



PROPOSED SOCIAL HOUSING DEVELOPMENT, ERVEN 3303 & 3304, MONTCLAIR, MANDALAY, CAPE TOWN

TRAFFIC IMPACT ASSESSMENT

PREPARED FOR: IHS SOCIAL HOUSING SA (PTY) LTD

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1. INTRODUCTION

Apex Transport Solutions was appointed by IHS Social Housing SA (Pty) Ltd (herein referred to as "the Client") to prepare a Traffic Impact Assessment (TIA) in respect of a proposed social housing development to be situated on Erven 3303 & 3304 in Mandalay, Cape Town (herein referred to as "the site"). Refer to Figure 1 for the site locality plan.

The specific objectives of this TIA are:

- To describe the extent of the proposed development and surrounding road network.
- To evaluate the existing operational performance at selected intersections within the study area.
- To estimate additional traffic generated by the proposed development.
- To estimate the trip distribution and assignment on the surrounding road network.
- To evaluate the traffic impacts of the proposed development on the surrounding road network.
- To evaluate the public and non-motorised transport provision surrounding the site.
- To determine the minimum off-street parking requirement for the site.
- To make recommendations for mitigation measures to the surrounding road network.

2. DEVELOPMENT PARTICULARS

The site is located on Erven 3303 & 3304 situated along Stinkwood Road in Montclair, Mandalay. The two properties when combined measures $\pm 49,800\text{m}^2$ in extent are zoned General Residential 2 (GR2) and are currently vacant. The site will be developed for social housing purposes comprising 770 housing opportunities, a crèche for 50 learners and $\pm 235\text{m}^2$ GLA in retail. Refer to Annexure A for the Site Development Plan.

The site formed part of a previously approved Communicare development in 2011 comprising 413 single residential units and 650 flats, of which 518 flats were approved for the site. Therefore, the additional number of flats to be located on the site is 252 units and will be the focus of this TIA.

Based on the latest aerial imagery, only the 413 single residential units appear to have been developed. Therefore, the remaining 132 flats approved for Erven 3300 & 3573 will also be factored into this TIA.

Figure 1: Site Locality Plan



Source: CityMapView, 2022

3. SURROUNDING ROAD NETWORK

The site is located within a suburban roadside development environment predominantly surrounded by residential zoned properties and is well served by the surrounding road network and is partially bound by Stinkwood Road to the south, Lente Road to the east and Montclair Drive to the north.

All internal roads within Montclair are classified as Class 5 local streets in the City of Cape Town's (CoCT) road network¹. However, Montclair Drive and Hillcrest Road serve as Class 4 Collectors servicing the area. Montclair Drive also gains access from Hillcrest Road and also provides access to Lente Road which in turn provides access to Stinkwood Road. Stinkwood Road is currently cordoned off from the general public and only serves the existing 413 single residential units, effectively making it a gated estate. Access to the site will also be located in Stinkwood Wood, before the cordoned access.

Access to Montclair Drive and Hillcrest Road is achievable via Highlands Drive and Swartklip Road, respectively, both of which are classified as Class 3 Minor Arterials. Swartklip Road is also known as a Proclaimed Main Road (PMR122) within the Provincial road network.

4. STUDY AREA

The study intersections listed below were selected for weekday AM and PM peak hour assessment to evaluate the potential traffic impacts of the additional 252 flats on the surrounding road network.

- Intersection 1: Swartklip Road (M49) / Highlands Drive
- Intersection 2: Swartklip Road / Hillcrest Road
- Intersection 3: Highlands Drive / Montclair Drive / Samantha Street
- Intersection 4: Montclair Drive / Hillcrest Road
- Intersection 5: Montclair Drive / Geranium Road
- Intersection 6: Geranium Road / Lente Road
- Intersection 7: Lente Road / Stinkwood Road

Existing traffic count information for the above-mentioned intersections was obtained from traffic count surveys conducted on the road network on Tuesday, 18 April 2023.

The surveys were undertaken during the following periods:

¹ TDA, City of Cape Town, Public Right of Way Road Network Map, July 2017

- AM Peak Period: 06:00 – 09:00
- PM Peak Period: 15:00 – 18:00

Refer to Annexure B for summaries of the traffic counts. A schematic diagram of the traffic movements and associated volumes is illustrated in Diagram 1 in Annexure C.

5. SITE INVESTIGATION

A site investigation was conducted on Tuesday, 18 April 2023. A photographic record of the site investigation capturing the site, geometric features of the study intersections and public transport facilities are contained in Annexure D.

6. TRAFFIC DEMAND ESTIMATION

6.1. ASSESSMENT YEARS

The following scenarios were analysed:

- Existing 2023-year Scenario
- Future 2028-year Scenario: excl. additional site traffic & approved flats traffic
- Future 2028-year Scenario: excl. additional site traffic but incl. approved flats traffic
- Future 2028-year Scenario: incl. additional site traffic & approved flats traffic

A growth rate of 2% per annum was used to estimate the increase in background traffic along Swartklip Road and Highlands Drive for the future year traffic scenarios. Whilst a conservative growth rate of 1% was used for all the minor roads within the study area.

6.2. ASSESSMENT HOURS

The peak hours across the study intersections vary but the additional site traffic will be evaluated during the individual peak hours at each intersection in a conservative approach as opposed to establishing a network peak hour for the study area. The individual peak hours for the study intersections are as follows:

- Intersection 1: AM Peak Hour: 07:00 – 08:00
PM Peak Hour: 16:30 – 17:30
- Intersection 2: AM Peak Hour: 06:45 – 07:45
PM Peak Hour: 15:15 – 16:15
- Intersection 3: AM Peak Hour: 07:00 – 08:00

	PM Peak Hour:	16:15 – 17:15
• Intersection 4:	AM Peak Hour:	06:00 – 07:00
	PM Peak Hour:	15:30 – 16:30
• Intersection 5:	AM Peak Hour:	06:00 – 07:00
	PM Peak Hour:	15:30 – 16:30
• Intersection 6:	AM Peak Hour:	07:00 – 08:00
	PM Peak Hour:	16:00 – 17:00
• Intersection 7:	AM Peak Hour:	06:00 – 07:00
	PM Peak Hour:	16:15 – 17:15

6.3. PEAK HOUR FACTOR

The weekday AM and PM Peak Hour Factors (PHF) for the study intersections were calculated as follows:

• Intersection 1:	AM PHF ₁	=	Total Hourly Volume / (4*15-min Peak Volume)
		=	1431 / (4*375) = 0.95
	PM PHF ₁	=	1635 / (4*420) = 0.97
• Intersection 2:	AM PHF ₂	=	1555 / (4*400) = 0.97
	PM PHF ₂	=	1702 / (4*459) = 0.93
• Intersection 3:	AM PHF ₃	=	1095 / (4*300) = 0.91
	PM PHF ₃	=	1137 / (4*294) = 0.97
• Intersection 4:	AM PHF ₄	=	480 / (4*128) = 0.94
	PM PHF ₄	=	502 / (4*140) = 0.90
• Intersection 5:	AM PHF ₅	=	419 / (4*111) = 0.94
	PM PHF ₅	=	464 / (4*125) = 0.93
• Intersection 6:	AM PHF ₆	=	121 / (4*124) = 0.98
	PM PHF ₆	=	163 / (4*47) = 0.88
• Intersection 7:	AM PHF ₇	=	249 / (4*67) = 0.93
	PM PHF ₇	=	300 / (4*84) = 0.89

6.4. TRIP GENERATION

The AM and PM peak hour trip generation estimation was based on the trip rates adopted in the previous TIA conducted by Pendulum Consulting Engineers in 2010 as illustrated in Figure 2.

Figure 2: 2010 TIA Trip Generation Estimation – Approved Communicare Development

Scope of development			Rate	Unit	No of trips	In/Out Split				No of trips			
						AM		PM		AM		PM	
						In	Out	In	Out	In	Out	In	Out
Single Residential	413	dwelling units	0.5	trips/du	207	35%	65%	65%	35%	72	134	134	72
Cluster Housing	650	dwelling units	0.5	trips/du	325	25%	75%	75%	25%	81	244	244	81
Commercial	8217	m ²	0	trips/100m ²	0	50%	50%	50%	50%	0	0	0	0
TOTAL NUMBER OF TRIPS					532					154	378	378	154

Source: Pendulum Consulting, Transportation Impact Assessment Proposed Development on Erf 776, Mandalay

As previously discussed, 518 flats were approved for the site. The proposal is to provide an additional 252 flats. The trip generation estimation for the approved and additional flats is tabulated below.

Table 1: AM & PM Peak Hour Trip Generation – Erven 3303 & 3304

Social Housing	Size Units	Trip rate	Split Ratio In/Out AM (PM)	Split In/Out AM (PM)	Total Trips
Flats (approved units)	518	0.50	25%:75% (75%:25%)	65:194 (194:65)	259
Flats (additional units)	252	0.50	25%:75% (75%:25%)	32:94 (94:32)	126
Total Trips				97:288 (288:97)	385

Note: The crèche and retail components were excluded from the trip generation estimation as the uses are considered to be ancillary uses to proposed development and the trips are expected to originate from within the proposed development.

It must be noted that the trip rates contained in the table above are more conservative than the trip rates given in the COTO TMH17 Trip Data Manual. After applying the adjustment factors for public transport and low vehicle ownership as per Table 3.2 of the TMH17, the adjusted trip rate for flats is 0.39 vehicle trips/unit in the AM and PM peak hours.

On the contrary, the existing 413 single residential units were found to generate more trips during the AM and PM peak hours than the 206 trips initially anticipated. The peak hour counts at Study Intersection 7 revealed a trip generation of 236 and 278 trips for the single residential units during the AM and PM peak hours, respectively.

Therefore, the conservative trip generation estimation for the additional flats was adopted in this TIA to evaluate the potential traffic impacts on the surrounding road network. The additional flats can be expected to generate 126 additional trips on the surrounding road network during the weekday AM and PM peak hours.

7. TRIP DISTRIBUTION & SITE TRAFFIC ASSIGNMENT

The development traffic must be distributed and assigned to the surrounding road network to evaluate the traffic impacts associated with the proposed development. The trip distribution of the additional site traffic is based on existing traffic patterns at the study intersections.

The trip distribution patterns and site traffic assignment are illustrated in Diagrams 2 and 3 contained in Annexure C.

8. CAPACITY ANALYSIS

The operational performance of the study intersections was analysed using SIDRA. The micro-analytical traffic engineering software determines the existing and future operational Levels of Service (LOS) in terms of delay and degree of saturation (v/c ratios) at the study intersections with the additional site traffic from the proposed development.

The operational performance of an intersection is defined in terms of LOS, a qualitative measure described using a scale that ranges from LOS A to F, with LOS A representing essentially free flow conditions and LOS F indicating that the intersection is operating beyond capacity.

Table 2 summarises the LOS for signalised intersections, roundabouts and unsignalised intersections in terms of delay and v/c ratios.

Table 2: Level of Service criteria based on delay and v/c ratios

Level of Service (LOS)	Control delay per vehicle in seconds (d)			Degree of Saturation (v/c) (x)
	Signalised Intersections	Roundabouts	Unsignalised Intersections	
A	$d \leq 10$	$d \leq 10$	$d \leq 10$	$0 < x \leq 0.85$
B	$10 < d \leq 20$	$10 < d \leq 20$	$10 < d \leq 15$	$0 < x \leq 0.85$
C	$20 < d \leq 35$	$20 < d \leq 35$	$15 < d \leq 25$	$0 < x \leq 0.85$
D	$35 < d \leq 55$	$30 < d \leq 50$	$25 < d \leq 35$	$0 < x \leq 0.85$
	$0 < d \leq 55$	$0 < d \leq 50$	$0 < d \leq 35$	$0.85 < x \leq 0.95$
E	$55 < d \leq 80$	$50 < d \leq 70$	$35 < d \leq 50$	$0 < x \leq 0.95$
	$0 < d \leq 80$	$0 < d \leq 70$	$0 < d \leq 50$	$0.95 < x \leq 1.00$
F	$80 < d$	$70 < d$	$50 < d$	$1.00 < x$

The operational performance at the study intersections are summarised in Tables 3 – 16 in terms of LOS, delay and v/c ratios. The detailed SIDRA output files are contained in Annexure E.

Overall, the findings of the SIDRA analysis indicate that the proposed development is expected to have a low to medium impact on the traffic operations at the study intersections during the future year scenarios.

The intersections of Swartklip Road / Hillcrest Road (Study Intersection 2) and Montclair Drive / Hillcrest Rod (Study Intersection 4) were found to operate at unacceptable LOS during the peak periods which is attributed to increased traffic in the Montclair area as a result of the approved traffic and further exacerbated by the additional site traffic. Mitigation measures to restore the traffic operations to an acceptable state are discussed in Chapter 9.

Furthermore, the proposed development was found to have a low impact on the traffic operations in Stinkwood Road at the site access. The operational performance of the site access is discussed in Chapter 10.

Table 3: AM Peak Hour Operational Performance at Intersection of Swartklip Rd / Highlands Dr

Intersection Approach	Movement	Intersection Category: Unsignalised Intersection											
		Existing 2023			Future 2028								
					Excl. Additional Site & Approved Traffic			Excl. Add. Site Traffic, Incl. Approved Traffic			Incl. Additional Site & Approved Traffic		
		v/c	Delay (sec)	LOS	v/c	Delay (sec)	LOS	v/c	Delay (sec)	LOS	v/c	Delay (sec)	LOS
South: Swartklip Rd	Left	0.314	5.6	LOS A	0.346	5.6	LOS A	0.359	5.6	LOS A	0.362	5.6	LOS A
	Through	0.314	0.1	LOS A	0.346	0.1	LOS A	0.359	0.1	LOS A	0.362	0.1	LOS A
	Approach	0.314	1.2	NA	0.346	1.2	NA	0.359	1.2	NA	0.362	1.2	NA
North: Swartklip Rd	Through	0.402	3.8	LOS A	0.473	5.1	LOS A	0.504	5.6	LOS A	0.515	5.7	LOS A
	Right	0.402	9.8	LOS A	0.473	11.2	LOS B	0.504	11.9	LOS B	0.515	12.1	LOS B
	Approach	0.402	7.0	NA	0.473	8.3	NA	0.504	8.7	NA	0.515	8.8	NA
West: Highlands Dr	Left	0.156	10.1	LOS B	0.184	10.4	LOS B	0.189	10.6	LOS B	0.191	10.6	LOS B
	Right	0.230	16.3	LOS C	0.304	19.4	LOS C	0.380	21.9	LOS C	0.409	23.0	LOS C
	Approach	0.230	12.2	LOS B	0.304	13.5	LOS B	0.380	14.8	LOS B	0.409	15.3	LOS C
All Vehicles		0.402	5.5	NA	0.473	6.2	NA	0.504	6.7	NA	0.515	6.8	NA

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.

Table 4: PM Peak Hour Operational Performance at Intersection of Swartklip Rd / Highlands Dr

Intersection Approach	Movement	Intersection Category: Unsignalised Intersection											
		Existing 2023			Future 2028								
					Excl. Additional Site & Approved Traffic			Excl. Add. Site Traffic, Incl. Approved Traffic			Incl. Additional Site & Approved Traffic		
		v/c	Delay (sec)	LOS	v/c	Delay (sec)	LOS	v/c	Delay (sec)	LOS	v/c	Delay (sec)	LOS
South: Swartklip Rd	Left	0.414	5.7	LOS A	0.457	5.7	LOS A	0.501	5.7	LOS A	0.518	5.7	LOS A
	Through	0.414	0.1	LOS A	0.457	0.2	LOS A	0.501	0.2	LOS A	0.518	0.2	LOS A
	Approach	0.414	1.5	NA	0.457	1.5	NA	0.501	1.5	NA	0.518	1.5	NA
North: Swartklip Rd	Through	0.379	4.5	LOS A	0.454	6.4	LOS A	0.513	8.5	LOS A	0.540	9.6	LOS A
	Right	0.379	12.1	LOS B	0.454	14.3	LOS B	0.513	16.9	LOS C	0.540	18.2	LOS C
	Approach	0.379	7.0	NA	0.454	8.9	NA	0.513	11.2	NA	0.540	12.3	NA
West: Highlands Dr	Left	0.180	10.9	LOS B	0.218	11.5	LOS B	0.243	12.3	LOS B	0.255	12.7	LOS B
	Right	0.494	22.4	LOS C	0.683	31.7	LOS D	0.860	50.6	LOS F	0.947	67.7	LOS F
	Approach	0.494	16.5	LOS C	0.683	21.2	LOS C	0.860	31.0	LOS D	0.947	39.7	LOS E
All Vehicles		0.494	6.2	NA	0.683	7.8	NA	0.860	10.1	NA	0.947	11.9	NA

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.

Figure 3: Intersection Geometry of Swartklip Rd / Highlands Dr

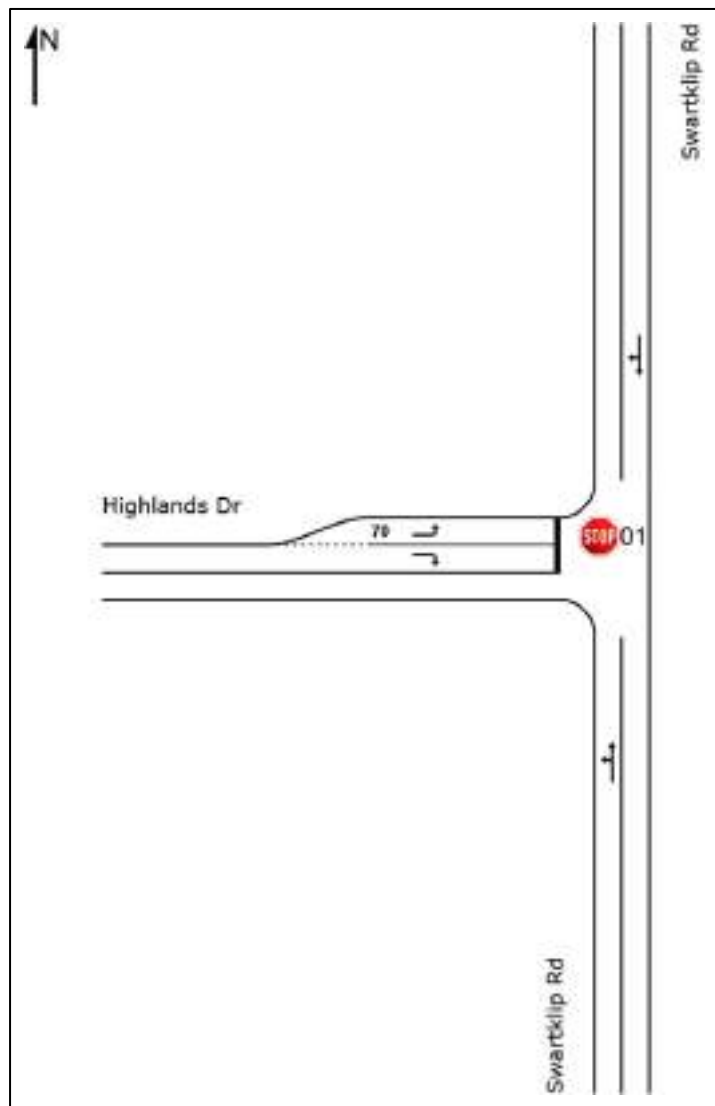


Table 5: AM Peak Hour Operational Performance at Intersection of Swartklip Rd / Hillcrest Rd

Intersection Approach	Movement	Intersection Category: Unsignalised Intersection											
		Existing 2023			Future 2028								
					Excl. Additional Site & Approved Traffic			Excl. Add. Site Traffic, Incl. Approved Traffic			Incl. Additional Site & Approved Traffic		
		v/c	Delay (sec)	LOS	v/c	Delay (sec)	LOS	v/c	Delay (sec)	LOS	v/c	Delay (sec)	LOS
South: Swartklip Rd	Left	0.343	5.6	LOS A	0.378	5.6	LOS A	0.389	5.7	LOS A	0.393	5.7	LOS A
	Through	0.343	0.1	LOS A	0.378	0.1	LOS A	0.389	0.1	LOS A	0.393	0.1	LOS A
	Approach	0.343	0.4	NA	0.378	0.4	NA	0.389	0.5	NA	0.393	0.6	NA
North: Swartklip Rd	Through	0.407	1.5	LOS A	0.457	2.0	LOS A	0.497	2.9	LOS A	0.514	3.3	LOS A
	Right	0.407	10.7	LOS B	0.457	12.2	LOS B	0.497	12.9	LOS B	0.514	13.2	LOS B
	Approach	0.407	2.7	NA	0.457	3.3	NA	0.497	4.5	NA	0.514	5.0	NA
West: Hillcrest Rd	Left	0.325	11.8	LOS B	0.420	13.6	LOS B	0.734	21.1	LOS C	0.865	30.3	LOS D
	Right	0.325	23.1	LOS C	0.420	29.3	LOS D	0.734	40.8	LOS E	0.865	51.7	LOS F
	Approach	0.325	15.5	LOS C	0.420	18.7	LOS C	0.734	27.3	LOS D	0.865	37.0	LOS E
All Vehicles		0.407	3.2	NA	0.457	3.7	NA	0.734	6.7	NA	0.865	9.1	NA

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.

Table 6: PM Peak Hour Operational Performance at Intersection of Swartklip Rd / Hillcrest Rd

Intersection Approach	Movement	Intersection Category: Unsignalised Intersection											
		Existing 2023			Future 2028								
					Excl. Additional Site & Approved Traffic			Excl. Add. Site Traffic, Incl. Approved Traffic			Incl. Additional Site & Approved Traffic		
		v/c	Delay (sec)	LOS	v/c	Delay (sec)	LOS	v/c	Delay (sec)	LOS	v/c	Delay (sec)	LOS
South: Swartklip Rd	Left	0.400	5.7	LOS A	0.439	5.7	LOS A	0.478	5.7	LOS A	0.493	5.7	LOS A
	Through	0.400	0.1	LOS A	0.439	0.2	LOS A	0.478	0.2	LOS A	0.493	0.2	LOS A
	Approach	0.400	0.8	NA	0.439	0.8	NA	0.478	1.2	NA	0.493	1.3	NA
North: Swartklip Rd	Through	0.438	2.4	LOS A	0.495	3.3	LOS A	0.649	7.9	LOS A	0.719	10.5	LOS B
	Right	0.438	12.5	LOS B	0.495	14.7	LOS B	0.649	18.8	LOS C	0.719	21.2	LOS C
	Approach	0.438	3.8	NA	0.495	4.8	NA	0.649	10.2	NA	0.719	13.1	NA
West: Hillcrest Rd	Left	0.519	14.2	LOS B	0.682	19.1	LOS C	1.047	69.1	LOS F	1.234	137.4	LOS F
	Right	0.519	29.0	LOS D	0.682	40.1	LOS E	1.047	100.1	LOS F	1.234	166.6	LOS F
	Approach	0.519	20.0	LOS C	0.682	27.3	LOS D	1.047	81.1	LOS F	1.234	148.8	LOS F
All Vehicles		0.519	4.4	NA	0.682	5.5	NA	1.047	15.3	NA	1.234	25.9	NA

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.

Figure 4: Intersection Geometry of Swartklip Rd / Hillcrest Rd

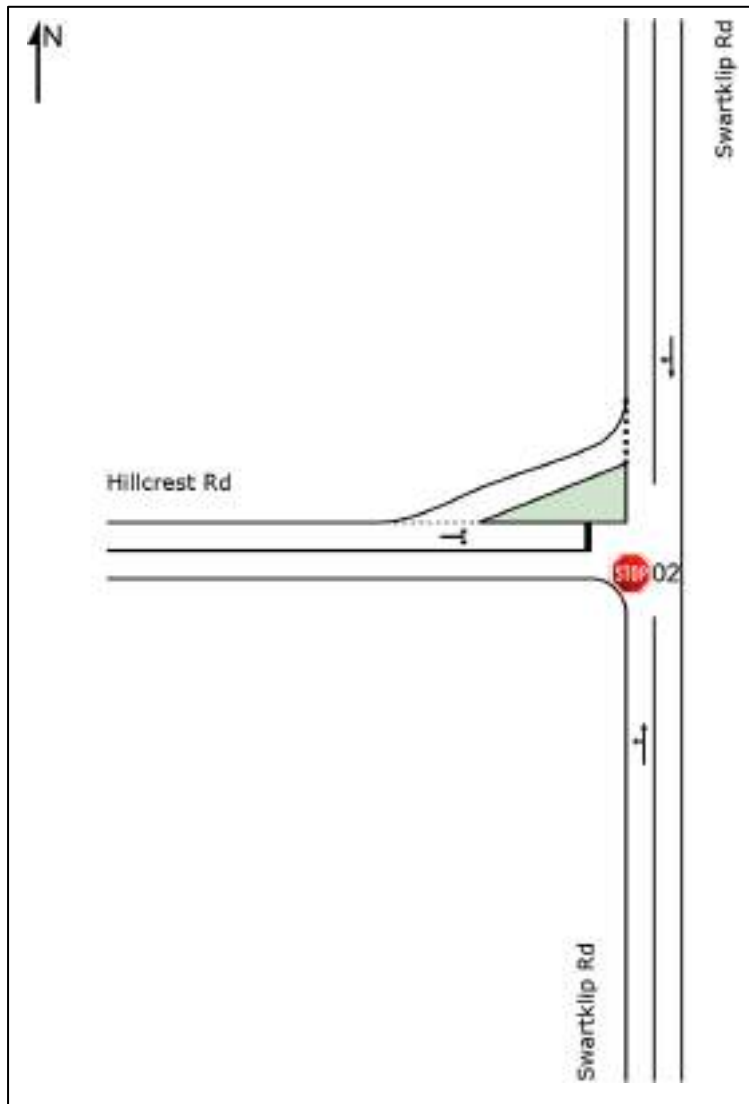


Table 7: AM Peak Hour Operational Performance at Intersection of Highlands Dr / Montclair Dr / Samantha St

Intersection Approach	Movement	Intersection Category: Signalised Intersection											
		Existing 2023			Future 2028								
					Excl. Additional Site & Hospital Traffic			Excl. Add. Site Traffic, Incl. Hospital Traffic			Incl. Additional Site & Hospital Traffic		
		v/c	Delay (sec)	LOS	v/c	Delay (sec)	LOS	v/c	Delay (sec)	LOS	v/c	Delay (sec)	LOS
South: Samantha St	Left	0.439	37.1	LOS D	0.460	37.2	LOS D	0.483	37.4	LOS D	0.492	37.5	LOS D
	Through	0.439	31.5	LOS C	0.460	31.7	LOS C	0.483	31.9	LOS C	0.492	31.9	LOS C
	Right	0.032	33.8	LOS C	0.035	33.8	LOS C	0.037	33.9	LOS C	0.037	33.9	LOS C
	Approach	0.439	34.8	LOS C	0.460	34.9	LOS C	0.483	34.9	LOS C	0.492	34.9	LOS C
East: Highlands Dr	Left	0.449	20.2	LOS C	0.493	20.6	LOS C	0.503	20.7	LOS C	0.510	20.8	LOS C
	Through	0.449	14.7	LOS B	0.493	15.1	LOS B	0.503	15.2	LOS B	0.510	15.2	LOS B
	Right	0.449	20.2	LOS C	0.493	20.6	LOS C	0.503	20.7	LOS C	0.510	20.7	LOS C
	Approach	0.449	15.0	LOS B	0.493	15.4	LOS B	0.503	15.6	LOS B	0.510	15.7	LOS B
North: Montclair Dr	Left	0.083	21.2	LOS C	0.088	21.3	LOS C	0.152	21.8	LOS C	0.176	22.0	LOS C
	Through	0.083	15.7	LOS B	0.088	15.7	LOS B	0.152	16.2	LOS B	0.176	16.4	LOS B
	Right	0.222	23.2	LOS C	0.237	23.3	LOS C	0.391	24.2	LOS C	0.452	24.6	LOS C
	Approach	0.222	20.8	LOS C	0.237	20.9	LOS C	0.391	21.6	LOS C	0.452	21.9	LOS C
West: Highlands Dr	Left	0.500	23.5	LOS C	0.557	24.7	LOS C	0.577	24.9	LOS C	0.584	24.3	LOS C
	Through	0.500	17.9	LOS B	0.557	19.2	LOS B	0.577	19.4	LOS B	0.584	18.8	LOS B
	Right	0.500	23.4	LOS C	0.557	24.7	LOS C	0.577	24.9	LOS C	0.584	24.3	LOS C
	Approach	0.500	19.7	LOS B	0.557	20.9	LOS C	0.577	21.3	LOS C	0.584	20.7	LOS C
All Vehicles		0.500	20.3	LOS C	0.557	20.8	LOS C	0.577	21.2	LOS C	0.584	21.2	LOS C

Table 8: PM Peak Hour Operational Performance at Intersection of Highlands Dr / Montclair Dr / Samantha St

Intersection Approach	Movement	Intersection Category: Signalised Intersection											
		Existing 2023			Future 2028								
					Excl. Additional Site & Hospital Traffic			Excl. Add. Site Traffic, Incl. Hospital Traffic			Incl. Additional Site & Hospital Traffic		
		v/c	Delay (sec)	LOS	v/c	Delay (sec)	LOS	v/c	Delay (sec)	LOS	v/c	Delay (sec)	LOS
South: Samantha St	Left	0.326	38.3	LOS D	0.343	38.5	LOS D	0.376	38.7	LOS D	0.390	38.8	LOS D
	Through	0.326	32.8	LOS C	0.343	32.9	LOS C	0.376	33.2	LOS C	0.390	33.3	LOS C
	Right	0.048	35.9	LOS D	0.051	35.9	LOS D	0.052	35.9	LOS D	0.052	35.9	LOS D
	Approach	0.326	35.5	LOS D	0.343	35.6	LOS D	0.376	35.6	LOS D	0.390	35.7	LOS D
East: Highlands Dr	Left	0.332	17.0	LOS B	0.370	17.9	LOS B	0.416	20.1	LOS C	0.439	21.0	LOS C
	Through	0.332	11.5	LOS B	0.370	12.4	LOS B	0.416	14.6	LOS B	0.439	15.5	LOS B
	Right	0.332	17.0	LOS B	0.370	17.9	LOS B	0.416	20.1	LOS C	0.439	21.0	LOS C
	Approach	0.332	12.1	LOS B	0.370	12.9	LOS B	0.416	15.3	LOS B	0.439	16.3	LOS B
North: Montclair Dr	Left	0.097	27.0	LOS C	0.101	27.0	LOS C	0.129	27.3	LOS C	0.139	27.4	LOS C
	Through	0.097	21.4	LOS C	0.101	21.5	LOS C	0.129	21.7	LOS C	0.139	21.8	LOS C
	Right	0.139	28.9	LOS C	0.149	29.0	LOS C	0.185	29.2	LOS C	0.200	29.5	LOS C
	Approach	0.139	25.5	LOS C	0.149	25.5	LOS C	0.185	25.7	LOS C	0.200	25.9	LOS C
West: Highlands Dr	Left	0.623	21.1	LOS C	0.685	22.0	LOS C	0.746	23.4	LOS C	0.769	23.8	LOS C
	Through	0.623	15.6	LOS B	0.685	16.4	LOS B	0.746	17.9	LOS B	0.769	18.2	LOS B
	Right	0.623	21.1	LOS C	0.685	21.9	LOS C	0.746	23.4	LOS C	0.769	23.7	LOS C
	Approach	0.623	18.1	LOS B	0.685	18.8	LOS B	0.746	20.6	LOS C	0.769	21.0	LOS C
All Vehicles		0.623	19.1	LOS B	0.685	19.6	LOS B	0.746	21.4	LOS C	0.769	21.9	LOS C

Table 9: AM Peak Hour Operational Performance at Intersection of Montclair Dr / Hillcrest Rd

Intersection Approach	Movement	Intersection Category: Unsignalised Intersection											
		Existing 2023			Future 2028								
					Excl. Additional Site & Approved Traffic			Excl. Add. Site Traffic, Incl. Approved Traffic			Incl. Additional Site & Approved Traffic		
		v/c	Delay (sec)	LOS	v/c	Delay (sec)	LOS	v/c	Delay (sec)	LOS	v/c	Delay (sec)	LOS
South: Montclair Dr	Through	0.122	12.2	LOS B	0.128	12.2	LOS B	0.180	12.9	LOS B	0.201	13.2	LOS B
	Right	0.122	11.9	LOS B	0.128	12.0	LOS B	0.180	12.7	LOS B	0.201	13.0	LOS B
	Approach	0.122	12.1	LOS B	0.128	12.1	LOS B	0.180	12.9	LOS B	0.201	13.2	LOS B
East: Hillcrest Rd	Left	0.235	14.9	LOS B	0.247	15.1	LOS C	0.354	16.7	LOS C	0.396	17.5	LOS C
	Right	0.235	14.4	LOS B	0.247	14.5	LOS B	0.354	16.2	LOS C	0.396	16.9	LOS C
	Approach	0.235	14.6	LOS B	0.247	14.7	LOS B	0.354	16.3	LOS C	0.396	17.1	LOS C
North: Montclair Dr	Left	0.474	17.5	LOS C	0.496	18.0	LOS C	0.887	41.5	LOS E	1.040	74.4	LOS F
	Through	0.474	17.2	LOS C	0.496	17.6	LOS C	0.887	41.1	LOS E	1.040	74.0	LOS F
	Approach	0.474	17.3	LOS C	0.496	17.7	LOS C	0.887	41.3	LOS E	1.040	74.2	LOS F
All Vehicles		0.474	15.8	LOS C	0.496	16.1	LOS C	0.887	32.0	LOS D	1.040	54.3	LOS F

Table 10: PM Peak Hour Operational Performance at Intersection of Montclair Dr / Hillcrest Rd

Intersection Approach	Movement	Intersection Category: Unsignalised Intersection											
		Existing 2023			Future 2028								
					Excl. Additional Site & Approved Traffic			Excl. Add. Site Traffic, Incl. Approved Traffic			Incl. Additional Site & Approved Traffic		
		v/c	Delay (sec)	LOS	v/c	Delay (sec)	LOS	v/c	Delay (sec)	LOS	v/c	Delay (sec)	LOS
South: Montclair Dr	Through	0.276	13.1	LOS B	0.291	13.3	LOS B	0.524	19.6	LOS C	0.614	23.3	LOS C
	Right	0.276	12.9	LOS B	0.291	13.0	LOS B	0.524	19.4	LOS C	0.614	23.1	LOS C
	Approach	0.276	13.1	LOS B	0.291	13.2	LOS B	0.524	19.6	LOS C	0.614	23.3	LOS C
East: Hillcrest Rd	Left	0.239	15.3	LOS C	0.251	15.5	LOS C	0.470	17.1	LOS C	0.550	18.5	LOS C
	Right	0.239	14.8	LOS B	0.251	14.9	LOS B	0.470	16.5	LOS C	0.550	17.9	LOS C
	Approach	0.239	14.9	LOS B	0.251	15.0	LOS C	0.470	16.5	LOS C	0.550	18.0	LOS C
North: Montclair Dr	Left	0.389	17.6	LOS C	0.410	18.0	LOS C	0.763	40.3	LOS E	0.896	60.7	LOS F
	Through	0.389	17.2	LOS C	0.410	17.6	LOS C	0.763	40.0	LOS E	0.896	60.3	LOS F
	Approach	0.389	17.5	LOS C	0.410	17.8	LOS C	0.763	40.2	LOS E	0.896	60.5	LOS F
All Vehicles		0.389	15.2	LOS C	0.410	15.5	LOS C	0.763	25.5	LOS D	0.896	33.6	LOS D

Figure 6: Intersection Geometry of Montclair Dr / Hillcrest Rd

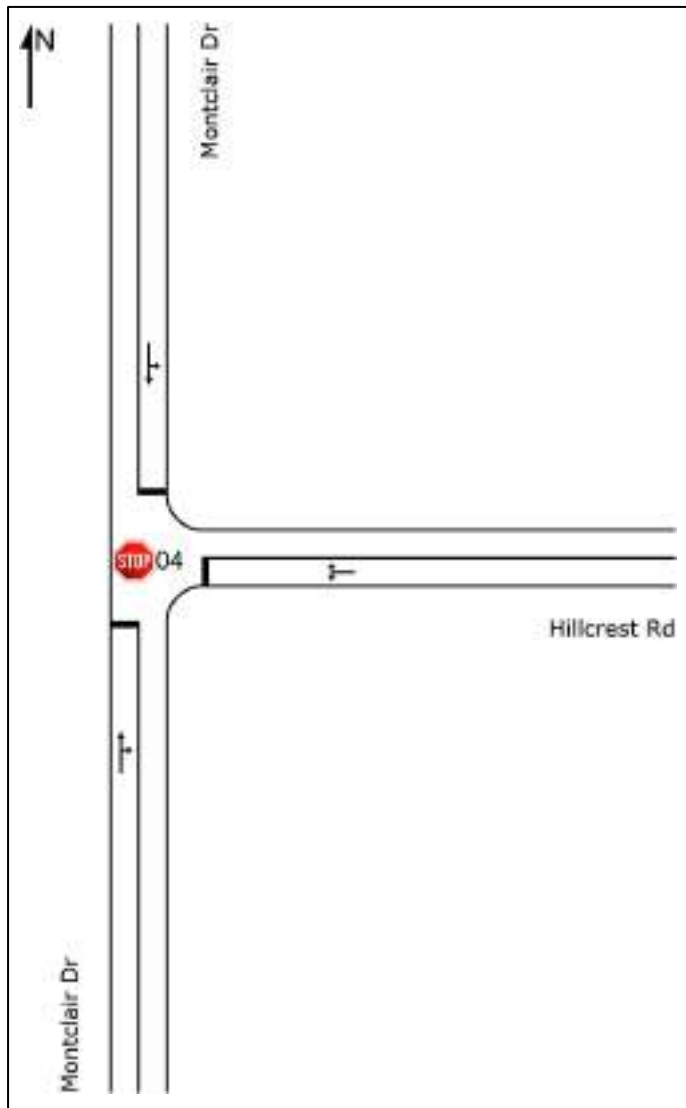


Table 11: AM Peak Hour Operational Performance at Intersection of Montclair Dr / Geranium Rd

Intersection Approach	Movement	Intersection Category: Unsignalised Intersection											
		Existing 2023			Future 2028								
					Excl. Additional Site & Approved Traffic			Excl. Add. Site Traffic, Incl. Approved Traffic			Incl. Additional Site & Approved Traffic		
		v/c	Delay (sec)	LOS	v/c	Delay (sec)	LOS	v/c	Delay (sec)	LOS	v/c	Delay (sec)	LOS
South: Montclair Dr	Left	0.071	5.6	LOS A	0.075	5.6	LOS A	0.117	5.6	LOS A	0.134	5.6	LOS A
	Through	0.071	0.0	LOS A	0.075	0.0	LOS A	0.117	0.0	LOS A	0.134	0.0	LOS A
	Approach	0.071	2.4	NA	0.075	2.4	NA	0.117	2.3	NA	0.134	2.2	NA
North: Montclair Dr	Through	0.091	0.0	LOS A	0.095	0.0	LOS A	0.183	0.0	LOS A	0.217	0.0	LOS A
	Right	0.091	5.9	LOS A	0.095	5.9	LOS A	0.183	6.3	LOS A	0.217	6.5	LOS A
	Approach	0.091	0.0	NA	0.095	0.0	NA	0.183	0.0	NA	0.217	0.0	NA
West: Geranium Rd	Left	0.097	8.2	LOS A	0.103	8.3	LOS A	0.221	8.5	LOS A	0.284	8.8	LOS A
	Right	0.097	8.6	LOS A	0.103	8.6	LOS A	0.221	10.2	LOS B	0.284	11.3	LOS B
	Approach	0.097	8.5	LOS A	0.103	8.6	LOS A	0.221	10.1	LOS B	0.284	11.2	LOS B
All Vehicles		0.097	3.0	NA	0.103	3.0	NA	0.221	3.1	NA	0.284	3.3	NA

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.

Table 12: PM Peak Hour Operational Performance at Intersection of Montclair Dr / Geranium Rd

Intersection Approach	Movement	Intersection Category: Unsignalised Intersection											
		Existing 2023			Future 2028								
					Excl. Additional Site & Approved Traffic			Excl. Add. Site Traffic, Incl. Approved Traffic			Incl. Additional Site & Approved Traffic		
		v/c	Delay (sec)	LOS	v/c	Delay (sec)	LOS	v/c	Delay (sec)	LOS	v/c	Delay (sec)	LOS
South: Montclair Dr	Left	0.132	5.6	LOS A	0.139	5.6	LOS A	0.266	5.6	LOS A	0.316	5.6	LOS A
	Through	0.132	0.0	LOS A	0.139	0.0	LOS A	0.266	0.1	LOS A	0.316	0.1	LOS A
	Approach	0.132	2.3	NA	0.139	2.3	NA	0.266	2.3	NA	0.316	2.3	NA
North: Montclair Dr	Through	0.065	0.1	LOS A	0.068	0.1	LOS A	0.088	0.2	LOS A	0.097	0.2	LOS A
	Right	0.065	6.3	LOS A	0.068	6.3	LOS A	0.088	7.6	LOS A	0.097	8.3	LOS A
	Approach	0.065	0.5	NA	0.068	0.5	NA	0.088	0.5	NA	0.097	0.6	NA
West: Geranium Rd	Left	0.081	8.5	LOS A	0.087	8.5	LOS A	0.169	9.1	LOS A	0.214	9.4	LOS A
	Right	0.081	8.7	LOS A	0.087	8.8	LOS A	0.169	10.4	LOS B	0.214	11.2	LOS B
	Approach	0.081	8.7	LOS A	0.087	8.8	LOS A	0.169	10.3	LOS B	0.214	11.1	LOS B
All Vehicles		0.132	3.0	NA	0.139	3.0	NA	0.266	3.3	NA	0.316	3.4	NA

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.

Figure 7: Intersection Geometry of Montclair Dr / Geranium Rd

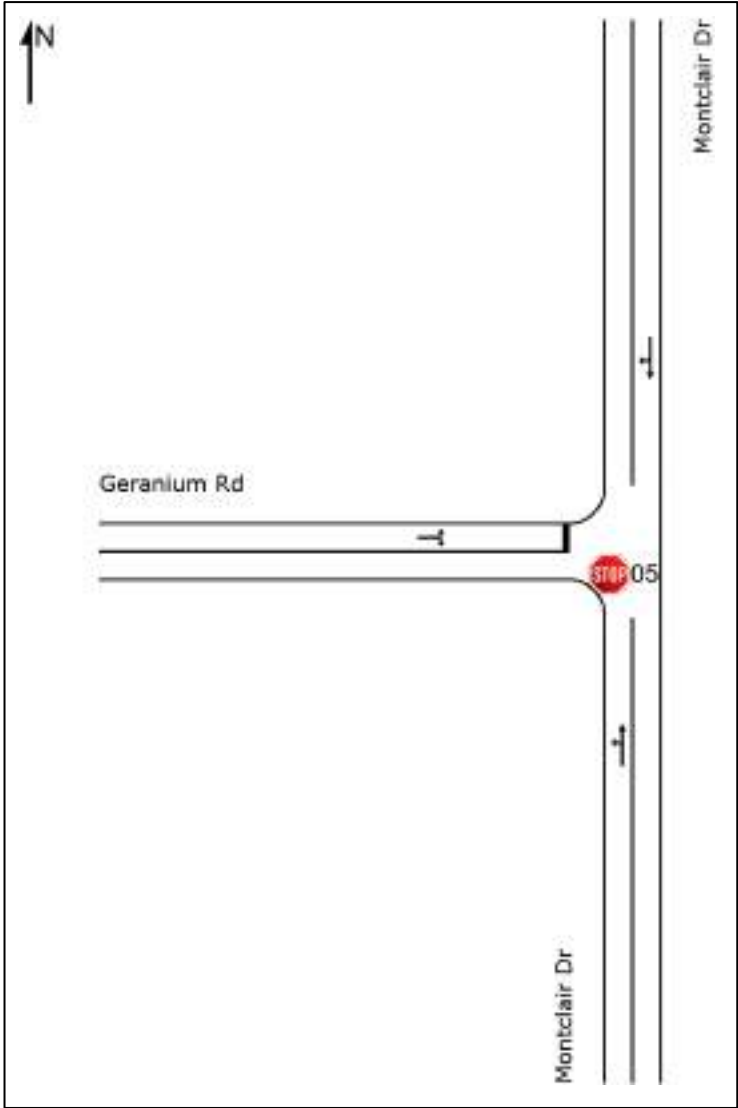


Table 13: AM Peak Hour Operational Performance at Intersection of Geranium Rd / Lente Rd

Intersection Approach	Movement	Intersection Category: Unsignalised Intersection											
		Existing 2023			Future 2028								
					Excl. Additional Site & Approved Traffic			Excl. Add. Site Traffic, Incl. Approved Traffic			Incl. Additional Site & Approved Traffic		
		v/c	Delay (sec)	LOS	v/c	Delay (sec)	LOS	v/c	Delay (sec)	LOS	v/c	Delay (sec)	LOS
South: Lente Rd	Through	0.009	0.1	LOS A	0.010	0.1	LOS A	0.010	0.2	LOS A	0.010	0.3	LOS A
	Right	0.009	5.7	LOS A	0.010	5.7	LOS A	0.010	5.9	LOS A	0.010	6.0	LOS A
	Approach	0.009	2.0	NA	0.010	1.9	NA	0.010	2.0	NA	0.010	2.1	NA
East: Geranium Rd	Left	0.019	8.0	LOS A	0.020	8.0	LOS A	0.043	8.0	LOS A	0.052	8.0	LOS A
	Right	0.019	7.6	LOS A	0.020	7.6	LOS A	0.043	7.8	LOS A	0.052	7.8	LOS A
	Approach	0.019	7.6	LOS A	0.020	7.6	LOS A	0.043	7.8	LOS A	0.052	7.8	LOS A
North: Lente Rd	Left	0.043	5.6	LOS A	0.045	5.6	LOS A	0.084	5.6	LOS A	0.099	5.6	LOS A
	Through	0.043	0.0	LOS A	0.045	0.0	LOS A	0.084	0.0	LOS A	0.099	0.0	LOS A
	Approach	0.043	5.5	NA	0.045	5.5	NA	0.084	5.5	NA	0.099	5.5	NA
All Vehicles		0.043	5.4	NA	0.045	5.4	NA	0.084	5.8	NA	0.099	5.8	NA

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.

Table 14: PM Peak Hour Operational Performance at Intersection of Geranium Rd / Lente Rd

Intersection Approach	Movement	Intersection Category: Unsignalised Intersection											
		Existing 2023			Future 2028								
					Excl. Additional Site & Approved Traffic			Excl. Add. Site Traffic, Incl. Approved Traffic			Incl. Additional Site & Approved Traffic		
		v/c	Delay (sec)	LOS	v/c	Delay (sec)	LOS	v/c	Delay (sec)	LOS	v/c	Delay (sec)	LOS
South: Lente Rd	Through	0.009	0.1	LOS A	0.010	0.1	LOS A	0.010	0.2	LOS A	0.010	0.3	LOS A
	Right	0.009	5.7	LOS A	0.010	5.7	LOS A	0.010	5.8	LOS A	0.010	5.9	LOS A
	Approach	0.009	2.6	NA	0.010	2.5	NA	0.010	2.6	NA	0.010	2.6	NA
East: Geranium Rd	Left	0.048	8.0	LOS A	0.050	8.0	LOS A	0.127	8.1	LOS A	0.158	8.1	LOS A
	Right	0.048	7.7	LOS A	0.050	7.7	LOS A	0.127	7.8	LOS A	0.158	7.8	LOS A
	Approach	0.048	7.7	LOS A	0.050	7.7	LOS A	0.127	7.8	LOS A	0.158	7.8	LOS A
North: Lente Rd	Left	0.043	5.6	LOS A	0.045	5.6	LOS A	0.069	5.6	LOS A	0.079	5.6	LOS A
	Through	0.043	0.0	LOS A	0.045	0.0	LOS A	0.069	0.0	LOS A	0.079	0.0	LOS A
	Approach	0.043	4.8	NA	0.045	4.8	NA	0.069	5.0	NA	0.079	5.1	NA
All Vehicles		0.048	5.7	NA	0.050	5.7	NA	0.127	6.3	NA	0.158	6.5	NA

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.

Figure 8: Intersection Geometry of Geranium Rd / Lente Rd

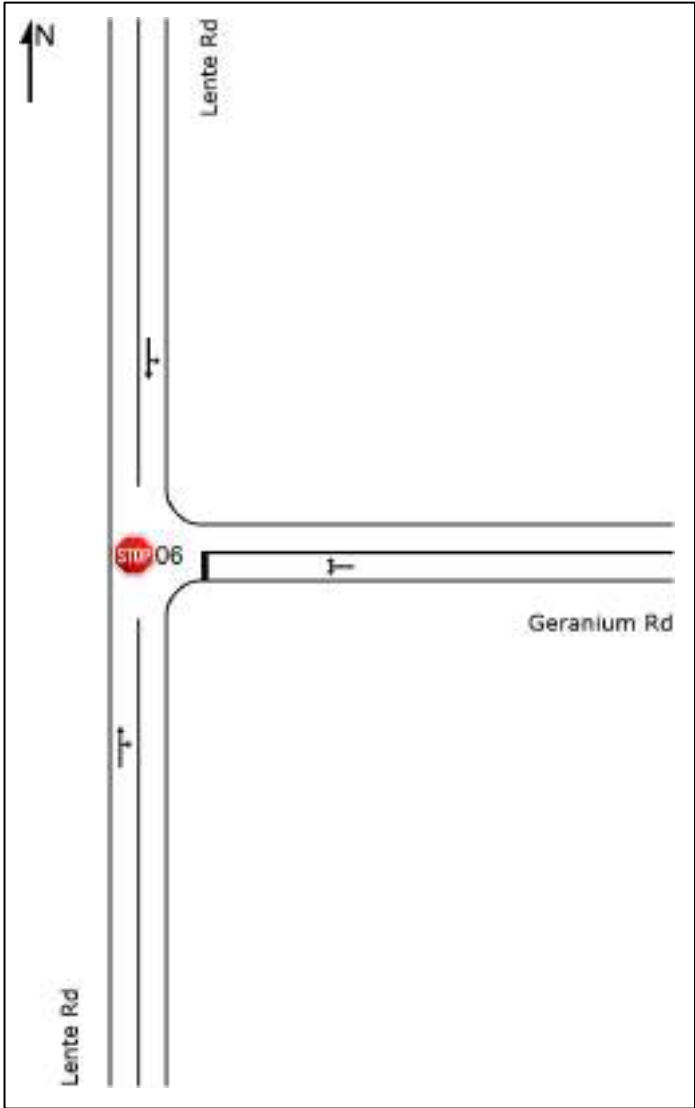


Table 15: AM Peak Hour Operational Performance at Intersection of Lente Rd / Stinkwood Rd

Intersection Approach	Movement	Intersection Category: Unsignalised Intersection											
		Existing 2023			Future 2028								
					Excl. Additional Site & Approved Traffic			Excl. Add. Site Traffic, Incl. Approved Traffic			Incl. Additional Site & Approved Traffic		
		v/c	Delay (sec)	LOS	v/c	Delay (sec)	LOS	v/c	Delay (sec)	LOS	v/c	Delay (sec)	LOS
South: Lente Rd	Left	0.019	5.5	LOS A	0.020	5.5	LOS A	0.035	5.5	LOS A	0.041	5.5	LOS A
	Through	0.019	0.0	LOS A	0.020	0.0	LOS A	0.035	0.0	LOS A	0.041	0.0	LOS A
	Approach	0.019	4.9	NA	0.020	4.9	NA	0.035	5.2	NA	0.041	5.3	NA
North: Lente Rd	Through	0.025	0.1	LOS A	0.026	0.1	LOS A	0.052	0.2	LOS A	0.062	0.2	LOS A
	Right	0.025	5.5	LOS A	0.026	5.5	LOS A	0.052	5.6	LOS A	0.062	5.7	LOS A
	Approach	0.025	4.6	NA	0.026	4.7	NA	0.052	5.2	NA	0.062	5.3	NA
West: Stinkwood Rd	Left	0.099	8.0	LOS A	0.104	8.0	LOS A	0.262	8.0	LOS A	0.324	8.0	LOS A
	Right	0.099	7.7	LOS A	0.104	7.7	LOS A	0.262	8.1	LOS A	0.324	8.3	LOS A
	Approach	0.099	7.9	LOS A	0.104	7.9	LOS A	0.262	8.1	LOS A	0.324	8.1	LOS A
All Vehicles		0.099	6.8	NA	0.104	6.8	NA	0.262	7.2	NA	0.324	7.3	NA

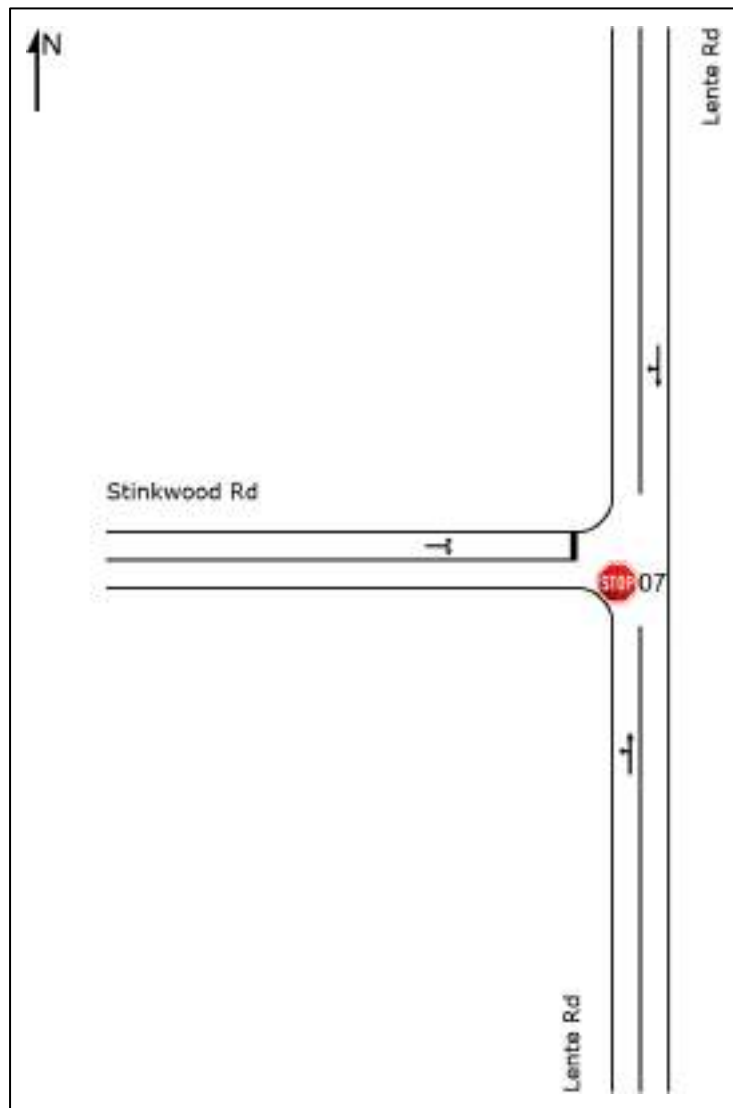
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

Table 16: PM Peak Hour Operational Performance at Intersection of Lente Rd / Stinkwood Rd

Intersection Approach	Movement	Intersection Category: Unsignalised Intersection											
		Existing 2023			Future 2028								
					Excl. Additional Site & Approved Traffic			Excl. Add. Site Traffic, Incl. Approved Traffic			Incl. Additional Site & Approved Traffic		
		v/c	Delay (sec)	LOS	v/c	Delay (sec)	LOS	v/c	Delay (sec)	LOS	v/c	Delay (sec)	LOS
South: Lente Rd	Left	0.033	5.5	LOS A	0.035	5.5	LOS A	0.087	5.6	LOS A	0.107	5.6	LOS A
	Through	0.033	0.0	LOS A	0.035	0.0	LOS A	0.087	0.0	LOS A	0.107	0.0	LOS A
	Approach	0.033	4.8	NA	0.035	4.9	NA	0.087	5.3	NA	0.107	5.3	NA
North: Lente Rd	Through	0.054	0.2	LOS A	0.057	0.2	LOS A	0.137	0.5	LOS A	0.173	0.7	LOS A
	Right	0.054	5.6	LOS A	0.057	5.6	LOS A	0.137	6.0	LOS A	0.173	6.2	LOS A
	Approach	0.054	4.9	NA	0.057	4.9	NA	0.137	5.7	NA	0.173	5.9	NA
West: Stinkwood Rd	Left	0.088	8.0	LOS A	0.093	8.0	LOS A	0.170	8.0	LOS A	0.207	8.0	LOS A
	Right	0.088	8.0	LOS A	0.093	8.0	LOS A	0.170	9.0	LOS A	0.207	9.5	LOS A
	Approach	0.088	8.0	LOS A	0.093	8.0	LOS A	0.170	8.6	LOS A	0.207	8.9	LOS A
All Vehicles		0.088	6.2	NA	0.093	6.2	NA	0.170	6.5	NA	0.207	6.7	NA

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.

Figure 9: Intersection Geometry of Lente Rd / Stinkwood Rd



9. PROPOSED MITIGATION

As previously discussed, the proposed development is expected to have a low to medium impact on the traffic operations at the study intersections during the future year scenarios.

The intersections of Swartklip Road / Hillcrest Road (Study Intersection 2) and Montclair Drive / Hillcrest Road (Study Intersection 4) were found to operate at unacceptable LOS during the peak periods which is attributed to increased traffic in the Montclair area as a result of the approved traffic and further exacerbated by the additional site traffic.

The following mitigation measures are recommended to restore the traffic operations to an acceptable state:

- Intersection 2: Dedicated left turn slip-lane in Hillcrest Road
- Intersection 4: One-way stop control in Hillcrest Road

If the above intersection improvements are implemented the proposed development can be considered to have a low impact on the surrounding road network.

The revised operational performances of the improved intersections are summarised in Tables 17 & 18. More detailed summaries are contained in Annexure E.

Table 17: Revised AM & PM Peak Hour Operational Performance at Intersection of Swartlip Rd / Hillcrest Rd

Approach	Movement	Future 2028 incl. Additional Site & Approved Traffic					
		AM Peak Hour			PM Peak Hour		
		v/c	Delay (sec)	LOS	v/c	Delay (sec)	LOS
South: Swartklip Rd	Left	0.393	5.7	LOS A	0.493	5.7	LOS A
	Through	0.393	0.1	LOS A	0.493	0.2	LOS A
	Approach	0.393	0.6	NA	0.493	1.3	NA
North: Swartklip Rd	Through	0.514	3.3	LOS A	0.719	10.5	LOS B
	Right	0.514	13.3	LOS B	0.719	21.2	LOS C
	Approach	0.514	5.0	NA	0.719	13.1	NA
West: Hillcrest Rd	Left	0.228	8.3	LOS A	0.248	8.9	LOS A
	Right	0.636	40.4	LOS E	0.985	106.4	LOS F
	Approach	0.636	18.4	LOS C	0.985	46.9	LOS E
All Vehicles		0.636	5.7	NA	0.985	12.4	NA

Cross-reference with Tables 5 & 6 (detailed summaries contained in Annexure E)

Table 18: Revised AM & PM Peak Hour Operational Performance at Intersection of Montclair Dr / Hillcrest Rd

Approach	Movement	Future 2028 incl. Additional Site & Approved Traffic					
		AM Peak Hour			PM Peak Hour		
		v/c	Delay (sec)	LOS	v/c	Delay (sec)	LOS
South: Montclair Dr	Through	0.077	1.2	LOS A	0.169	0.2	LOS A
	Right	0.077	8.4	LOS A	0.169	6.7	LOS A
	Approach	0.077	2.7	NA	0.169	0.9	NA
East: Hillcrest Rd	Left	0.322	10.4	LOS B	0.512	10.0	LOS B
	Right	0.322	12.6	LOS B	0.512	13.2	LOS B
	Approach	0.322	12.2	LOS B	0.512	13.0	LOS B
North: Montclair Dr	Left	0.331	5.6	LOS A	0.169	5.6	LOS A
	Through	0.331	0.1	LOS A	0.169	0.0	LOS A
	Approach	0.331	2.5	NA	0.169	3.4	NA
All Vehicles		0.331	4.6	NA	0.512	6.0	NA

Cross-reference with Tables 9 & 10 (detailed summaries contained in Annexure E)

Figure 10: Improved intersection Geometry of Swartlip Rd / Hillcrest Rd

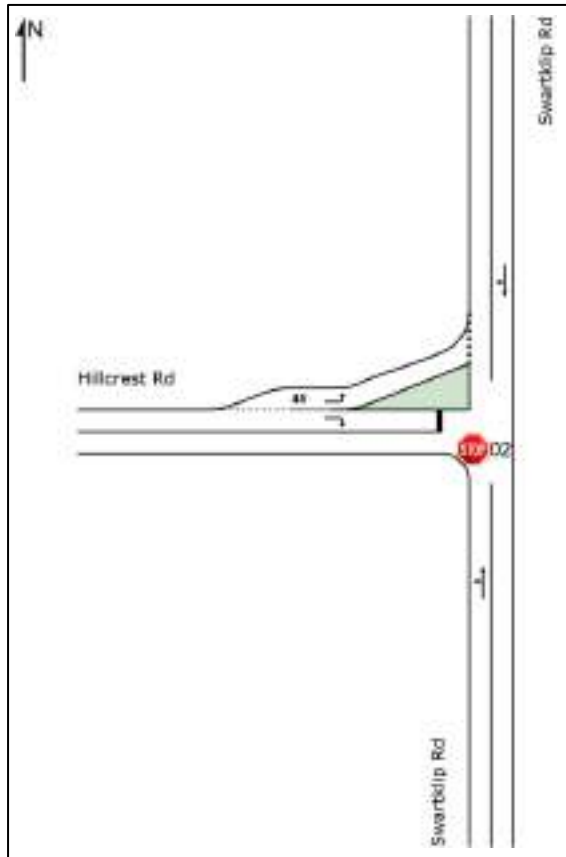
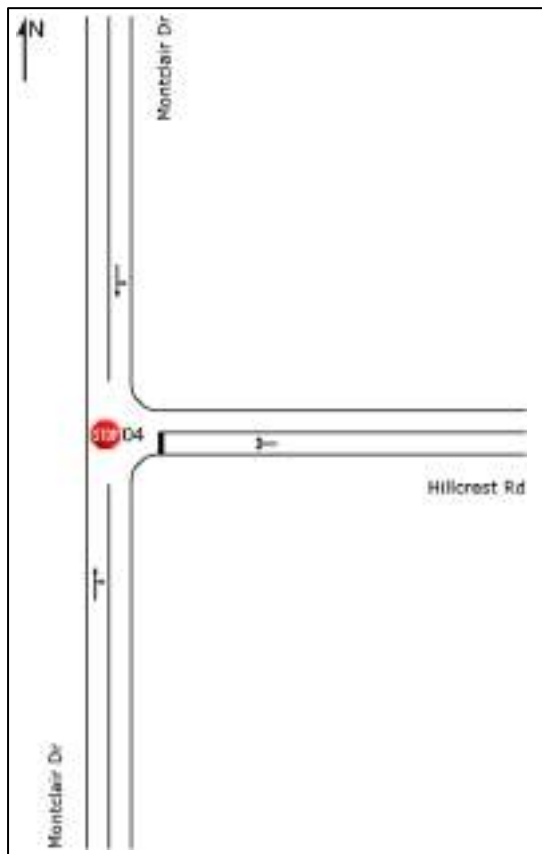


Figure 11: Improved intersection Geometry of Montclair Dr / Hillcrest Rd



10. SITE ACCESS

According to the SDP, there will be a single vehicular access in Stinkwood Road. Pedestrian access will be achievable via turnstiles on either side of the site access road. The access will likely require a carriageway crossing (CWC) departure from the maximum 8m permitted in terms of the Municipal Planning By-Law to accommodate the ingress and egress lanes and to ensure that the stacking requirement can be achieved.

A queue length analysis was prepared in accordance with COTO THM16 (Volume 2) to determine the setback of the access control gates at the proposed development, also known as the stacking requirement. For the determination of the queue length, a traffic ratio at the entrance must be determined by means of the following formula:

$$\text{Traffic Ratio} = \frac{\text{Total Volume /PHF}}{\text{Service Flow Rate}} \times 100$$

Where, Total Volume = Highest inbound volume
 PHF = Peak Hour Factor
 Service Flow Rate = Frequency of inbound vehicles based on the type of access control mechanisms measured in vehicles per hour (vph)

Figure 12: Access Control Service Flow Rates

Service flow rates (veh/h) for different control types	
Control type	Service flow (vph)
Swipe magnetic card	480
Remote controlled gates	450
Ticket dispenser: Automatic	390 -450
Ticket dispenser: Push button	220 - 360
Pin number operated gates	150
Pay fee on entry	120
Cell-phone operated gates (gate opens when a call is received)	100
Manual recording, Visitor completes form	80
Intercom operated gates (visitor contacts resident by intercom)	50

Source: Table 30 – COTO TMH16 (Vol2)

The total volume is based on the PM peak hour trip generation estimation as it has the highest inbound volume at 288 trips. The PHF of 0.89 at study intersection 2 was adopted. It is assumed that the control type at the access gate will be remote-

controlled gates and based on Figure 12, the service flow rate for remote controlled gates is 450 vph. Therefore, the traffic ratio is calculated as follows:

$$\text{Traffic Ratio} = \frac{288 / 0.89}{450} \times 100 = 71.9$$

Based on Figure 13 below, the stacking requirement for a traffic ratio of 79 (less than 94) is 2 vehicles in a 2-channel system.

Figure 13: Access Control Queue Lengths on Access Throats

95 th Percentile queue length (vehicles per channel) at controlled accesses						
Storage (Vehs)	Traffic ratio (Percentage) for different Numbers of Channels					
N _{Queue}	1 Channel	2 Channel	3 Channel	4 Channel	5 Channel	6 Channel
1	23	58	97	140	188	235
2	39	94	155	220	292	363
3	49	115	186	261	341	421
4	56	128	205	283	367	449
5	61	137	216	297	382	466
6	65	143	224	306	392	476
7	68	147	229	312	399	484
8	70	151	233	317	403	489
9	71	153	236	321	407	493
10	73	155	239	324	410	496

Source: Table 31 – COTO TMH16 (Vol2)

According to the SDP, the access control gates will be set back at 12m into the site, measured from the site boundary line, and is therefore deemed adequate.

In terms of operational performance, the site access was found to operate at acceptable LOS during the AM and PM peak periods in the future 2028-year scenario and is not expected to have any negative impacts on the traffic operations in Stinkwood Road. Refer to Table 19 for a summary of operational performance at the site access.

Table 19: AM & PM Peak Hour Operational Performance at Intersection of Stinkwood Rd / Site Access

Approach	Movement	Intersection Category: Unsignalised Intersection					
		Future 2028 incl. Site & Approved Traffic					
		AM Peak Hour			PM Peak Hour		
		v/c	Delay (sec)	LOS	v/c	Delay (sec)	LOS
East: Stinkwood Rd	Through	0.097	0.0	LOS A	0.260	0.3	LOS A
	Right	0.097	5.5	LOS A	0.260	6.3	LOS A
	Approach	0.097	0.9	NA	0.260	1.4	NA
North: Site Access	Left	0.407	8.0	LOS A	0.019	8.0	LOS A
	Right	0.407	8.5	LOS A	0.019	10.3	LOS B
	Approach	0.407	8.4	LOS A	0.019	8.1	LOS A
West: Stinkwood Rd	Left	0.001	5.5	LOS A	0.115	5.6	LOS A
	Through	0.001	0.0	LOS A	0.115	0.0	LOS A
	Approach	0.001	2.8	NA	0.115	5.5	NA
All Vehicles		0.407	6.4	NA	0.260	2.9	NA

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.

11. PUBLIC TRANSPORTATION

It is evident from the traffic count information that the Montclair area is serviced by minibus taxis and buses. Currently, minibus taxis are the predominant mode of public transport surrounding the site operating throughout the day compared to the Golden Arrow bus services which only operate with a few buses in the AM and PM peak periods.

There are bus stops on both sides of Montclair Drive and Hillcrest Road. The walking distance to the bus stops from the proposed development is in excess of 700m which is not ideal. However, there is a minibus taxi stop at the Mandalay train station as well as an informal taxi rank on the corner of Montclair Drive / Geranium Road, mainly in operation during the AM peak period. The informal taxi rank is located approximately 450m in walking distance from the site.

The Golden Arrow bus service has a handful of buses operating in the area between 06:00 – 06:30 to Cape Town City Centre and Claremont CBD. In the PM peak, a single bus from both Cape Town and Claremont returns to Montclair.

The taxi stop at the Mandalay train station is not in use as the train services are still suspended due to historic vandalism of the trains and rail infrastructure on the Central Line. The Passenger Rail Agency of SA (Prasa) concluded phase one of their restoration project on the Central line in March this year with services running from Nyanga to Maitland. The Mandalay train station may form part of the Phase 2 restoration.

According to the SDP, a future pedestrian access is envisaged within the proposed development to provide direct access to the Mandalay train station.

12. NON-MOTORISED TRANSPORTATION

The existing sidewalks within the Montclair area are adequate to serve the needs of pedestrians. Most of the sidewalks measure 2,0m in width. It is recommended that all internal sidewalks measure at least 1,5m in width.

13. PARKING REQUIREMENTS

The site is located in a 'PT2 area' which is defined as areas where the use of public transport is promoted and the City considers the provision of public transport good, or where the use of motor vehicles is very limited.

In accordance with the City of Cape Town's Development Management Scheme (DMS), developments within a PT2 area have a zero-parking requirement. However, provision shall be made for parking at a ratio of 0,53 bays/unit which is higher than the 0,5 bays/unit ratio adopted for social housing developments endorsed by the Social Housing Regulatory Authority (SHRA).

In addition, dedicated parking will be provided to serve the ancillary uses with 14 bays and 12 bays allocated to the crèche and retail shops, respectively.

14. CONCLUSIONS & RECOMMENDATIONS

1. This Traffic Impact Assessment (TIA) is prepared in respect of the proposed residential development to be situated on Erven 3303 & 3304 in Montclair, Mandalay.
2. The site will be developed for social housing purposes comprising 770 housing opportunities as well as ancillary uses such as a 50-learner crèche and $\pm 235\text{m}^2$ GLA in retail.
3. The site formed part of a previously approved Communicare development comprising 413 single residential units and 650 flats, of which 518 flats were approved for the site. Therefore, the additional number of flats to be located on the site is 252 units.
4. The site is well served by the surrounding road network and is partially bound by Stinkwood Road to the south, Lente Road to the east and Montclair Drive to the north.
5. The additional 252 flats can be expected to generate 126 additional trips on the surrounding road network during the weekday AM and PM peak hours. This traffic was loaded to the 2028 scenario with the previously approved trips.
6. The proposed development is expected to have a low to medium impact on the surrounding road network. Mitigation measures are required at the study intersections of Swartklip Road / Hillcrest Road (Intersection 2) and Montclair Drive / Hillcrest Road (Intersection 4) to restore the traffic operations to an acceptable state.
7. A single vehicular access in Stinkwood Road is proposed. Pedestrian access will be achievable via turnstiles on either side of the site access road.
8. The access will likely require a CWC departure from the maximum 8m permitted in terms of the Municipal Planning By-Law to accommodate the ingress and egress lanes and to ensure that the stacking requirement can be achieved.
9. The access control gates will be set back at 12m into the site and deemed adequate based on the queue length analysis.
10. Montclair is serviced by minibus taxis and buses. Currently, minibus taxis are the predominant mode of public transport surrounding the site operating throughout the day compared to the Golden Arrow bus services which only operate with a few buses in the AM and PM peak periods.
11. The Mandalay train station is still out of order as the train services are still suspended due to historic vandalism of the trains and rail infrastructure on the Central Line. Prasa concluded phase one of their restoration project on the Central line in March this year with services running from Nyanga to Maitland. The Mandalay train station may form part of the Phase 2 restoration.

12. The existing sidewalks within the Montclair area are adequate to serve the needs of pedestrians. Most of the sidewalks measure 2,0m in width.
13. The site is located in a 'PT2 area' which has a zero-parking requirement. However, provision shall be made for parking at a ratio of 0,53 bays/unit. Furthermore, dedicated parking will be provided to serve the ancillary uses with 14 bays and 12 bays allocated to the crèche and retail shops, respectively.

It is therefore recommended that;

1. The City of Cape Town consider supporting the application as the proposed development was found to have a low impact on the surrounding road network, provided the following mitigation measures are implemented at Study Intersections 2 & 4:
 - Intersection 2: Dedicated left turn slip-lane in Hillcrest Road
 - Intersection 4: One-way stop control in Hillcrest Road
2. All internal sidewalks measure at least 1,5m in width.



H CASSOO (PR TECH ENG)

(Pr No. 2020300726)

17 August 2023