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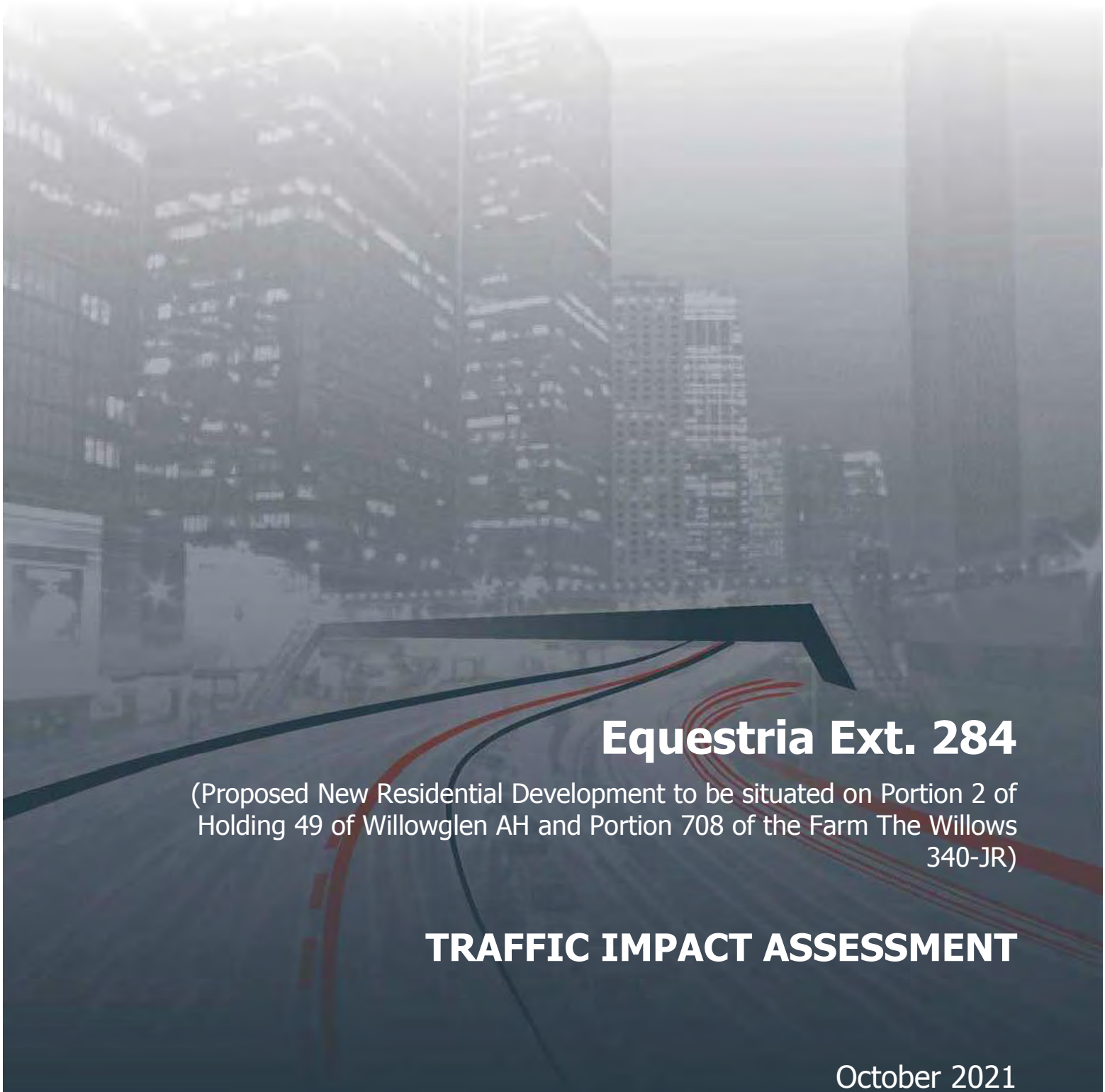

Equestria Ext. 284

(Proposed New Residential Development to be situated on Portion 2 of Holding 49 of Willowglen AH and Portion 708 of the Farm The Willows 340-JR)

TRAFFIC IMPACT ASSESSMENT

October 2021

Document Verification

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1. Introduction & Background

Dhubecon Consulting Engineers (Pty) Ltd have been appointed to undertake this Traffic Impact Assessment (TIA) as part of the township application for a proposed new residential development which is to be situated on Portion 2 of Holding 49 of Willowglen AH and Portion 708 of the Farm The Willows 340-JR, in Equestria. The site location is shown in attached **Figure 1** and **Figure 2** and falls under the jurisdiction of the City of Tshwane (CoT).

The subject site, as a whole, extends approximately 2.14ha and the proposed township will be known as Equestria Ext. 284. With reference to the town planner's proposed Township Layout Plan enclosed in **Annexure A**, the subject site will be zoned 'Residential 3' with a proposed development density of about 50 units/ ha. Based on this density, this particular development would have a maximum permissible development extent of about 107 units, but with reference to the Architect's Draft Site Development Plan (SDP) enclosed in **Annexure B**, the developer only intends to construct 98 units and thus the proposed development extent falls within its allowable rights. The expected target market would be the middle-income market, similar to other nearby residential developments/ complexes in the Equestria area.

This study investigates the impact of the additional traffic to be generated by the proposed development on the immediate surrounding road network and determines whether it is necessary to implement any road and/or intersection improvements to mitigate the anticipated traffic impact. New traffic counts had been undertaken at identified key intersections in the study area in order to quantify and assess the traffic flow operations. The study also investigates the proposed site layout, the site access arrangements and provides comments with respect to non-motorised and public transport.

2. Site Location & Surrounding Road Network

2.1 SITE LOCATION

The subject site is situated about 600m south-east of the existing intersection between Simon Vermooten Road (M12) and Furrow Road, in the Equestria area. As shown in **Figure 1** and **Figure 2**, the site is bordered by:

- Equestria Ext. 172 to the north-west;
- Portion 764 of the Farm The Willows 340-JR to the north-east;
- Ouklipmuur Avenue to the south-east; and
- Furrow Road to the south-west.

The following existing and/or future streets are relevant to the study area:

2.2 EXISTING ROAD NETWORK

Furrow Road: is classified as a Class 4a collector road which borders the site to the south-west. Furrow Road also forms an intersection with Ouklipmuur Avenue, at the southern corner of the site, which is controlled by a traffic circle. Furrow Road travels between Simon Vermooten Road (M12) to the north-west of the site and Vergelegen Avenue to the south-east of the site. It is expected that a significant percentage of the development's estimated generated traffic would distribute towards Simon Vermooten Road which in turn leads to the N4 freeway to the north of the site. Furrow Road currently comprises of a single carriageway (two lanes undivided) road along its length and currently, the traffic volumes on this road, past the site, are in the order of 930vph and 1040vph (total both directions), during the weekday AM and PM peak hours, respectively.

Ouklipmuur Avenue: is classified as a Class 4b collector road which borders the site to the south-east. As discussed further in Section 3.2 of this document, the access to the proposed development will also be provided from Ouklipmuur Avenue. Ouklipmuur Avenue travels between Stellenberg Road to the north-east of the site and Simon Vermooten Road to the south-west of the site. It is expected that some of the development's estimated generated traffic would travel south-westbound along Ouklipmuur Avenue to get to Lynnwood Road (M6) via Simon Vermooten Road. In the opposite direction, north-eastbound, some of the development's estimated generated traffic is expected to distribute to Stellenberg Road which in turns leads directly to Solomon Mahlangu Drive (M10). Ouklipmuur Avenue currently comprises of a single carriageway (two lanes undivided) road along its length and currently, the traffic volumes on this road, past the site, are in the order of 340vph (total both directions), during both the weekday AM and PM peak hours, respectively.

Stellenberg Road: is classified as a Class 4b collector road that is located about 200m north-east of the site. This road travels in a north-west to south-east direction between Ouklipmuur Avenue and Solomon Mahlangu Drive (M10) and it is expected that some of the development's estimated generated traffic would likely use this road to get onto Solomon Mahlangu Drive (M10) as mentioned above. Stellenberg Road currently comprises of a single carriageway (two lanes undivided) road along its length and currently, the total traffic volumes on this road, at its existing intersection with Libertas Avenue, are in the order of 970vph and 1280vph (total both directions), during the weekday AM and PM peak hours, respectively.

2.3 PLANNED FUTURE ROAD NETWORK

Attached **Figure 3** and **Figure 4** shows the relevant extracts of CoT's Road Master Plan (2015) and Gautrans Strategic Road Network (2007), respectively, in the vicinity of the subject site.

In terms of the CoT's local road network master plan shown in **Figure 3**, there are no new local municipal roads planned in the immediate vicinity of the site. Thus, it is confirmed that this development does not directly affect the implementation of any future municipal roads in the area. Furthermore, in terms of Gautrans' provincial road network shown in **Figure 4**, there are also no planned provincial roads that will affect the proposed development, or *vice versa*.

3. Proposed Development & Site Access

3.1 PROPOSED DEVELOPMENT

The proposed new residential development will be situated on Portion 2 of Holding 49 of Willowglen AH and Portion 708 of the Farm The Willows 340-JR, in Equestria. The site location is shown in attached **Figure 1** and **Figure 2** and falls under the jurisdiction of the City of Tshwane (CoT).

The subject site, as a whole, extends approximately 2.14ha and the proposed township will be known as Equestria Ext. 284. With reference to the town planner's proposed Township Layout Plan enclosed in **Annexure A**, the subject site will be zoned 'Residential 3' with a proposed development density of about 50 units/ ha. Based on this density, this particular development would have a maximum permissible development extent of about 107 units, but with reference to the Architect's Draft Site Development Plan (SDP) enclosed in **Annexure B**, the developer only intends to construct 98 units and thus the proposed development extent falls within its allowable rights. The expected target market would be the middle-income market, similar to other nearby residential developments/ complexes in the Equestria area.

Parking will be provided as per the requirements of the relevant Town Planning Scheme, or as separately motivated otherwise.

3.2 SITE ACCESS ARRANGEMENTS

Access to the development could be provided from either Furrow Road (Class 4a road) or Ouklipmuur Avenue (Class 4b road); however, due to Ouklipmuur Avenue being the lower order road, with significantly lower traffic volumes past the site, it is recommended that the main access to the development be rather implemented from this road. Therefore, as shown in attached **Figure 2** and **Drawing No. 0569/CL/01**, a single access to the development is proposed off Ouklipmuur Avenue.

With the proposed location of the access, the nearest intersections to the north-east and south-west are spaced at approximately 280m and 90m, respectively. According to the latest and most relevant guideline, entitled the *THM 16 (Vol 2): South African Traffic Impact and Site Traffic Assessment Standards and Requirement Manual (Committee Draft 2.0, October 2019)*, the minimum spacing requirement for priority stop controlled intersections on Class 4b roads is 50-75m. The access spacing is therefore within the required standards and the proposed access position is therefore supported in this document.

Two inbound lanes and one outbound lane are recommended for the access. Important to note is that the access will be security controlled and therefore adequate stacking distance should be provided to ensure that inbound vehicles queuing at the security gate do not impact on other traffic along the adjacent roads. For this purpose, *THM 16 Vol 2 (Committee Draft 2.0, October 2019)*, was used to determine the required stacking distance for this site access. The following assumptions were made:

- Total development trip generations for weekday PM peak entering the development is **56vph** (see Section 4.3);
- Service flow rate of 450 veh/hr was assumed for 'Swipe magnetic card'; it is expected that this system will be used or something very similar, such as a biometric system; and
- Peak hour factor (PHF) = 0.85.

The traffic ratio percentage calculated to be about 15% (for the 90th percentile queue), which then according to Table 33 of the *THM 16 (Vol 2)* a theoretical storage length of only one vehicle (approximately 6.5m) is required for a double entry channel. It is recommended, however, that a minimum stacking distance of 15m be provided. This is in line with the minimum required stacking distance for accesses off Class 4b collector roads, as per Table 30 of the *THM 16 (Vol 2)*.

In order to accommodate emergency and service vehicles, it is also necessary to ensure that at least one traffic lane (inbound or outbound) has a width of at least 3.5m wide with a total free-space of 4.5m and a height clearance of 5.2m, or as per the requirements of the local authority.

4. Traffic Flows & Development Trip Generation

4.1 EXISTING TRAFFIC FLOWS & OPERATIONS

Given the type and extent of the proposed development, new detailed traffic surveys were carried out to quantify the existing traffic volumes in the vicinity of the site. The traffic surveys comprised of manual classified traffic counts which were done on a weekday in June 2021 at the following key intersections:

- Ouklipmuur Avenue / Furrow Road; and
- Stellenberg Road / Libertas Avenue.

The existing weekday morning (AM) and afternoon (PM) peak hour traffic volumes at the above-mentioned key intersections are summarised in **Figure 5**. It was found that the weekday AM peak hour traffic occurred during 06:45 - 07:45, while the PM peak hour traffic occurred during 16:30 - 17:30.

From a traffic engineering perspective, it can be noted that the Covid-19 pandemic has also had an impact on the traffic volumes on the roads in general, with the Covid-19 lockdown regulations resulting in less traffic overall on the roads. However, it is submitted that by the time these traffic surveys were conducted, the majority of industries, businesses and schools had been fully operational again, with the resultant effect that traffic volumes had almost restored back to normal.

4.2 FUTURE BACKGROUND TRAFFIC FLOWS

Apart from the existing 2021 traffic volumes, a future base traffic volume scenario had been considered for the report, namely 2026. The future 2026 background traffic presented in this document, and as summarised in **Figure 6**, comprises of traffic growth over 5 years at the rate discussed below.

4.2.1 Traffic growth

The *THM16, Volume 1, South African Traffic Impact and Site Traffic Assessment Manual (Committee Draft 2.0, May 2018)* suggests that for developments which generate more than 50 peak hour trips, it is necessary to undertake a full traffic impact assessment which must also include traffic growth and/or the potential traffic generations of other nearby approved developments that still need to realise.

In order to make provision for other developments in the area and increases in traffic along the main routes, traffic growth is added. In this case the traffic growth makes provision for those other developments not accounted for in Section 4.2.2 below.

It has been assumed that the background traffic would increase at the rate of 3.0% per annum for 5 years to future 2026, which is in accordance with the *TMH17 guidelines*. The growth rate is considered reasonable and typical to that used in most traffic studies in Gauteng.

4.2.2 Trips Generations from "Other Developments" (Latent Rights)

No 'Other Developments' have been included as latent rights in this document. There are currently no other planned or approved developments nearby that are known of at this stage.

4.3 DEVELOPMENT TRIP GENERATION

In order to estimate the expected trip generations of the proposed development, the latest and most relevant guideline, entitled *TMH 17 Volume 1, South African Trip Data Manual (Committee Draft 2.0, May 2018*) had been used as a basis, which has been based on a comprehensive data base, which makes provision for different types of residential developments, as well different income levels of developments, vehicle ownership and availability of public transport services.

Given the proposed development density of about 50 units/ ha, it was decided to apply a trip rate of **0.75 trips/ unit** for this proposed 'Residential 3' development, which is the *TMH 17*'s suggested base trip rate for *"Multi-level Townhouses"*. This is viewed as the most accurate description of the proposed development. No adjustment factors had been applied in this case, given the anticipated target market of the development.

Based on this trip rate of 0.75 trips/ unit, it is estimated that the proposed (permissible as per proposed density) 107 unit development will generate a maximum of **80 peak hour trips** (total IN plus OUT) during both the AM and PM peaks. **Table 1** below summarises the total estimated AM and PM peak traffic generations for the proposed development, using the recommended directional splits (IN:OUT) as per the *TMH 17* of 25:75 and 70:30 for the AM and PM peaks, respectively.

Table 1: Estimated Development Trips

Peak	Development Trips (vph)		
	IN	OUT	TOTAL
Weekday AM Peak hr	20	60	**80**
Weekday PM Peak hr	56	24	**80**

4.4 TRIP DISTRIBUTION & ASSIGNMENT

Assumptions on the expected trip distribution were based on the location of the site access in relation to the surrounding road network, existing traffic volumes and patterns in the study area, the type of development in relation to employment opportunities as well as our knowledge of the area.

Figure 7 depicts the expected trip distribution of the proposed development onto the surrounding road network.

Given the above distribution, **Figure 8** summarizes the estimated development trips at the identified key intersections, for the weekday AM and PM peak hours, respectively.

4.5 ASSESSMENT TRAFFIC FLOWS WITH DEVELOPMENT

Figure 9 shows the total existing 2021 peak hour traffic volumes with the estimated traffic generations from the proposed development, which is the summation of **Figure 5** and **Figure 8**.

Figure 10 shows the total future 2026 base traffic volumes with the estimated traffic generations from the proposed development, which is the summation of **Figure 6** and **Figure 8**.

In this report **Figure 5**, **Figure 6**, **Figure 9** and **Figure 10** had been used for assessing the current traffic conditions, as well as the traffic impact of the proposed development and future background traffic flows, onto the surrounding road network.

5. Traffic Impact & Capacity Analyses

Capacity analyses had been undertaken in order to quantify the anticipated traffic impact of the proposed development. For this purpose, the latest *SIDRA Intersection 9* traffic engineering software was used. With reference to the analyses of the various scenarios mentioned below, this section comments on the current traffic operations without the additional development traffic, as well as the likely traffic flow conditions with the additional development traffic. Where necessary and feasible, intersection improvements have been identified that would mitigate the likely traffic impact and/or improve current traffic flow conditions.

The following key intersections have been analysed for potential traffic impact, namely:

- Ouklipmuur Avenue / Furrow Road Intersection;
- Stellenberg Road / Libertas Avenue Intersection; and
- Ouklipmuur Avenue / Site Access Intersection Intersection.

The following scenarios were analysed, namely:

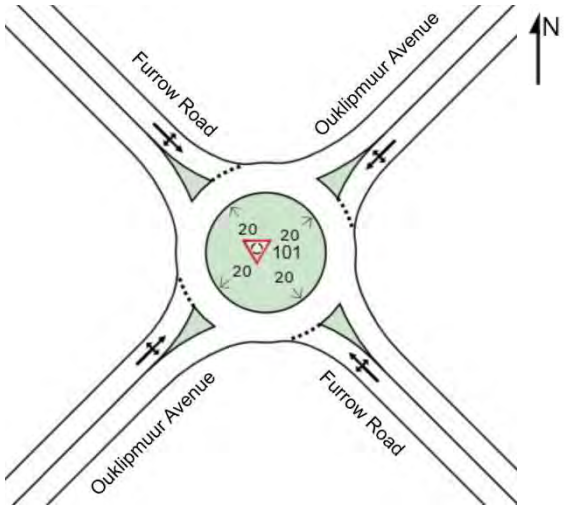
- **Scenario 1:** Existing 2021 weekday AM and PM peak hour traffic volumes WITHOUT the estimated development trips (as per **Figure 5**);
- **Scenario 2:** Future 2026 base weekday AM and PM peak hour traffic volumes WITHOUT the estimated development trips (as per **Figure 6**);
- **Scenario 3:** Existing 2021 weekday AM and PM peak hour traffic volumes PLUS the estimated development trips (as per **Figure 9**);
- **Scenario 4:** Future 2026 base weekday AM and PM peak hour traffic volumes PLUS the estimated development trips (as per **Figure 10**).

Results of the SIDRA capacity analyses at the various intersections are discussed in the following sub-sections, with the details of the outputs enclosed in **Annexure C**.

5.1 OUKLIPMUUR AVENUE / FURROW ROAD INTERSECTION

Existing Geometry & Control:

- 4-legged Traffic Circle;
- **North-West:** One shared through, left turning and right turning lane;
- **North-East:** One shared through, left turning and right turning lane;
- **South-East**: One shared through, left turning and right turning lane; and
- **South-West:** One shared through, left turning and right turning lane.

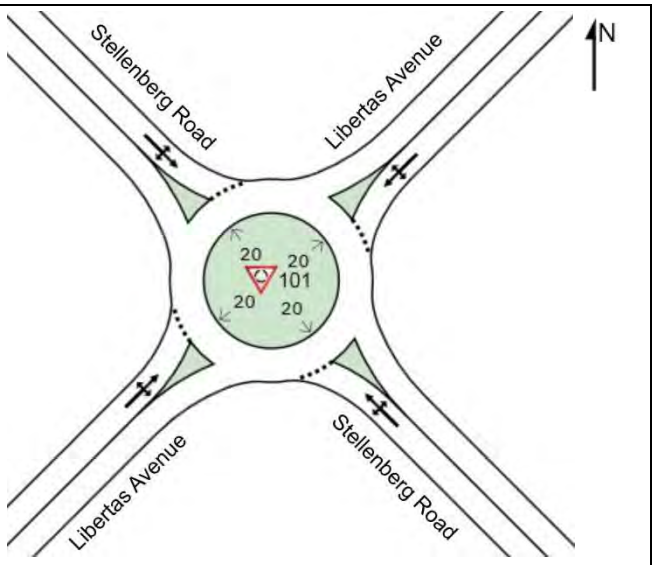


Analysis Results & Conclusion			Intersection: **Ouklipmuur Ave / Furrow Rd**			
Detailed Results: **Annexures C1.1 to C1.8**						
Scenario	**Geometry & Control**	**Peak**	**Overall**			**Comment**
			LOS	**Delay(s)**	**v/c_{max}**	
Scenario 1	Existing geometry	AM	A	6	0.46	Very good overall level of operation
Scenario 2	Existing geometry	AM	A	7	0.56	Very good overall level of operation
Scenario 3	Existing geometry	AM	A	6	0.48	Very good overall level of operation
Scenario 4	Existing geometry	AM	A	7	0.58	Very good overall level of operation
Scenario 1	Existing geometry	PM	A	6	0.40	Very good overall level of operation
Scenario 2	Existing geometry	PM	A	6	0.47	Very good overall level of operation
Scenario 3	Existing geometry	PM	A	6	0.42	Very good overall level of operation
Scenario 4	Existing geometry	PM	A	6	0.49	Very good overall level of operation
Conclusion:	The existing intersection has adequate capacity to accommodate the existing traffic volumes, as well as considerable future growth in background traffic, during both the weekday AM and PM peaks. When the additional development trips are added, this intersection will continue to have ample spare capacity with minimal delays on all approaches and therefore no upgrades are required for this intersection.					
Upgrade Required:	None					
Upgrade Responsibility:	N/A					

5.2 STELLENBERG ROAD / LIBERTAS AVENUE

Existing Geometry & Control:

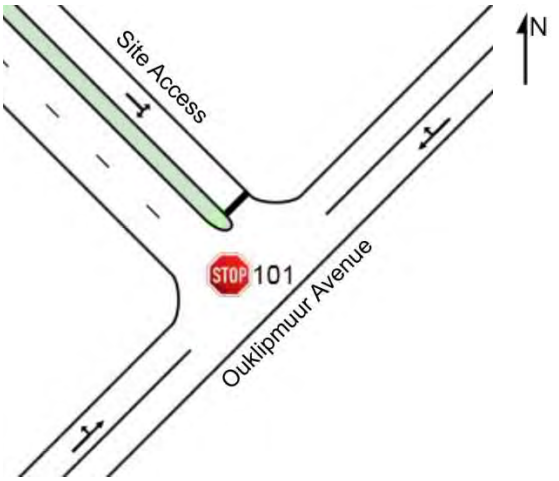
- 4-legged Traffic Circle;
- **North-West:** One shared through, left turning and right turning lane;
- **North-East:** One shared through, left turning and right turning lane;
- **South-East**: One shared through, left turning and right turning lane; and
- **South-West:** One shared through, left turning and right turning lane.



Analysis Results & Conclusion			Intersection: **Stellenberg Rd / Libertas Ave**			
Detailed Results: **Annexures C2.1 to C2.8**						
Scenario	**Geometry & Control**	**Peak**	**Overall**			**Comment**
			LOS	**Delay(s)**	**v/c_{max}**	
Scenario 1	Existing geometry	AM	A	6	0.41	Very good overall level of operation
Scenario 2	Existing geometry	AM	A	7	0.48	Very good overall level of operation
Scenario 3	Existing geometry	AM	A	6	0.43	Very good overall level of operation
Scenario 4	Existing geometry	AM	A	7	0.50	Very good overall level of operation
Scenario 1	Existing geometry	PM	A	8	0.50	Very good overall level of operation
Scenario 2	Existing geometry	PM	A	9	0.60	Very good overall level of operation
Scenario 3	Existing geometry	PM	A	8	0.51	Very good overall level of operation
Scenario 4	Existing geometry	PM	A	9	0.61	Very good overall level of operation

Conclusion:	The existing intersection has adequate capacity to accommodate the existing traffic volumes, as well as considerable future growth in background traffic, during both the weekday AM and PM peaks. When the additional development trips are added, this intersection will continue to have ample spare capacity with minimal delays on all approaches and therefore no upgrades are required for this intersection.
Upgrade Required:	None
Upgrade Responsibility:	N/A

5.3 OUKLIPMUUR AVENUE / SITE ACCESS

Proposed Geometry & Control:	

- Priority stop-controlled T-intersection with free-flow conditions prevailing along Ouklipmuur Avenue;
- **North-West:** One shared left turning and right turning lane;
- **North-East:** One shared through and right turning lane; and
- **South-West**: One shared through and left turning lane.

Analysis Results & Conclusion			Intersection: **Ouklipmuur Avenue / Site Access**			
Detailed Results: **Annexures C3.1 to C3.4**						
Scenario	**Geometry & Control**	**Peak**	**Stop Approach**			**Comment**
			LOS	**Delay(s)**	**v/c_{max}**	
Scenario 3	Proposed geometry	AM	A	6	0.07	Very good overall level of operation
Scenario 4	Proposed geometry	AM	A	6	0.07	Very good overall level of operation
Scenario 3	Proposed geometry	PM	A	6	0.03	Very good overall level of operation
Scenario 4	Proposed geometry	PM	A	6	0.03	Very good overall level of operation
Conclusion:	The proposed site access configuration will have adequate capacity to accommodate the anticipated development trips and will ensure that inbound vehicles do not impact on the movement of vehicles along Ouklipmuur Avenue, during both the weekday AM and PM peak hours, respectively.					
Upgrade Required:	Yes, as per **Drawing No. 0569/CL/01**					
Upgrade Responsibility:	Developer					

6. Road and/or Intersection Upgrades

Based on the estimated additional traffic generations that will result from the proposed development and the projected trip distribution onto the surrounding road network during the weekday AM and PM peak hours, the capacity analyses in Section 5 as well as site observations during the peaks, it was concluded that no external road and/ or intersection upgrades would be required for this proposed development. The identified key intersections have sufficient capacity to accommodate existing traffic, as well as future background traffic growth. Furthermore, the impact of the additional traffic by the proposed development is minimal overall and does not warrant any upgrades.

The developer would, however, be responsible to implement the required access configuration as discussed in Section 3.2 of this study (see also **Drawing No. 0569/CL/01**).

Since the only road upgrade for this township relates to the site access of the development, it would not be possible to off-set any bulk contributions payable with respect to roads and stormwater.

7. Non-Motorised & Public Transport

7.1 AVAILABILITY OF SERVICES & FACILITIES

On-site observations and the classified traffic surveys indicated that there is an existing public transport presence in the study area comprising mainly of minibus taxis. From the traffic volumes recorded at the intersection between Ouklipmuur Avenue and Furrow Road, it was noted that approximately 2% of all the traffic accounted for during the survey was minibus taxis.

It is expected that most of the residents/ tenants of the proposed development will use their own private vehicles for commuting, instead of public transport, given the medium income target market. The proposed development will however create various employment opportunities for domestic workers, security staff, gardening and maintenance personnel, who are generally public transport users. It is expected that particularly minibus taxis would respond to this demand by providing more services along Furrow Road.

In terms of the existing non-motorised and public transport facilities, there are currently no paved sidewalks provided around the site's boundary.

7.2 PROPOSED FACILITIES

In order to make provision for users of public transport, generated by the proposed development, the following facilities are proposed:

- **Paved Sidewalks:** It is recommended that a new paved sidewalk of at least 1.8m wide be constructed along the south-western boundary of the site (i.e. Furrow Road) as well as the south-eastern boundary of the site (i.e. Ouklipmuur Avenue), starting from the gate house of the access. A section of the proposed sidewalk, at the development's access, is shown conceptually in attached **Drawing No. 0569/CL/01**.

More details of the above would be submitted as part of the Site Development Plans and/or detail designs of the external roads.

8. Summary, Conclusions & Recommendations

Based on the content of this document, the following key conclusions and recommendations are relevant:

1. This Traffic Impact Assessment (TIA) has been undertaken as part of the township application for a proposed new residential development which is to be situated on Portion 2 of Holding 49 of Willowglen AH and Portion 708 of the Farm The Willows 340-JR, in Equestria. The site location is shown in attached **Figure 1** and **Figure 2** and falls under the jurisdiction of the City of Tshwane (CoT).

2. The subject site, as a whole, extends approximately 2.14ha and the proposed township will be known as Equestria Ext. 284. With reference to the town planner's proposed Township Layout Plan enclosed in **Annexure A**, the subject site will be zoned 'Residential 3' with a proposed development density of about 50 units/ ha. Based on this density, this particular development would have a maximum permissible development extent of about 107 units, which is the number of units evaluated in this TIA. The expected target market would be the middle-income market, similar to other nearby residential developments/ complexes in the Equestria area.

3. **ACCESS**: As shown in attached **Figure 2** and **Drawing No. 0569/CL/01**, a single access to the development is proposed off Ouklipmuur Avenue, which is viewed as a Class 4b collector road. The proposed access position is well within the intersection spacing standards of the *THM 16 Vol 2 (Committee Draft 2.0, October 2019)* and is therefore supported in this document.

   Two inbound lanes and one outbound lane are recommended for the access. Important to note is that the access will be security controlled and therefore adequate stacking distance should be provided to ensure that inbound vehicles queuing at the security gate do not impact on other traffic along the adjacent roads. For this purpose, *THM 16 Vol 2 (Committee Draft 2.0, October 2019)*, was used to determine the required stacking distance for this site access. It is recommended that a minimum stacking distance of 15m be provided. This is in line with the minimum required stacking distance for accesses off Class 4b roads, as per Table 30 of the *THM 16 (Vol 2)*.

4. In order to accommodate emergency and service vehicles, it is also necessary to ensure that at least one traffic lane (inbound or outbound) has a width of at least 3.5m wide with a total free-space of 4.5m and a height clearance of 5.2m, or as per the requirements of the local authority.

5. **TRIP GENERATIONS:** It is estimated that the proposed residential development, will generate approximately **80vph** (total IN plus OUT) during both the weekday AM and PM peak hours.

6. **ROAD & INTERSECTION UPGRADES**: Considering the new traffic counts that were carried out and based on the estimated development traffic generations during the critical weekday AM and PM peak hours, the capacity analyses in Section 5 as well as site observations during the peaks, it was concluded that no external road or intersection upgrades would be required for the proposed development. The identified key intersections all have ample capacity available to accommodate the existing peak hour traffic, as well as future background traffic growth. Furthermore, the impact of the additional traffic by the proposed development will be minimal and does not warrant any upgrades for the developer.

   Although no external road or intersection upgrades are required, the developer will be responsible to construct the access to the proposed development, as indicated in attached **Drawing No. 0569/CL/01** and in accordance with the recommendations set out in Section 3.2.

7. Since the only road upgrade for this township relates to the site access of the development, it would not be possible to off-set any bulk contributions payable with respect to roads and stormwater.

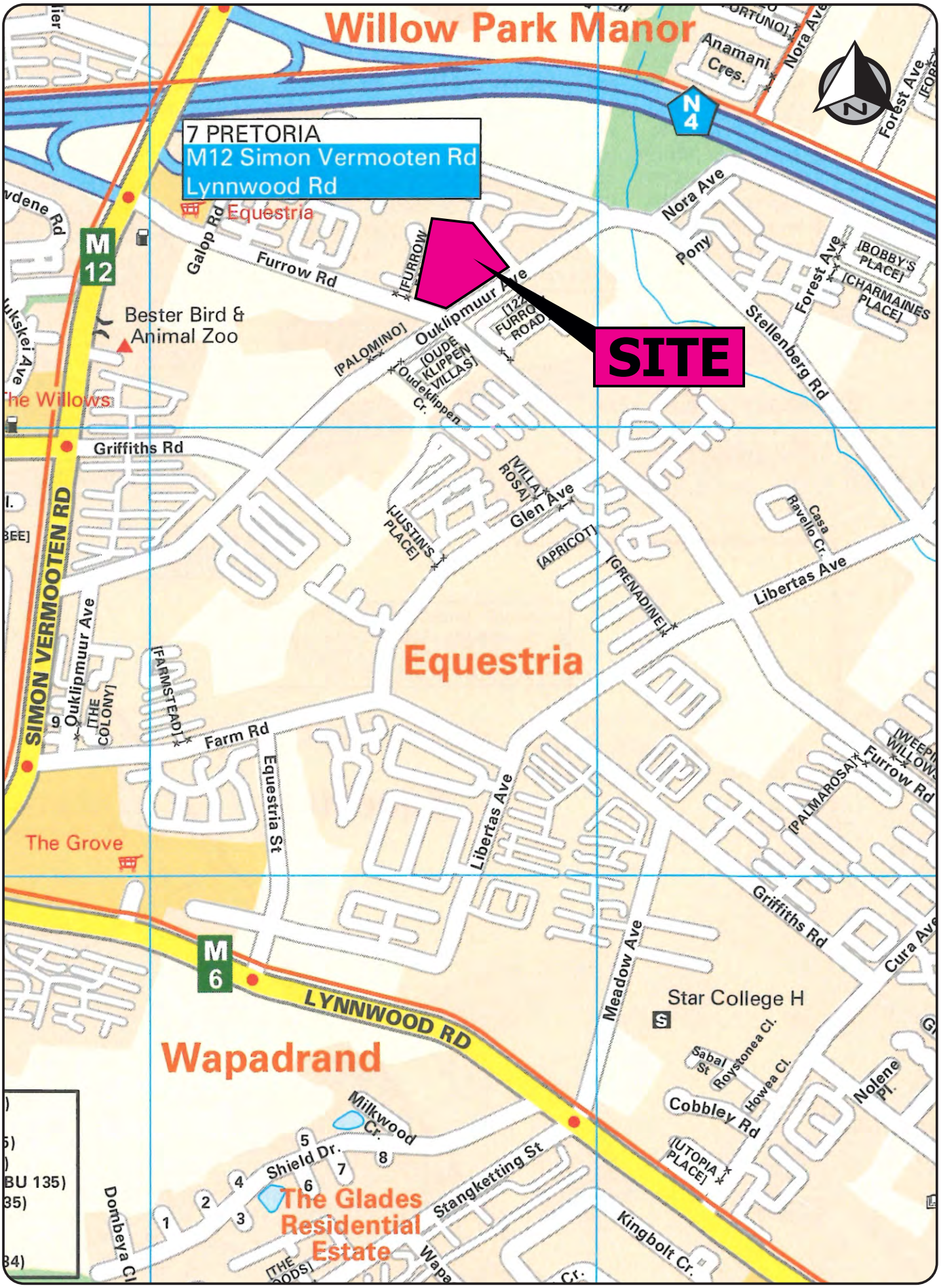
8. **NON-MOTORISED & PUBLIC TRANSPORT:** On-site observations and the classified traffic surveys indicated that there is an existing public transport presence in the study area comprising mainly of minibus taxis. From the traffic volumes recorded at the intersection between Ouklipmuur Avenue and Furrow Road, it was noted that approximately 2% of all the traffic accounted for during the survey was minibus taxis.

   It is expected that most of the residents/ tenants of the proposed development will use their own private vehicles for commuting, instead of public transport, given the medium income target market. The proposed development will however create various employment opportunities for domestic workers, security staff, gardening and maintenance personnel, who are generally public transport users. It is expected that particularly minibus taxis would respond to this demand by providing more services along Furrow Road.

   In terms of the existing non-motorised and public transport facilities, there are currently no paved sidewalks provided around the site's boundary. Thus, in order to ease and formalize the movement of pedestrians in the vicinity of the proposed development, it is recommended that a new paved sidewalk of at least 1.8m wide be constructed along the south-western boundary of the site (i.e. Furrow Road) as well as the south-eastern boundary of the site (i.e. Ouklipmuur Avenue), starting from the gate house of the access. A section of the proposed sidewalk, at the development's access, is shown conceptually in attached **Drawing No. 0568/CL/01**. More details of the above would be submitted as part of the final Site Development Plan (SDP) for this development.

From a traffic engineering perspective, the proposed new residential development known as Equestria Ext. 284 is supported, provided that the proposed site access intersection and NMT facilities as proposed in this TIA are being implemented to the relevant design standards of the City of Tshwane.

Figures



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Project Name	Proj Ref.
Equestria Ext. 284	P0569
Description	Figure
Locality Plan	**1**

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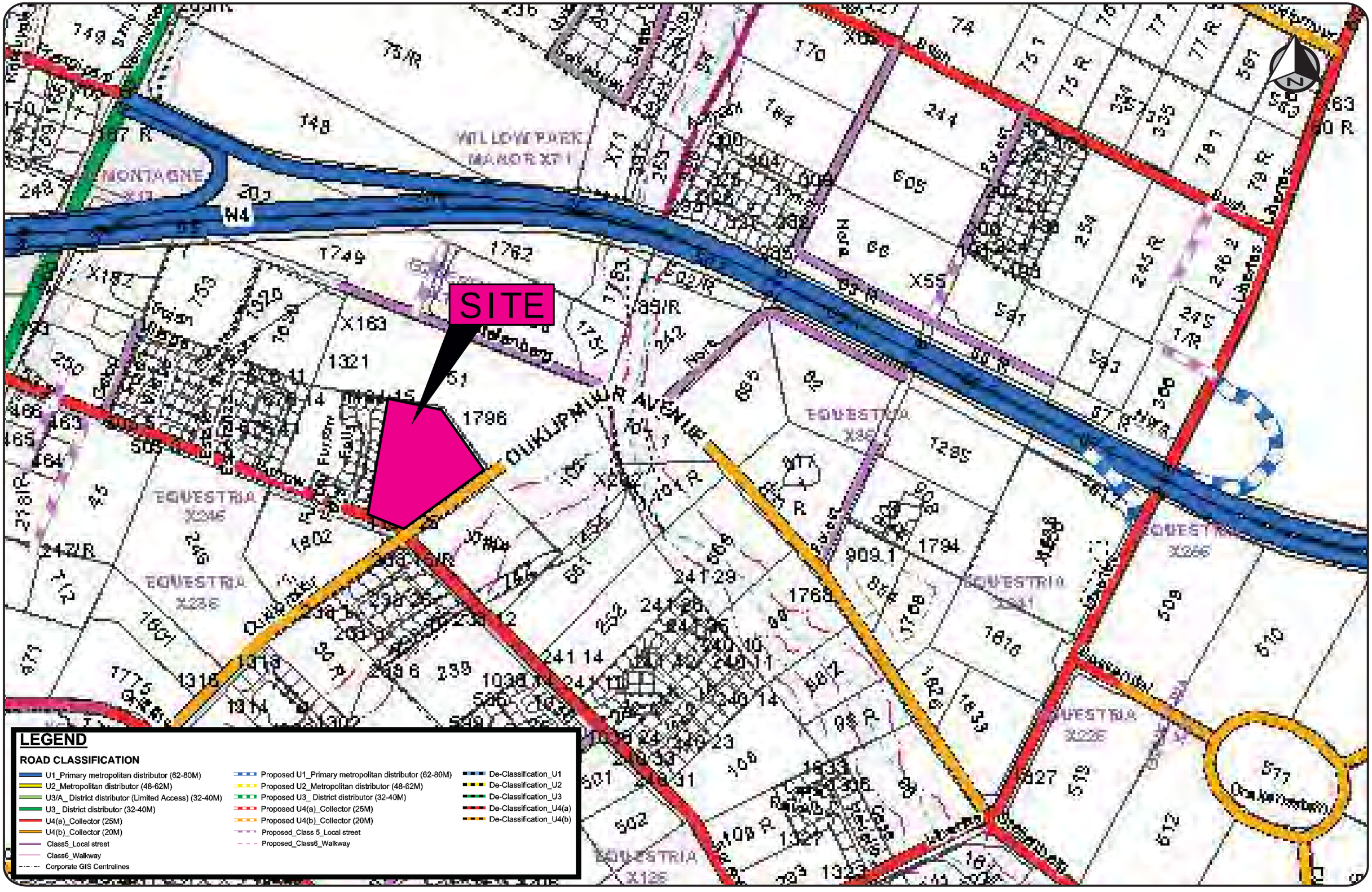
Client	Notes

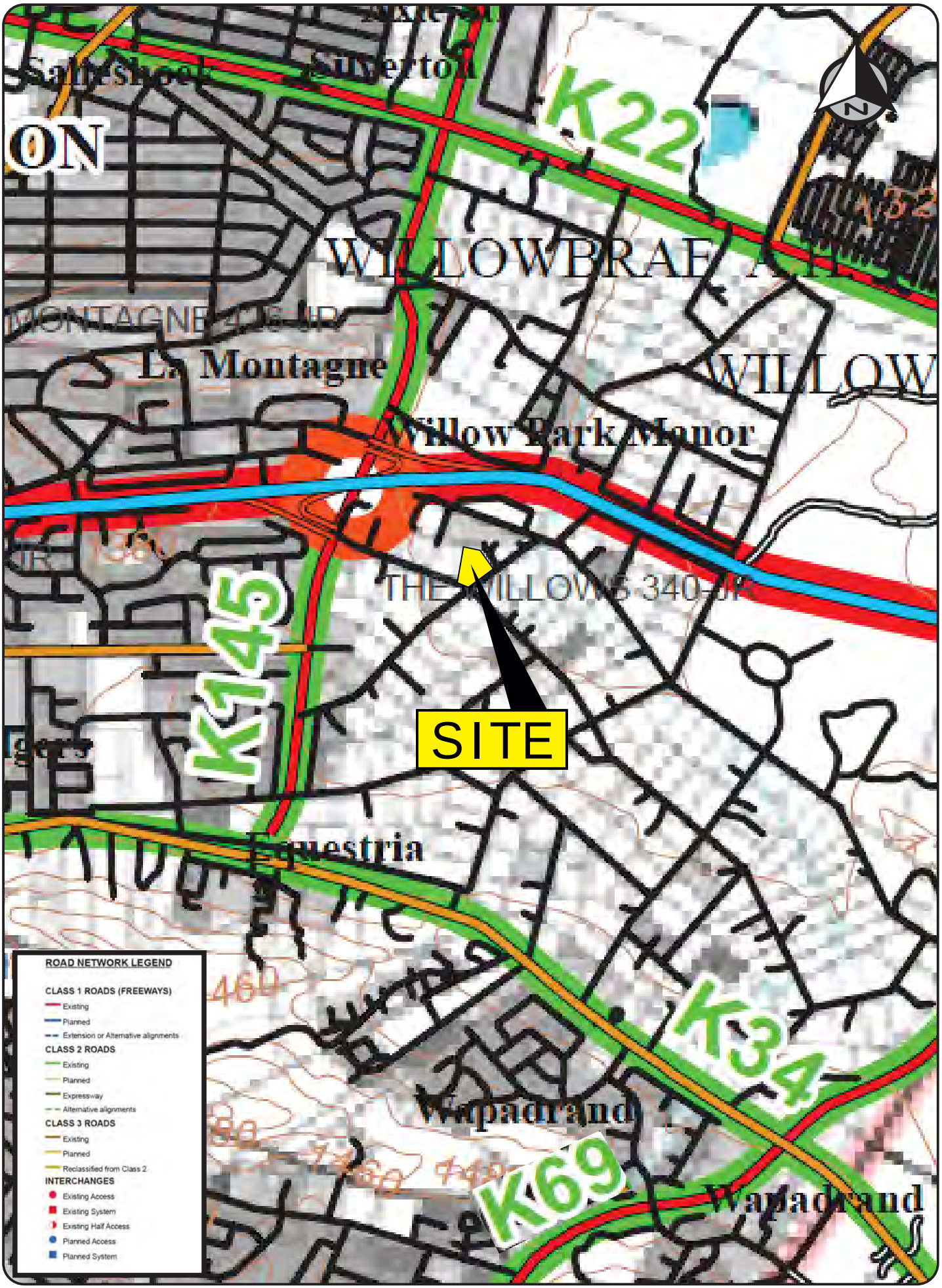
Project Name	Proj Ref.
Equestria Ext. 284	P0569
Description	**Figure**
Site Aerial View & Key Plan	**2**



dhubecon consulting engineers

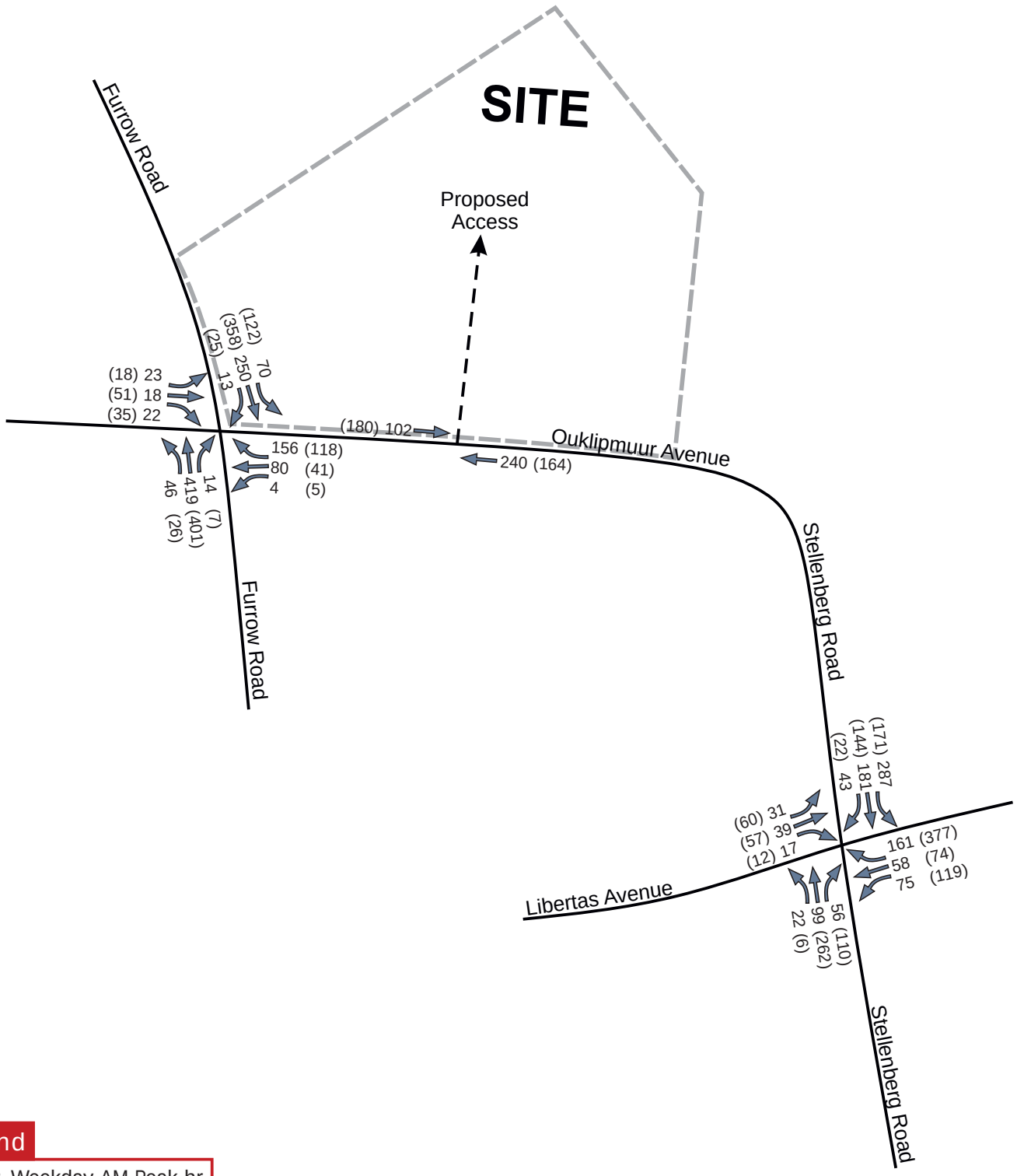
Client	Notes

Project Name	Proj Ref.
Equestria Ext. 284	P0569
Description	**Figure**
Extract Of CoT's Road Master Plan (2015)	3



dhubecon consulting engineers

Project Name	Proj Ref.
Equestria Ext. 284	P0569
Description	**Figure**
Extract of Gautrans' Strategic Major Road Network (2007)	4

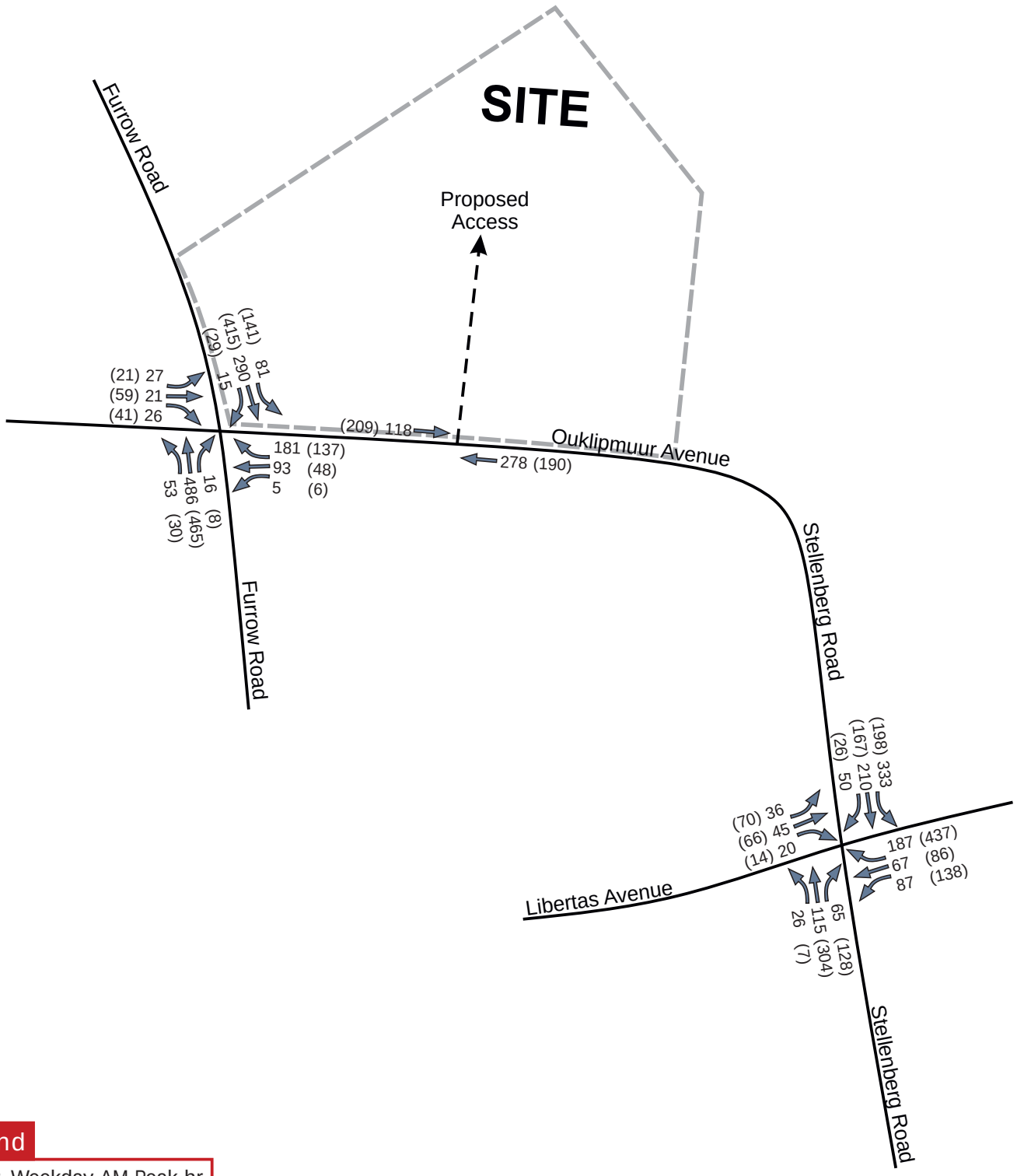


Legend

150 : Weekday AM Peak hr
(200) : Weekday PM Peak hr

dhubecon consulting engineers

Project Name	Proj Ref.
Equestria Ext. 284	P0569
Description	**Figure**
Existing 2021 Peak Hour Traffic Volumes	5

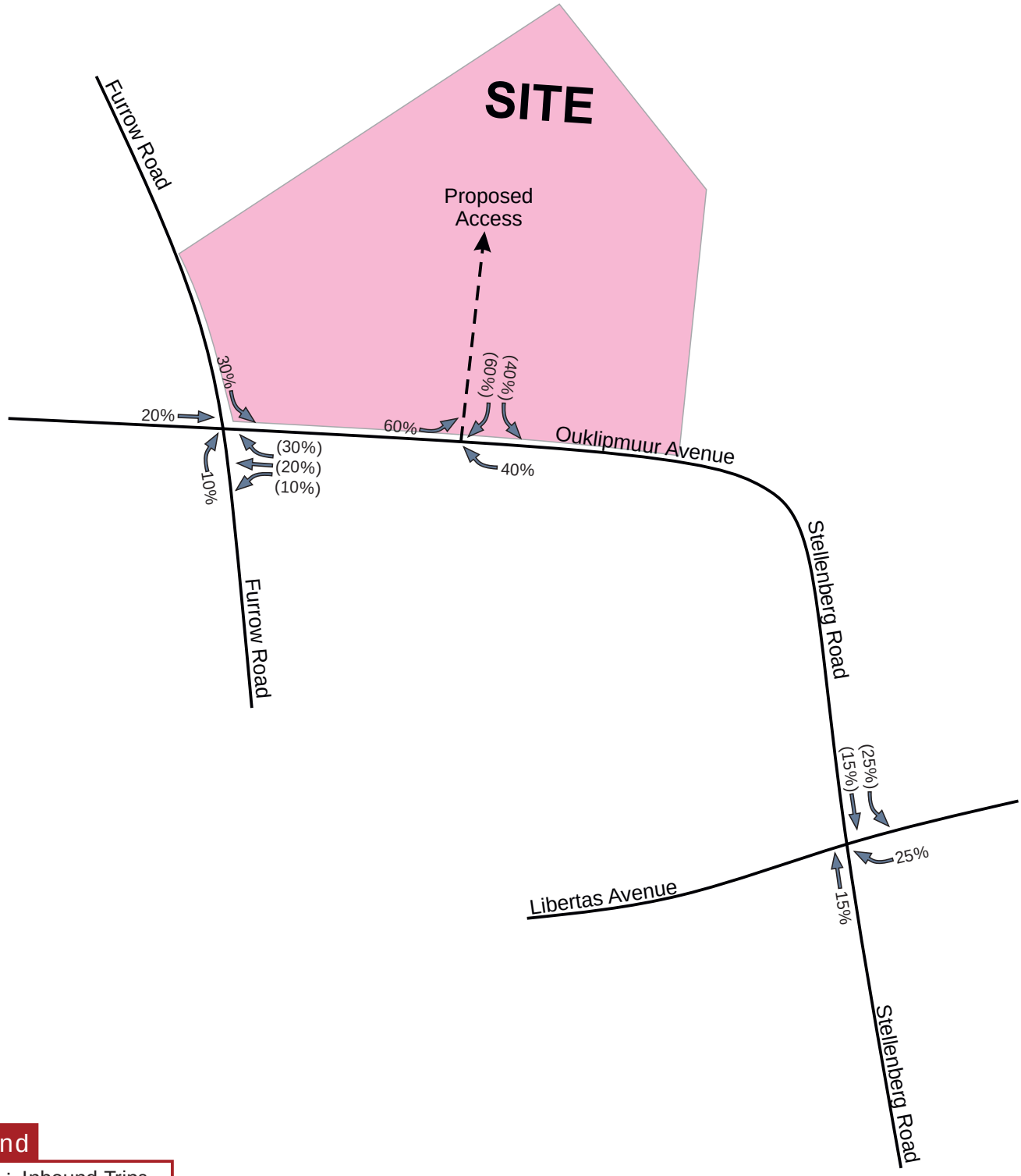


Legend

150 : Weekday AM Peak hr
(200) : Weekday PM Peak hr

dhubecon consulting engineers

Project Name	Proj Ref.
Equestria Ext. 284	P0569
Description	Figure
Future 2026 Base Peak Hour Traffic Volumes	6

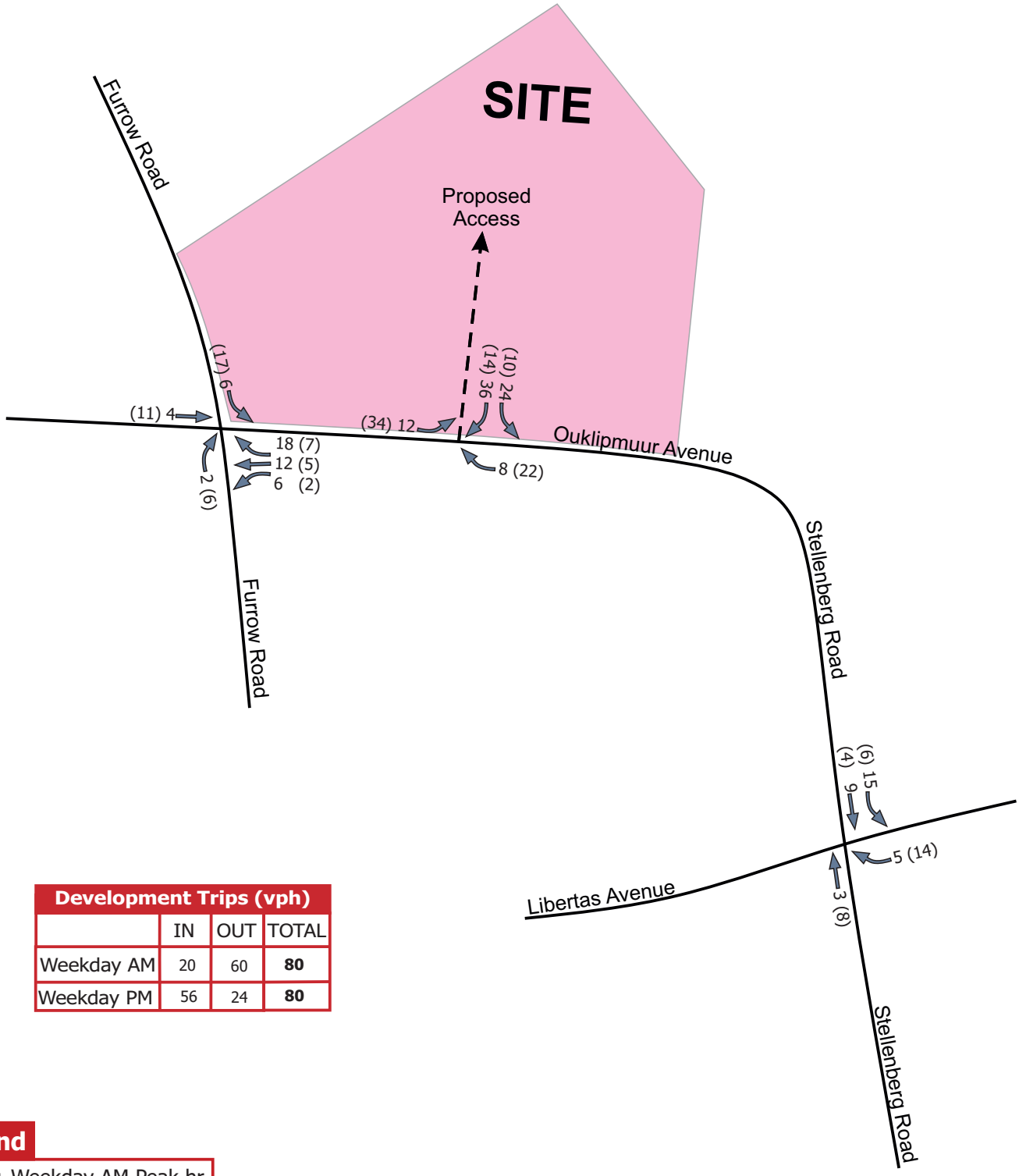


Legend

15% : Inbound Trips
(20%) : Outbound Trips

dhubecon consulting engineers

Project Name	Proj Ref.
Equestria Ext. 284	P0569
Description	**Figure**
Expected Development Trip Distribution	7



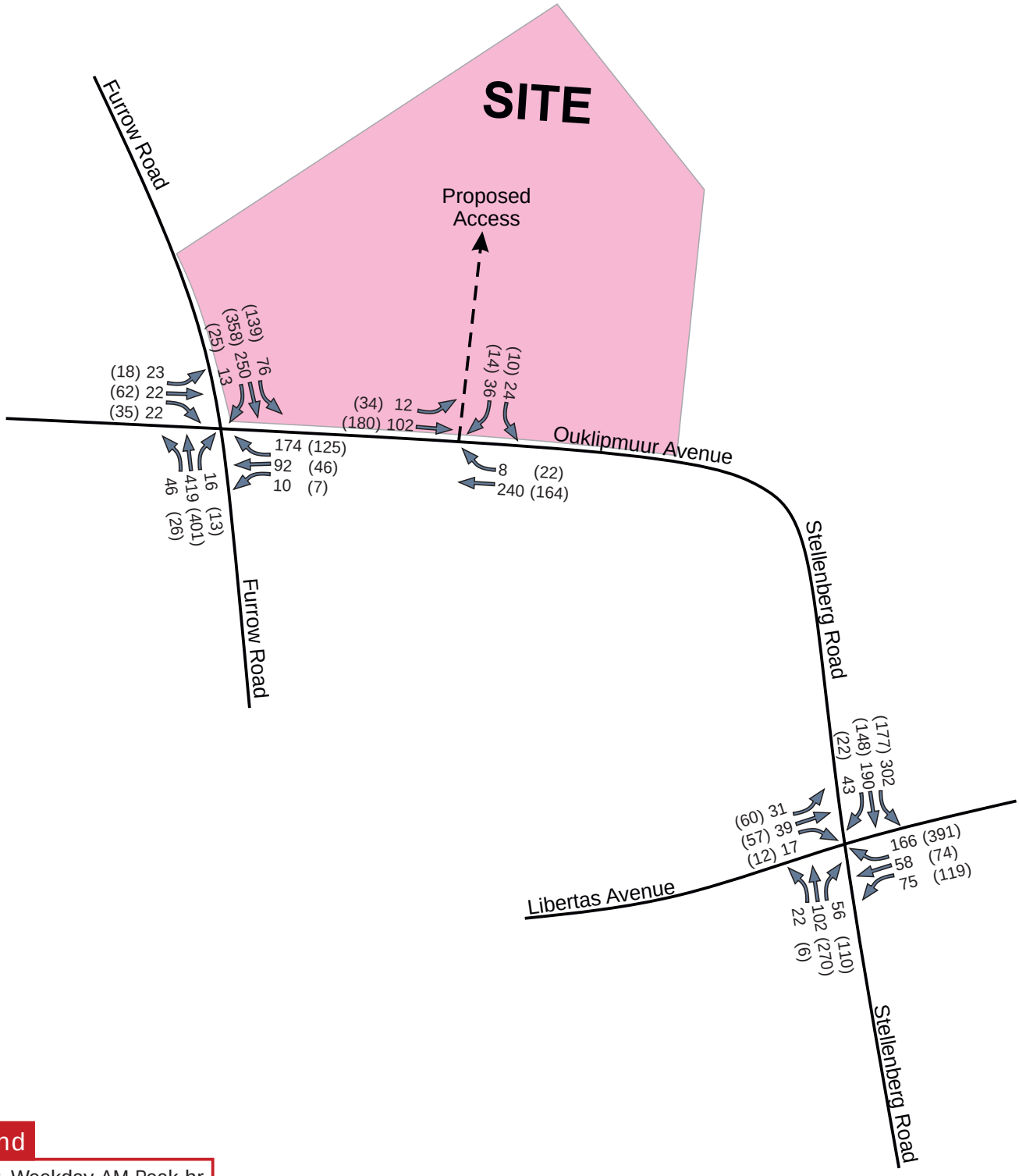
Development Trips (vph)			
	IN	OUT	TOTAL
Weekday AM	20	60	**80**
Weekday PM	56	24	**80**

Legend

150 : Weekday AM Peak hr
(200) : Weekday PM Peak hr

dhubecon consulting engineers

Project Name	Proj Ref.
Equestria Ext. 284	P0569
Description	Figure
Estimated Development Trips	**8**

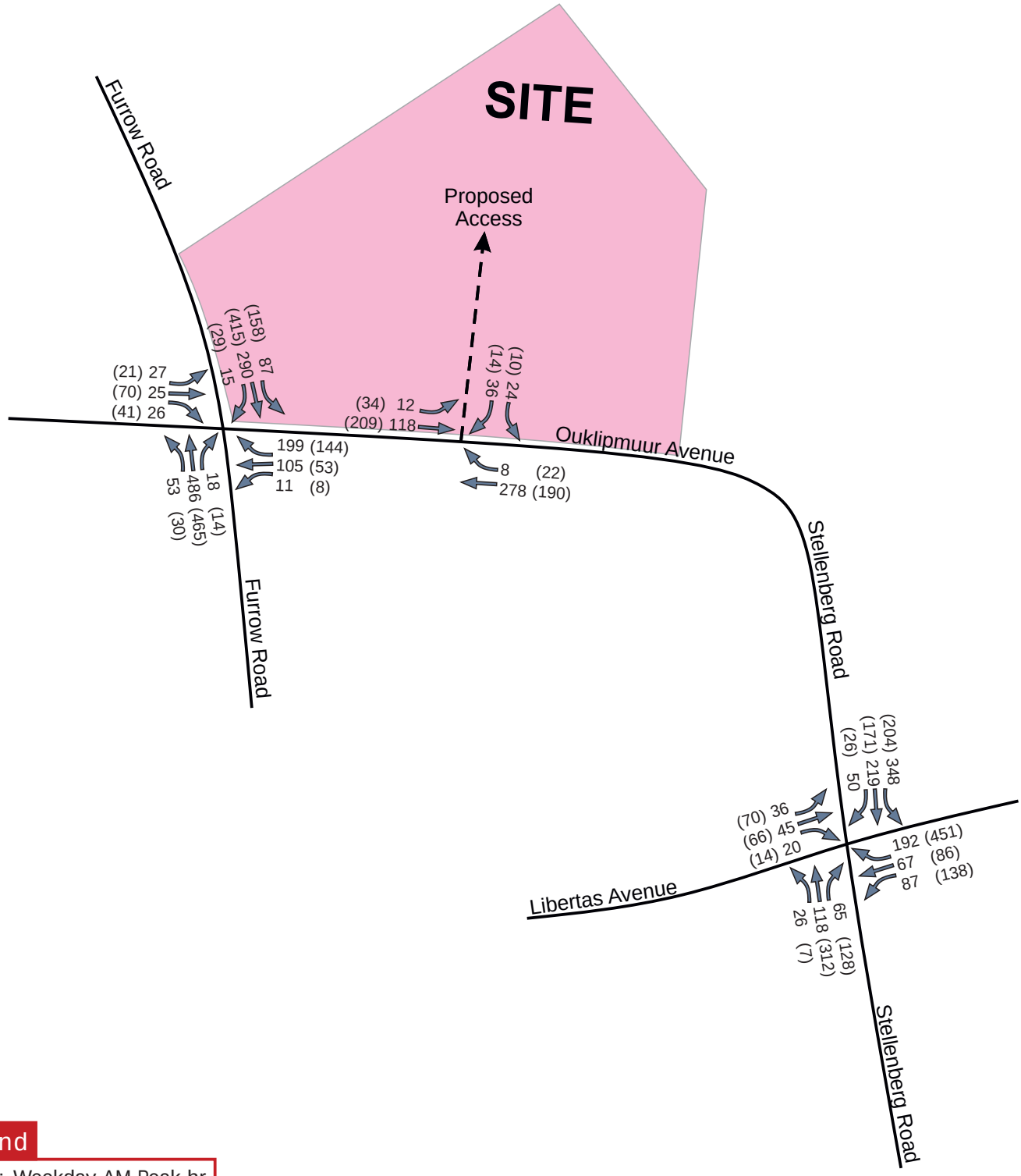


Legend

150 : Weekday AM Peak hr
(200) : Weekday PM Peak hr

dhubecon consulting engineers

Project Name	Proj Ref.
Equestria Ext. 284	P0569
Description	**Figure**
Existing 2021 Peak Hour Traffic Volumes + Estimated Development Trips	9



Legend

150 : Weekday AM Peak hr
(200) : Weekday PM Peak hr

dhubecon consulting engineers

Project Name	Proj Ref.
Equestria Ext. 284	P0569
Description: Future 2026 Base Peak Hour Traffic Volumes + Estimated Development Trips	Figure: 10

Drawings

Drawing No. 0569/CL/01 Proposed Site Access Arrangement

dhubecon consulting engineers

Dhubecon Consulting Engineers
41 Via Aurelia Drive
Irene Corporate Corner
Irene, Centurion
Tel: 012 667 5531
Email: admin@dhubecon.co.za

PROJECT: Equestria Ext. 284

TITLE: **Proposed Site Access Arrangement**

DRAWING STATUS: TRAFFIC IMPACT ASSESSMENT

DRAWING No: **0569/CL/01**

PROJECT No: **P0569**

DATE: 2021/06/29

REV: -

Annexures

Annexure A	Town Planner's Proposed Township Layout Plan
Annexure B	Architect's Draft Site Development Plan
Annexure C	Relevant Outputs of the SIDRA Intersection Capacity Analyses

Annexure A

Town Planner's Proposed Township Layout Plan

PROPOSED TOWNSHIP

EQUESTRIA X284

SITUATED ON PORTION 2 of HOLDING 49,
WILLOWGLEN AGRICULTURAL HOLDINGS AND
PORTION 708 OF THE FARM THE WILLOWS 340-JR

ZONING	ERF NO.	No. OF ERVEN	AREA (ha)	%
Residential 3 (50 Units / ha)	1 - 2	2	2,1362	97.21
Existing Streets			0,0613	2.79
Total		2	2,1975	100.00

NOTES:

1.) All measurements are approximate.

2.) Township boundary A B C D E F A

3.) Erven 1 & 2 will be consolidated after proclamation of the township

WILLOWGLEN AH

251

N

W E

S

A B C D E F

1 1,1854 ha

2 0,9508 ha

3m Municipal Stormwater servitude

1332 1333 1334 1335 1336

EQUESTRIA X172

R/354

Estate Esperanza

10/676 11/676 12/676 13/676 14/676 15/676 16/676 17/676 18/676 19/676 20/676 38/676 39/676 37/676 40/676 41/676 42/676 43/676

12/ 13/ 14/ 15/ 16/ 17/ 18/ 19/ 20/ 21/ 22/ 23/ 24/ 25/1164

11/1164 10/1164 9/1164 8/1164 7/1164 6/1164 5/1164 4/1164 3/1164 2/1164 1/1164

Furrow Falls

Furrow Road 4,63m

Furrow Road 15,74m

Ouklipmuur Road 2,13m

EQUESTRIA X246

1802

EQUESTRIA X144

742

741

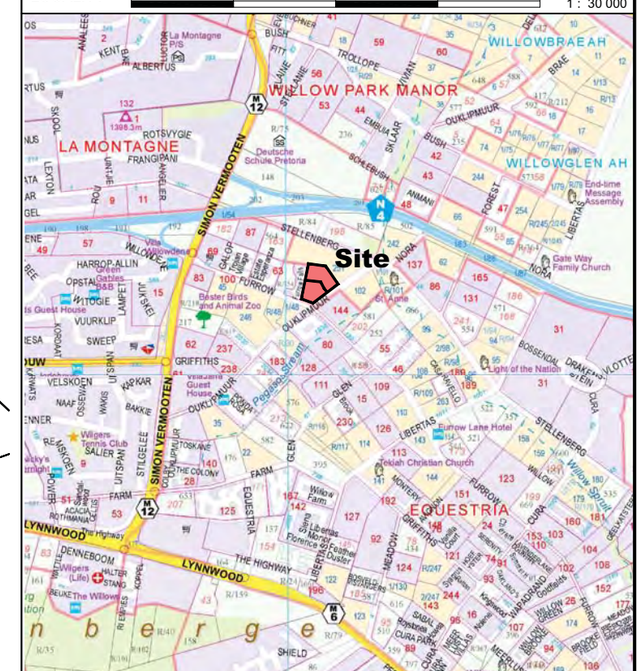
30/238 16/238 R/15/238 17/238 18/238 14/238 19/238 23/238 22/238 13/238 24/238

Oudeklippen

0 50m 100m

SCALE: 1 : 1 500 (A3)

LOCALITY 0 0,5km 1km 1,5km 2km SCALE 1 : 30 000



CONTOURS

The contours on this plan are in accordance with the stipulations of Regulation 18(1)(a)(1) of the Town Planning- and Townships Ordinance, Ord.15 of 1986.
The contours were obtained from: WDM LAND SURVEYORS
Contour Interval: 1,0 m
Datum Plan: WGS84

FLOOD LINE

In terms of the Regulations of Article 144 (Act 36 of 1998), it is hereby stated that this township is not affected by a flood with an expected frequency of one every 50 years and one every 100 years in the public stream.

A. BECK, Civil Craft Consulting Engineers (20190968) Date

PLAN NUMBER: EQSX284/1

LOCAL COUNCIL: TSHWANE METROPOLITAN MUNICIPALITY

Sonja Meissner-Roloff
Town & Environmental Planning
P.O. Box 7194
Centurion
0046
Highveld Office Park
Charles de Gaulle Crescent
Highveld
Centurion
Tel: (012) 665-2330
Cell: 082 451 9585
E-mail: smeissner@icon.co.za

PLAN NUMBER: SMR570 / p1

DATE: JULY 2021

Annexure B

Architect's Draft Site Development Plan

A=28
B=28
C=5
D=5
E=9
F=10
G=5
H=2
I=6

98

UNIT No.	PHASE	STAND SIZE	HOUSE TYPE	GROUND FL	FIRST FLOOR	GARAGE	CARPORT(EXCL)	STORE	TOTAL
01	1	N/A	B1	93.43	N/A	36.66			130.09
02	1	N/A	A1	72.50	N/A		36.00	8.30	80.80
03	1	N/A	A1	72.50	N/A		36.00	8.30	80.80
04	1	N/A	B1	93.43	N/A	36.66		8.30	138.39
05	1	N/A	B2	93.43	N/A	36.66			130.09
06	1	N/A	A2	72.50	N/A		32.07		72.50
07	1	N/A	A2	72.50	N/A		32.07		72.50
08	1	N/A	B2	93.43	N/A	36.66			130.09
09	1	N/A	B3	93.43	N/A		36.00	8.10	101.53
10	1	N/A	A3	72.50	N/A		36.00	8.10	80.60
11	1	N/A	A3	72.50	N/A		36.00	8.10	80.60
12	1	N/A	B3	93.43	N/A		36.00	8.10	101.53
13	1	N/A	B1	93.43	N/A		36.00	6.76	100.19
14	1	N/A	A1	72.50	N/A		18.00	7.42	79.92
15	1	N/A	A1	72.50	N/A		18.00	7.42	79.92
16	1	N/A	B1	93.43	N/A		36.00	6.76	100.19
17	1	N/A	B2	93.43	N/A	36.66			130.09
18	1	N/A	A2	72.50	N/A		16.03		72.50
19	1	N/A	A2	72.50	N/A		16.03		72.50
20	1	N/A	B2	93.43	N/A	36.66			130.09
21	1	N/A	B3	93.43	N/A	36.66			130.09
22	1	N/A	A3	72.50	N/A		16.03		72.50
23	1	N/A	A3	72.50	N/A		16.03		72.50
24	1	N/A	B3	93.43	N/A	36.66			130.09
25	4		H	96.28	58.37	SINGLE (INCL)	19.68 (EXSTRA G)		174.33
26	2		C	90.88	71.09	SINGLE (INCL)	18.00		161.97
27	2		I	113.79	70.55	DOUBLE (INCL)	16.03		184.34
28	2		I	113.79	70.55	DOUBLE (INCL)	16.03		184.34
29	2		C	90.88	71.09	SINGLE (INCL)	18.00		161.97
30	2		I	113.79	70.55	DOUBLE (INCL)	16.03		184.34
				2610.57	412.20	239.64	536.35	85.66	3348.07

UNIT No.	PHASE	STAND SIZE	HOUSE TYPE	GROUND FL	FIRST FLOOR	GARAGE	CARPORT(EXCL)	STORE	TOTAL
31	2		C	90.88	71.09	SINGLE (INCL)	18.00		161.97
32	2		I	113.79	70.55	DOUBLE (INCL)	16.03		184.34
33	2		C	90.88	71.09	SINGLE (INCL)	18.00		161.97
34	2		I	113.79	70.55	DOUBLE (INCL)	16.03		184.34
35	2		C	90.88	71.09	SINGLE (INCL)	18.00		161.97
36	2		I	113.79	70.55	DOUBLE (INCL)	16.03		184.34
37	3		E	113.41	70.55	DOUBLE (INCL)			183.95
38	3		E	113.41	70.55	DOUBLE (INCL)			183.95
39	3		E	113.41	70.55	DOUBLE (INCL)			183.95
40	4		D	95.38	81.48	DOUBLE (INCL)			176.86
41	4		D	95.38	81.48	DOUBLE (INCL)			176.86
42	4		D	95.38	81.48	DOUBLE (INCL)			176.86
43	4		D	95.38	81.48	DOUBLE (INCL)			176.86
44	4		D	95.38	81.48	DOUBLE (INCL)			176.86
45	4	N/A	B1	93.43	N/A	37.33			130.76
46	4	N/A	A1	72.50	N/A		36.00	7.63	80.13
47	4	N/A	A1	72.50	N/A		36.00	7.63	80.13
48	4	N/A	B1	93.43	N/A	37.33			130.76
49	4	N/A	B2	93.43	N/A	37.33			130.76
50	4	N/A	A2	72.50	N/A		31.40		72.50
51	4	N/A	A2	72.50	N/A		31.40	7.63	80.13
52	4	N/A	B2	93.43	N/A	37.33			130.76
53	4		E	113.41	70.55	DOUBLE (INCL)			183.95
54	4		E	113.41	70.55	DOUBLE (INCL)			183.95
55	5		F(m)	116.57	70.55	DOUBLE (INCL)			187.12
56	5		F(m)	116.57	70.55	DOUBLE (INCL)			187.12
57	5		F	116.57	70.55	DOUBLE (INCL)			187.12
58	5		F	116.57	70.55	DOUBLE (INCL)			187.12
59	5		F	116.57	70.55	DOUBLE (INCL)			187.12
60	5		F	116.57	70.55	DOUBLE (INCL)			187.12
				3021.10	1608.37	149.32	236.89	22.89	4801.68

SCHEDULE

STAND No.	PHASE	STAND SIZE	HOUSE TYPE	GROUND FL	FIRST FL	GARAGE	CARPORT(EXCL)	STORE	TOTAL
61	5		F(m)	116.57	70.55	DOUBLE (INCL)			187.12
62	5		F(m)	116.57	70.55	DOUBLE (INCL)			187.12
63	5		F	116.57	70.55	DOUBLE (INCL)			187.12
64	5		F	116.57	70.55	DOUBLE (INCL)			187.12
65	5		E	113.41	70.55	DOUBLE (INCL)			183.95
66	5		E	113.41	70.55	DOUBLE (INCL)			183.95
67	5		E	113.41	70.55	DOUBLE (INCL)			183.95
68	6		G	76.06	58.16	SINGLE(INCL)	19.32		134.22
69	6		G	76.06	58.16	SINGLE(INCL)	19.32		134.22
70	6		G	76.06	58.16	SINGLE(INCL)	19.32		134.22
71	6		G	76.06	58.16	SINGLE(INCL)	19.32		134.22
72	6		G	76.06	58.16	SINGLE(INCL)	19.32		134.22
73	6	N/A	B1	93.43	N/A		36.00	8.30	101.73
74	6	N/A	A1	72.5	N/A		31.40	8.30	80.80
75	6	N/A	A1	72.5	N/A		31.40	8.30	80.80
76	6	N/A	B1	93.43	N/A		36.00	8.30	101.73
77	6	N/A	B2	93.43	N/A	36.66			130.09
78	6	N/A	A2	72.5	N/A		36.00	8.01	80.51
79	6	N/A	A2	72.5	N/A		36.00	8.01	80.51
80	6	N/A	B2	93.43	N/A	36.66			130.09
81	6	N/A	B3	93.43	N/A	36.66			130.09
82	6	N/A	A3	72.5	N/A		36.00	8.01	80.51
83	6	N/A	A3	72.5	N/A		36.00	8.01	80.51
84	6	N/A	B3	93.43	N/A	36.66			130.09
85	6		H(s)	96.28	58.37	DOUBLE (INCL)			154.65
86	7		E	92.50	70.55	SINGLE (INCL)	16.50		163.05
87	7	N/A	B1	93.43	N/A		36.00		93.43
88	7	N/A	A1	72.5	N/A		15.70		72.50
89	7	N/A	A1	72.5	N/A		15.70		72.50
90	7	N/A	B1	93.43	N/A		36.00		93.43
91	7	N/A	B2	93.43	N/A	21.44	17.50		114.87
92	7	N/A	A2	72.5	N/A		15.70		72.50
93	7	N/A	A2	72.5	N/A		15.70		72.50
94	7	N/A	B2	93.43	N/A	21.44	17.50		114.87
95	7	N/A	B3	93.43	N/A	21.44	17.50		114.87
96	7	N/A	A3	72.5	N/A	21.44			93.94
97	7	N/A	A3	72.5	N/A	21.44			93.94
98	7	N/A	B3	93.43	N/A	21.44	17.50		114.87
				3366.75	913.57	275.28	596.70	65.24	4620.81
REFUSE									15.27
GATEHOUSE									60.93
TOTAL				8996.42	2934.14	664.24	1369.94 (EXCL)	173.79	12946.76
FSR				8977.97	2890.79	EXCLUDED	EXCLUDED	EXCLUDED	11868.76

SCHEDULE

SITE DEVELOPMENT PLAN CHECK LIST

SITE

SITE:	STAND 1690&1691, EQUESTRIA x231	
OPPERVLAKTE: ZONE:	2.15 HECTARE	
BUILDING LINES:	AS PER SITE DEVELOPMENT PLAN	

RIGHTS

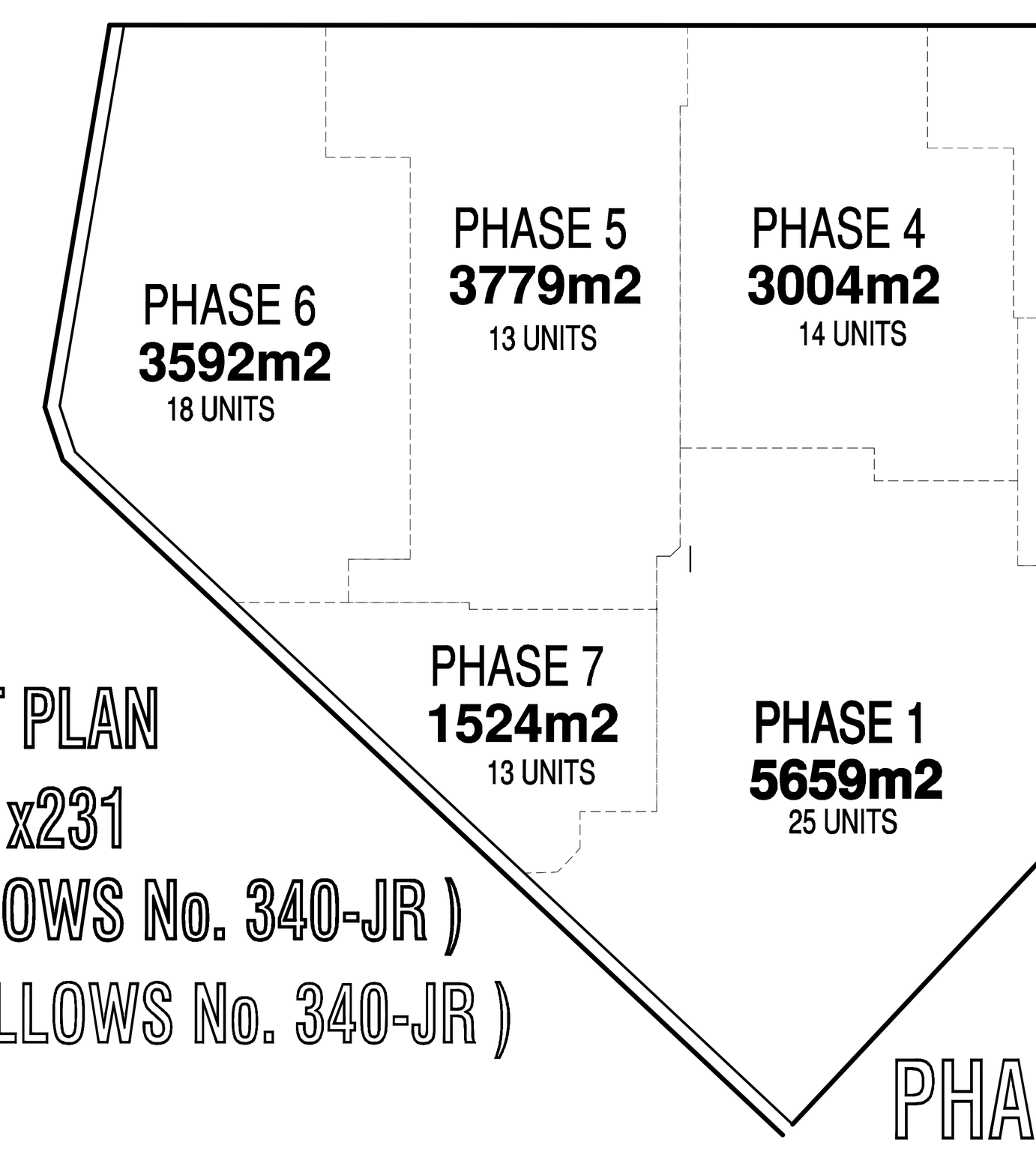
	ALLOWED	USED
UNITS (50/HECT)	107	98
COVERAGE:(SDP%)	SDP	11235.42(52.25%)
HEIGHT:	3 FLOORS	3 FLOORS
FSR: (SDP)	SDP	0,56 (11868.76)
AREAS:	–	12780.22
CARPORTS	–	1365.74

PARKING

UNITS (98)

3 BEDROOM UNIT	2 COVERED/UNIT	140	140
2 BEDROOM UNIT	1 COVERED/1 OPEN	46 COVERED	10 OPEN
VISITORS:	1/3 UNITS	33	45

PROPOSED SITE DEVELOPEMENT PLAN
STAND 1690 & 1691 EQUESTRIA x231
(PORTION 708 OF THE FARM THE WILLOWS No. 340-JR)
PORTION 2 of PORTION 49 OF THE FARM THE WILLOWS No. 340-JR)
98 UNITS



PHASES (7)

JOHAN DU RANDT

BUILDING PLANS
PROFESIONAL ARCHITECT TECHNOLOGIST
J.A. DU RANDT HOD(BK) VDO TECH SIVIEL PARG(TECH)
SACAP reg nr. T0925

601, LETABA AVENUE
WATERLAKE FARM
BOSCHKOP
PRETORIA
CELL: 082 578 9175 E MAIL:–ansoliri@gmail.com

PROJECT	BISHOP'S GATE
CLIENT	BASTION DEVELOPMENTS
STAND	STAND 000
TOWNSHIP	EQUESTRIA x231
AREA	2.15 hectare (2,1835 hectare)
DESCRIPTION	PROPOSED SITE DEVELOPMENT PLAN
SCALE	1:250
DATE	SEPT. 2021
PLAN NO.	DRT1136–T1
SIGNED	

Annexure C

Relevant Outputs of the SIDRA Intersection Capacity Analyses:

(Order of Appearance)

C1 – Ouklipmuur Avenue / Furrow Road Intersection;

C2 – Stellenberg Road / Libertas Avenue Intersection; and

C3 – Ouklipmuur Avenue / Site Access Intersection.

ANNEXURE C1.1: MOVEMENT SUMMARY

Site: 101 [Existing 2021 AM Peak (Site Folder: AM Peak)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	85% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: Furrow Road														
1	L2	46	0.0	48	0.0	0.462	5.7	LOS A	2.5	17.6	0.60	0.61	0.60	52.9
2	T1	419	0.0	441	0.0	0.462	5.8	LOS A	2.5	17.6	0.60	0.61	0.60	54.1
3	R2	14	0.0	15	0.0	0.462	10.5	LOS B	2.5	17.6	0.60	0.61	0.60	54.0
Approach		479	0.0	504	0.0	0.462	5.9	LOS A	2.5	17.6	0.60	0.61	0.60	54.0
NorthEast: Ouklipmuur Avenue														
4	L2	4	0.0	4	0.0	0.241	5.6	LOS A	1.0	7.1	0.50	0.67	0.50	51.6
5	T1	80	0.0	84	0.0	0.241	5.6	LOS A	1.0	7.1	0.50	0.67	0.50	52.7
6	R2	156	0.0	164	0.0	0.241	10.3	LOS B	1.0	7.1	0.50	0.67	0.50	52.7
Approach		240	0.0	253	0.0	0.241	8.7	LOS A	1.0	7.1	0.50	0.67	0.50	52.7
NorthWest: Furrow Road														
7	L2	70	0.0	74	0.0	0.250	4.1	LOS A	1.2	8.3	0.23	0.43	0.23	54.4
8	T1	250	0.0	263	0.0	0.250	4.2	LOS A	1.2	8.3	0.23	0.43	0.23	55.7
9	R2	13	0.0	14	0.0	0.250	8.9	LOS A	1.2	8.3	0.23	0.43	0.23	55.6
Approach		333	0.0	351	0.0	0.250	4.4	LOS A	1.2	8.3	0.23	0.43	0.23	55.4
SouthWest: Ouklipmuur Avenue														
10	L2	23	0.0	24	0.0	0.085	7.3	LOS A	0.4	2.5	0.66	0.71	0.66	51.5
11	T1	18	0.0	19	0.0	0.085	7.4	LOS A	0.4	2.5	0.66	0.71	0.66	52.7
12	R2	22	0.0	23	0.0	0.085	12.1	LOS B	0.4	2.5	0.66	0.71	0.66	52.6
Approach		63	0.0	66	0.0	0.085	9.0	LOS A	0.4	2.5	0.66	0.71	0.66	52.2
All Vehicles		1115	0.0	1174	0.0	0.462	6.2	LOS A	2.5	17.6	0.47	0.57	0.47	54.0

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

ANNEXURE C1.2: MOVEMENT SUMMARY

Site: 101 [Future 2026 AM Peak (Site Folder: AM Peak)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	85% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: Furrow Road														
1	L2	53	0.0	56	0.0	0.557	6.4	LOS A	3.4	23.8	0.70	0.68	0.71	52.5
2	T1	486	0.0	512	0.0	0.557	6.4	LOS A	3.4	23.8	0.70	0.68	0.71	53.7
3	R2	16	0.0	17	0.0	0.557	11.1	LOS B	3.4	23.8	0.70	0.68	0.71	53.6
Approach		555	0.0	584	0.0	0.557	6.6	LOS A	3.4	23.8	0.70	0.68	0.71	53.5
NorthEast: Ouklipmuur Avenue														
4	L2	5	0.0	5	0.0	0.292	6.0	LOS A	1.3	9.0	0.56	0.70	0.56	51.4
5	T1	93	0.0	98	0.0	0.292	6.0	LOS A	1.3	9.0	0.56	0.70	0.56	52.5
6	R2	181	0.0	191	0.0	0.292	10.7	LOS B	1.3	9.0	0.56	0.70	0.56	52.4
Approach		279	0.0	294	0.0	0.292	9.1	LOS A	1.3	9.0	0.56	0.70	0.56	52.4
NorthWest: Furrow Road														
7	L2	81	0.0	85	0.0	0.292	4.2	LOS A	1.5	10.3	0.26	0.44	0.26	54.3
8	T1	290	0.0	305	0.0	0.292	4.2	LOS A	1.5	10.3	0.26	0.44	0.26	55.5
9	R2	15	0.0	16	0.0	0.292	8.9	LOS A	1.5	10.3	0.26	0.44	0.26	55.5
Approach		386	0.0	406	0.0	0.292	4.4	LOS A	1.5	10.3	0.26	0.44	0.26	55.3
SouthWest: Ouklipmuur Avenue														
10	L2	27	0.0	28	0.0	0.112	8.2	LOS A	0.5	3.5	0.74	0.76	0.74	50.9
11	T1	21	0.0	22	0.0	0.112	8.3	LOS A	0.5	3.5	0.74	0.76	0.74	52.0
12	R2	26	0.0	27	0.0	0.112	13.0	LOS B	0.5	3.5	0.74	0.76	0.74	52.0
Approach		74	0.0	78	0.0	0.112	9.9	LOS A	0.5	3.5	0.74	0.76	0.74	51.6
All Vehicles		1294	0.0	1362	0.0	0.557	6.7	LOS A	3.4	23.8	0.54	0.62	0.54	53.7

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

ANNEXURE C1.3: MOVEMENT SUMMARY

Site: 101 [Existing 2021 AM Peak + DEV (Site Folder: AM Peak)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	85% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: Furrow Road														
1	L2	46	0.0	48	0.0	0.481	6.0	LOS A	2.6	18.5	0.63	0.64	0.63	52.7
2	T1	419	0.0	441	0.0	0.481	6.0	LOS A	2.6	18.5	0.63	0.64	0.63	53.9
3	R2	16	0.0	17	0.0	0.481	10.7	LOS B	2.6	18.5	0.63	0.64	0.63	53.8
Approach		481	0.0	506	0.0	0.481	6.2	LOS A	2.6	18.5	0.63	0.64	0.63	53.8
NorthEast: Ouklipmuur Avenue														
4	L2	10	0.0	11	0.0	0.278	5.7	LOS A	1.2	8.4	0.51	0.67	0.51	51.6
5	T1	92	0.0	97	0.0	0.278	5.7	LOS A	1.2	8.4	0.51	0.67	0.51	52.8
6	R2	174	0.0	183	0.0	0.278	10.4	LOS B	1.2	8.4	0.51	0.67	0.51	52.7
Approach		276	0.0	291	0.0	0.278	8.7	LOS A	1.2	8.4	0.51	0.67	0.51	52.7
NorthWest: Furrow Road														
7	L2	76	0.0	80	0.0	0.257	4.2	LOS A	1.2	8.6	0.24	0.44	0.24	54.4
8	T1	250	0.0	263	0.0	0.257	4.2	LOS A	1.2	8.6	0.24	0.44	0.24	55.6
9	R2	13	0.0	14	0.0	0.257	8.9	LOS A	1.2	8.6	0.24	0.44	0.24	55.5
Approach		339	0.0	357	0.0	0.257	4.4	LOS A	1.2	8.6	0.24	0.44	0.24	55.3
SouthWest: Ouklipmuur Avenue														
10	L2	23	0.0	24	0.0	0.092	7.5	LOS A	0.4	2.8	0.68	0.71	0.68	51.5
11	T1	22	0.0	23	0.0	0.092	7.6	LOS A	0.4	2.8	0.68	0.71	0.68	52.6
12	R2	22	0.0	23	0.0	0.092	12.3	LOS B	0.4	2.8	0.68	0.71	0.68	52.5
Approach		67	0.0	71	0.0	0.092	9.1	LOS A	0.4	2.8	0.68	0.71	0.68	52.2
All Vehicles		1163	0.0	1224	0.0	0.481	6.4	LOS A	2.6	18.5	0.49	0.59	0.49	53.9

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

ANNEXURE C1.4: MOVEMENT SUMMARY

Site: 101 [Future 2026 AM Peak + DEV (Site Folder: AM Peak)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	85% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: Furrow Road														
1	L2	53	0.0	56	0.0	0.579	7.1	LOS A	3.8	26.6	0.74	0.73	0.78	52.3
2	T1	486	0.0	512	0.0	0.579	7.1	LOS A	3.8	26.6	0.74	0.73	0.78	53.4
3	R2	18	0.0	19	0.0	0.579	11.8	LOS B	3.8	26.6	0.74	0.73	0.78	53.4
Approach		557	0.0	586	0.0	0.579	7.3	LOS A	3.8	26.6	0.74	0.73	0.78	53.3
NorthEast: Ouklipmuur Avenue														
4	L2	11	0.0	12	0.0	0.330	6.1	LOS A	1.5	10.5	0.57	0.70	0.57	51.4
5	T1	105	0.0	111	0.0	0.330	6.1	LOS A	1.5	10.5	0.57	0.70	0.57	52.5
6	R2	199	0.0	209	0.0	0.330	10.8	LOS B	1.5	10.5	0.57	0.70	0.57	52.4
Approach		315	0.0	332	0.0	0.330	9.1	LOS A	1.5	10.5	0.57	0.70	0.57	52.4
NorthWest: Furrow Road														
7	L2	87	0.0	92	0.0	0.300	4.2	LOS A	1.5	10.6	0.28	0.44	0.28	54.2
8	T1	290	0.0	305	0.0	0.300	4.3	LOS A	1.5	10.6	0.28	0.44	0.28	55.5
9	R2	15	0.0	16	0.0	0.300	9.0	LOS A	1.5	10.6	0.28	0.44	0.28	55.4
Approach		392	0.0	413	0.0	0.300	4.5	LOS A	1.5	10.6	0.28	0.44	0.28	55.2
SouthWest: Ouklipmuur Avenue														
10	L2	27	0.0	28	0.0	0.121	8.5	LOS A	0.6	3.9	0.75	0.77	0.75	50.8
11	T1	25	0.0	26	0.0	0.121	8.5	LOS A	0.6	3.9	0.75	0.77	0.75	51.9
12	R2	26	0.0	27	0.0	0.121	13.2	LOS B	0.6	3.9	0.75	0.77	0.75	51.9
Approach		78	0.0	82	0.0	0.121	10.1	LOS B	0.6	3.9	0.75	0.77	0.75	51.5
All Vehicles		1342	0.0	1413	0.0	0.579	7.0	LOS A	3.8	26.6	0.57	0.64	0.58	53.5

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

ANNEXURE C1.5: MOVEMENT SUMMARY

Site: 101 [Existing 2021 PM Peak (Site Folder: PM Peak)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	85% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: Furrow Road														
1	L2	26	0.0	27	0.0	0.389	5.1	LOS A	2.0	14.2	0.49	0.54	0.49	53.3
2	T1	401	0.0	422	0.0	0.389	5.2	LOS A	2.0	14.2	0.49	0.54	0.49	54.5
3	R2	7	0.0	7	0.0	0.389	9.9	LOS A	2.0	14.2	0.49	0.54	0.49	54.5
Approach		434	0.0	457	0.0	0.389	5.2	LOS A	2.0	14.2	0.49	0.54	0.49	54.5
NorthEast: Ouklipmuur Avenue														
4	L2	5	0.0	5	0.0	0.185	6.3	LOS A	0.8	5.5	0.58	0.72	0.58	51.0
5	T1	41	0.0	43	0.0	0.185	6.4	LOS A	0.8	5.5	0.58	0.72	0.58	52.1
6	R2	118	0.0	124	0.0	0.185	11.1	LOS B	0.8	5.5	0.58	0.72	0.58	52.0
Approach		164	0.0	173	0.0	0.185	9.8	LOS A	0.8	5.5	0.58	0.72	0.58	52.0
NorthWest: Furrow Road														
7	L2	122	0.0	128	0.0	0.397	4.5	LOS A	2.2	15.7	0.37	0.47	0.37	53.8
8	T1	358	0.0	377	0.0	0.397	4.5	LOS A	2.2	15.7	0.37	0.47	0.37	55.1
9	R2	25	0.0	26	0.0	0.397	9.2	LOS A	2.2	15.7	0.37	0.47	0.37	55.0
Approach		505	0.0	532	0.0	0.397	4.7	LOS A	2.2	15.7	0.37	0.47	0.37	54.8
SouthWest: Ouklipmuur Avenue														
10	L2	18	0.0	19	0.0	0.130	7.0	LOS A	0.5	3.8	0.64	0.70	0.64	51.7
11	T1	51	0.0	54	0.0	0.130	7.0	LOS A	0.5	3.8	0.64	0.70	0.64	52.9
12	R2	35	0.0	37	0.0	0.130	11.7	LOS B	0.5	3.8	0.64	0.70	0.64	52.8
Approach		104	0.0	109	0.0	0.130	8.6	LOS A	0.5	3.8	0.64	0.70	0.64	52.7
All Vehicles		1207	0.0	1271	0.0	0.397	5.9	LOS A	2.2	15.7	0.46	0.55	0.46	54.1

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

ANNEXURE C1.6: MOVEMENT SUMMARY

Site: 101 [Future 2026 PM Peak (Site Folder: PM Peak)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	85% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: Furrow Road														
1	L2	30	0.0	32	0.0	0.466	5.4	LOS A	2.6	18.4	0.57	0.58	0.57	53.0
2	T1	465	0.0	489	0.0	0.466	5.5	LOS A	2.6	18.4	0.57	0.58	0.57	54.2
3	R2	8	0.0	8	0.0	0.466	10.2	LOS B	2.6	18.4	0.57	0.58	0.57	54.1
Approach		503	0.0	529	0.0	0.466	5.6	LOS A	2.6	18.4	0.57	0.58	0.57	54.1
NorthEast: Ouklipmuur Avenue														
4	L2	6	0.0	6	0.0	0.231	6.9	LOS A	1.0	7.2	0.65	0.76	0.65	50.6
5	T1	48	0.0	51	0.0	0.231	7.0	LOS A	1.0	7.2	0.65	0.76	0.65	51.7
6	R2	137	0.0	144	0.0	0.231	11.7	LOS B	1.0	7.2	0.65	0.76	0.65	51.6
Approach		191	0.0	201	0.0	0.231	10.3	LOS B	1.0	7.2	0.65	0.76	0.65	51.6
NorthWest: Furrow Road														
7	L2	141	0.0	148	0.0	0.469	4.6	LOS A	2.9	20.3	0.43	0.49	0.43	53.6
8	T1	415	0.0	437	0.0	0.469	4.7	LOS A	2.9	20.3	0.43	0.49	0.43	54.8
9	R2	29	0.0	31	0.0	0.469	9.4	LOS A	2.9	20.3	0.43	0.49	0.43	54.7
Approach		585	0.0	616	0.0	0.469	4.9	LOS A	2.9	20.3	0.43	0.49	0.43	54.5
SouthWest: Ouklipmuur Avenue														
10	L2	21	0.0	22	0.0	0.166	7.7	LOS A	0.7	5.2	0.70	0.75	0.70	51.3
11	T1	59	0.0	62	0.0	0.166	7.8	LOS A	0.7	5.2	0.70	0.75	0.70	52.4
12	R2	41	0.0	43	0.0	0.166	12.5	LOS B	0.7	5.2	0.70	0.75	0.70	52.4
Approach		121	0.0	127	0.0	0.166	9.4	LOS A	0.7	5.2	0.70	0.75	0.70	52.2
All Vehicles		1400	0.0	1474	0.0	0.469	6.3	LOS A	2.9	20.3	0.54	0.58	0.54	53.8

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

ANNEXURE C1.7: MOVEMENT SUMMARY

Site: 101 [Existing 2021 PM Peak + DEV (Site Folder: PM Peak)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	85% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: Furrow Road														
1	L2	26	0.0	27	0.0	0.402	5.2	LOS A	2.1	14.8	0.51	0.55	0.51	53.2
2	T1	401	0.0	422	0.0	0.402	5.3	LOS A	2.1	14.8	0.51	0.55	0.51	54.4
3	R2	13	0.0	14	0.0	0.402	10.0	LOS A	2.1	14.8	0.51	0.55	0.51	54.3
Approach		440	0.0	463	0.0	0.402	5.4	LOS A	2.1	14.8	0.51	0.55	0.51	54.3
NorthEast: Ouklipmuur Avenue														
4	L2	7	0.0	7	0.0	0.203	6.4	LOS A	0.9	6.1	0.59	0.72	0.59	51.0
5	T1	46	0.0	48	0.0	0.203	6.4	LOS A	0.9	6.1	0.59	0.72	0.59	52.1
6	R2	125	0.0	132	0.0	0.203	11.1	LOS B	0.9	6.1	0.59	0.72	0.59	52.0
Approach		178	0.0	187	0.0	0.203	9.7	LOS A	0.9	6.1	0.59	0.72	0.59	52.0
NorthWest: Furrow Road														
7	L2	139	0.0	146	0.0	0.421	4.6	LOS A	2.4	16.8	0.41	0.49	0.41	53.7
8	T1	358	0.0	377	0.0	0.421	4.6	LOS A	2.4	16.8	0.41	0.49	0.41	54.9
9	R2	25	0.0	26	0.0	0.421	9.3	LOS A	2.4	16.8	0.41	0.49	0.41	54.9
Approach		522	0.0	549	0.0	0.421	4.9	LOS A	2.4	16.8	0.41	0.49	0.41	54.6
SouthWest: Ouklipmuur Avenue														
10	L2	18	0.0	19	0.0	0.146	7.1	LOS A	0.6	4.4	0.65	0.71	0.65	51.8
11	T1	62	0.0	65	0.0	0.146	7.2	LOS A	0.6	4.4	0.65	0.71	0.65	52.9
12	R2	35	0.0	37	0.0	0.146	11.9	LOS B	0.6	4.4	0.65	0.71	0.65	52.8
Approach		115	0.0	121	0.0	0.146	8.6	LOS A	0.6	4.4	0.65	0.71	0.65	52.7
All Vehicles		1255	0.0	1321	0.0	0.421	6.1	LOS A	2.4	16.8	0.49	0.56	0.49	54.0

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

ANNEXURE C1.8: MOVEMENT SUMMARY

Site: 101 [Future 2026 PM Peak + DEV (Site Folder: PM Peak)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	85% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: Furrow Road														
1	L2	30	0.0	32	0.0	0.479	5.6	LOS A	2.7	19.1	0.59	0.60	0.59	52.9
2	T1	465	0.0	489	0.0	0.479	5.6	LOS A	2.7	19.1	0.59	0.60	0.59	54.1
3	R2	14	0.0	15	0.0	0.479	10.3	LOS B	2.7	19.1	0.59	0.60	0.59	54.0
Approach		509	0.0	536	0.0	0.479	5.7	LOS A	2.7	19.1	0.59	0.60	0.59	54.0
NorthEast: Ouklipmuur Avenue														
4	L2	8	0.0	8	0.0	0.250	7.0	LOS A	1.1	7.9	0.66	0.76	0.66	50.6
5	T1	53	0.0	56	0.0	0.250	7.0	LOS A	1.1	7.9	0.66	0.76	0.66	51.7
6	R2	144	0.0	152	0.0	0.250	11.7	LOS B	1.1	7.9	0.66	0.76	0.66	51.7
Approach		205	0.0	216	0.0	0.250	10.3	LOS B	1.1	7.9	0.66	0.76	0.66	51.6
NorthWest: Furrow Road														
7	L2	158	0.0	166	0.0	0.494	4.8	LOS A	3.1	21.7	0.48	0.51	0.48	53.4
8	T1	415	0.0	437	0.0	0.494	4.8	LOS A	3.1	21.7	0.48	0.51	0.48	54.7
9	R2	29	0.0	31	0.0	0.494	9.5	LOS A	3.1	21.7	0.48	0.51	0.48	54.6
Approach		602	0.0	634	0.0	0.494	5.1	LOS A	3.1	21.7	0.48	0.51	0.48	54.3
SouthWest: Ouklipmuur Avenue														
10	L2	21	0.0	22	0.0	0.184	7.9	LOS A	0.8	5.8	0.72	0.76	0.72	51.3
11	T1	70	0.0	74	0.0	0.184	8.0	LOS A	0.8	5.8	0.72	0.76	0.72	52.4
12	R2	41	0.0	43	0.0	0.184	12.7	LOS B	0.8	5.8	0.72	0.76	0.72	52.3
Approach		132	0.0	139	0.0	0.184	9.4	LOS A	0.8	5.8	0.72	0.76	0.72	52.2
All Vehicles		1448	0.0	1524	0.0	0.494	6.4	LOS A	3.1	21.7	0.56	0.60	0.56	53.6

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

ANNEXURE C2.1: MOVEMENT SUMMARY

Site: 101 [Existing 2021 AM Peak (Site Folder: AM)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	85% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: Stellenberg Road														
1	L2	22	0.0	23	0.0	0.177	5.3	LOS A	0.7	5.1	0.48	0.60	0.48	52.7
2	T1	99	0.0	104	0.0	0.177	5.4	LOS A	0.7	5.1	0.48	0.60	0.48	53.8
3	R2	56	0.0	59	0.0	0.177	10.1	LOS B	0.7	5.1	0.48	0.60	0.48	53.8
Approach		177	0.0	186	0.0	0.177	6.9	LOS A	0.7	5.1	0.48	0.60	0.48	53.7
NorthEast: Libertas Avenue														
4	L2	75	0.0	79	0.0	0.287	5.4	LOS A	1.3	9.0	0.49	0.65	0.49	52.0
5	T1	58	0.0	61	0.0	0.287	5.4	LOS A	1.3	9.0	0.49	0.65	0.49	53.2
6	R2	161	0.0	169	0.0	0.287	10.1	LOS B	1.3	9.0	0.49	0.65	0.49	53.1
Approach		294	0.0	309	0.0	0.287	8.0	LOS A	1.3	9.0	0.49	0.65	0.49	52.8
NorthWest: Stellenberg Road														
7	L2	287	0.0	302	0.0	0.410	4.6	LOS A	2.1	14.9	0.37	0.51	0.37	53.9
8	T1	181	0.0	191	0.0	0.410	4.7	LOS A	2.1	14.9	0.37	0.51	0.37	55.1
9	R2	43	0.0	45	0.0	0.410	9.4	LOS A	2.1	14.9	0.37	0.51	0.37	55.0
Approach		511	0.0	538	0.0	0.410	5.0	LOS A	2.1	14.9	0.37	0.51	0.37	54.4
SouthWest: Libertas Avenue														
10	L2	31	0.0	33	0.0	0.090	5.5	LOS A	0.3	2.4	0.47	0.59	0.47	53.1
11	T1	39	0.0	41	0.0	0.090	5.6	LOS A	0.3	2.4	0.47	0.59	0.47	54.3
12	R2	17	0.0	18	0.0	0.090	10.3	LOS B	0.3	2.4	0.47	0.59	0.47	54.2
Approach		87	0.0	92	0.0	0.090	6.5	LOS A	0.3	2.4	0.47	0.59	0.47	53.8
All Vehicles		1069	0.0	1125	0.0	0.410	6.3	LOS A	2.1	14.9	0.43	0.57	0.43	53.8

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

ANNEXURE C2.2: MOVEMENT SUMMARY

Site: 101 [Future 2026 AM Peak (Site Folder: AM)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	85% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: Stellenberg Road														
1	L2	26	0.0	27	0.0	0.215	5.7	LOS A	0.9	6.5	0.53	0.63	0.53	52.4
2	T1	115	0.0	121	0.0	0.215	5.7	LOS A	0.9	6.5	0.53	0.63	0.53	53.6
3	R2	65	0.0	68	0.0	0.215	10.4	LOS B	0.9	6.5	0.53	0.63	0.53	53.5
Approach		206	0.0	217	0.0	0.215	7.2	LOS A	0.9	6.5	0.53	0.63	0.53	53.4
NorthEast: Libertas Avenue														
4	L2	87	0.0	92	0.0	0.345	5.7	LOS A	1.6	11.5	0.56	0.68	0.56	51.8
5	T1	67	0.0	71	0.0	0.345	5.8	LOS A	1.6	11.5	0.56	0.68	0.56	53.0
6	R2	187	0.0	197	0.0	0.345	10.5	LOS B	1.6	11.5	0.56	0.68	0.56	52.9
Approach		341	0.0	359	0.0	0.345	8.4	LOS A	1.6	11.5	0.56	0.68	0.56	52.6
NorthWest: Stellenberg Road														
7	L2	333	0.0	351	0.0	0.484	4.8	LOS A	2.7	19.2	0.44	0.53	0.44	53.6
8	T1	210	0.0	221	0.0	0.484	4.9	LOS A	2.7	19.2	0.44	0.53	0.44	54.9
9	R2	50	0.0	53	0.0	0.484	9.6	LOS A	2.7	19.2	0.44	0.53	0.44	54.8
Approach		593	0.0	624	0.0	0.484	5.2	LOS A	2.7	19.2	0.44	0.53	0.44	54.2
SouthWest: Libertas Avenue														
10	L2	36	0.0	38	0.0	0.109	5.8	LOS A	0.4	3.0	0.52	0.62	0.52	52.9
11	T1	45	0.0	47	0.0	0.109	5.9	LOS A	0.4	3.0	0.52	0.62	0.52	54.1
12	R2	20	0.0	21	0.0	0.109	10.6	LOS B	0.4	3.0	0.52	0.62	0.52	54.0
Approach		101	0.0	106	0.0	0.109	6.8	LOS A	0.4	3.0	0.52	0.62	0.52	53.6
All Vehicles		1241	0.0	1306	0.0	0.484	6.5	LOS A	2.7	19.2	0.49	0.60	0.49	53.6

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

ANNEXURE C2.3: MOVEMENT SUMMARY

Site: 101 [Existing 2021 AM Peak + DEV (Site Folder: AM)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	85% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: Stellenberg Road														
1	L2	22	0.0	23	0.0	0.181	5.4	LOS A	0.8	5.3	0.48	0.60	0.48	52.6
2	T1	102	0.0	107	0.0	0.181	5.4	LOS A	0.8	5.3	0.48	0.60	0.48	53.8
3	R2	56	0.0	59	0.0	0.181	10.1	LOS B	0.8	5.3	0.48	0.60	0.48	53.7
Approach		180	0.0	189	0.0	0.181	6.9	LOS A	0.8	5.3	0.48	0.60	0.48	53.6
NorthEast: Libertas Avenue														
4	L2	75	0.0	79	0.0	0.294	5.5	LOS A	1.3	9.3	0.50	0.65	0.50	52.0
5	T1	58	0.0	61	0.0	0.294	5.5	LOS A	1.3	9.3	0.50	0.65	0.50	53.1
6	R2	166	0.0	175	0.0	0.294	10.2	LOS B	1.3	9.3	0.50	0.65	0.50	53.0
Approach		299	0.0	315	0.0	0.294	8.1	LOS A	1.3	9.3	0.50	0.65	0.50	52.8
NorthWest: Stellenberg Road														
7	L2	302	0.0	318	0.0	0.428	4.6	LOS A	2.3	15.9	0.38	0.51	0.38	53.8
8	T1	190	0.0	200	0.0	0.428	4.7	LOS A	2.3	15.9	0.38	0.51	0.38	55.1
9	R2	43	0.0	45	0.0	0.428	9.4	LOS A	2.3	15.9	0.38	0.51	0.38	55.0
Approach		535	0.0	563	0.0	0.428	5.0	LOS A	2.3	15.9	0.38	0.51	0.38	54.4
SouthWest: Libertas Avenue														
10	L2	31	0.0	33	0.0	0.091	5.6	LOS A	0.3	2.4	0.48	0.59	0.48	53.0
11	T1	39	0.0	41	0.0	0.091	5.6	LOS A	0.3	2.4	0.48	0.59	0.48	54.2
12	R2	17	0.0	18	0.0	0.091	10.3	LOS B	0.3	2.4	0.48	0.59	0.48	54.2
Approach		87	0.0	92	0.0	0.091	6.5	LOS A	0.3	2.4	0.48	0.59	0.48	53.8
All Vehicles		1101	0.0	1159	0.0	0.428	6.3	LOS A	2.3	15.9	0.44	0.57	0.44	53.8

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

ANNEXURE C2.4: MOVEMENT SUMMARY

Site: 101 [Future 2026 AM Peak + DEV (Site Folder: AM)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	85% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: Stellenberg Road														
1	L2	26	0.0	27	0.0	0.219	5.7	LOS A	1.0	6.7	0.54	0.64	0.54	52.4
2	T1	118	0.0	124	0.0	0.219	5.7	LOS A	1.0	6.7	0.54	0.64	0.54	53.6
3	R2	65	0.0	68	0.0	0.219	10.4	LOS B	1.0	6.7	0.54	0.64	0.54	53.5
Approach		209	0.0	220	0.0	0.219	7.2	LOS A	1.0	6.7	0.54	0.64	0.54	53.4
NorthEast: Libertas Avenue														
4	L2	87	0.0	92	0.0	0.354	5.8	LOS A	1.7	11.9	0.57	0.69	0.57	51.8
5	T1	67	0.0	71	0.0	0.354	5.9	LOS A	1.7	11.9	0.57	0.69	0.57	52.9
6	R2	192	0.0	202	0.0	0.354	10.6	LOS B	1.7	11.9	0.57	0.69	0.57	52.8
Approach		346	0.0	364	0.0	0.354	8.5	LOS A	1.7	11.9	0.57	0.69	0.57	52.6
NorthWest: Stellenberg Road														
7	L2	348	0.0	366	0.0	0.502	4.9	LOS A	2.9	20.4	0.45	0.53	0.45	53.6
8	T1	219	0.0	231	0.0	0.502	4.9	LOS A	2.9	20.4	0.45	0.53	0.45	54.8
9	R2	50	0.0	53	0.0	0.502	9.6	LOS A	2.9	20.4	0.45	0.53	0.45	54.8
Approach		617	0.0	649	0.0	0.502	5.3	LOS A	2.9	20.4	0.45	0.53	0.45	54.1
SouthWest: Libertas Avenue														
10	L2	36	0.0	38	0.0	0.110	5.9	LOS A	0.4	3.0	0.52	0.62	0.52	52.8
11	T1	45	0.0	47	0.0	0.110	5.9	LOS A	0.4	3.0	0.52	0.62	0.52	54.0
12	R2	20	0.0	21	0.0	0.110	10.6	LOS B	0.4	3.0	0.52	0.62	0.52	54.0
Approach		101	0.0	106	0.0	0.110	6.9	LOS A	0.4	3.0	0.52	0.62	0.52	53.6
All Vehicles		1273	0.0	1340	0.0	0.502	6.6	LOS A	2.9	20.4	0.50	0.60	0.50	53.5

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

ANNEXURE C2.5: MOVEMENT SUMMARY

Site: 101 [Existing 2021 PM Peak (Site Folder: PM)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	85% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: Stellenberg Road														
1	L2	6	0.0	6	0.0	0.461	7.7	LOS A	2.5	17.4	0.76	0.80	0.78	51.4
2	T1	262	0.0	276	0.0	0.461	7.7	LOS A	2.5	17.4	0.76	0.80	0.78	52.5
3	R2	110	0.0	116	0.0	0.461	12.4	LOS B	2.5	17.4	0.76	0.80	0.78	52.4
Approach		378	0.0	398	0.0	0.461	9.1	LOS A	2.5	17.4	0.76	0.80	0.78	52.4
NorthEast: Libertas Avenue														
4	L2	119	0.0	125	0.0	0.499	5.2	LOS A	2.9	20.3	0.53	0.64	0.53	51.6
5	T1	74	0.0	78	0.0	0.499	5.3	LOS A	2.9	20.3	0.53	0.64	0.53	52.7
6	R2	377	0.0	397	0.0	0.499	10.0	LOS A	2.9	20.3	0.53	0.64	0.53	52.6
Approach		570	0.0	600	0.0	0.499	8.4	LOS A	2.9	20.3	0.53	0.64	0.53	52.4
NorthWest: Stellenberg Road														
7	L2	171	0.0	180	0.0	0.305	5.0	LOS A	1.4	10.1	0.45	0.55	0.45	53.6
8	T1	144	0.0	152	0.0	0.305	5.0	LOS A	1.4	10.1	0.45	0.55	0.45	54.9
9	R2	22	0.0	23	0.0	0.305	9.7	LOS A	1.4	10.1	0.45	0.55	0.45	54.8
Approach		337	0.0	355	0.0	0.305	5.3	LOS A	1.4	10.1	0.45	0.55	0.45	54.2
SouthWest: Libertas Avenue														
10	L2	60	0.0	63	0.0	0.202	9.2	LOS A	0.9	6.5	0.78	0.80	0.78	51.0
11	T1	57	0.0	60	0.0	0.202	9.3	LOS A	0.9	6.5	0.78	0.80	0.78	52.1
12	R2	12	0.0	13	0.0	0.202	14.0	LOS B	0.9	6.5	0.78	0.80	0.78	52.1
Approach		129	0.0	136	0.0	0.202	9.7	LOS A	0.9	6.5	0.78	0.80	0.78	51.6
All Vehicles		1414	0.0	1488	0.0	0.499	8.0	LOS A	2.9	20.3	0.59	0.68	0.60	52.8

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

ANNEXURE C2.6: MOVEMENT SUMMARY

Site: 101 [Future 2026 PM Peak (Site Folder: PM)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	85% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: Stellenberg Road														
1	L2	7	0.0	7	0.0	0.586	10.5	LOS B	4.1	28.7	0.88	0.96	1.06	49.6
2	T1	304	0.0	320	0.0	0.586	10.5	LOS B	4.1	28.7	0.88	0.96	1.06	50.7
3	R2	128	0.0	135	0.0	0.586	15.2	LOS B	4.1	28.7	0.88	0.96	1.06	50.6
Approach		439	0.0	462	0.0	0.586	11.9	LOS B	4.1	28.7	0.88	0.96	1.06	50.6
NorthEast: Libertas Avenue														
4	L2	138	0.0	145	0.0	0.596	5.7	LOS A	3.9	27.2	0.64	0.67	0.64	51.3
5	T1	86	0.0	91	0.0	0.596	5.7	LOS A	3.9	27.2	0.64	0.67	0.64	52.4
6	R2	437	0.0	460	0.0	0.596	10.4	LOS B	3.9	27.2	0.64	0.67	0.64	52.3
Approach		661	0.0	696	0.0	0.596	8.8	LOS A	3.9	27.2	0.64	0.67	0.64	52.1
NorthWest: Stellenberg Road														
7	L2	198	0.0	208	0.0	0.365	5.2	LOS A	1.8	12.9	0.51	0.58	0.51	53.4
8	T1	167	0.0	176	0.0	0.365	5.3	LOS A	1.8	12.9	0.51	0.58	0.51	54.6
9	R2	26	0.0	27	0.0	0.365	10.0	LOS A	1.8	12.9	0.51	0.58	0.51	54.5
Approach		391	0.0	412	0.0	0.365	5.6	LOS A	1.8	12.9	0.51	0.58	0.51	54.0
SouthWest: Libertas Avenue														
10	L2	70	0.0	74	0.0	0.274	11.1	LOS B	1.4	9.6	0.86	0.88	0.86	49.7
11	T1	66	0.0	69	0.0	0.274	11.1	LOS B	1.4	9.6	0.86	0.88	0.86	50.8
12	R2	14	0.0	15	0.0	0.274	15.8	LOS B	1.4	9.6	0.86	0.88	0.86	50.7
Approach		150	0.0	158	0.0	0.274	11.5	LOS B	1.4	9.6	0.86	0.88	0.86	50.3
All Vehicles		1641	0.0	1727	0.0	0.596	9.1	LOS A	4.1	28.7	0.69	0.75	0.74	51.9

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

ANNEXURE C2.7: MOVEMENT SUMMARY

Site: 101 [Existing 2021 PM Peak + DEV (Site Folder: PM)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	85% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: Stellenberg Road														
1	L2	6	0.0	6	0.0	0.478	8.0	LOS A	2.7	18.8	0.78	0.82	0.82	51.3
2	T1	270	0.0	284	0.0	0.478	8.1	LOS A	2.7	18.8	0.78	0.82	0.82	52.4
3	R2	110	0.0	116	0.0	0.478	12.8	LOS B	2.7	18.8	0.78	0.82	0.82	52.3
Approach		386	0.0	406	0.0	0.478	9.4	LOS A	2.7	18.8	0.78	0.82	0.82	52.3
NorthEast: Libertas Avenue														
4	L2	119	0.0	125	0.0	0.513	5.3	LOS A	3.0	21.2	0.55	0.65	0.55	51.5
5	T1	74	0.0	78	0.0	0.513	5.3	LOS A	3.0	21.2	0.55	0.65	0.55	52.6
6	R2	391	0.0	412	0.0	0.513	10.0	LOS B	3.0	21.2	0.55	0.65	0.55	52.5
Approach		584	0.0	615	0.0	0.513	8.5	LOS A	3.0	21.2	0.55	0.65	0.55	52.3
NorthWest: Stellenberg Road														
7	L2	177	0.0	186	0.0	0.314	5.0	LOS A	1.5	10.5	0.45	0.55	0.45	53.6
8	T1	148	0.0	156	0.0	0.314	5.0	LOS A	1.5	10.5	0.45	0.55	0.45	54.9
9	R2	22	0.0	23	0.0	0.314	9.7	LOS A	1.5	10.5	0.45	0.55	0.45	54.8
Approach		347	0.0	365	0.0	0.314	5.3	LOS A	1.5	10.5	0.45	0.55	0.45	54.2
SouthWest: Libertas Avenue														
10	L2	60	0.0	63	0.0	0.207	9.5	LOS A	1.0	6.8	0.79	0.81	0.79	50.8
11	T1	57	0.0	60	0.0	0.207	9.6	LOS A	1.0	6.8	0.79	0.81	0.79	51.9
12	R2	12	0.0	13	0.0	0.207	14.3	LOS B	1.0	6.8	0.79	0.81	0.79	51.9
Approach		129	0.0	136	0.0	0.207	10.0	LOS A	1.0	6.8	0.79	0.81	0.79	51.4
All Vehicles		1446	0.0	1522	0.0	0.513	8.1	LOS A	3.0	21.2	0.61	0.68	0.62	52.7

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

ANNEXURE C2.8: MOVEMENT SUMMARY

Site: 101 [Future 2026 PM Peak + DEV (Site Folder: PM)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	85% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
SouthEast: Stellenberg Road														
1	L2	7	0.0	7	0.0	0.609	11.1	LOS B	4.4	31.1	0.90	0.99	1.12	49.2
2	T1	312	0.0	328	0.0	0.609	11.2	LOS B	4.4	31.1	0.90	0.99	1.12	50.2
3	R2	128	0.0	135	0.0	0.609	15.9	LOS B	4.4	31.1	0.90	0.99	1.12	50.2
Approach		447	0.0	471	0.0	0.609	12.5	LOS B	4.4	31.1	0.90	0.99	1.12	50.2
NorthEast: Libertas Avenue														
4	L2	138	0.0	145	0.0	0.611	5.8	LOS A	4.1	28.4	0.66	0.68	0.66	51.2
5	T1	86	0.0	91	0.0	0.611	5.8	LOS A	4.1	28.4	0.66	0.68	0.66	52.3
6	R2	451	0.0	475	0.0	0.611	10.5	LOS B	4.1	28.4	0.66	0.68	0.66	52.2
Approach		675	0.0	711	0.0	0.611	8.9	LOS A	4.1	28.4	0.66	0.68	0.66	52.0
NorthWest: Stellenberg Road														
7	L2	204	0.0	215	0.0	0.374	5.3	LOS A	1.9	13.4	0.52	0.58	0.52	53.4
8	T1	171	0.0	180	0.0	0.374	5.3	LOS A	1.9	13.4	0.52	0.58	0.52	54.6
9	R2	26	0.0	27	0.0	0.374	10.0	LOS B	1.9	13.4	0.52	0.58	0.52	54.5
Approach		401	0.0	422	0.0	0.374	5.6	LOS A	1.9	13.4	0.52	0.58	0.52	54.0
SouthWest: Libertas Avenue														
10	L2	70	0.0	74	0.0	0.284	11.5	LOS B	1.4	10.0	0.88	0.90	0.88	49.5
11	T1	66	0.0	69	0.0	0.284	11.5	LOS B	1.4	10.0	0.88	0.90	0.88	50.6
12	R2	14	0.0	15	0.0	0.284	16.2	LOS B	1.4	10.0	0.88	0.90	0.88	50.5
Approach		150	0.0	158	0.0	0.284	11.9	LOS B	1.4	10.0	0.88	0.90	0.88	50.0
All Vehicles		1673	0.0	1761	0.0	0.611	9.4	LOS A	4.4	31.1	0.71	0.76	0.77	51.8

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Existing 2021 AM Peak + DEV (Site Folder: AM)]

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

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	85% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
NorthEast: Ouklipmuur Avenue														
8	T1	240	0.0	253	0.0	0.134	0.0	LOS A	0.0	0.3	0.02	0.02	0.02	59.7
9	R2	8	0.0	8	0.0	0.134	5.9	LOS A	0.0	0.3	0.02	0.02	0.02	57.0
Approach		248	0.0	261	0.0	0.134	0.2	NA	0.0	0.3	0.02	0.02	0.02	59.7
NorthWest: Site Access														
10	L2	24	0.0	25	0.0	0.067	5.0	LOS A	0.2	1.2	0.26	0.91	0.26	49.1
12	R2	36	0.0	38	0.0	0.067	6.4	LOS A	0.2	1.2	0.26	0.91	0.26	48.9
Approach		60	0.0	63	0.0	0.067	5.9	LOS A	0.2	1.2	0.26	0.91	0.26	49.0
SouthWest: Ouklipmuur Avenue														
1	L2	12	0.0	13	0.0	0.061	5.6	LOS A	0.0	0.0	0.00	0.06	0.00	30.0
2	T1	102	0.0	107	0.0	0.061	0.0	LOS A	0.0	0.0	0.00	0.06	0.00	59.4
Approach		114	0.0	120	0.0	0.061	0.6	NA	0.0	0.0	0.00	0.06	0.00	56.2
All Vehicles		422	0.0	444	0.0	0.134	1.1	NA	0.2	1.2	0.05	0.16	0.05	57.7

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).

Minor Road Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).

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

Delay Model: SIDRA Standard (Geometric Delay is included).

Queue Model: SIDRA Standard.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Future 2026 AM Peak + DEV (Site Folder: AM)]

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

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	85% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
NorthEast: Ouklipmuur Avenue														
8	T1	278	0.0	293	0.0	0.154	0.0	LOS A	0.0	0.3	0.02	0.02	0.02	59.8
9	R2	8	0.0	8	0.0	0.154	5.9	LOS A	0.0	0.3	0.02	0.02	0.02	57.1
Approach		286	0.0	301	0.0	0.154	0.2	NA	0.0	0.3	0.02	0.02	0.02	59.7
NorthWest: Site Access														
10	L2	24	0.0	25	0.0	0.071	5.1	LOS A	0.2	1.3	0.29	0.91	0.29	48.9
12	R2	36	0.0	38	0.0	0.071	6.8	LOS A	0.2	1.3	0.29	0.91	0.29	48.6
Approach		60	0.0	63	0.0	0.071	6.1	LOS A	0.2	1.3	0.29	0.91	0.29	48.7
SouthWest: Ouklipmuur Avenue														
1	L2	12	0.0	13	0.0	0.070	5.6	LOS A	0.0	0.0	0.00	0.06	0.00	30.0
2	T1	118	0.0	124	0.0	0.070	0.0	LOS A	0.0	0.0	0.00	0.06	0.00	59.5
Approach		130	0.0	137	0.0	0.070	0.5	NA	0.0	0.0	0.00	0.06	0.00	56.7
All Vehicles		476	0.0	501	0.0	0.154	1.0	NA	0.2	1.3	0.05	0.14	0.05	57.9

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Minor Road Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Existing 2021 PM Peak + DEV (Site Folder: PM)]

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

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	85% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
NorthEast: Ouklipmuur Avenue														
8	T1	164	0.0	173	0.0	0.104	0.1	LOS A	0.1	0.9	0.09	0.07	0.09	59.0
9	R2	22	0.0	23	0.0	0.104	6.2	LOS A	0.1	0.9	0.09	0.07	0.09	55.7
Approach		186	0.0	196	0.0	0.104	0.9	NA	0.1	0.9	0.09	0.07	0.09	58.7
NorthWest: Site Access														
10	L2	10	0.0	11	0.0	0.028	5.3	LOS A	0.1	0.5	0.33	0.88	0.33	49.2
12	R2	14	0.0	15	0.0	0.028	6.4	LOS A	0.1	0.5	0.33	0.88	0.33	48.9
Approach		24	0.0	25	0.0	0.028	6.0	LOS A	0.1	0.5	0.33	0.88	0.33	49.0
SouthWest: Ouklipmuur Avenue														
1	L2	34	0.0	36	0.0	0.115	5.6	LOS A	0.0	0.0	0.00	0.09	0.00	29.8
2	T1	180	0.0	189	0.0	0.115	0.0	LOS A	0.0	0.0	0.00	0.09	0.00	59.1
Approach		214	0.0	225	0.0	0.115	0.9	NA	0.0	0.0	0.00	0.09	0.00	54.3
All Vehicles		424	0.0	446	0.0	0.115	1.2	NA	0.1	0.9	0.06	0.13	0.06	56.0

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).

Minor Road Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).

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

Delay Model: SIDRA Standard (Geometric Delay is included).

Queue Model: SIDRA Standard.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Future 2026 PM Peak + DEV (Site Folder: PM)]

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

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	85% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
NorthEast: Ouklipmuur Avenue														
8	T1	190	0.0	200	0.0	0.118	0.1	LOS A	0.1	0.9	0.09	0.06	0.09	59.0
9	R2	22	0.0	23	0.0	0.118	6.4	LOS A	0.1	0.9	0.09	0.06	0.09	55.8
Approach		212	0.0	223	0.0	0.118	0.8	NA	0.1	0.9	0.09	0.06	0.09	58.9
NorthWest: Site Access														
10	L2	10	0.0	11	0.0	0.030	5.5	LOS A	0.1	0.5	0.37	0.88	0.37	48.9
12	R2	14	0.0	15	0.0	0.030	6.8	LOS A	0.1	0.5	0.37	0.88	0.37	48.6
Approach		24	0.0	25	0.0	0.030	6.3	LOS A	0.1	0.5	0.37	0.88	0.37	48.7
SouthWest: Ouklipmuur Avenu														
1	L2	34	0.0	36	0.0	0.131	5.6	LOS A	0.0	0.0	0.00	0.08	0.00	29.9
2	T1	209	0.0	220	0.0	0.131	0.0	LOS A	0.0	0.0	0.00	0.08	0.00	59.2
Approach		243	0.0	256	0.0	0.131	0.8	NA	0.0	0.0	0.00	0.08	0.00	55.0
All Vehicles		479	0.0	504	0.0	0.131	1.1	NA	0.1	0.9	0.06	0.11	0.06	56.5

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).

Minor Road Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).

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

Delay Model: SIDRA Standard (Geometric Delay is included).

Queue Model: SIDRA Standard.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.