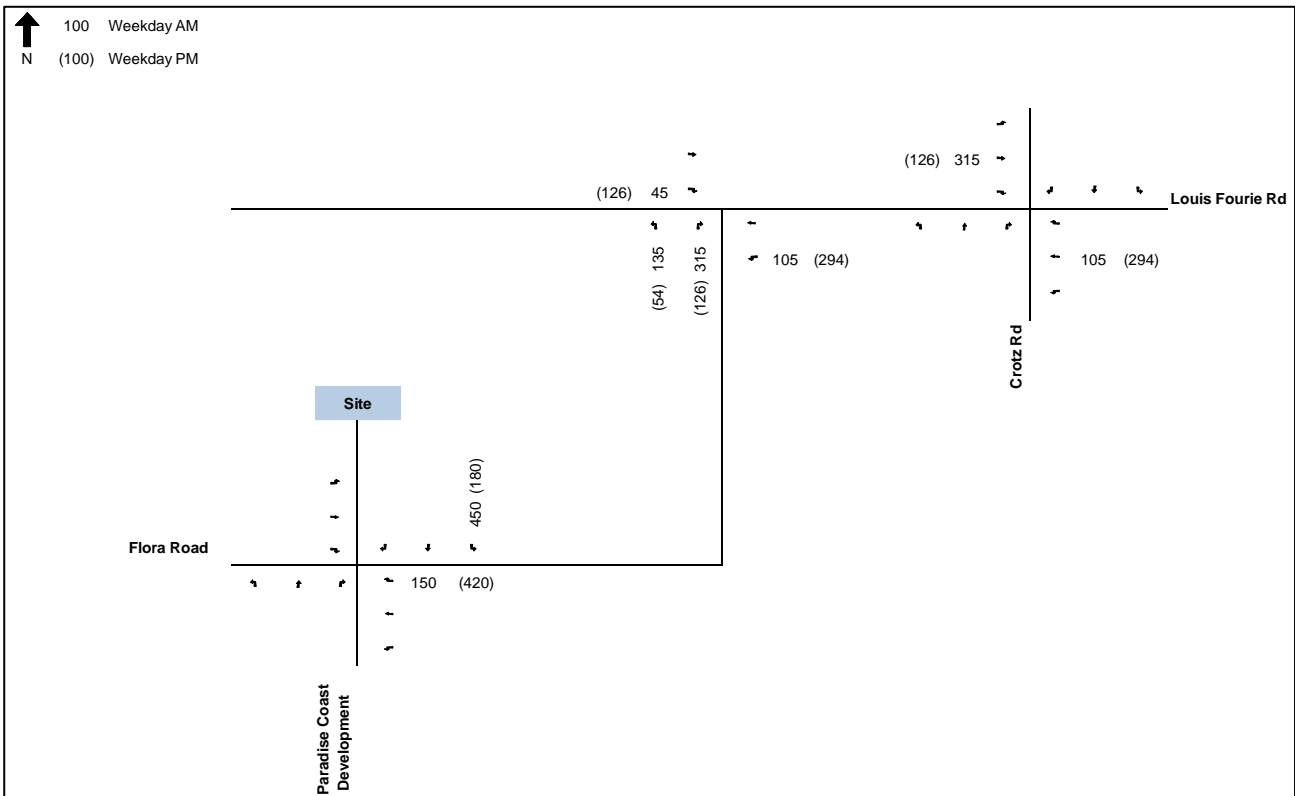


Figure 4-5: Traffic Assignment – Existing Flora Road Alignment (New Trips: Outeniqua View)

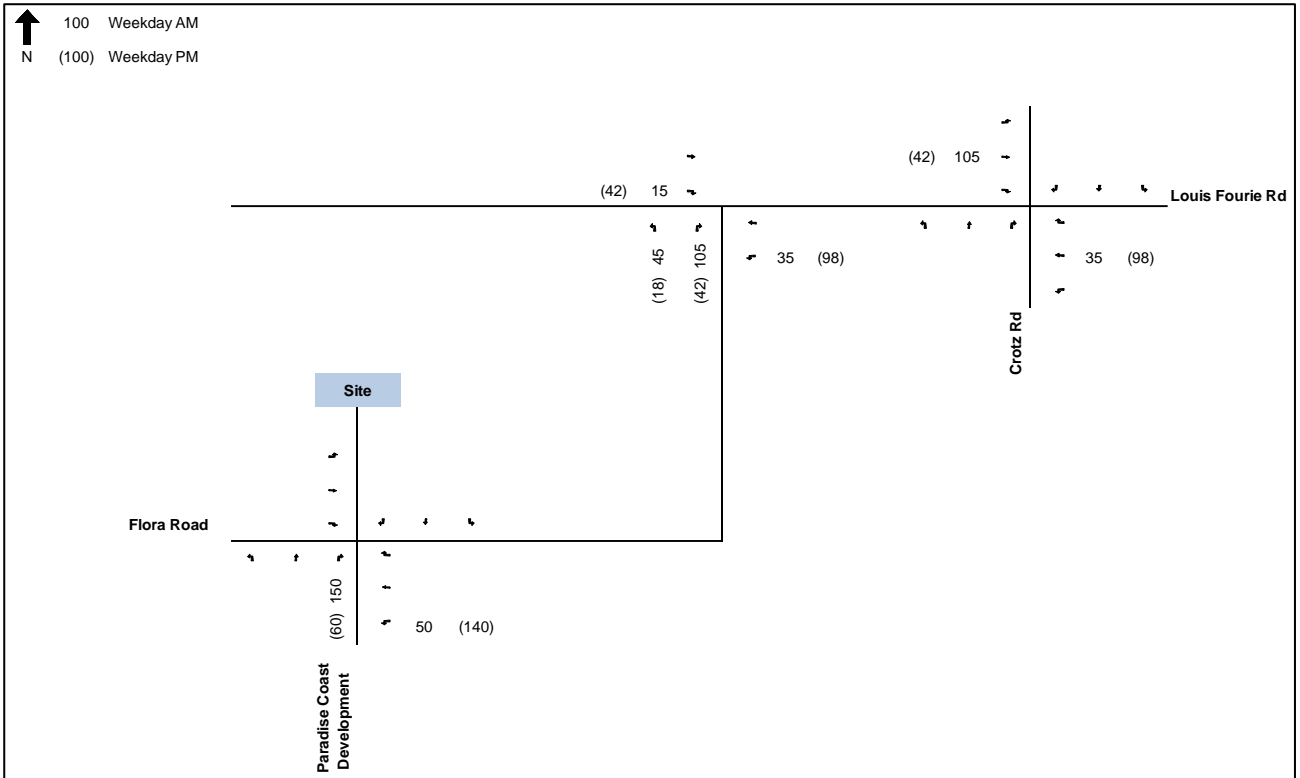


Figure 4-6: Traffic Assignment – Existing Flora Road Alignment (New Trips: Paradise Coast)

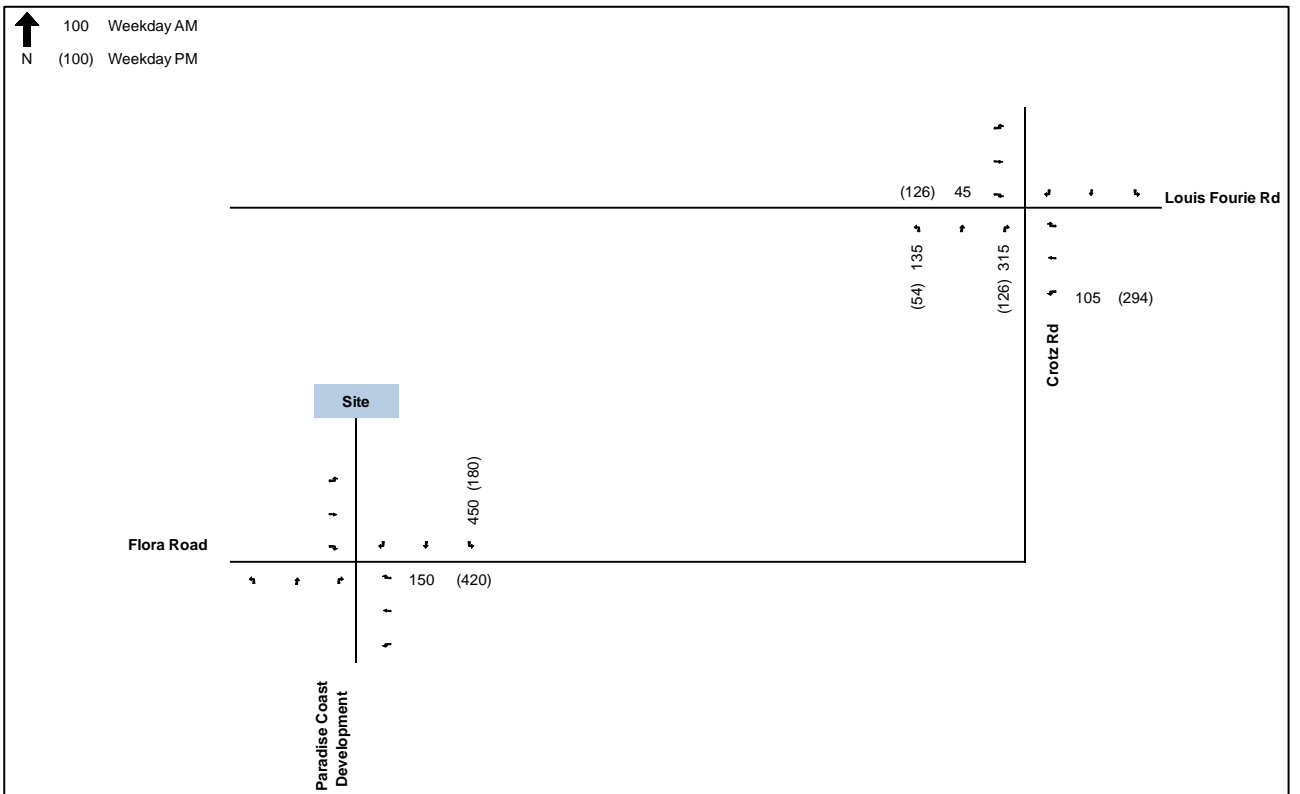


Figure 4-7: Traffic Assignment – Realigned Flora Road (New Trips – Outeniqua View)

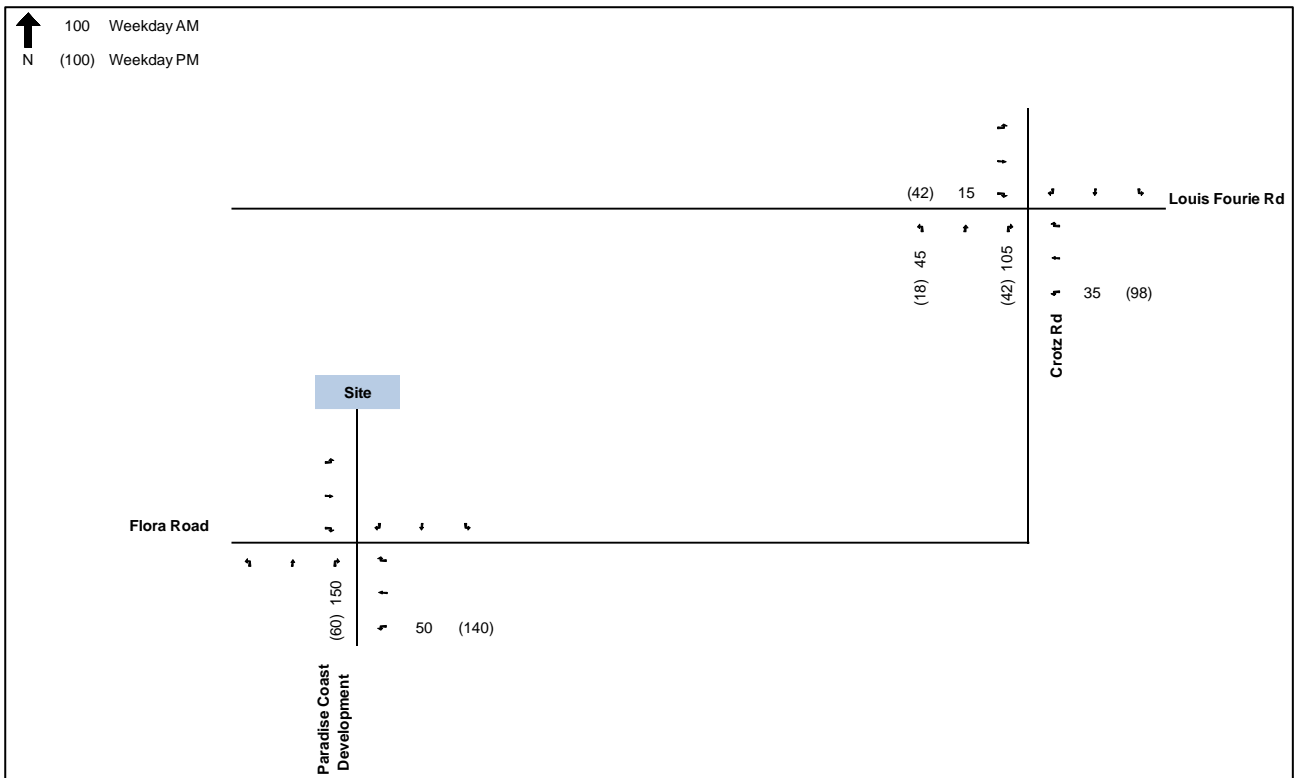


Figure 4-8: Traffic Assignment – Realigned Flora Road (New Trips – Paradise Coast)

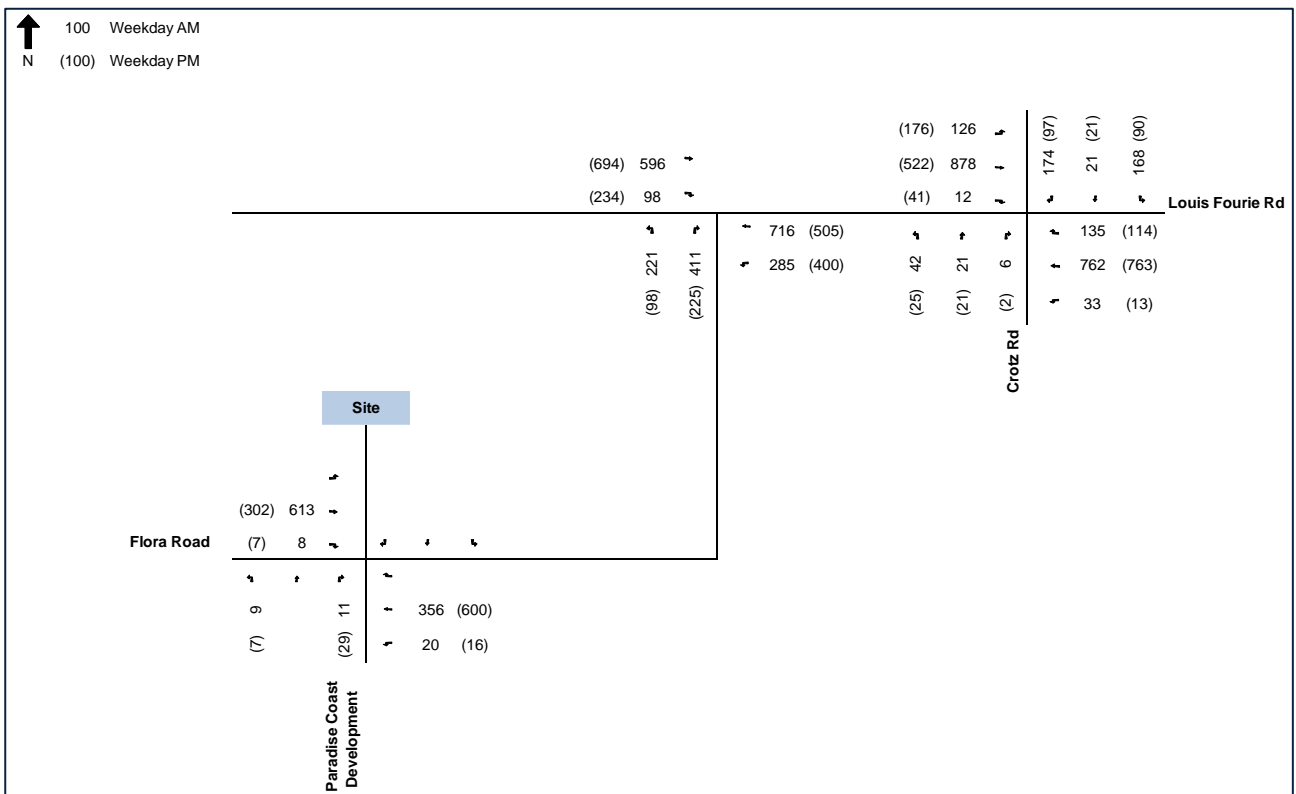


Figure 4-9: 2023 Base Year Traffic Flows: Existing Flora Road Alignment

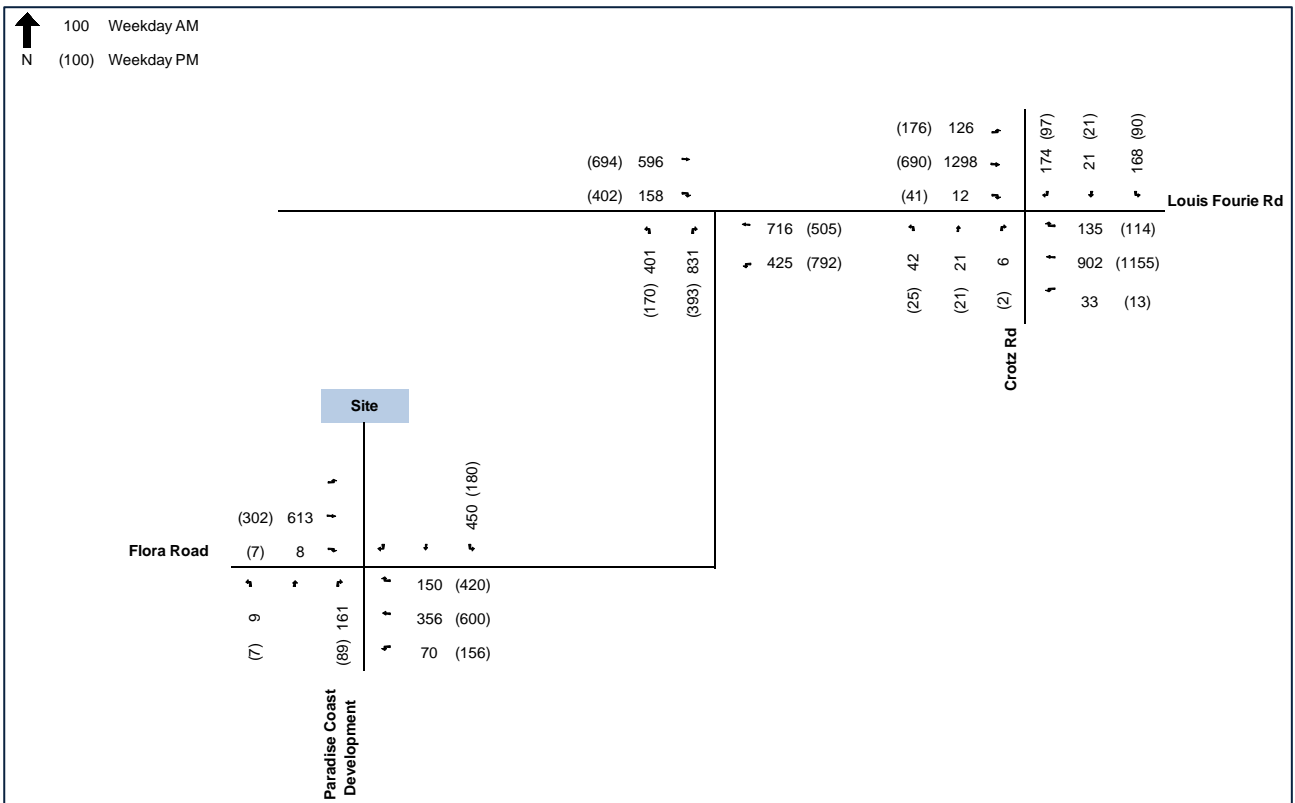


Figure 4-10: 2028 Forecast Year Traffic Flows + Development Trips: Existing Flora Road Alignment

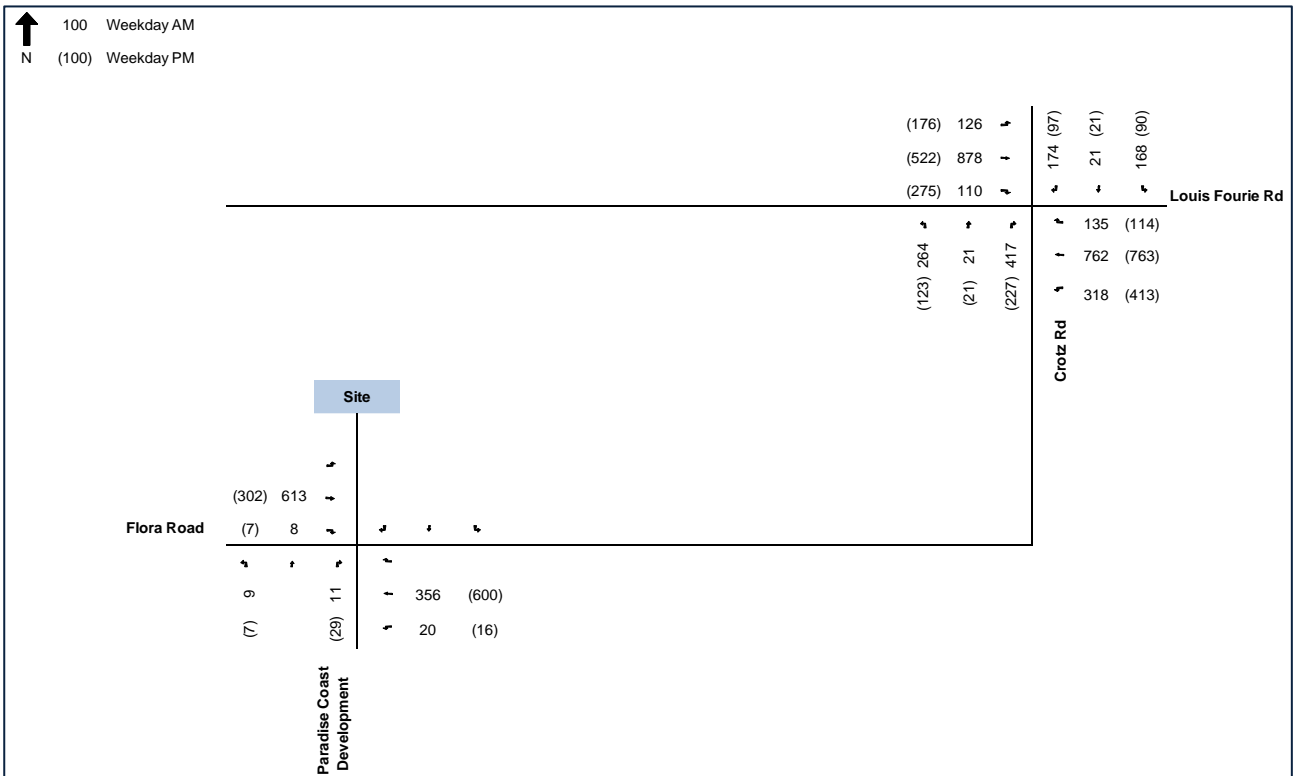


Figure 4-11: 2023 Base Year Traffic Flows: Realigned Flora Road

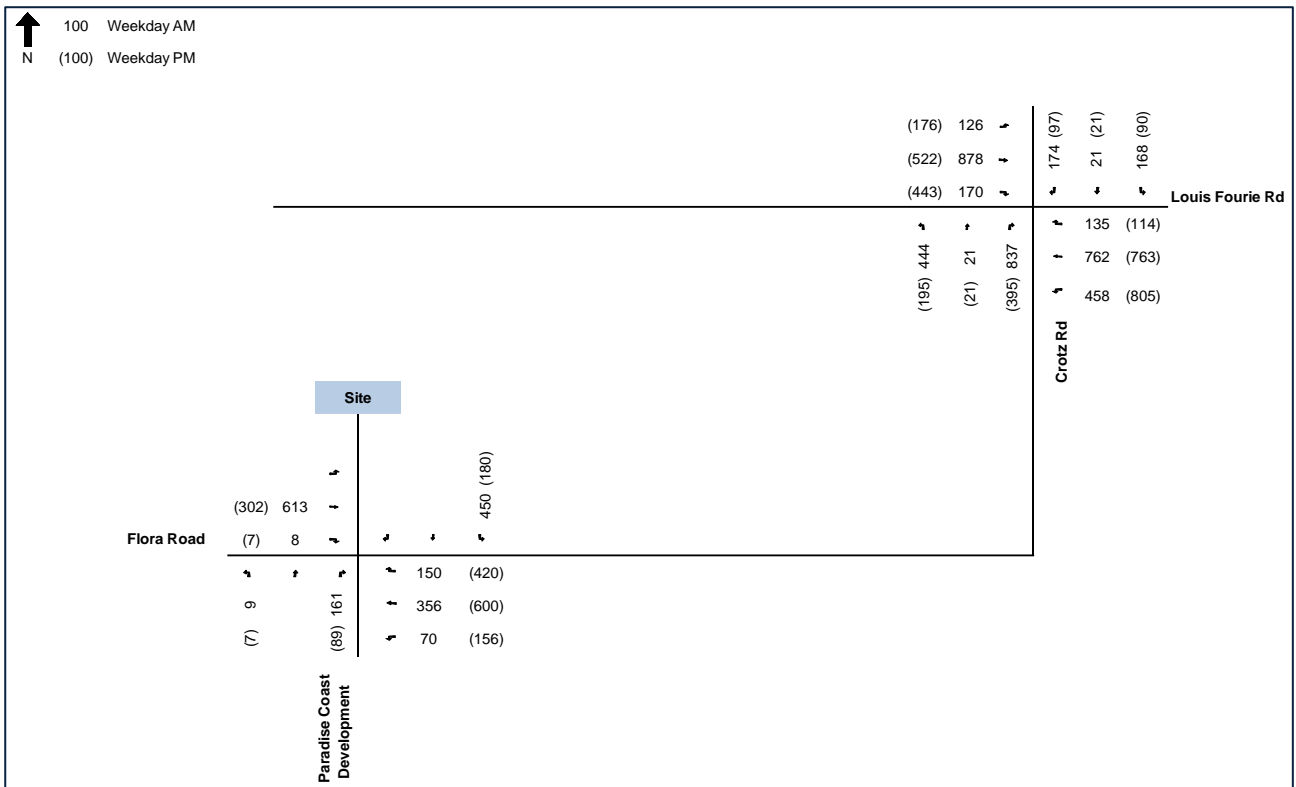


Figure 4-12: 2028 Forecast Year Traffic Flows + Development Trips: Realigned Flora Road

5 Traffic Analysis

Intersection capacity analyses were undertaken to determine the anticipated operational performance of the site access and surrounding road network, taking into consideration the anticipated development trips. The state-of-the-art traffic engineering software package, SIDRA Intersection 9.0 software, was used. The intersections analysed for the development are listed below:

- Louis Fourie (R102) and Flora Road Intersection
- Louis Fourie (R102) and Crotz Road Intersection
- Flora Road and Proposed Development Access (opposite Paradise Coast)

The following scenarios were analysed as part of this project assignment:

- 2023 Base Year Traffic Flows
- 2028 Forecast Year Traffic Flows + Development Trips

The operational performance of an intersection is typically quantified in terms of Level of Service as defined by the SIDRA Intersection User Guide Ver. 8 (2018). These definitions relate average delays at intersections (for individual turning movements, for each approach and for the overall intersection) to a level of service ranging from A to F, as are shown in **Table 5-1**.

Table 5-1: Intersection-Based Level of Service Criteria

Level of Service	Control Delay per Vehicle in Seconds (d)			LOS for V/C Ratio
	Signals	Roundabouts	Stop Signs and Yield Signs	V/C > 1
A	$d \leq 10$	$d \leq 10$	$d \leq 10$	F
B	$10 < d \leq 20$	$10 < d \leq 20$	$10 < d \leq 15$	F
C	$20 < d \leq 35$	$20 < d \leq 35$	$15 < d \leq 25$	F
D	$35 < d \leq 55$	$35 < d \leq 50$	$25 < d \leq 35$	F
E	$55 < d \leq 80$	$50 < d \leq 70$	$35 < d \leq 50$	F
F	$80 < d$	$70 < d$	$50 < d$	F

Detailed SIDRA outputs are contained in **Annexure B**.

5.1 R102 Louis Fourie Road and Flora Road Intersection

The existing intersection of R102 Louis Fourie and Flora Road takes the form of a signalised T-junction. The east approach comprises of a through lane and a shared through-and-left-turn lane. The south approach comprises of a single lane serving left and right-turn movements. The west approach comprises of a through lane and a shared through-and-right-turn lane. Refer to **Figure 5-1**.

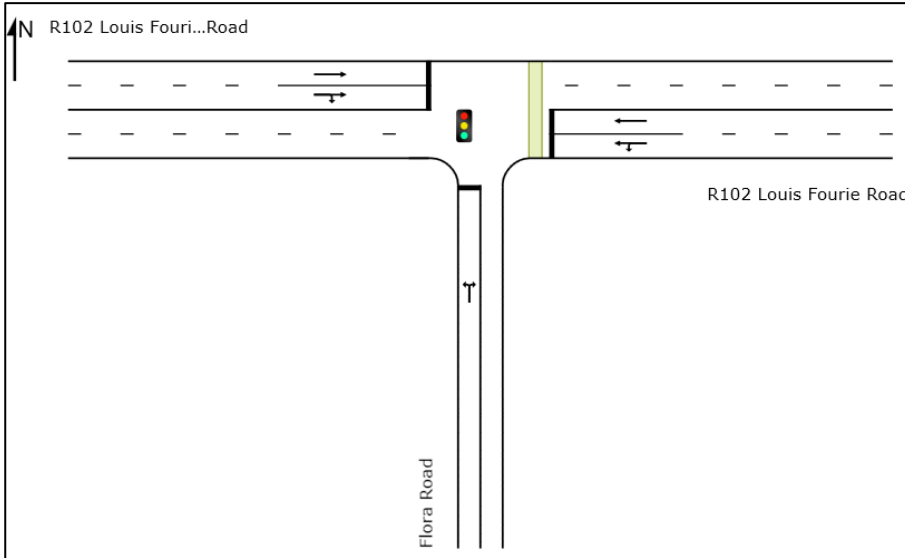


Figure 5-1: Existing Intersection Layout: R102 Louis Fourie Road and Flora Road

2023 Base Year Traffic Flows

Taking into consideration the existing intersection layout as well as the 2023 Base Year Traffic flows, the intersection is currently operating at an overall Level of Service C and B during the Weekday AM and PM Peak Hours, with an average delay of approximately 31 and 18 seconds respectively.

It is concluded that the existing intersection configuration is able to accommodate the 2023 Base Year Traffic Flows at an acceptable Level of Service.

2028 Forecast Year Traffic Flows + Development Trips

Taking into consideration the existing intersection layout as well as the 2028 Forecast Year Traffic Flows + Development Trips, the intersection is anticipated to operate at an overall Level of Service F during both the Weekday AM and PM Peak Hours, with an average delay of approximately 95 and 140 seconds respectively.

It is concluded that the existing intersection configuration would be unable to accommodate the 2028 Forecast Year Traffic Flows + Development Trips at an acceptable Level of Service.

As discussed in Section 2.2 of this report, there are plans to realign Flora Road to the intersection of Louis Fourie Road and Crotz Road. However, as part of this investigation, an instance that the realignment is not implemented was assessed and a revised layout was tested to improve the intersection Level of Service.

The revised intersection would still take the form of a signalised T-junction. The east approach would comprise of two through lanes and a short left-turn slip lane. The south approach would comprise of a full right-turn lane, a short right-turn lane and a full length left-turn slip lane. The west approach would comprise of a through lane and a shared through-and-right-turn lane. Two lanes per direction would be required along the entire length of the link between Louis Fourie Road and Outeniqua View Development. Refer to **Figure 5-2**.

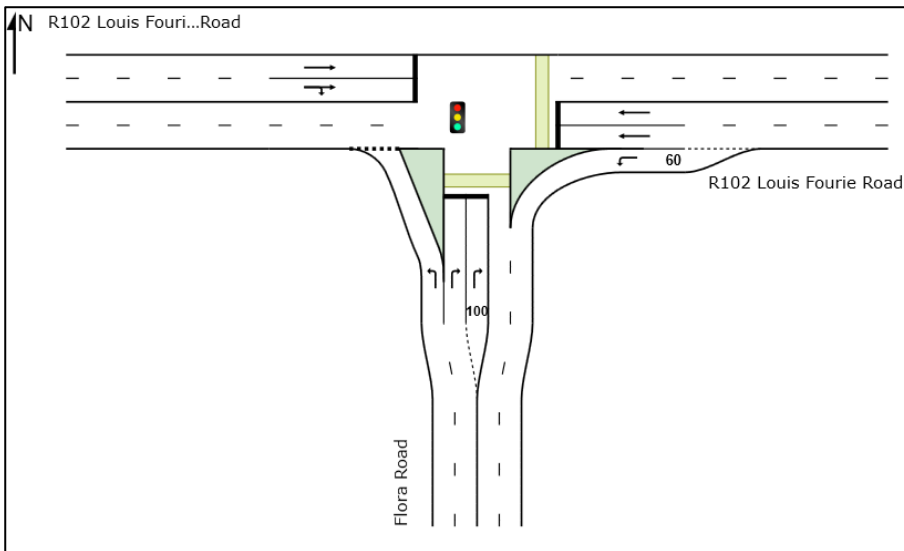


Figure 5-2: Proposed Intersection Layout: Louis Fourie Road and Flora Road

Taking into consideration the proposed intersection layout as well as the 2028 Forecast Year traffic flows plus the anticipated development trips, the intersection is anticipated to operate at a Level of Service C during both the Weekday AM and PM Peak Hours, with an average delay of approximately 26 and 23 seconds respectively.

It is concluded that the proposed intersection configuration would be able to accommodate the 2028 Forecast Year Traffic Flows + Development Trips at an acceptable Level of Service. However, it is recommended that the planned Flora Road realignment is implemented before the need arise to upgrade the intersection of Louis Fourie Road and Flora Road.

5.2 R102 Louis Fourie Road and Crotz Road Intersection

The existing intersection of the R102 Louis Fourie Road and Crotz Road takes the form of a two-way stop-controlled intersection, with the north and south approaches being under stop control. The north and south approaches comprise of a single lane serving all movements. The east and west approaches comprise of a shared through-and-left-turn lane and a shared through-and-right-turn lane. Refer to **Figure 5-3**.

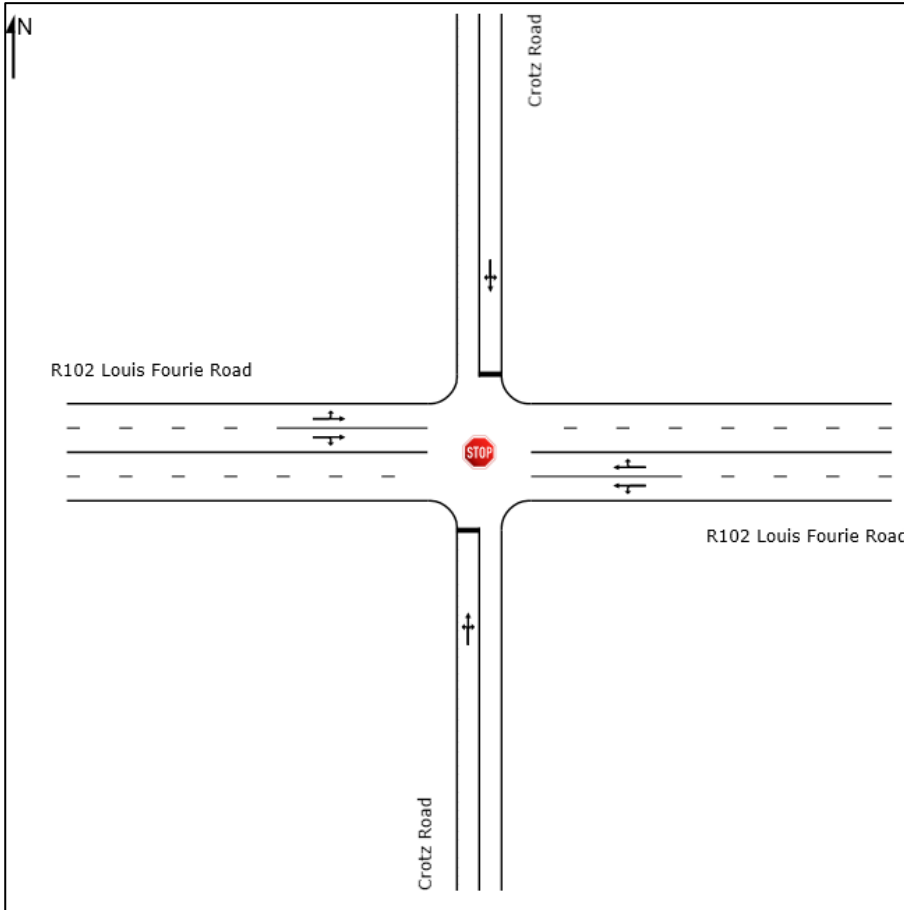


Figure 5-3: Existing Intersection Layout: R102 Louis Fourie Road and Crotz Road

2023 Base Year Traffic Flows

Taking into consideration the 2023 Base Year Traffic flows, the worst approach is currently operating at a Level of Service F for both the Weekday AM and PM Peak Hours, with an average delay of approximately 2876 and 610 seconds respectively.

It is concluded that the existing intersection configuration is unable to accommodate the 2023 Base Year Traffic Flows at an acceptable Level of Service.

As discussed in Section 2.2 of this report, there are plans to realign Flora Road to the south approach of the existing intersection of Louis Fourie Road and Crotz Road. Following the realignment of Flora Road, this intersection would be converted to a signalised full intersection. The north approach would comprise of a shared through and left-turn lane and a short right-turn lane. The east approach would comprise of a short left-turn slip lane, two through lanes, and a short right-turn lane. The south approach will comprise of a short left-turn slip lane, a through lane, a full length right-turn lane and a short right-turn lane. The west approach will comprise of a shared left-and-through lane, a through lane, and a short right-turn lane. Refer to **Figure 5-4**.

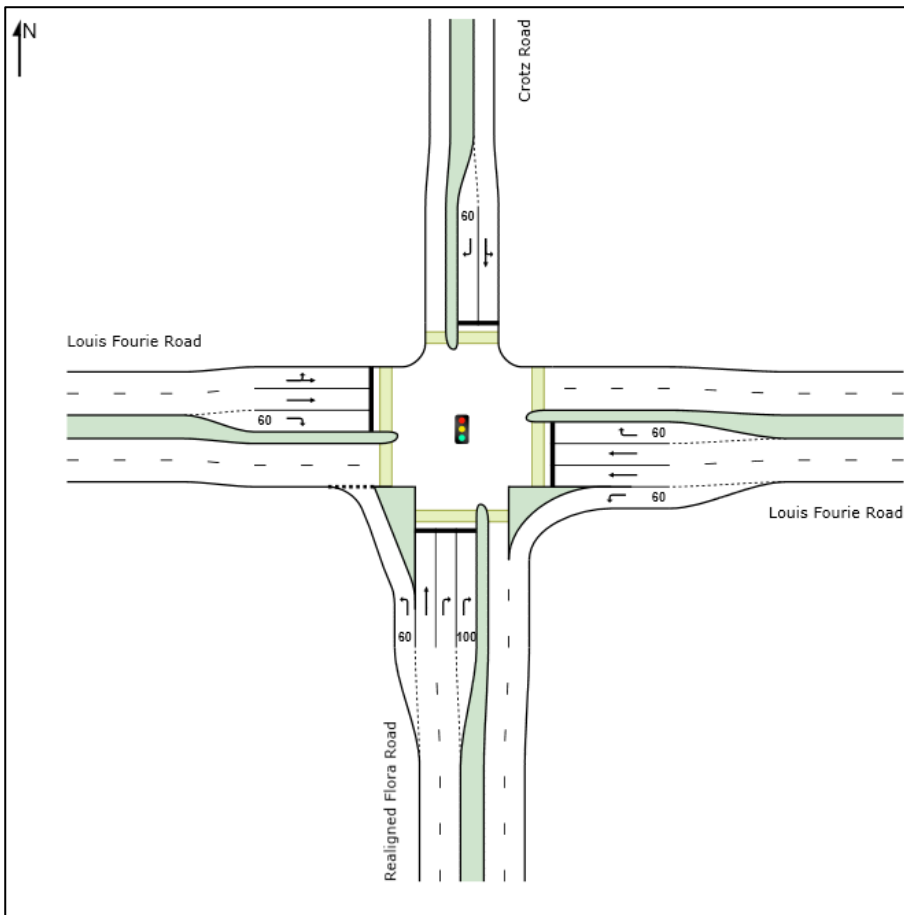


Figure 5-4: Proposed Intersection Layout: Louis Fourie Road and Crotz Road/ Realigned Flora Road

2028 Forecast Year Traffic Flows + Development Trips

Taking into consideration the proposed intersection layout as well as the 2028 Forecast Year Traffic Flows + Development Trips, the intersection is anticipated to operate at a Level of Service C and B during the Weekday AM and PM Peak Hours, with an average delay of approximately 21 and 20 seconds respectively.

It is concluded that the proposed intersection configuration would be able to accommodate the 2028 Forecast Year Traffic Flows + Development Trips at an acceptable Level of Service.

5.3 Flora Road and Site Access (opposite Paradise Coast)

The existing intersection of Flora Road and the Paradise Coast Access takes the form of a priority-controlled T-junction with the Paradise Coast Access under stop control. The east approach comprises of a single lane serving through and left-turn movements. The south approach comprises of a right-turn lane and a left-turn lane. The west approach comprises of a single lane serving through and right-turn movements. Refer to **Figure 5-5**.

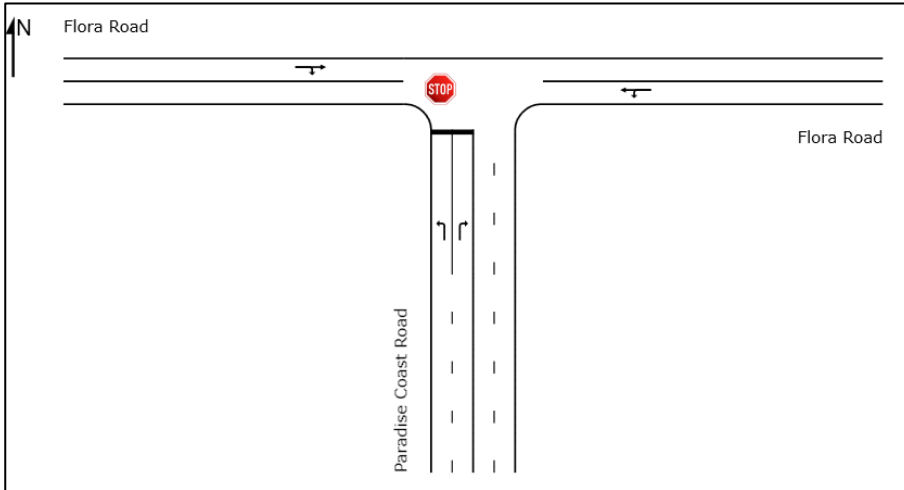


Figure 5-5: Existing Intersection Layout: Flora Road and Paradise Coast Access

2023 Base Year Traffic Flows

Taking into consideration the 2023 Base Year Traffic flows, the stop-controlled side road is currently operating at a Level of Service A for both the Weekday AM and PM Peak Hours, with an average delay of approximately 9 seconds.

It is concluded that the existing intersection configuration is able to accommodate the 2023 Base Year Traffic Flows at an acceptable Level of Service.

Following the implementation of the Outeniqua View Residential Development, the proposed access intersection would take the form of a roundabout with two circulating lanes. The north approach will comprise of a left-turn lane and a shared through and right-turn lane. The east approach will comprise of a shared left-and-through lane and a shared through-and-right lane. The south approach will comprise of a shared left-and-through lane and a right-turn lane. The west approach will comprise of a shared left-and-through lane and a shared through-and-right lane. Refer to **Figure 5-6**.

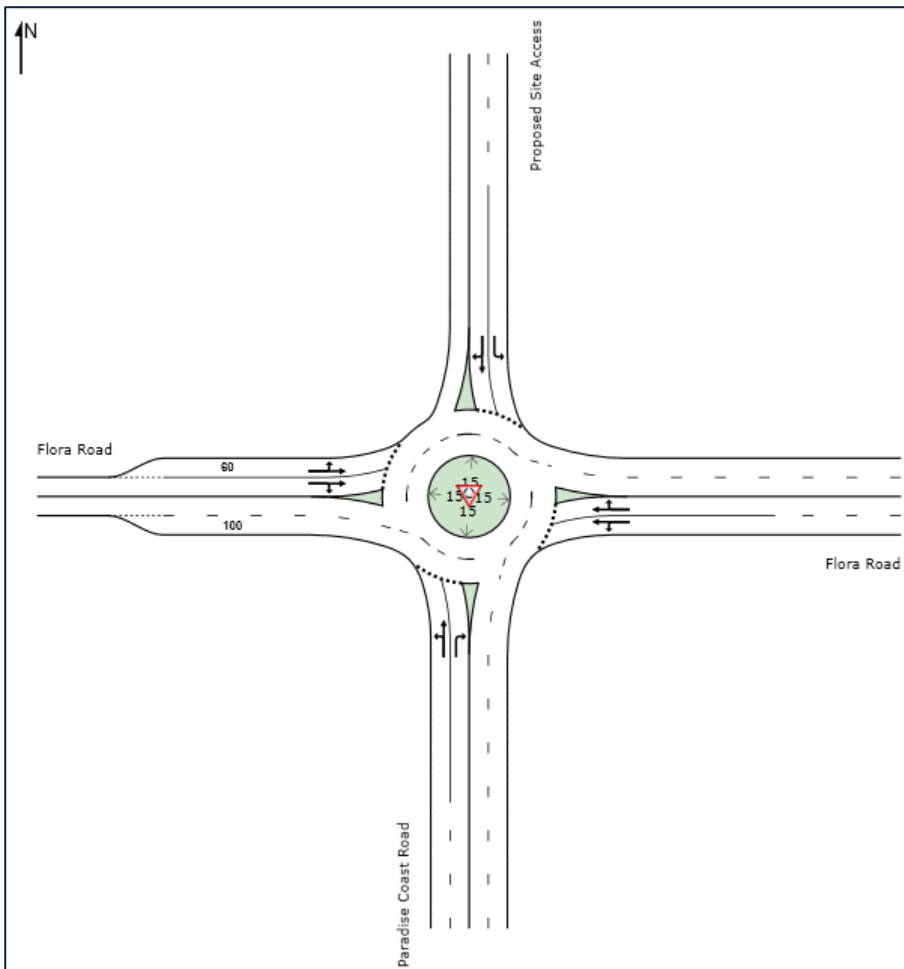


Figure 5-6: Intersection Layout: Flora Road and Site Access (opposite Paradise Coast)

2028 Forecast Year Traffic Flows + Development Trips

Taking into consideration the proposed intersection layout as well as the 2028 Forecast Year Traffic Flows + Development Trips, the worst approach is anticipated to operate at a Level of Service B and A during the Weekday AM and PM Peak Hours, with an average delay of approximately 15 and 7 seconds respectively.

It is concluded that the proposed intersection configuration would be able to accommodate the 2028 Forecast Year Traffic Flows + Development Trips at an acceptable Level of Service.

The developer of Outeniqua View has proposed to only construct the roundabout with two circulating lanes at this point in time, with the planned widening of Flora Road to be implemented once required from a traffic operations perspective. Taking into consideration the development phasing reported in **Section 4.1**, it is our submission that the interim intersection configuration would be able to accommodate the anticipated traffic flows of Phase 2, but not of Phase 3, at which point the anticipated build-out of the Outeniqua View and Paradise Coast developments would be 450 and 100 single dwelling units, respectively. It is recommended that the widening required to Flora Road be implemented before Phase 3 of either development materialise (currently anticipated by 2026), subject to approval by the Municipality.

5.4 Analysis Summary

A summary of the analysis outputs is provided in **Table 5-2**.

Table 5-2: Analysis Summary

Intersection	2023 Base Year	2028 Forecast Year + Development Trips	2028 Forecast Year + Upgrades + Development Trips
R102 Louis Fourie and Flora Road	C / B	F / F	C / C
R102 Louis Fourie and Crotz Road / Realigned Flora Road	F / F*	-	C / B
Flora Road and Site Access (opposite Paradise Coast)	A / A	-	B / A

* Worst Approach LOS.

6 Site Impact Assessment

A site traffic impact assessment was undertaken to evaluate internal operations, parking and loading bay requirements as well as the access throat length. Where necessary, suitable mitigation measures are proposed.

6.1 Internal Operations

The internal layout of the planned development should be designed in such a way to promote ease of movement. A minimum 12-metre bellmouth radius is recommended for use at all internal road junctions. The access and internal road layout should be such to allow for the swept path of fire trucks. Should the internal road network not be designed to cater for moving company vehicles, suitable provision should be made outside the development, in the direct vicinity of the access.

6.2 Parking

Parking provision is an important consideration of any development and would ultimately ensure that vehicular traffic is accommodated on-site in its entirety. Insufficient parking provision would have dire consequences on the operational performance of the site and surrounding public roads, as well as on road safety.

The Mossel Bay Municipality Zoning Scheme By-Law (2021) was used to ascertain the applicable parking requirements. For the purpose of determining parking requirements, the Outeniqua View Development is taken to fall within a Normal Area.

It was assumed that parking would be provided on single dwelling unit erven. Taking this into consideration, the parking requirements are stipulated in **Table 6-1**.

Table 6-1: Parking Requirements

Land Use	Quantity	Minimum Parking Ratio	Parking Requirement (bays)
Single Dwelling Units	90 units	-	-
Apartments and Flats	288 units	1 bay per dwelling 0.25 bays/unit for visitors	288 for residents 72 for visitors
Townhouses (Simplexes & Duplexes)	391 units	2 bays per dwelling unit	782 for residents
Total			1142

It is concluded that 1142 parking bays would need to be provided of which 1070 would be for residents and 72 would be for visitors.

6.3 Loading

The Mossel Bay Municipality Zoning Scheme By-Law (2021) was used to ascertain the loading bay requirements to be adhered to. Taking into consideration the planned land uses, no loading bays would be required for the development.

6.4 Throat Length

Adequate throat length provision is essential in ensuring efficient operation of a development access and preventing possible spill-back onto the surrounding public road. The throat length requirements were derived from the Committee of Transport Officials South African Traffic Impact and Site Traffic Assessment Standards and Requirements Manual (COTO, TMH 16 Volume 2).

Considering the priority control access onto a Class 4b Residential Collector Street, the minimum requirement for both ingress and egress throat lengths is 15 metres.

Allowing for the provision of a security-controlled access to Outeniqua View Residential Development, a queue length analysis was undertaken to assess the operational performance thereof. The following assumptions were made:

- The ingress would have three lanes, one lane for residents and two lanes for visitors. Residents would however be able to use the two visitors' lanes when the residents' lane is occupied
- The egress would have two lanes serving all vehicles
- An ingress service rate of 360 and 60 vehicles per hour for residents and visitors' lanes respectively
- An egress service rate of 360 vehicles per hour for both residents and visitors' lanes
- 10% of vehicles arriving/departing during the respective critical Weekday Peak Hour would be visitors

Taking the above into consideration, the queue length analysis results are provided in **Table 6-2**.

Table 6-2: Queue Length Analysis

Intersection	Units	Ingress (PM IN)		Egress (AM OUT)	
		Residents	Visitors	Residents	Visitors
Number of service lanes	lanes	3		2	
Service rate	veh/h/lane	360	60	360	360
Arrival distribution per lane	%	90%	10%	90%	10%
Arrival rate per lane	veh/h/lane	427		457	
95th percentile queue per lane	veh	1.8		3.4	
95th percentile queue length per lane	metres	12		24	

Taking the above into consideration, a minimum ingress and egress throat length of 12 and 24 metres is required to serve the development respectively. It is, however, recommended that a minimum ingress and egress throat length of 18 and 24 metres be provided to accommodate a truck accessing the development. The access road should be designed in such a way to ensure that all access lanes are accessible with consideration of the anticipated queue lengths.

7 Proposed Capacity Improvements

The following transport improvements are proposed as part of the planned development, to be implemented at the cost of the developer:

2024 Forecast Year (Phase 1)

- Convert Flora Road and the Site Access (opposite Paradise Coast) junction to a four-legged roundabout with two circulating lanes
- The development access should make provision for public transport as part thereof. Alternatively, a layby should be constructed along Flora Road on the downstream sides of the development access.
- In the event that public transport laybys are constructed along Flora Road on the downstream sides of the development access, it is recommended that pedestrian walkways be provided to link the laybys with the development access.
- Reduce the speed limit along flora Road to 60 km/h

2026 Forecast Year (Phase 3)

- Widen the intersection of Flora Road and the Site Access (opposite Paradise Coast) by adding approach and exit lanes along Flora Road (see Figure 5.6)

2028 Forecast Year

- Implement local road widening at either the Louis Fourie and Flora intersection (see Figure 5.2), or the Louis Fourie and Crotz intersection (see Figure 5.4), depending whether Flora Road has been realigned or not

8 Conclusion and Recommendations

SMEC South Africa (Pty) Ltd was appointed by Integrate Structural and Civil Engineering (Pty) Ltd to conduct a Traffic Impact Assessment for the proposed Outeniqua View Residential Development on Erf 19741, Dana Bay, Western Cape.

The subject site measures approximately 75.3 hectares in extent and will comprise of 90 single dwelling units, 288 flats, and 391 townhouses.

It is planned for the development to be served by a single access along Flora Road directly opposite the existing Paradise Coast Beach and Eco Estate.

It is anticipated that the development would generate 610 new vehicular trips during both the Weekday AM and PM Peak Hours, respectively.

It is concluded that 1142 parking bays would need to be provided of which 1070 would be for residents and 72 would be for visitors.

Taking into consideration the planned land uses, no loading bays would be required for the development.

A minimum ingress and egress throat length of 12 and 24 metres is required to serve the development respectively. It is, however, recommended that a minimum ingress and egress throat length of 18 and 24 metres be provided to accommodate a truck accessing the development. The access road should be designed in such a way to ensure that all access lanes are accessible with consideration of the anticipated queue lengths.

Following our assessment, the following capacity improvements are required as part of the planned development:

2024 Forecast Year (Phase 1)

- Convert Flora Road and the Site Access (opposite Paradise Coast) junction to a four-legged roundabout with two circulating lanes
- The development access should make provision for public transport as part thereof. Alternatively, a layby should be constructed along Flora Road on the downstream sides of the development access.
- In the event that public transport laybys are constructed along Flora Road on the downstream sides of the development access, it is recommended that pedestrian walkways be provided to link the laybys with the development access.
- Reduce the speed limit along flora Road to 60 km/h

2026 Forecast Year (Phase 3)

- Widen the intersection of Flora Road and the Site Access (opposite Paradise Coast) by adding approach and exit lanes along Flora Road (see Figure 5.6)

2028 Forecast Year

- Implement local road widening at either the Louis Fourie and Flora intersection (see Figure 5.2), or the Louis Fourie and Crotz intersection (see Figure 5.4), depending whether Flora Road has been realigned or not

This development is supported from a traffic engineering perspective, provided that the site-specific requirements are implemented as per the applicable design standards.

Annexure A Traffic Survey Data

Counting Station 1: Intersection of Louis Fourie and Flora Road

LOCATION	Intersection: Louis Fourie Rd & Flora Rd												Date:		
HOUR COUNT	TOTAL VEHICLES												Day:		
AM PEAK	07:00	08:00											PM PEAK	16:30	17:30
						0	0	0							
						0	0	0							
						0	0	0							
				OUT		9	8	7	IN						
		602			773	NI	←	↓	←	OUT			908		756
		0	0	0	10	↑	↓	↑	6	0	0	0			
		513	0	549	11	↓	↑	↓	5	623	0	429			
		89	0	224	12	←	↑	←	4	259	0	380			
		838			524	IN	←	↑	←	IN			882		809
						1	2	3	OUT						
						610	215	0	395	348					
							0	0	0						
						302	95	0	207	604					

Time	South			East			North			West			Hourly	
	1	2	3	4	5	6	7	8	9	10	11	12		
05:00														
05:15														
05:30														
05:45													05:00	
06:00													05:15	
06:15													05:30	
06:30	37		76	10	79						41	6	249	05:45
06:45	65		132	28	111						84	5	674	06:00
07:00	57		142	42	148						135	17	1215	06:15
07:15	54		88	75	153						147	26	1758	06:30
07:30	53		90	82	179						121	24	2058	06:45
07:45	51		75	60	143						110	22	2094	07:00
08:00	42		62	54	92						69	14	1886	07:15
08:15	38		59	37	86						53	17	1633	07:30
08:30	46		51	39	70						63	22	1375	07:45
08:45	22		48	47	61						79	19	1190	08:00
09:00	37		60	37	54						60	13	1118	08:15
09:15	35		50	21	52						49	20	1055	08:30
09:30	37		54	35	74						59	24	1047	08:45
09:45	26		52	35	62						71	23	1040	08:00
10:00	27		61	50	54						71	22	1064	09:15
10:15	23		59	35	58						58	19	1089	09:30
10:30	23		55	50	50						51	18	1089	09:45

Counting Station 2: Intersection of Louis Fourie and Crotz Road

LV														
LOCATION	Intersection: Louis Fourie & Crotz Rd												Date:	
HOUR COUNT	TOTAL VEHICLES												Day:	
AM PEAK	07:00	08:00										PM PEAK	16:30	17:30
					193	134	0	125	259					
						0	0	0						
					234	70	0	81	151					
					OUT	9	8	7	IN					
				909	653	IN	↓	↑	OUT	932	574			
	95	0	133	10	↓	↑	↓	↑	6	98	0	101		
	802	0	491	11	↑	↓	↑	↓	5	686	0	697		
	12	0	29	12	↓	↑	↓	↑	4	29	0	13		
				858	788	OUT	↑	↓	IN	813	811			
					IN	1	2	3	OUT					
					43	38	0	5	41					
						0	0	0						
					23	21	0	2	42					

Time	South			East			North			West			Hourly
	1	2	3	4	5	6	7	8	9	10	11	12	
05:00													
05:15													
05:30													
05:45													
06:00			1	1	19	6	2		19	8	16		72
06:15					39	6	15		12	15	48		207
06:30	4			3	63	14	32	1	23	19	90	1	457
06:45	10		4	14	102	18	31	2	31	18	188	4	879
07:00	13		2	11	145	26	35		29	22	260	4	1354
07:15	9		1	6	158	25	48		33	26	200	3	1728
07:30	12		2	6	218	27	29		40	19	178	4	2013
07:45	4			6	165	20	13		32	28	164	1	2024
08:00			1	1	113	8	15		21	20	114	1	1771
08:15	2				99	6	9		15	12	100	2	1507
08:30	1			1	94	5	9		16	15	95		1208
08:45	1				89	8	14	1	15	16	113	1	1033
09:00	1				73	10	9		16	14	101		963
09:15				1	64	8	7		12	11	92		913
09:30					96	7	10		10	4	109		913
09:45					82	8	3		12	12	113		885
10:00					91	9	9	1	15	9	122		917
10:15					77	7	9		8	9	104	1	937
10:30					68	5	8		8	10	100		845

Counting Station 3: Intersection of Flora Road and Paradise Coast Road

LOCATION	Intersection: Flora Rd & Paraside Coast										Date:	
HOUR COUNT	TOTAL VEHICLES										Day:	
AM PEAK	07:00	08:00								PM PEAK	16:30	17:30
					596	0	327	19	346			
						0	0	0				
					307	0	578	16	594			
					OUT	9	8	7	IN			
						NI			OUT	27		23
		0	0	0	10				6	11	0	28
		0	0	0	11				5	0	0	0
		0	0	0	12				4	9	0	7
					LN0				IN	20		35
					IN	1	2	3	OUT			
					593	0	585	8	336			
						0	0	0				
					286	0	279	7	585			

Time	South			East			North			West			Hourly
	1	2	3	4	5	6	7	8	9	10	11	12	
05:00													
05:15													
05:30													
05:45													05:00
06:00		30					2	6					38 05:15
06:15		40	1	1		2	2	10					94 05:30
06:30		119				1		17					231 05:45
06:45		199	1				5	24					460 06:00
07:00		186	2	2		2		57					671 06:15
07:15		146	2			1	7	87					858 06:30
07:30		138	1	5		4	6	96					971 06:45
07:45		115	3	2		4	6	87					959 07:00
08:00		103	1			1	3	71					889 07:15
08:15		98	1	3		3	5	52					808 07:30
08:30		83	3	2		5	3	53					707 07:45
08:45		76	1	1		3	7	56					634 08:00
09:00		81	1			6	5	37					585 08:15
09:15		79		3		6	4	40					555 07:30
09:30		80	2	1		6	3	54					552 07:45
09:45		70	2	4		7	2	54					547 08:00
10:00		82	5	3		6	7	61					581 09:15
10:15		74	5	3		6	6	47					590 09:30
10:30		84	4	2		4	0	50					586 09:45

Annexure B Detailed SIDRA Analysis Outputs

Louis Fourie Road and Flora Road Intersection

2023 Base Year Weekday AM Peak Hour

MOVEMENT SUMMARY

Site: [2023 Weekday AM (Site Folder: 1. Flora Rd / Louis Fourie Rd)]

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 120 seconds (Site Optimum Cycle Time - Minimum Degree of Saturation)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h]	[HV %]	[Total veh/h]	[HV %]				[Veh. veh]	[Dist m]				
South: Flora Road														
1	L2	221	0.0	233	0.0	0.698	31.2	LOS C	30.0	210.1	0.84	0.85	0.84	38.9
3	R2	411	0.0	433	0.0	* 0.698	31.2	LOS C	30.0	210.1	0.84	0.85	0.84	38.9
Approach		632	0.0	665	0.0	0.698	31.2	LOS C	30.0	210.1	0.84	0.85	0.84	38.9
East: R102 Louis Fourie Road														
4	L2	285	1.0	300	1.0	0.599	33.3	LOS C	23.1	164.3	0.82	0.79	0.82	39.0
5	T1	716	3.0	754	3.0	0.599	27.7	LOS C	23.6	169.3	0.82	0.75	0.82	40.8
Approach		1001	2.4	1054	2.4	0.599	29.3	LOS C	23.6	169.3	0.82	0.76	0.82	40.3
West: R102 Louis Fourie Road														
11	T1	596	3.0	627	3.0	0.682	29.8	LOS C	28.2	202.8	0.87	0.78	0.87	40.2
12	R2	98	2.0	103	2.0	* 0.682	54.1	LOS D	7.2	51.3	0.96	0.87	1.05	31.5
Approach		694	2.9	731	2.9	0.682	33.2	LOS C	28.2	202.8	0.88	0.79	0.90	38.7
All Vehicles		2327	1.9	2449	1.9	0.698	31.0	LOS C	30.0	210.1	0.85	0.79	0.85	39.4

2023 Base Year Weekday PM Peak Hour

MOVEMENT SUMMARY

 Site: [2023 Weekday PM (Site Folder: 1. Flora Rd / Louis Fourie Rd)]

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 110 seconds (Site Optimum Cycle Time - Minimum Degree of Saturation)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h]	[HV %]	[Total veh/h]	[HV %]				[Veh. veh]	[Dist m]				
South: Flora Road														
1	L2	98	0.0	103	0.0	0.680	45.7	LOS D	16.6	116.9	0.96	0.84	0.96	33.7
3	R2	225	1.0	237	1.0	* 0.680	45.7	LOS D	16.6	116.9	0.96	0.84	0.96	33.7
Approach		323	0.7	340	0.7	0.680	45.7	LOS D	16.6	116.9	0.96	0.84	0.96	33.7
East: R102 Louis Fourie Road														
4	L2	400	1.0	421	1.0	0.360	14.6	LOS B	11.1	78.8	0.49	0.70	0.49	47.6
5	T1	505	3.0	532	3.0	0.360	9.1	LOS A	11.5	82.6	0.49	0.46	0.49	51.9
Approach		905	2.1	953	2.1	0.360	11.5	LOS B	11.5	82.6	0.49	0.56	0.49	49.9
West: R102 Louis Fourie Road														
11	T1	694	4.0	731	4.0	0.547	10.8	LOS B	20.7	150.0	0.58	0.53	0.58	50.9
12	R2	234	0.0	246	0.0	* 0.690	26.9	LOS C	10.2	71.7	0.77	0.84	0.81	40.7
Approach		928	3.0	977	3.0	0.690	14.9	LOS B	20.7	150.0	0.63	0.61	0.64	47.9
All Vehicles		2156	2.3	2269	2.3	0.690	18.1	LOS B	20.7	150.0	0.62	0.62	0.62	45.8

2028 Forecast Year Weekday AM Peak Hour

MOVEMENT SUMMARY

 Site: [2028 Weekday AM (Site Folder: 1. Flora Rd / Louis Fourie Rd)]

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 60 seconds (Site Optimum Cycle Time - Minimum Degree of Saturation)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h]	[HV %]	[Total veh/h]	[HV %]				[Veh. veh]	[Dist m]				
South: Flora Road														
1	L2	401	0.0	422	0.0	1.233	142.6	LOS F	102.1	714.5	1.00	1.60	2.68	17.6
3	R2	831	0.0	875	0.0	* 1.233	142.6	LOS F	102.1	714.5	1.00	1.60	2.68	17.5
Approach		1232	0.0	1297	0.0	1.233	142.6	LOS F	102.1	714.5	1.00	1.60	2.68	17.6
East: R102 Louis Fourie Road														
4	L2	425	1.0	447	1.0	0.989	56.0	LOS E	26.7	189.5	1.00	1.22	1.67	31.1
5	T1	716	3.0	754	3.0	0.989	50.3	LOS D	27.4	196.7	1.00	1.28	1.67	32.6
Approach		1141	2.3	1201	2.3	0.989	52.4	LOS D	27.4	196.7	1.00	1.25	1.67	32.0
West: R102 Louis Fourie Road														
11	T1	596	3.0	627	3.0	* 1.019	58.5	LOS F	30.5	219.3	1.00	1.37	1.79	30.4
12	R2	158	2.0	166	2.0	1.269	158.4	LOS F	12.9	92.2	1.00	1.43	3.05	16.0
Approach		754	2.8	794	2.8	1.269	79.5	LOS E	30.5	219.3	1.00	1.38	2.05	25.6
All Vehicles		3127	1.5	3292	1.5	1.269	94.5	LOS F	102.1	714.5	1.00	1.42	2.16	23.1

2028 Forecast Year Weekday PM Peak Hour

MOVEMENT SUMMARY

Site: [2028 Weekday PM (Site Folder: 1. Flora Rd / Louis Fourie Rd)]

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 60 seconds (Site Optimum Cycle Time - Minimum Degree of Saturation)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h]	[HV %]	[Total veh/h]	[HV %]				[Veh. veh]	[Dist m]				
South: Flora Road														
1	L2	170	0.0	179	0.0	1.811	396.3	LOS F	74.4	524.2	1.00	2.29	4.55	7.7
3	R2	393	1.0	414	1.0	* 1.811	396.3	LOS F	74.4	524.2	1.00	2.29	4.55	7.7
Approach		563	0.7	593	0.7	1.811	396.3	LOS F	74.4	524.2	1.00	2.29	4.55	7.7
East: R102 Louis Fourie Road														
4	L2	792	1.0	834	1.0	0.632	11.8	LOS B	14.1	99.4	0.62	0.78	0.62	49.1
5	T1	505	3.0	532	3.0	0.388	4.8	LOS A	7.0	50.1	0.48	0.43	0.48	55.6
Approach		1297	1.8	1365	1.8	0.632	9.1	LOS A	14.1	99.4	0.57	0.64	0.57	51.4
West: R102 Louis Fourie Road														
11	T1	694	4.0	731	4.0	0.537	5.6	LOS A	11.1	80.4	0.56	0.50	0.56	54.9
12	R2	402	0.0	423	0.0	* 1.862	432.0	LOS F	57.1	399.6	1.00	2.40	4.73	7.2
Approach		1096	2.5	1154	2.5	1.862	162.0	LOS F	57.1	399.6	0.72	1.20	2.09	16.1
All Vehicles		2956	1.9	3112	1.9	1.862	139.5	LOS F	74.4	524.2	0.71	1.16	1.89	17.8

2028 Forecast Year Weekday AM Peak Hour + Upgrades

MOVEMENT SUMMARY

Site: [2028 Weekday AM (Site Folder: 1. Flora Rd / Louis Fourie Rd)]

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 90 seconds (Site Optimum Cycle Time - Minimum Degree of Saturation)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h]	[HV %]	[Total veh/h]	[HV %]				[Veh. veh]	[Dist m]				
South: Flora Road														
1	L2	401	0.0	422	0.0	0.778	31.2	LOS C	25.4	178.1	0.93	0.89	0.96	39.0
3	R2	831	0.0	875	0.0	* 0.778	31.2	LOS C	25.4	178.1	0.93	0.89	0.96	39.2
Approach		1232	0.0	1297	0.0	0.778	31.2	LOS C	25.4	178.1	0.93	0.89	0.96	39.1
East: R102 Louis Fourie Road														
4	L2	425	1.0	447	1.0	0.226	5.7	LOS A	0.0	0.0	0.00	0.53	0.00	54.8
5	T1	716	3.0	754	3.0	* 0.763	36.5	LOS D	16.6	118.9	0.98	0.90	1.07	37.5
Approach		1141	2.3	1201	2.3	0.763	25.0	LOS C	16.6	118.9	0.62	0.76	0.67	42.6
West: R102 Louis Fourie Road														
11	T1	596	3.0	627	3.0	0.549	18.5	LOS B	16.5	118.4	0.79	0.70	0.79	45.7
12	R2	158	2.0	166	2.0	* 0.549	24.4	LOS C	7.5	53.3	0.90	0.79	0.90	43.1
Approach		754	2.8	794	2.8	0.549	19.7	LOS B	16.5	118.4	0.81	0.72	0.81	45.2
All Vehicles		3127	1.5	3292	1.5	0.778	26.2	LOS C	25.4	178.1	0.79	0.80	0.82	41.7

2028 Forecast Year Weekday PM Peak Hour + Upgrades

MOVEMENT SUMMARY

 Site: [2028 Weekday PM (Site Folder: 1. Flora Rd / Louis Fourie Rd)]

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 120 seconds (Site Optimum Cycle Time - Minimum Degree of Saturation)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV] %	[Total veh/h	HV] %				[Veh. veh	Dist] m				
South: Flora Road														
1	L2	170	0.0	179	0.0	0.549	45.6	LOS D	14.9	104.4	0.91	0.83	0.91	33.8
3	R2	393	1.0	414	1.0	* 0.549	45.6	LOS D	14.9	104.4	0.91	0.82	0.91	34.0
Approach		563	0.7	593	0.7	0.549	45.6	LOS D	14.9	104.5	0.91	0.83	0.91	33.9
East: R102 Louis Fourie Road														
4	L2	792	1.0	834	1.0	0.421	5.7	LOS A	0.0	0.0	0.00	0.53	0.00	54.7
5	T1	505	3.0	532	3.0	* 0.536	42.8	LOS D	13.6	97.7	0.92	0.78	0.92	35.3
Approach		1297	1.8	1365	1.8	0.536	20.2	LOS C	13.6	97.7	0.36	0.63	0.36	45.1
West: R102 Louis Fourie Road														
11	T1	694	4.0	731	4.0	0.521	12.2	LOS B	21.1	152.6	0.59	0.55	0.59	49.7
12	R2	402	0.0	423	0.0	* 0.521	18.4	LOS B	12.9	90.4	0.74	0.78	0.74	45.5
Approach		1096	2.5	1154	2.5	0.521	14.5	LOS B	21.1	152.6	0.65	0.63	0.65	48.1
All Vehicles		2956	1.9	3112	1.9	0.549	22.9	LOS C	21.1	152.6	0.57	0.67	0.57	43.4

Louis Fourie Road and Crotz Road Intersection

2023 Base Year Weekday AM Peak Hour

MOVEMENT SUMMARY

 Site: [2023 Weekday AM (Site Folder: Louis Fourie Rd & Crotz Rd)]

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

Vehicle Movement Performance															
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed	
		[Total veh/h]	[HV %]	[Total veh/h]	[HV %]				[Veh. veh]	[Dist m]					
South: Crotz Road															
1	L2	256	3.0	269	3.0	7.336	2871.1	LOS F	216.8	1532.1	1.00	3.76	10.94	1.2	
2	T1	20	0.0	21	0.0	7.336	2879.3	LOS F	216.8	1532.1	1.00	3.76	10.94	1.2	
3	R2	405	0.0	426	0.0	7.336	2879.5	LOS F	216.8	1532.1	1.00	3.76	10.94	1.2	
Approach		681	1.1	717	1.1	7.336	2876.3	LOS F	216.8	1532.1	1.00	3.76	10.94	1.2	
East: Louis Fourie Rd															
4	L2	309	3.0	325	3.0	0.427	5.7	LOS A	0.0	0.0	0.00	0.22	0.00	56.1	
5	T1	740	2.0	779	2.0	0.427	3.1	LOS A	4.0	28.4	0.25	0.27	0.36	55.1	
6	R2	131	0.0	138	0.0	0.427	17.2	LOS C	4.0	28.4	0.80	0.37	1.15	48.6	
Approach		1180	2.0	1242	2.0	0.427	5.3	NA	4.0	28.4	0.25	0.27	0.35	54.6	
North: Crotz Road															
7	L2	163	3.0	172	3.0	4.104	1424.9	LOS F	100.8	728.7	1.00	3.29	9.33	2.4	
8	T1	20	0.0	21	0.0	4.104	1442.9	LOS F	100.8	728.7	1.00	3.29	9.33	2.4	
9	R2	169	5.0	178	5.0	4.104	1443.4	LOS F	100.8	728.7	1.00	3.29	9.33	2.4	
Approach		352	3.8	371	3.8	4.104	1434.8	LOS F	100.8	728.7	1.00	3.29	9.33	2.4	
West: Louis Fourie Rd															
10	L2	122	2.0	128	2.0	0.395	5.7	LOS A	0.0	0.0	0.00	0.09	0.00	57.3	
11	T1	852	2.0	897	2.0	0.395	2.7	LOS A	3.7	26.1	0.19	0.16	0.27	56.3	
12	R2	107	0.0	113	0.0	0.395	18.7	LOS C	3.7	26.1	0.81	0.35	1.12	47.8	
Approach		1081	1.8	1138	1.8	0.395	4.6	NA	3.7	26.1	0.23	0.17	0.32	55.4	
All Vehicles		3294	2.0	3467	2.0	7.336	751.4	NA	216.8	1532.1	0.48	1.28	3.49	4.4	

2023 Base Year Weekday PM Peak Hour

MOVEMENT SUMMARY

 Site: [2023 Weekday PM (Site Folder: Louis Fourie Rd & Crotz Rd)]

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

Vehicle Movement Performance															
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed	
		[Total veh/h	HV] %	[Total veh/h	HV] %				[Veh. veh	Dist] m					
South: Crotz Road															
1	L2	119	5.0	125	5.0	2.276	598.5	LOS F	75.9	539.7	1.00	3.78	10.60	5.3	
2	T1	20	4.0	21	4.0	2.276	621.0	LOS F	75.9	539.7	1.00	3.78	10.60	5.3	
3	R2	220	0.0	232	0.0	2.276	614.8	LOS F	75.9	539.7	1.00	3.78	10.60	5.3	
Approach		359	1.9	378	1.9	2.276	609.7	LOS F	75.9	539.7	1.00	3.78	10.60	5.3	
East: Louis Fourie Rd															
4	L2	401	0.0	422	0.0	0.383	5.6	LOS A	0.0	0.0	0.00	0.32	0.00	55.5	
5	T1	741	2.0	780	2.0	0.383	1.9	LOS A	2.9	20.4	0.26	0.24	0.36	56.0	
6	R2	111	2.0	117	2.0	0.383	12.2	LOS B	2.9	20.4	0.48	0.18	0.65	53.6	
Approach		1253	1.4	1319	1.4	0.383	4.0	NA	2.9	20.4	0.20	0.26	0.27	55.6	
North: Crotz Road															
7	L2	87	0.0	92	0.0	1.225	151.6	LOS F	19.6	138.0	1.00	2.29	5.42	15.5	
8	T1	20	0.0	21	0.0	1.225	199.6	LOS F	19.6	138.0	1.00	2.29	5.42	15.5	
9	R2	94	2.0	99	2.0	1.225	181.6	LOS F	19.6	138.0	1.00	2.29	5.42	15.5	
Approach		201	0.9	212	0.9	1.225	170.4	LOS F	19.6	138.0	1.00	2.29	5.42	15.5	
West: Louis Fourie Rd															
10	L2	171	2.0	180	2.0	0.348	5.7	LOS A	0.0	0.0	0.00	0.15	0.00	56.8	
11	T1	507	1.0	534	1.0	0.348	0.1	LOS A	0.0	0.0	0.00	0.15	0.00	58.5	
12	R2	267	6.0	281	6.0	0.882	42.6	LOS E	7.5	55.1	0.97	1.49	2.81	34.6	
Approach		945	2.6	995	2.6	0.882	13.1	NA	7.5	55.1	0.27	0.53	0.79	48.7	
All Vehicles		2758	1.8	2903	1.8	2.276	98.1	NA	75.9	539.7	0.39	0.96	2.17	22.5	

2028 Forecast Year Weekday AM Peak Hour

MOVEMENT SUMMARY

Site: [2028 Weekday AM (Site Folder: Louis Fourie Rd & Crotz Rd)]

New Site

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 70 seconds (Site Practical Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV] %	[Total veh/h	HV] %				[Veh. veh	Dist] m				
South: Realigned Flora Road														
1	L2	444	3.0	467	3.0	0.467	10.2	LOS B	6.6	47.5	0.54	0.72	0.54	50.7
2	T1	21	0.0	22	0.0	0.107	32.3	LOS C	0.7	5.0	0.94	0.66	0.94	39.4
3	R2	837	0.0	881	0.0	* 0.781	27.3	LOS C	13.0	91.2	0.98	0.90	1.11	41.2
Approach		1302	1.0	1371	1.0	0.781	21.5	LOS C	13.0	91.2	0.83	0.84	0.91	43.9
East: Louis Fourie Road														
4	L2	458	3.0	482	3.0	0.247	5.7	LOS A	0.0	0.0	0.00	0.53	0.00	54.8
5	T1	762	2.0	802	2.0	0.679	18.1	LOS B	10.9	77.7	0.82	0.71	0.83	46.4
6	R2	135	0.0	142	0.0	0.456	22.8	LOS C	3.0	21.3	0.96	0.77	0.96	42.9
Approach		1355	2.1	1426	2.1	0.679	14.3	LOS B	10.9	77.7	0.56	0.66	0.56	48.5
North: Crotz Road														
7	L2	168	3.0	177	3.0	0.481	32.4	LOS C	6.2	44.1	0.92	0.80	0.92	38.7
8	T1	21	0.0	22	0.0	* 0.481	26.8	LOS C	6.2	44.1	0.92	0.80	0.92	39.5
9	R2	174	5.0	183	5.0	0.295	21.3	LOS C	4.3	31.2	0.78	0.76	0.78	43.6
Approach		363	3.8	382	3.8	0.481	26.8	LOS C	6.2	44.1	0.86	0.78	0.86	40.9
West: Louis Fourie Road														
10	L2	126	2.0	133	2.0	0.925	33.4	LOS C	20.6	146.7	1.00	1.03	1.24	39.8
11	T1	878	2.0	924	2.0	* 0.925	27.8	LOS C	20.6	146.7	0.98	1.01	1.22	41.0
12	R2	170	0.0	179	0.0	* 0.215	10.2	LOS B	1.8	12.3	0.54	0.69	0.54	50.8
Approach		1174	1.7	1236	1.7	0.925	25.8	LOS C	20.6	146.7	0.92	0.96	1.12	42.1
All Vehicles		4194	1.8	4415	1.8	0.925	20.9	LOS C	20.6	146.7	0.77	0.81	0.85	44.5

2028 Forecast Year Weekday PM Peak Hour

MOVEMENT SUMMARY

 Site: [2028 Weekday PM (Site Folder: Louis Fourie Rd & Crotz Rd)]

New Site

Site Category: (None)

Signals - Actuated Coordinated Cycle Time = 87 seconds (Site Practical Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h]	[HV %]	[Total veh/h]	[HV %]				[Veh. veh]	[Dist] m				
South: Crotz Street														
1	L2	195	5.0	205	5.0	0.187	9.1	LOS A	2.5	18.1	0.34	0.64	0.34	51.4
2	T1	21	4.0	22	4.0	0.106	40.5	LOS D	0.9	6.4	0.91	0.65	0.91	36.2
3	R2	395	0.0	416	0.0	* 0.415	30.0	LOS C	6.6	46.4	0.86	0.78	0.86	39.9
Approach		611	1.7	643	1.7	0.415	23.7	LOS C	6.6	46.4	0.70	0.73	0.70	42.8
East: Louis Fourie Road														
4	L2	805	0.0	847	0.0	0.425	5.7	LOS A	0.0	0.0	0.00	0.53	0.00	54.8
5	T1	763	2.0	803	2.0	* 0.735	25.3	LOS C	14.3	102.0	0.86	0.74	0.86	42.5
6	R2	114	2.0	120	2.0	0.199	18.6	LOS B	2.5	18.0	0.71	0.73	0.71	45.0
Approach		1682	1.0	1771	1.0	0.735	15.5	LOS B	14.3	102.0	0.44	0.64	0.44	47.8
North: Crotz Street														
7	L2	90	0.0	95	0.0	0.313	39.7	LOS D	4.3	30.4	0.88	0.76	0.88	36.1
8	T1	21	0.0	22	0.0	* 0.313	34.2	LOS C	4.3	30.4	0.88	0.76	0.88	36.7
9	R2	97	2.0	102	2.0	0.181	28.1	LOS C	3.1	21.8	0.76	0.73	0.76	40.4
Approach		208	0.9	219	0.9	0.313	33.8	LOS C	4.3	30.4	0.82	0.75	0.82	38.0
West: Louis Fourie Road														
10	L2	176	2.0	185	2.0	0.678	30.4	LOS C	12.5	88.3	0.83	0.76	0.83	40.5
11	T1	522	1.0	549	1.0	0.678	24.8	LOS C	12.8	90.4	0.83	0.72	0.83	42.3
12	R2	443	6.0	466	6.0	* 0.492	11.4	LOS B	6.0	44.0	0.60	0.74	0.60	49.8
Approach		1141	3.1	1201	3.1	0.678	20.4	LOS C	12.8	90.4	0.74	0.74	0.74	44.6
All Vehicles		3642	1.8	3834	1.8	0.735	19.5	LOS B	14.3	102.0	0.60	0.69	0.60	45.3

Flora Road and Paradise Coast Road / Proposed Site Access Intersection

2023 Base Year Weekday AM Peak Hour

MOVEMENT SUMMARY

 **Site: [2023 Weekday AM (Site Folder: 2. Flora Rd / Paradise Coast Rd)]**

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

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h]	[HV %]	[Total veh/h]	[HV %]				[Veh. veh]	[Dist m]				
South: Paradise Coast Road														
1	L2	9	0.0	9	0.0	0.006	9.1	LOS A	0.0	0.2	0.44	0.79	0.44	51.6
3	R2	11	0.0	12	0.0	0.007	9.0	LOS A	0.0	0.2	0.45	0.86	0.45	51.6
Approach		20	0.0	21	0.0	0.007	9.0	LOS A	0.0	0.2	0.45	0.83	0.45	51.6
East: Flora Road														
4	L2	20	0.0	21	0.0	0.191	5.6	LOS A	0.0	0.0	0.00	0.03	0.00	58.0
5	T1	356	1.0	375	1.0	0.191	0.0	LOS A	0.0	0.0	0.00	0.03	0.00	59.6
Approach		376	0.9	396	0.9	0.191	0.3	NA	0.0	0.0	0.00	0.03	0.00	59.5
West: Flora Road														
11	T1	613	0.0	645	0.0	0.314	0.0	LOS A	0.1	0.7	0.02	0.01	0.02	59.8
12	R2	8	0.0	8	0.0	0.314	7.4	LOS A	0.1	0.7	0.02	0.01	0.02	58.0
Approach		621	0.0	654	0.0	0.314	0.1	NA	0.1	0.7	0.02	0.01	0.02	59.8
All Vehicles		1017	0.4	1071	0.4	0.314	0.4	NA	0.1	0.7	0.02	0.03	0.02	59.5

2023 Base Year Weekday PM Peak Hour

MOVEMENT SUMMARY

 Site: [2023 Weekday PM (Site Folder: 2. Flora Rd / Paradise Coast Rd)]

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

Vehicle Movement Performance														
Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h]	[HV %]	[Total veh/h]	[HV %]				[Veh. veh]	[Dist m]				
South: Paradise Coast Road														
1	L2	7	0.0	7	0.0	0.007	10.3	LOS B	0.0	0.2	0.57	0.80	0.57	51.0
3	R2	29	0.0	31	0.0	0.018	8.9	LOS A	0.1	0.4	0.44	0.89	0.44	51.6
Approach		36	0.0	38	0.0	0.018	9.1	LOS A	0.1	0.4	0.46	0.87	0.46	51.5
East: Flora Road														
4	L2	16	0.0	17	0.0	0.310	5.6	LOS A	0.0	0.0	0.00	0.02	0.00	58.1
5	T1	600	0.0	632	0.0	0.310	0.1	LOS A	0.0	0.0	0.00	0.02	0.00	59.7
Approach		616	0.0	648	0.0	0.310	0.2	NA	0.0	0.0	0.00	0.02	0.00	59.6
West: Flora Road														
11	T1	302	1.0	318	1.0	0.160	0.1	LOS A	0.1	0.7	0.04	0.01	0.04	59.7
12	R2	7	0.0	7	0.0	0.160	8.6	LOS A	0.1	0.7	0.04	0.01	0.04	57.9
Approach		309	1.0	325	1.0	0.160	0.3	NA	0.1	0.7	0.04	0.01	0.04	59.6
All Vehicles		961	0.3	1012	0.3	0.310	0.6	NA	0.1	0.7	0.03	0.05	0.03	59.3

2028 Forecast Year Weekday AM Peak Hour

MOVEMENT SUMMARY

 Site: [2028 Weekday AM (Site Folder: 2. Flora Rd / Paradise Coast Rd)]

New Site
 Site Category: (None)
 Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h	HV] %	[Total veh/h	HV] %				[Veh. veh	Dist] m				
South: Paradise Coast Road														
1	L2	9	0.0	9	0.0	0.018	8.5	LOS A	0.1	0.5	0.53	0.64	0.53	52.0
2	T1	1	0.0	1	0.0	0.018	8.1	LOS A	0.1	0.5	0.53	0.64	0.53	53.3
3	R2	161	0.0	169	0.0	0.167	10.5	LOS B	0.8	5.3	0.51	0.75	0.51	51.4
Approach		171	0.0	180	0.0	0.167	10.4	LOS B	0.8	5.3	0.51	0.74	0.51	51.4
East: Flora Road														
4	L2	70	0.0	74	0.0	0.153	4.5	LOS A	0.9	6.2	0.08	0.45	0.08	54.6
5	T1	356	1.0	375	1.0	0.242	4.7	LOS A	1.6	11.1	0.08	0.50	0.08	55.1
6	R2	150	0.0	158	0.0	0.242	8.6	LOS A	1.6	11.1	0.08	0.53	0.08	54.5
Approach		576	0.6	606	0.6	0.242	5.7	LOS A	1.6	11.1	0.08	0.50	0.08	54.9
North: Proposed Site Access														
7	L2	450	0.0	474	0.0	0.889	33.3	LOS C	14.6	102.2	1.00	1.44	2.17	38.3
8	T1	1	0.0	1	0.0	0.889	33.7	LOS C	14.6	102.2	1.00	1.44	2.17	38.9
9	R2	1	0.0	1	0.0	0.889	37.7	LOS D	14.6	102.2	1.00	1.44	2.17	38.8
Approach		452	0.0	476	0.0	0.889	33.4	LOS C	14.6	102.2	1.00	1.44	2.17	38.3
West: Flora Road														
10	L2	1	0.0	1	0.0	0.683	9.0	LOS A	7.0	49.3	0.77	0.82	0.90	51.3
11	T1	613	0.0	645	0.0	0.683	9.3	LOS A	7.0	49.3	0.77	0.82	0.90	52.5
12	R2	8	0.0	8	0.0	0.683	13.4	LOS B	7.0	49.3	0.77	0.82	0.90	52.3
Approach		622	0.0	655	0.0	0.683	9.4	LOS A	7.0	49.3	0.77	0.82	0.90	52.5
All Vehicles		1821	0.2	1917	0.2	0.889	14.3	LOS B	14.6	102.2	0.58	0.86	0.92	48.7

2028 Forecast Year Weekday PM Peak Hour

MOVEMENT SUMMARY

 Site: [2028 Weekday PM (Site Folder: 2. Flora Rd / Paradise Coast Rd)]

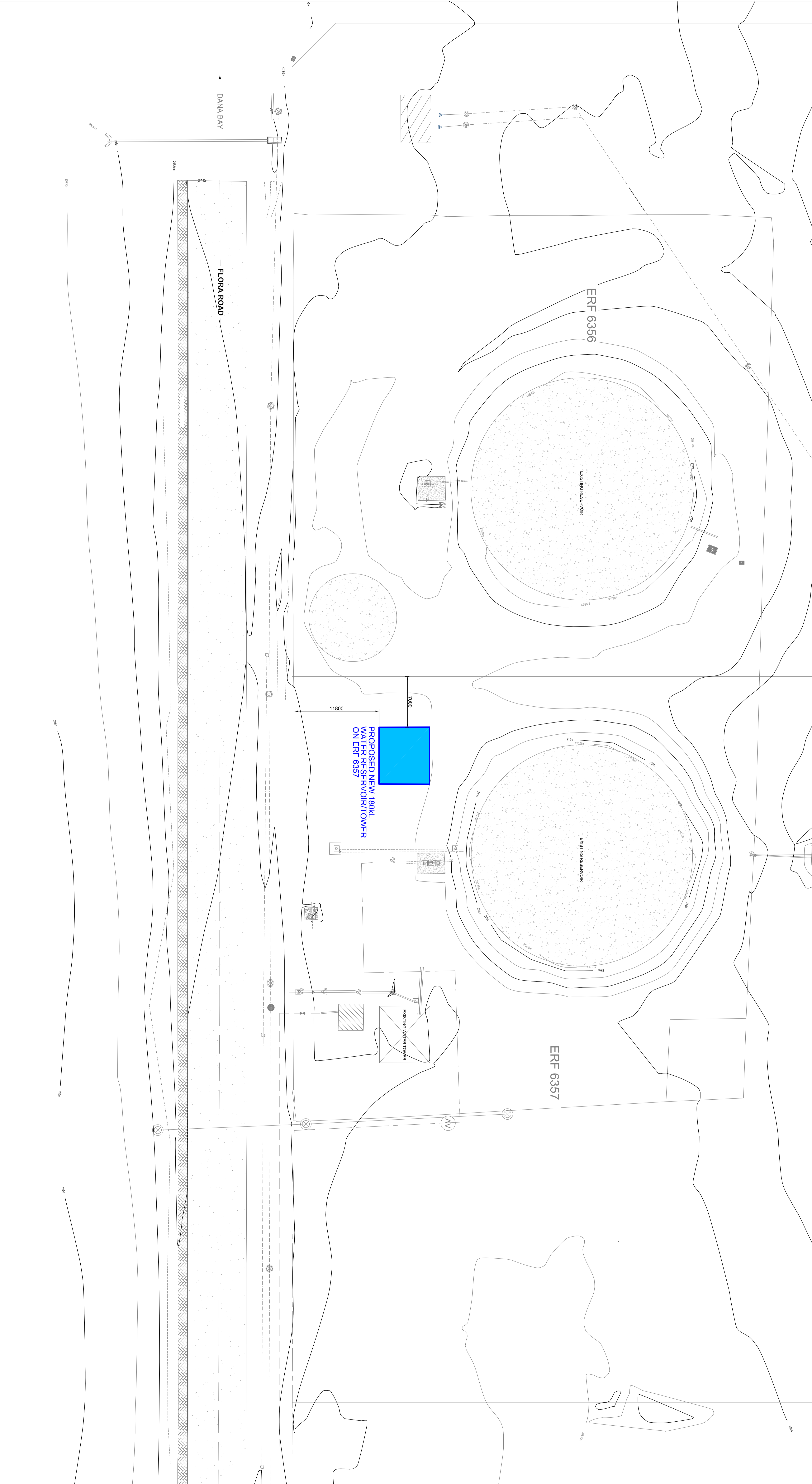
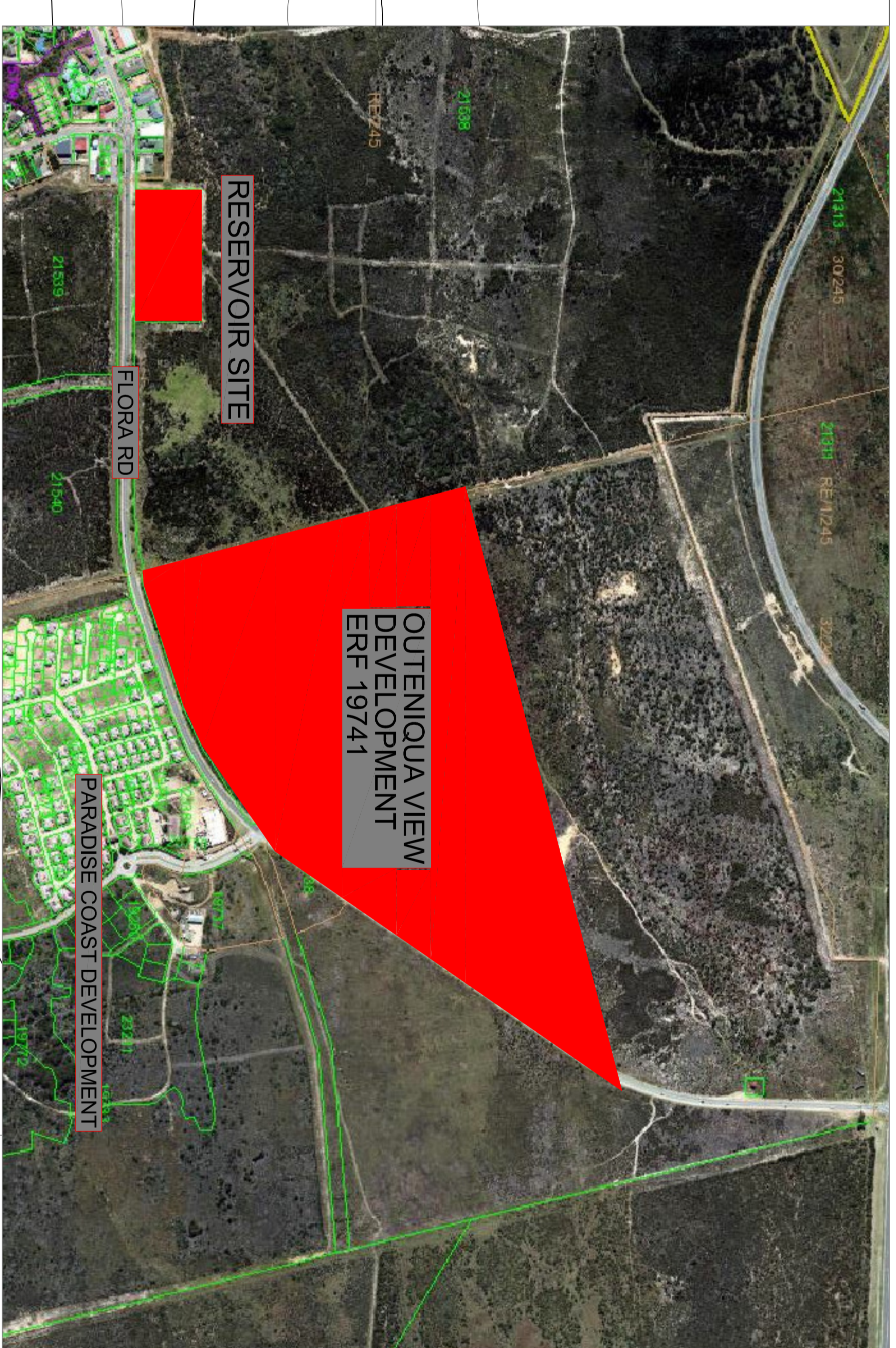
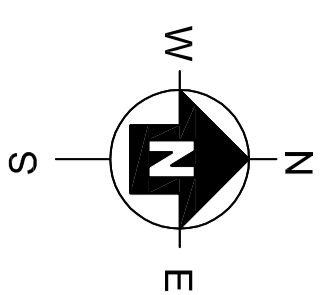
New Site
 Site Category: (None)
 Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES		DEMAND FLOWS		Deg. Satn	Aver. Delay	Level of Service	95% BACK OF QUEUE		Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed
		[Total veh/h]	[HV %]	[Total veh/h]	[HV %]				[Veh. veh]	[Dist. m]				
South: Paradise Coast Road														
1	L2	7	0.0	7	0.0	0.019	11.9	LOS B	0.1	0.5	0.66	0.74	0.66	49.9
2	T1	1	0.0	1	0.0	0.019	11.2	LOS B	0.1	0.5	0.66	0.74	0.66	51.1
3	R2	89	0.0	94	0.0	0.118	12.6	LOS B	0.6	3.9	0.66	0.83	0.66	50.1
Approach		97	0.0	102	0.0	0.118	12.5	LOS B	0.6	3.9	0.66	0.82	0.66	50.1
East: Flora Road														
4	L2	156	0.0	164	0.0	0.304	4.5	LOS A	2.0	14.2	0.09	0.45	0.09	54.5
5	T1	600	0.0	632	0.0	0.479	4.9	LOS A	4.2	29.1	0.09	0.51	0.09	54.9
6	R2	420	0.0	442	0.0	0.479	8.6	LOS A	4.2	29.1	0.10	0.55	0.10	54.0
Approach		1176	0.0	1238	0.0	0.479	6.1	LOS A	4.2	29.1	0.09	0.52	0.09	54.5
North: Proposed Site Access														
7	L2	180	0.0	189	0.0	0.231	6.7	LOS A	1.3	9.1	0.59	0.69	0.59	53.1
8	T1	1	0.0	1	0.0	0.231	7.1	LOS A	1.3	9.1	0.59	0.69	0.59	54.4
9	R2	1	0.0	1	0.0	0.231	11.1	LOS B	1.3	9.1	0.59	0.69	0.59	54.1
Approach		182	0.0	192	0.0	0.231	6.8	LOS A	1.3	9.1	0.59	0.69	0.59	53.2
West: Flora Road														
10	L2	1	0.0	1	0.0	0.411	8.1	LOS A	2.4	17.1	0.68	0.77	0.69	51.9
11	T1	302	1.0	318	1.0	0.411	8.5	LOS A	2.4	17.1	0.68	0.77	0.69	53.0
12	R2	7	0.0	7	0.0	0.411	12.5	LOS B	2.4	17.1	0.68	0.77	0.69	52.8
Approach		310	1.0	326	1.0	0.411	8.6	LOS A	2.4	17.1	0.68	0.77	0.69	53.0
All Vehicles		1765	0.2	1858	0.2	0.479	7.0	LOS A	4.2	29.1	0.28	0.60	0.28	53.9

APPENDIX 5

INTEGRATE DRG NRS 120.00 – REV A AND 130.00 – REV A
INDICATING POSITION OF WATER TOWER, SEWAGE PUMPSTATION
AND RISING MAIN



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NOTES:
 1. Site general construction notes drawing No. CD2021-000100-001 rev.01.
 2. General site plan and site layout drawings are provided, with the exception of the site plan and site layout drawings, which are provided for the attention of the Engineer.

PROJECT
OUTENIQUA VIEW

CLIENT
SAMILAN PROPERTY DEVELOPERS

KEY PLAN

NO.	REVISION	DATE	BY	CHKD
1	ISSUED FOR PERMIT	15/08/24	SM	TL
2	FOR COMMENTS	15/08/24	SM	TL
3	FOR COMMENTS	15/08/24	SM	TL
4	FOR COMMENTS	15/08/24	SM	TL
5	FOR COMMENTS	15/08/24	SM	TL
6	FOR COMMENTS	15/08/24	SM	TL
7	FOR COMMENTS	15/08/24	SM	TL
8	FOR COMMENTS	15/08/24	SM	TL
9	FOR COMMENTS	15/08/24	SM	TL
10	FOR COMMENTS	15/08/24	SM	TL
11	FOR COMMENTS	15/08/24	SM	TL
12	FOR COMMENTS	15/08/24	SM	TL
13	FOR COMMENTS	15/08/24	SM	TL
14	FOR COMMENTS	15/08/24	SM	TL
15	FOR COMMENTS	15/08/24	SM	TL
16	FOR COMMENTS	15/08/24	SM	TL
17	FOR COMMENTS	15/08/24	SM	TL
18	FOR COMMENTS	15/08/24	SM	TL
19	FOR COMMENTS	15/08/24	SM	TL
20	FOR COMMENTS	15/08/24	SM	TL

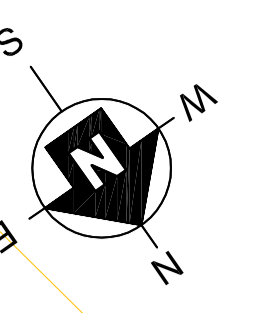
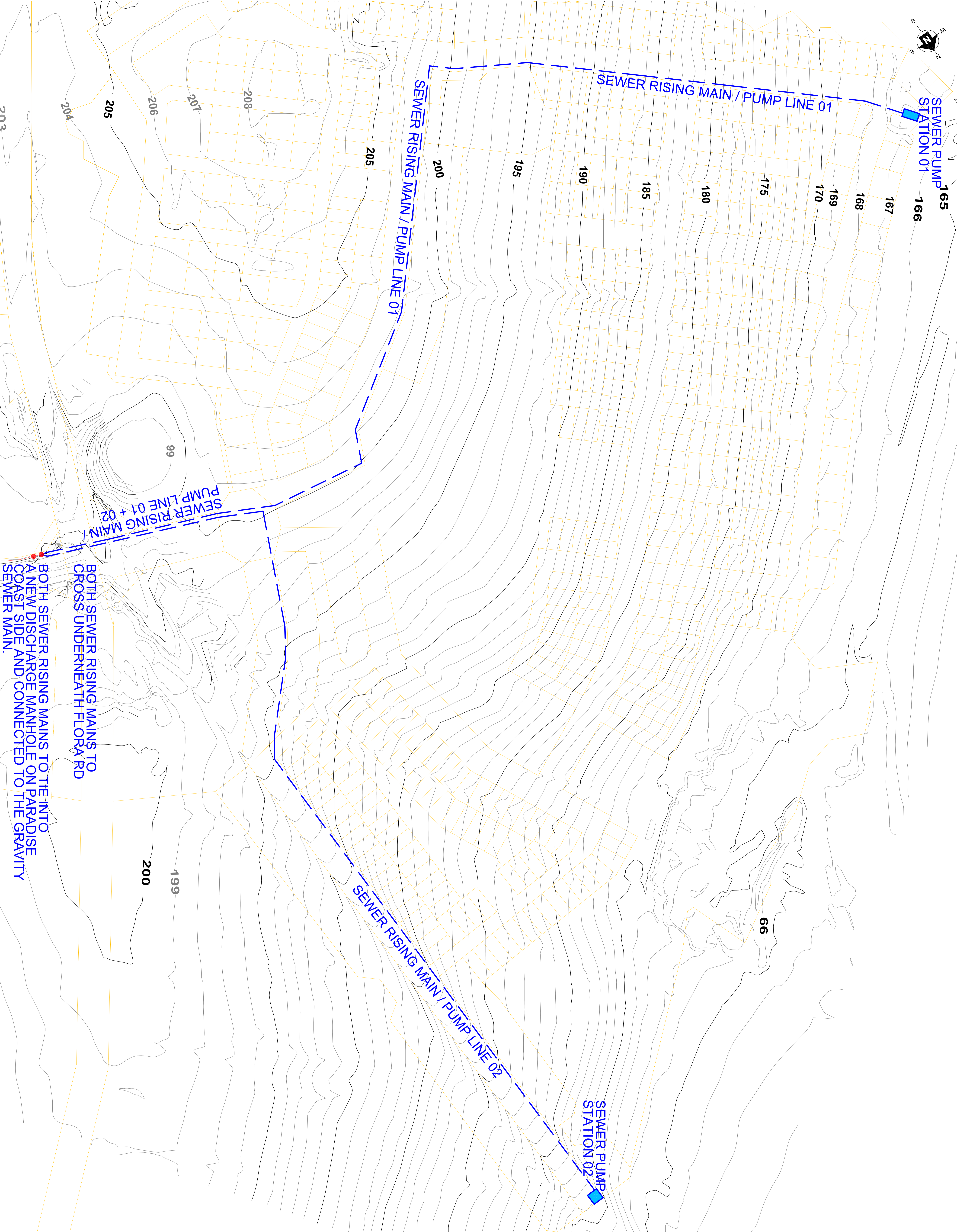
INTEGRATE
 STRUCTURAL AND CIVIL ENGINEERING

UNIVERSITY OF CAPE TOWN
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PROJECT NO.
ERF 6357

SCALE: 1:200 (ON A4)
 DATE: AUGUST 2024
 DRAWN: []
 CHECKED: []
 APPROVED: []

JOB No. **C 23021**
 DRAWING No. **1200000001**



SEWER PUMP
STATION 01
165
166

SEWER RISING MAIN / PUMP LINE 01

SEWER RISING MAIN / PUMP LINE 01

SEWER RISING MAIN
PUMP LINE 01 + 02

SEWER PUMP
STATION 02

SEWER RISING MAIN / PUMP LINE 02

BOTH SEWER RISING MAINS TO
A NEW DISCHARGE MANHOLE ON PARADISE
COAST SIDE AND CONNECTED TO THE GRAVITY
SEWER MAIN.

BOTH SEWER RISING MAINS TO
CROSS UNDERNEATH FLORA RD

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NOTES:
1. See general construction notes drawing No. CD2021-000100 for notes.
2. General engineering and construction notes are located on drawing No. CD2021-000100 for notes.
3. All work shall be in accordance with the latest edition of the Engineering Council of Engineers.

PROJECT
OUTENIQUA VIEW

CLIENT
SIMILAN PROPERTY DEVELOPERS

DATE: 11/08/2024
DRAWN BY: [Signature]
CHECKED BY: [Signature]
APPROVED BY: [Signature]

NO.	REVISION	DATE	BY	CHKD
1	ISSUED FOR PERMIT	11/08/2024	[Signature]	[Signature]

INTEGRATE
STRUCTURAL AND CIVIL ENGINEERING

11/08/2024
11/08/2024

021 913 7253
021 913 7253
021 913 7253

SEWER RISING MAIN LAYOUT

SCALE: 1:150 (ON A4)

DATE: AUGUST 2024

DRAWN BY: [Signature]

CHECKED BY: [Signature]

APPROVED BY: [Signature]

PROJECT: [Signature]

JOB No. [Signature]

DRAWING No. [Signature]

1 3 0 0 0 0 A