TRAFFIC AND PARKING IMPACT ASSESSMENT

OF THE PROPOSED RETIREMENT VILLAGE

AT 181 ALLAMBIE ROAD, ALLAMBIE HEIGHTS

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Transport Planning, Traffic Impact Assessments, Road Safety Audits, Expert Witness

18273.01FA - 26th July 2018

Development Type: **Retirement Village**

Site Address: **181 Allambie Road, Allambie Heights**

Prepared for: **Centurion Group Pty Ltd**

Document reference: **18273.01FA**

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1 INTRODUCTION

McLaren Traffic Engineering (MTE) was commissioned by *Centurion Group Pty Ltd* to provide a Traffic and Parking Impact Assessment of the proposed Retirement Village at 181 Allambie Road, Allambie Heights.

1.1 Description and Scale of Development

The proposed development (as depicted in **Annexure A** for reference), includes the construction of infrastructure and other works required to facilitate the proposed senior living development consisting of 24 dwellings. The proposed development has the following features relevant to this Traffic and Parking Impact Assessment:

- 24 x two-bedroom seniors living units distributed across two apartment buildings;
- Construction of an ancillary Pool building;
- Construction of an ancillary putting golf course;
- 30 x resident parking spaces located in a basement / lower ground level carpark and one (1) car wash bay on the ground floor;
- 16 x visitor parking spaces with 2 provided within the basement / lower ground level carpark and the remaining 14 provided on ground level;
- Construction of an emergency egress road to the north of the site.

All vehicular access to the site will be from the proposed two-way driveway off Martin Luther Place with the exception of waste collection and loading by vehicles up to a Small Rigid Vehicle (SRV) which will utilise the driveway of the adjacent William Charlton Village site which is located at the intersection of Allambie Road / Mortain Avenue

1.2 State Environmental Planning Policy (Infrastructure) 2007

The proposed development does not qualify as a traffic generating development with relevant size and/or capacity under Clause 104 of the *SEPP (Infrastructure) 2007*. Accordingly, formal referral to the Roads and Maritime Services (RMS) is not necessary and Northern Beaches Council officers can determine accordingly.

1.3 Site Description

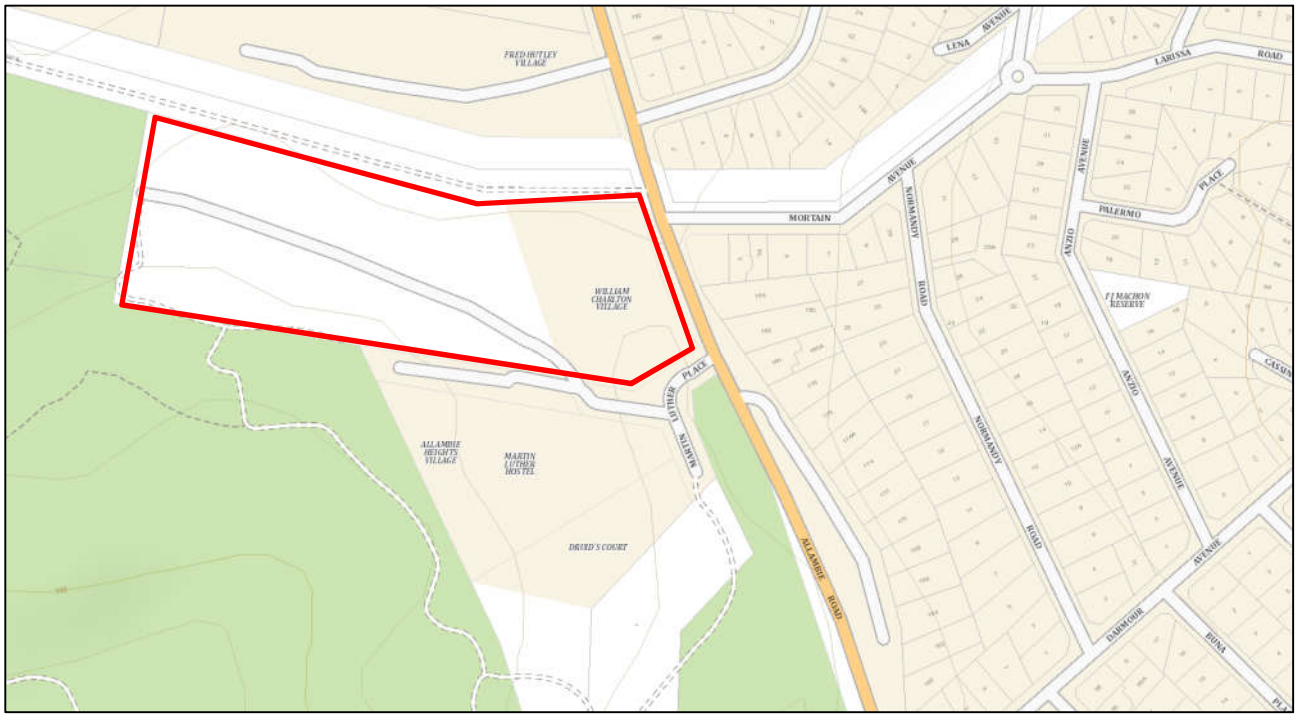
Currently, the subject site is predominantly vacant land with William Charlton Retirement Village located on the eastern side of the site. The proposed development has a single frontage to Martin Luther Place to the south. Vehicular access to the site is provided by an internal road from Martin Luther Place. The site is generally surrounded by low density residential dwellings to the east, bushland to the south and west with Fred Hutley Village located directly to the north of the site. The subject site is currently zoned R2 – Low Density Residential under the *Warringah Local Environment Plan 2011*.

1.4 Site Context

The site location is shown in an aerial photo and a map in **Figure** 1 **& Figure** 2 below.

Site Location

FIGURE 1: SITE CONTEXT – AERIAL PHOTO



Site Location

FIGURE 2: SITE CONTEXT – STREET MAP

2 EXISTING TRAFFIC AND PARKING CONDITIONS

2.1 Road Hierarchy

The existing road network within close proximity to the site has the following characteristics:

2.1.1 Allambie Road

- RMS classified REGIONAL Road (Road No. 7345);
- Approximately 13m in width facilitating one traffic flow lane and one dedicated bicycle lane in both directions and kerbside parking;
- Signposted 60km/h speed limit;
- Unrestricted kerbside parking permitted on both sides of the road.

2.1.2 Martin Luther Place

- Unclassified LOCAL road;
- Approximately 10m in width facilitating two-way passing and kerbside;
- No speed limit signposted, 50km/h applies;
- Unrestricted kerbside parking permitted on both sides of the road.

2.2 Existing Traffic Management

- Priority controlled intersection of Allambie Road / Martin Luther Place;
- Signalised intersection of Allambie Road / Mortain Avenue.

2.3 Existing Traffic Environment

Traffic counts were completed at the intersections of Allambie Road/ Martin Luther Place and Allambie Road/ Mortain Avenue on 30th and 31st May 2018, representing a typical weekday. Surveys are reproduced in **Annexure B**.

2.3.1 Intersection Performance

Existing intersection performances have been assessed using SIDRA INTERSECTION 8.0. The analysis is summarised in **Table 1**. Detailed SIDRA output summaries are provided in **Annexure C** for reference.

TABLE 1: INTERSECTION PERFORMANCES (SIDRA INTERSECTION 8.0)

Intersection	Peak Hour	Degree of Saturation[1]	Average Delay[2] (sec/veh)	Level of Service[3][4]	Control Type	Worst Movement
EXISTING PERFORMANCE						
Allambie Road / Martin Luther Place	AM	0.66	1.4 (Worst: >70)	**NA** (Worst: F)	Give Way	RT from Martin Luther Place
	PM	0.85	0.5 (Worst: >70)	**NA** (Worst: F)		RT from Martin Luther Place
Allambie Road / Mortain Avenue	AM	0.99	40.9 (Worst: >70)	**C** (Worst: E)	Signalised	Through from Allambie Road South
	PM	2.01	>70 (Worst: >70)	**F** (Worst: F)		Right from Allambie Road South

NOTES:
(1) Degree of Saturation is the ratio of demand to capacity for the most disadvantaged movement.
(2) Average delay is the delay experienced on average by all vehicles. The value in brackets represents the delay to the most disadvantaged movement.
(3) Level of Service is a qualitative measure of performance describing operational conditions. There are six levels of service, designated from A to F, with A representing the best operational condition and level of service F the worst. The LoS of the intersection is shown in bold, and the LoS of the most disadvantaged movement is shown in brackets.
(4) 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.

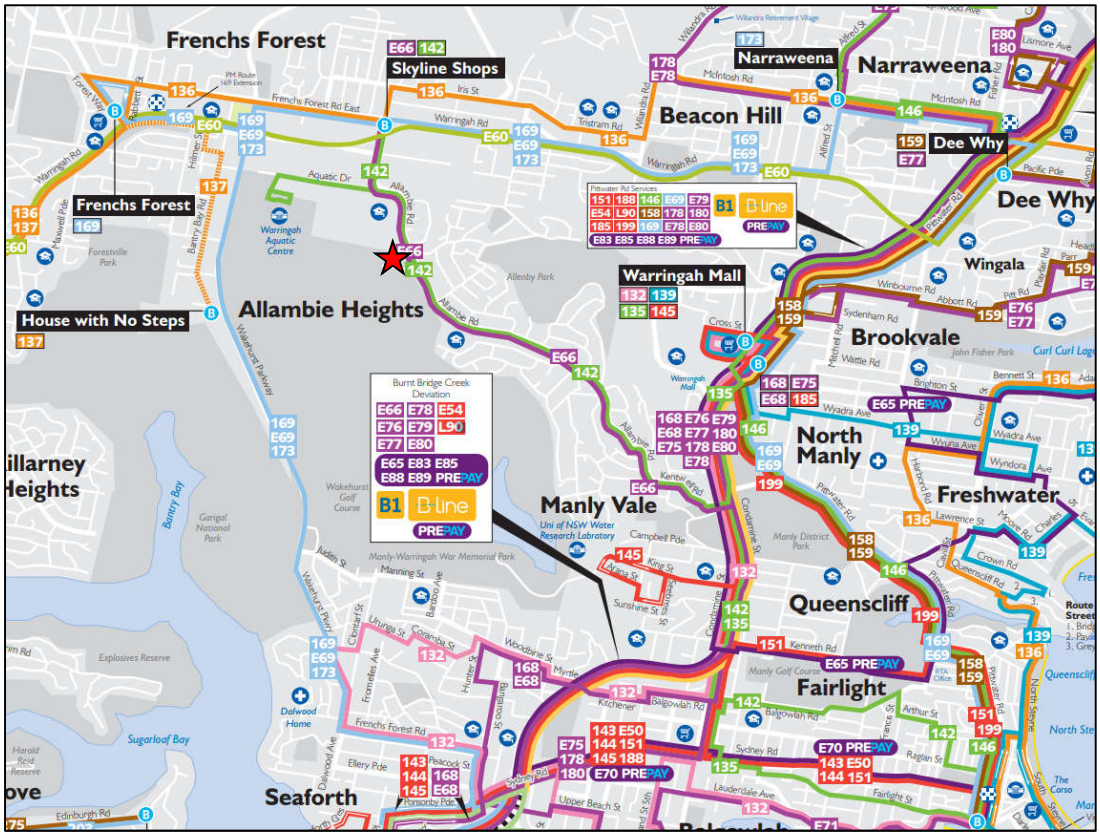
As shown above the intersection of Allambie Road / Mortain Avenue is currently operating at Level of Service (LoS) C during the AM peak period and LoS F during the PM peak period. LoS F indicates that the intersection is operating at capacity with significant delays and queues. The intersection of Martin Luther Place / Allambie Road indicates existing delays for right turn movements out of the site.

2.4 Future Road and Infrastructure Upgrades

From *Northern Beaches Council's Development Application Tracker* and website, it appears that there are no future planned road changes which will affect existing traffic conditions within the vicinity of the subject site.

2.5 Public Transport

The subject site has access to existing bus route 142, 280 and E66 provided by *State Transit* and *Forest Coach Lines*. The nearest bus stop is located along the sites frontage on Allambie Road (Stop ID 210093). These bus routes provide access to the local suburbs, including Wynyard, Cremorne, Manly Vale, Manly, Chatswood and Frenches Forest. The site has no direct access to the Sydney Trains Network. The subject sites location in relation to the surrounding public transport infrastructure is shown in **Figure 3** below.



★ **Site Location**

FIGURE 3: BUS NETWORK MAP

3 PARKING ASSESSMENT

3.1 Council Parking Requirement

Warringah's Development Control Plan 2011 does not provide car parking requirements for seniors housing and as such reference will be made to the *State Environmental Planning Policy (SEPP) (Housing for Seniors or People with a Disability) 2004*.

3.2 State Environmental Planning Policy (Housing for Seniors or People with a Disability) 2004

Reference is made to Clause 50 of the *SEPP (Housing for Seniors or people with a Disability) 2004 – standards that cannot be used to refuse development consent for self-contained dwellings* which states the following in relation to car parking provision:

"(h) parking: if at least the following is provided:

(i) 0.5 car spaces for each bedroom where the development application is made by a person other than a social housing provider, or"

(ii) 1 car space for each 5 dwellings where the development application is made by, or is made by a person jointly with, a social housing provider.

TABLE 2: SEPP MINIMUM PARKING REQUIREMENTS

Type	Scale	Rate	Spaces Required	Spaces Provided
Independent Living Unit	24 dwellings with a total of 48 bedrooms	0.5 car spaces per bedroom	24	30
Subtotal	**24**	**-**	**24**	**30**

As shown above, the development requires a total of **24** car parking spaces. The site plan indicates a total of **30** car parking spaces for residential dwellings representing a numerical surplus of some six **(6)** parking spaces from the SEPP minimum parking requirements.
The proposed pool building and putting golf course are ancillary to the seniors living dwellings and therefore does not require the provision of visitor parking. Furthermore, the SEPP does not require the provision of visitor parking spaces for seniors living such that the provision of nil (0) parking satisfies the minimum requirements. Nevertheless, the proposed plans indicate a total of **16** visitor parking spaces located on ground level and lower ground level which should be looked upon favourably by Council.

3.3 Bicycle & Motorcycle parking Requirements

Warringah's DCP outlines the following bicycle parking requirement for seniors living developments.

> *Seniors Housing*
> *1 per 2 Independent living units and for all other types of development 1 per 15 beds.*
> *Visitors: 1 per 12 independent living units and for all other types of development 1 per 30 beds.*

Applying these rates based upon the 24 independent living units, this would result in twelve (**12**) residential bicycle spaces and two (**2**) visitor bicycle spaces. The plans detail nil (0) residential or visitor bicycle parking however there is sufficient space onsite to provide this provision.

Warringah's DCP does not provide motorcycle parking rates for seniors housing and as such, the DCP does not require the provision of motorcycle parking such that nil (0) provision complies.

3.4 Servicing & Loading

Council's DCP does not specify a specific waste collection provision for seniors living developments. It is proposed that the development will use the historical waste collection area that services William Charlton Village. Currently William Charlton Village's waste is stored and collected twice a week to the north of the site accessed from the driveway located within the intersection of Mortain Avenue / Allambie Road. It is envisaged that this historical waste collection service is sufficient for both the existing William Charlton Village and the proposed development such that the historical operation will satisfy the requirements of the proposed development.

The site provides a loading bay of dimensions 2.8m by 5.4m within the lower ground floor parking area for use by vehicles up to B99 in size. Loading by vehicles larger than a B99 vehicle up to and including a 6.4m Small Rigid Vehicle is proposed to occur via access from the adjacent driveway of the William Charlton Village located within the intersection of Mortain Avenue / Allambie Road.

A bushfire emergency egress lane is provided to the north of the site to provide an alternative exit for firetrucks in an emergency. It should also be noted that the public road within the site is assessed as acceptable for fire brigade access within the *Bush Fire Assessment Report Allambie Heights Village Project 2* completed by *Total Earth Care Pty Ltd* dated May 2018.The subject sites proposed driveway and alternative bushfire exit are assessed below in relation to the guidelines referred to in the following subsections.

3.4.1 NSW Fire Brigades Guidelines for Emergency Vehicle Access

Reference is made to the *NSW Fire Brigades Guidelines for Emergency Vehicle Access Policy No. 4 Version 02* dated 27th October 2010, which provides guidelines regarding the

dimensions of Fire Brigade vehicles and their access requirements. The subject sites driveway and alternate emergency exit provide sufficient dimensions for general appliance egress as well as sufficient grades and transitions, based on the plans in **Annexure A**. However, within the adjacent site of William Charlton Village, the roadway widths near Allambie road are less than the 5.0m specified within the NSW Fire Brigades guidelines document. Despite the variation from the guidelines, swept path analysis has been undertaken for a General Appliance of 10.1m in length with resultant swept paths shown in **Annexure D** for reference. The undertaken swept paths illustrate successful egress of a 10.1m length General Appliance through the adjacent sites driveway. Whether this variation from the guidelines and the swept paths provided in **Annexure D** are acceptable or not is subject to confirmation from a Fire Consultant.

3.4.2 NSW Rural Fire Services Planning for Bush Fire Protection

Reference is made to the *NSW Rural Fire Service Planning for Bush Fire Protection (PBP) 2006* which provides guidelines regarding the dimensions of Rural Fire Brigade vehicles and their access requirements for bush fires. The subject site Driveway and alternate exit provide sufficient dimensions with widths of at least 6m and sufficient grades below 15% on sealed roads or 10% on unsealed roads for fire vehicle access. the adjacent site of William Charlton Village, the roadway widths near Allambie road are less than the 4.0m specified within the *PBP* but greater than 3.5m. The *PBP* states the following:

> *Note: Some short constrictions in the access may be accepted where they are not less than the minimum (3.5m), extend for no more than 30m and where the obstruction cannot be reasonably avoided or removed. The gradients applicable to public roads also apply to community style development property access roads in addition to the above.*

Despite the variation of 4.0m width from the *PBP* guidelines, swept path analysis has been undertaken for the constricted access with an 8.8m length Medium Rigid Vehicle (MRV) (which the PBP refers to as being equivalent to a Category 1 Tanker), with resultant swept paths shown in **Annexure D** for reference. The undertaken swept paths illustrate successful egress of an MRV through the adjacent sites driveway. Whether this variation from the *PBP* guidelines and the swept paths provided in **Annexure D** are acceptable or not is subject to confirmation from a Fire Consultant.

3.5 Disabled Parking

The Council DCP does not specifically outline any disabled parking with regards to seniors living developments, as such reference is made to the *Building Code of Australia* (BCA) which classifies accommodation for the aged as a Class 3(b) building and stated the following disabled parking requirement.

> *1 space for every 100 car parking spaces or part thereof*

The application of the BCA requirement for the seniors living development requires that there is a minimum of one **(1)** disabled parking space. The lower ground carpark details two (2) adaptable parking spaces of minimum width 3.8m in accordance with AS4299 and four

(4) visitor disabled accessible parking spaces in accordance with AS2890.6 (subject to the required changes in **Section 3.6**) representing compliance with the BCA.

3.6 Car Park Design & Compliance

The car parking layout of both the ground level and lower ground level has been assessed and found to be generally compliant with the relevant clauses of AS2890.1 and AS2890.6 subject to the required changes below. Swept path test results are reproduced in **Annexure D**.
The car parking layout includes the following features:

- A total of **46** car parking spaces including:
    - 30 car parking spaces of minimum 3.2m x 5.4m for residents;
    - 16 car parking spaces of minimum 2.5m x 5.4m for visitors;
- 3.8m width, 5.4m length adaptable spaces for residents of adaptable dwellings;
- 2.4m width by 5.4m length disabled spaces with associated adjacent 2.4m width by 5.4m length shared space for visitors;
- One (1) car wash bay located on ground level.

The following dot points are required changes to the design which are required to be completed prior to certification at the Construction Certificate Stage. It is recommended that a design certificate be required at the Construction Certificate Stage to confirm the required changes have been implemented, as well as to account for any design changes during the Development Application process.

- The intersection of Martin Luther Lane and Martin Luther Place is required to be signposted and linemarked as a stop intersection with a concept shown in **Annexure E** for reference.
- The proposed disabled accessible spaces and the adjacent shared spaces are to be sufficiently linemarked in accordance with AS2890.6:2009.
- Bollards within the shared spaces located adjacent to disabled accessible spaces are to be set back a complaint distance of 800±50mm from the back of the shared space. Alternatively, the variation in bollard distance from the standards could be approved by an Accessibility Consultant.
- Each disabled accessible parking space and associated shared spaces are required to be changed to have a maximum grade of 1:40 (or 1:33 if the surface is bituminous seal and the space is out of doors), or alternatively be approved for disabled access by an Accessibility Consultant.

- Confirmation from a Fire Consultant is required regarding the emergency egress of fire brigade vehicles outlined in **Section 3.4**.

- Visitor spaces on the ground floor are to be widened to a minimum width of 2.5m.

- Confirmation of a minimum headroom of 2.2m within typical parking spaces and light vehicle circulation areas and 2.5m above disabled accessible spaces and adjacent shared spaces.

4 TRAFFIC ASSESSMENT

The impact of the expected traffic generation levels associated with the subject proposal is discussed in the following sub-sections.

4.1 Traffic Generation

The estimated traffic generation level for the proposed development is based upon the RMS *Guide to Traffic Generating Developments October 2002* and more recent supplements. The RMS publicised updated traffic generation rates for seniors housing within the *Technical Direction TDT 2013/04a,* and will be applied to the seniors living development. The pool building and putting golf course is ancillary to the seniors living development and is not expected to generate additional traffic to or from the site. The expected traffic generation is summarised in **Table 3** below.

TABLE 3: EVENING PEAK HOUR TRAFFIC GENERATION

Development Type	Scale	Peak Period	Rate	Peak Traffic Generation	Trip Assignment(1)
Independent Living Unit	24	AM(2)	0.4 per dwelling	9.6 (10)	2 IN; 8 OUT
		PM		9.6 (10)	8 IN; 2 OUT

Note (1): Assumes 20% inbound & 80% outbound during AM peak (shown above). Vice versa for PM.
(2) AM morning peak hour does not generally coincide with the network peak hour

As shown above, the traffic generated by the site equates to **10** vehicles trips in both the AM (2 IN; 8 OUT) and PM (8 IN; 2 OUT) peak periods respectively. As stated with the RMS surveys the traffic generation for senior living dwellings does not generally coincide with the peak AM period.

4.2 Traffic Assignment

Given the surrounding road network and limited available routes to / from the site, it is assumed that traffic entering the site will be evenly distributed between the north and the south direction such that 50% of traffic arrives from the north and 50% arrives from the south along Allambie Road. Similarly, traffic exiting the site will be split with 50% travelling north and 50% travelling south along Allambie Road.

4.3 Traffic Impact

The traffic generation outlined in **Section 4.1 & 4.2** above has been added to the existing traffic volumes recorded and SIDRA INTERSECTION 8.0 used to assess the resulting performance of each intersection. The purpose of this assessment is to compare the existing intersection operations to the future scenario under the increased traffic load. The results of this assessment are shown in **Table 4**.

TABLE 4: FUTURE INTERSECTION PERFORMANCES (SIDRA INTERSECTION 8.0)

Intersection	Peak Hour	Degree of Saturation[1]	Average Delay[2] (sec/veh)	Level of Service[3][4]	Control Type	Worst Movement
EXISTING PERFORMANCE						
Allambie Road / Martin Luther Place	AM	0.66	1.4 (Worst: >70)	**NA** (Worst: F)	Give Way	RT from Martin Luther Place
	PM	0.85	0.5 (Worst: >70)	**NA** (Worst: F)		RT from Martin Luther Place
Allambie Road / Mortain Avenue	AM	0.99	40.9 (Worst: >70)	**C** (Worst: E)	Signalised	Through from Allambie Road South
	PM	2.01	>70 (Worst: >70)	**F** (Worst: F)		Right from Allambie Road South
FUTURE PERFORMANCE (POST DEVELOPMENT)						
Allambie Road / Martin Luther Place	AM	0.66	1.9 (Worst: >70)	**NA** (Worst: F)	Give Way	RT from Martin Luther Place
	PM	0.86	0.9 (Worst: >70)	**NA** (Worst: F)		RT from Martin Luther Place
Allambie Road / Mortain Avenue	AM	0.99	42.0 (Worst: >70)	**C** (Worst: F)	Signalised	Through from Allambie Road South
	PM	2.06	>70 (Worst: >70)	**F** (Worst: F)		Right from Allambie Road South

NOTES:
(1) Degree of Saturation is the ratio of demand to capacity for the most disadvantaged movement.
(2) Average delay is the delay experienced on average by all vehicles. The value in brackets represents the delay to the most disadvantaged movement.
(3) Level of Service is a qualitative measure of performance describing operational conditions. There are six levels of service, designated from A to F, with A representing the best operational condition and level of service F the worst. The LoS of the intersection is shown in bold, and the LoS of the most disadvantaged movement is shown in brackets.
(4) 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.

As shown above the impact of this level of traffic will have very minimal adverse effect on any nearby intersections. The intersection of Allambie Road / Mortain Avenue is currently operating at a LoS of F during the PM peak period. The increase in some five through movements at the intersection represents an increase of 0.2% which will not detrimentally impact delays or queue lengths and can be readily accommodated within the existing road network.

The Intersection of Martin Luther Place / Allambie Road indicates delays for right turn movements out of the site. During peak traffic times it is expected that drivers wishing to

travel southbound from the site will turn left out of the site and travel to the roundabout intersection of Allambie Road / Aquatic Drive approximately 700m to the north of the site and perform a U-turn to return traveling south. It is emphasised that this manoeuvre will be low in frequency and is not expected to occur due to majority of vehicle trips regarding the development occurring outside of network peak traffic periods.

5 CONCLUSION

In view of the foregoing, the proposed senior living development (as depicted in **Annexure A**) is fully supportable in terms of its traffic and parking impacts, subject to the required changes outlined in **Section 3.6**. The following outcomes of this traffic impact assessment are relevant to note:

- The car parking layout has been assessed to generally comply with the relevant dimensional requirements and objectives of AS2890.1, AS2890.2 and AS2890.6, subject to the required changes outlined in **Section 3.6.** It is recommended that a design certificate be required at the Construction Certificate Stage to confirm the required changes have been implemented, as well as to account for any design changes during the Development Application process.

- The site requires the provision of **24** residential parking spaces as per the requirements of the *SEPP (Housing for Seniors or people with a Disability) 2004.* The development proposes a total of **30** residential car parking spaces representing a surplus of some six (**6**) residential spaces from the SEPP requirements. The site additionally provides **16** visitors where nil (0) are required which should be looked upon favourably by Council

- The traffic generated by the site equates to **10** vehicles trips in both the AM (2 in; 8 out) and PM (8 in; 2 out) peak periods respectively. The traffic generated by the proposed development will be of a low order and will not detrimentally impact the ongoing operation of the existing road network.

- It is envisaged that the historical waste collection service that accesses the adjacent William Charlton Village site via the driveway located within the intersection of Mortain Avenue / Allambie Road is sufficient for both the existing William Charlton Village and the proposed development such that the historical operation will satisfy the requirements of the proposed development.

- It is expected that loading by vehicles up to a B99 will occur from the proposed loading bay within the lower ground floor parking area. Loading by vehicles larger than a B99 vehicle, up to and including a 6.4m length Small Rigid Vehicle is proposed to occur via access from the driveway located within the intersection of Mortain Avenue / Allambie Road.

ANNEXURE A: CONCEPT SITE PLANS
(SHEET 1 OF 3)

ANNEXURE B: CONCEPT SITE PLANS
(SHEET 2 OF 3)

ANNEXURE B: CONCEPT SITE PLANS
(SHEET 3 OF 3)

ANNEXURE C: SURVEY DATA
(SHEET 1 OF 2)

Curtis Traffic Surveys — **Turning movement count**

180602mcl (18_273)

Day, date: 31/05/18
Location: Allambie Rd & Mortain Av
Weather: Fine
Client: McLaren Traffic Engineering

Allambie Rd

Peak Hour Volumes: 920 | 26 | 77 | 60 | 1214 | 70

N

Mortain Av

From Mortain Av: south / north

Time Period	through	right	left	right	left	through	vehicles	Peak
07:00 to 07:15	210	10	18	15	6	151	410	
07:15 to 07:30	206	13	16	17	8	146	406	
07:30 to 07:45	250	13	14	14	4	152	447	
07:45 to 08:00	247	20	15	27	10	141	460	
08:00 to 08:15	263	15	18	21	10	227	554	
08:15 to 08:30	385	20	15	28	5	243	696	peak
08:30 to 08:45	319	15	17	14	4	238	607	
08:45 to 09:00	247	20	10	14	7	212	510	
Total	2127	126	123	150	54	1510		
Hourly summary								
07:00 to 08:00	913	56	63	73	28	590	1723	
07:15 to 08:15	966	61	63	79	32	666	1867	
07:30 to 08:30	1145	68	62	90	29	763	2157	
07:45 to 08:45	1214	70	65	90	29	849	2317	
08:00 to 09:00	1214	70	60	77	26	920	2367	peak hour

Curtis Traffic Surveys — **Turning movement count**

180602mcl (18_273)

Day, date: 30/05/18
Location: Allambie Rd & Mortain Av
Weather: Rain
Client: McLaren Traffic Engineering

Allambie Rd

Peak Hour Volumes: 1607 | 352 | 11 | 43 | 602 | 181

N

Mortain Av

From Mortain Av: south / north

Time Period	through	right	left	right	left	through	vehicles	Peak
16:00 to 16:15	68	26	6	2	25	251	378	
16:15 to 16:30	63	45	15	4	45	305	477	
16:30 to 16:45	57	51	9	7	80	462	666	
16:45 to 17:00	81	84	11	3	77	282	538	
17:00 to 17:15	139	43	8	6	88	402	686	
17:15 to 17:30	153	52	15	4	84	362	670	
17:30 to 17:45	145	46	12	0	108	412	723	peak
17:45 to 18:00	165	40	8	1	72	431	717	
18:00 to 18:15	153	38	4	1	50	418	664	
18:15 to 18:30	103	22	5	4	8	353	495	
18:30 to 18:45	102	12	4	3	8	219	348	
18:45 to 19:00	105	15	4	2	6	191	323	
Total	1334	474	101	37	651	4088		
Hourly summary								
16:00 to 17:00	269	206	41	16	227	1300	2059	
16:15 to 17:15	340	223	43	20	290	1451	2367	
16:30 to 17:30	430	230	43	20	329	1508	2560	
16:45 to 17:45	518	225	46	13	357	1458	2617	
17:00 to 18:00	602	181	43	11	352	1607	2796	peak hour
17:15 to 18:15	616	176	39	6	314	1623	2774	
17:30 to 18:30	566	146	29	6	238	1614	2599	
17:45 to 18:45	523	112	21	9	138	1421	2224	
18:00 to 19:00	463	87	17	10	72	1181	1830	

ANNEXURE B: SURVEY DATA
(SHEET 2 OF 2)

Curtis Traffic Surveys

Turning movement count

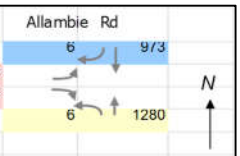
180602mcl (18_273)

Day, date: 31/05/18

Location: Allambie Rd & Martin Luther Pl

Weather: Fine

Client: McLaren Traffic Engineering



Time Period	From Allambie Rd north through	right	From M Luther Pl left	right	From Allambie Rd south left	through	vehicles	Peak
07:00 to 07:15	170	1	1	1	1	218	392	
07:15 to 07:30	168	1	2	2	0	219	392	
07:30 to 07:45	168	0	0	0	4	256	428	
07:45 to 08:00	155	0	0	0	1	264	420	
08:00 to 08:15	239	1	0	3	0	281	524	
08:15 to 08:30	264	0	2	1	0	389	656	peak
08:30 to 08:45	251	3	1	7	2	341	605	
08:45 to 09:00	219	2	2	1	4	269	497	
Total	1634	8	8	15	12	2237		
Hourly summary								
07:00 to 08:00	661	2	3	3	6	957	1632	
07:15 to 08:15	730	2	2	5	5	1020	1764	
07:30 to 08:30	826	1	2	4	5	1190	2028	
07:45 to 08:45	909	4	3	11	3	1275	2205	
08:00 to 09:00	973	6	5	12	6	1280	2282	peak hour

Curtis Traffic Surveys

Turning movement count

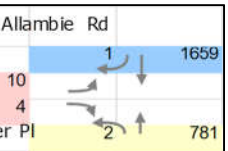
180602mcl (18_273)

Day, date: 30/05/18

Location: Allambie Rd & Martin Luther Pl

Weather: Rain

Client: McLaren Traffic Engineering



Time Period	north through	right	From M Luther Pl left	right	south left	through	vehicles	Peak
16:00 to 16:15	254	4	2	2	1	89	352	
16:15 to 16:30	315	0	5	2	4	101	427	
16:30 to 16:45	451	0	2	0	4	120	577	
16:45 to 17:00	301	0	2	1	3	159	466	
17:00 to 17:15	389	1	1	0	1	191	583	
17:15 to 17:30	384	1	3	2	1	199	590	
17:30 to 17:45	410	0	3	1	0	195	609	
17:45 to 18:00	425	0	2	0	0	198	625	
18:00 to 18:15	440	0	2	1	1	189	633	peak
18:15 to 18:30	368	1	2	2	0	130	503	
18:30 to 18:45	214	0	0	0	1	108	323	
18:45 to 19:00	201	1	0	0	0	112	314	
Total	4152	8	24	11	16	1791		
Hourly summary								
16:00 to 17:00	1321	4	11	5	12	469	1822	
16:15 to 17:15	1456	1	10	3	12	571	2053	
16:30 to 17:30	1525	2	8	3	9	669	2216	
16:45 to 17:45	1484	2	9	4	5	744	2248	
17:00 to 18:00	1608	2	9	3	2	783	2407	
17:15 to 18:15	1659	1	10	4	2	781	2457	peak hour
17:30 to 18:30	1643	1	9	4	1	712	2370	
17:45 to 18:45	1447	1	6	3	2	625	2084	
18:00 to 19:00	1223	2	4	3	2	539	1773	

MOVEMENT SUMMARY

Site: 101 [Allambie/ Martin Luther AM Ex]

Allambie/ Martin Luther
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Allambie Road South												
1	L2	6	0.0	0.660	5.7	LOS A	0.0	0.0	0.00	0.00	0.00	58.1
2	T1	1280	0.0	0.660	0.2	LOS A	0.0	0.0	0.00	0.00	0.00	59.6
Approach		1286	0.0	0.660	0.2	NA	0.0	0.0	0.00	0.00	0.00	59.6
North: Allambie Road North												
8	T1	973	0.0	0.526	1.2	LOS A	1.0	6.8	0.06	0.00	0.09	57.7
9	R2	6	0.0	0.526	40.8	LOS C	1.0	6.8	0.06	0.00	0.09	54.6
Approach		979	0.0	0.526	1.4	NA	1.0	6.8	0.06	0.00	0.09	57.6
West: Martin Luther Place												
10	L2	5	0.0	0.368	40.5	LOS C	1.0	6.7	0.98	1.01	1.08	13.4
12	R2	12	0.0	0.368	116.8	LOS F	1.0	6.7	0.98	1.01	1.08	23.1
Approach		17	0.0	0.368	94.3	LOS F	1.0	6.7	0.98	1.01	1.08	20.3
All Vehicles		2282	0.0	0.660	1.4	NA	1.0	6.8	0.03	0.01	0.05	57.5

MOVEMENT SUMMARY

Site: 101 [Allambie/ Martin Luther PM Ex]

Allambie/ Martin Luther
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Allambie Road South												
1	L2	2	0.0	0.402	5.6	LOS A	0.0	0.0	0.00	0.00	0.00	58.3
2	T1	781	0.0	0.402	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
Approach		783	0.0	0.402	0.1	NA	0.0	0.0	0.00	0.00	0.00	59.9
North: Allambie Road North												
8	T1	1659	0.0	0.852	0.0	LOS A	0.1	0.7	0.01	0.00	0.01	59.9
9	R2	1	0.0	0.852	34.8	LOS C	0.1	0.7	0.01	0.00	0.01	56.6
Approach		1660	0.0	0.852	0.1	NA	0.1	0.7	0.01	0.00	0.01	59.9
West: Martin Luther Place												
10	L2	10	0.0	0.281	24.2	LOS B	0.7	4.9	0.95	1.00	1.02	14.7
12	R2	4	0.0	0.281	226.1	LOS F	0.7	4.9	0.95	1.00	1.02	25.2
Approach		14	0.0	0.281	81.9	LOS F	0.7	4.9	0.95	1.00	1.02	17.7
All Vehicles		2457	0.0	0.852	0.5	NA	0.7	4.9	0.01	0.01	0.01	58.9

MOVEMENT SUMMARY

Site: 101 [Allambie/ Mortain AM Ex]

Allambie Road/ Mortain Avenue
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 60 seconds (Site Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Allambie Road South												
2	T1	1214	0.0	0.990	70.1	LOS E	72.9	510.6	0.86	1.60	1.87	19.9
3	R2	70	0.0	0.250	17.1	LOS B	1.4	9.7	0.67	0.73	0.67	38.8
Approach		1284	0.0	0.990	67.2	LOS E	72.9	510.6	0.85	1.56	1.81	20.5
East: Mortain Avenue												
4	L2	60	0.0	0.738	38.0	LOS C	4.4	30.9	1.00	0.89	1.27	27.8
6	R2	77	0.0	0.738	38.0	LOS C	4.4	30.9	1.00	0.89	1.27	36.2
Approach		137	0.0	0.738	38.0	LOS C	4.4	30.9	1.00	0.89	1.27	33.1
North: Allambie Road North												
7	L2	26	0.0	0.020	8.4	LOS A	0.2	1.6	0.32	0.63	0.32	51.4
8	T1	920	0.0	0.681	5.5	LOS A	15.3	107.2	0.61	0.56	0.61	51.8
Approach		946	0.0	0.681	5.6	LOS A	15.3	107.2	0.61	0.56	0.61	51.8
All Vehicles		2367	0.0	0.990	40.9	LOS C	72.9	510.6	0.76	1.12	1.30	28.0

MOVEMENT SUMMARY

Site: 101 [Allambie/ Mortain PM Ex]

Allambie Road/ Mortain Avenue
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 90 seconds (Site Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Allambie Road South												
2	T1	602	0.0	0.386	2.8	LOS A	7.5	52.6	0.31	0.28	0.31	55.6
3	R2	181	0.0	2.057	1936.4	LOS F	84.9	594.1	1.00	4.13	11.46	1.0
Approach		783	0.0	2.057	449.7	LOS F	84.9	594.1	0.47	1.17	2.89	4.3
East: Mortain Avenue												
4	L2	43	0.0	0.436	52.4	LOS D	2.5	17.2	1.00	0.74	1.00	23.4
6	R2	11	0.0	0.436	52.3	LOS D	2.5	17.2	1.00	0.74	1.00	31.7
Approach		54	0.0	0.436	52.4	LOS D	2.5	17.2	1.00	0.74	1.00	25.4
North: Allambie Road North												
7	L2	352	0.0	0.237	7.9	LOS A	3.7	26.2	0.26	0.66	0.26	51.8
8	T1	1607	0.0	1.192	389.0	LOS F	315.6	2209.2	1.00	3.69	4.45	4.9
Approach		1959	0.0	1.192	320.6	LOS F	315.6	2209.2	0.87	3.15	3.70	6.6
All Vehicles		2796	0.0	2.057	351.6	LOS F	315.6	2209.2	0.76	2.55	3.42	5.8

MOVEMENT SUMMARY

Site: 101 [Allambie/ Martin Luther AM Fut]

Allambie/ Martin Luther
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Allambie Road South												
1	L2	7	0.0	0.660	5.7	LOS A	0.0	0.0	0.00	0.00	0.00	58.1
2	T1	1280	0.0	0.660	0.2	LOS A	0.0	0.0	0.00	0.00	0.00	59.6
Approach		1287	0.0	0.660	0.2	NA	0.0	0.0	0.00	0.00	0.00	59.6
North: Allambie Road North												
8	T1	973	0.0	0.531	1.4	LOS A	1.1	8.0	0.08	0.00	0.10	57.3
9	R2	7	0.0	0.531	40.9	LOS C	1.1	8.0	0.08	0.00	0.10	54.3
Approach		980	0.0	0.531	1.7	NA	1.1	8.0	0.08	0.00	0.10	57.2
West: Martin Luther Place												
10	L2	9	0.0	0.503	52.5	LOS D	1.4	9.6	0.98	1.03	1.16	12.8
12	R2	16	0.0	0.503	130.2	LOS F	1.4	9.6	0.98	1.03	1.16	22.0
Approach		25	0.0	0.503	102.2	LOS F	1.4	9.6	0.98	1.03	1.16	18.7
All Vehicles		2292	0.0	0.660	1.9	NA	1.4	9.6	0.04	0.02	0.06	56.6

MOVEMENT SUMMARY

Site: 101 [Allambie/ Martin Luther PM Fut]

Allambie/ Martin Luther
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Allambie Road South												
1	L2	6	0.0	0.404	5.6	LOS A	0.0	0.0	0.00	0.00	0.00	58.2
2	T1	781	0.0	0.404	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.8
Approach		787	0.0	0.404	0.1	NA	0.0	0.0	0.00	0.00	0.00	59.8
North: Allambie Road North												
8	T1	1659	0.0	0.858	0.2	LOS A	0.6	3.9	0.04	0.00	0.05	59.4
9	R2	5	0.0	0.858	35.6	LOS C	0.6	3.9	0.04	0.00	0.05	56.2
Approach		1664	0.0	0.858	0.3	NA	0.6	3.9	0.04	0.00	0.05	59.4
West: Martin Luther Place												
10	L2	11	0.0	0.357	37.2	LOS C	0.9	6.4	0.96	1.01	1.07	12.8
12	R2	5	0.0	0.357	244.8	LOS F	0.9	6.4	0.96	1.01	1.07	22.1
Approach		16	0.0	0.357	102.1	LOS F	0.9	6.4	0.96	1.01	1.07	15.8
All Vehicles		2467	0.0	0.858	0.9	NA	0.9	6.4	0.03	0.01	0.04	58.2

MOVEMENT SUMMARY

Site: 101 [Allambie/ Mortain AM Fut]

Allambie Road/ Mortain Avenue
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 65 seconds (Site Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Allambie Road South												
2	T1	1218	0.0	0.991	71.9	LOS F	76.1	532.8	0.85	1.54	1.79	19.6
3	R2	70	0.0	0.253	17.6	LOS B	1.5	10.3	0.66	0.73	0.66	38.5
Approach		1288	0.0	0.991	69.0	LOS E	76.1	532.8	0.84	1.49	1.73	20.1
East: Mortain Avenue												
4	L2	60	0.0	0.685	39.0	LOS C	4.6	32.4	1.00	0.85	1.16	27.4
6	R2	77	0.0	0.685	39.0	LOS C	4.6	32.4	1.00	0.85	1.16	35.8
Approach		137	0.0	0.685	39.0	LOS C	4.6	32.4	1.00	0.85	1.16	32.7
North: Allambie Road North												
7	L2	26	0.0	0.020	8.5	LOS A	0.2	1.7	0.31	0.63	0.31	51.4
8	T1	921	0.0	0.675	5.7	LOS A	16.2	113.1	0.60	0.55	0.60	51.6
Approach		947	0.0	0.675	5.7	LOS A	16.2	113.1	0.59	0.55	0.59	51.6
All Vehicles		2372	0.0	0.991	42.0	LOS C	76.1	532.8	0.75	1.08	1.24	27.6

MOVEMENT SUMMARY

Site: 101 [Allambie/ Mortain PM Fut]

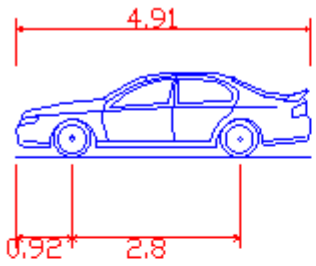
Allambie Road/ Mortain Avenue
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 90 seconds (Site Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Allambie Road South												
2	T1	603	0.0	0.387	2.8	LOS A	7.5	52.7	0.31	0.28	0.31	55.6
3	R2	181	0.0	2.057	1936.4	LOS F	84.9	594.1	1.00	4.13	11.46	1.0
Approach		784	0.0	2.057	449.2	LOS F	84.9	594.1	0.47	1.17	2.89	4.3
East: Mortain Avenue												
4	L2	43	0.0	0.436	52.4	LOS D	2.5	17.2	1.00	0.74	1.00	23.4
6	R2	11	0.0	0.436	52.3	LOS D	2.5	17.2	1.00	0.74	1.00	31.7
Approach		54	0.0	0.436	52.4	LOS D	2.5	17.2	1.00	0.74	1.00	25.4
North: Allambie Road North												
7	L2	352	0.0	0.237	7.9	LOS A	3.7	26.2	0.26	0.66	0.26	51.8
8	T1	1611	0.0	1.192	389.9	LOS F	316.8	2217.5	1.00	3.70	4.46	4.9
Approach		1963	0.0	1.192	321.4	LOS F	316.8	2217.5	0.87	3.15	3.70	6.5
All Vehicles		2801	0.0	2.057	352.0	LOS F	316.8	2217.5	0.76	2.55	3.42	5.8

ANNEXURE D: SWEPT PATH TESTING

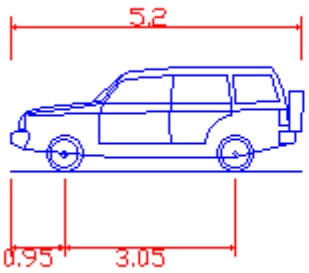
(Sheet 1 of 11)



B85 Vehicle (Realistic min radius) (2004)

Overall Length	4.910m
Overall Width	1.870m
Overall Body Height	1.421m
Min Body Ground Clearance	0.159m
Track Width	1.770m
Lock-to-lock time	4.00s
Curb to Curb Turning Radius	5.750m

Australian 85th Percentile sized Light Vehicle (in accordance with AS2890.1:2004)



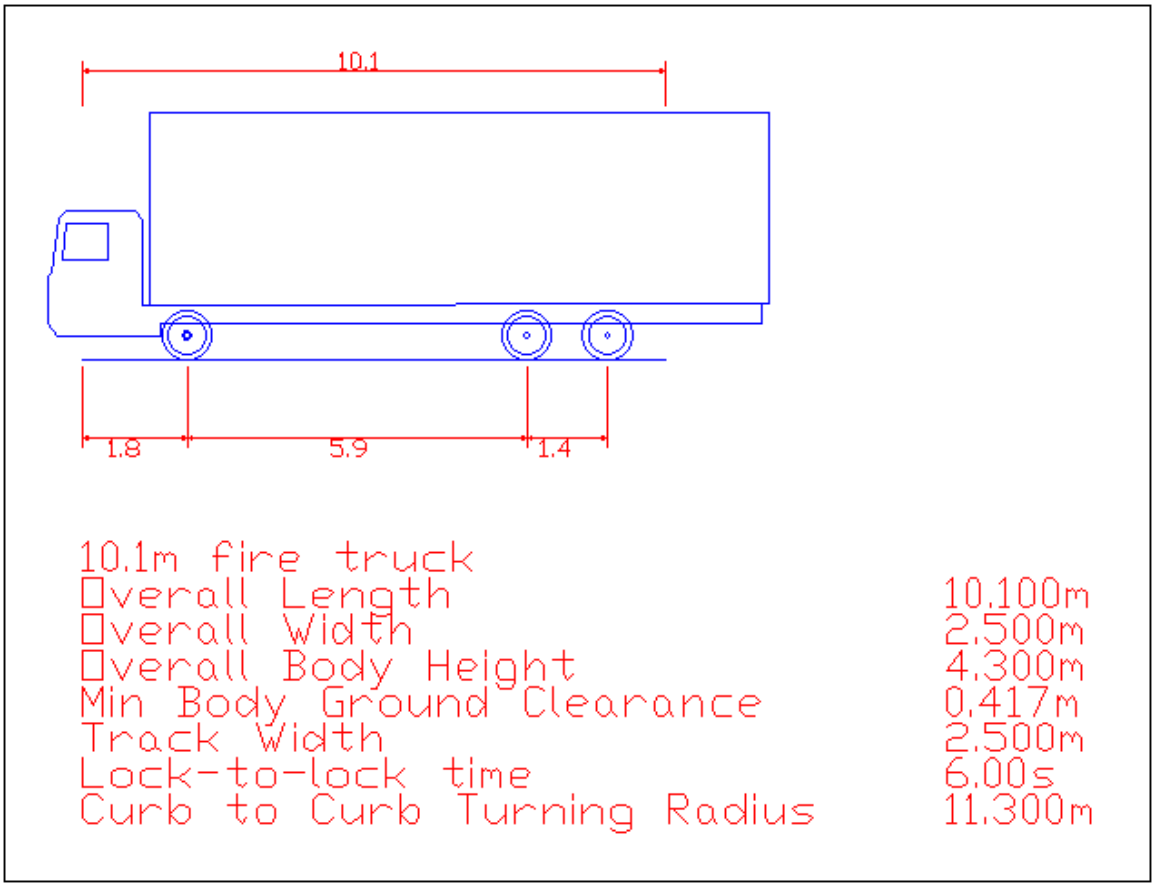
B99 Vehicle (Realistic min radius) (2004)

Overall Length	5.200m
Overall Width	1.940m
Overall Body Height	1.878m
Min Body Ground Clearance	0.272m
Track Width	1.840m
Lock-to-lock time	4.00s
Curb to Curb Turning Radius	6.250m

Australian 99th Percentile sized Light Vehicle (in accordance with AS2890.1:2004)

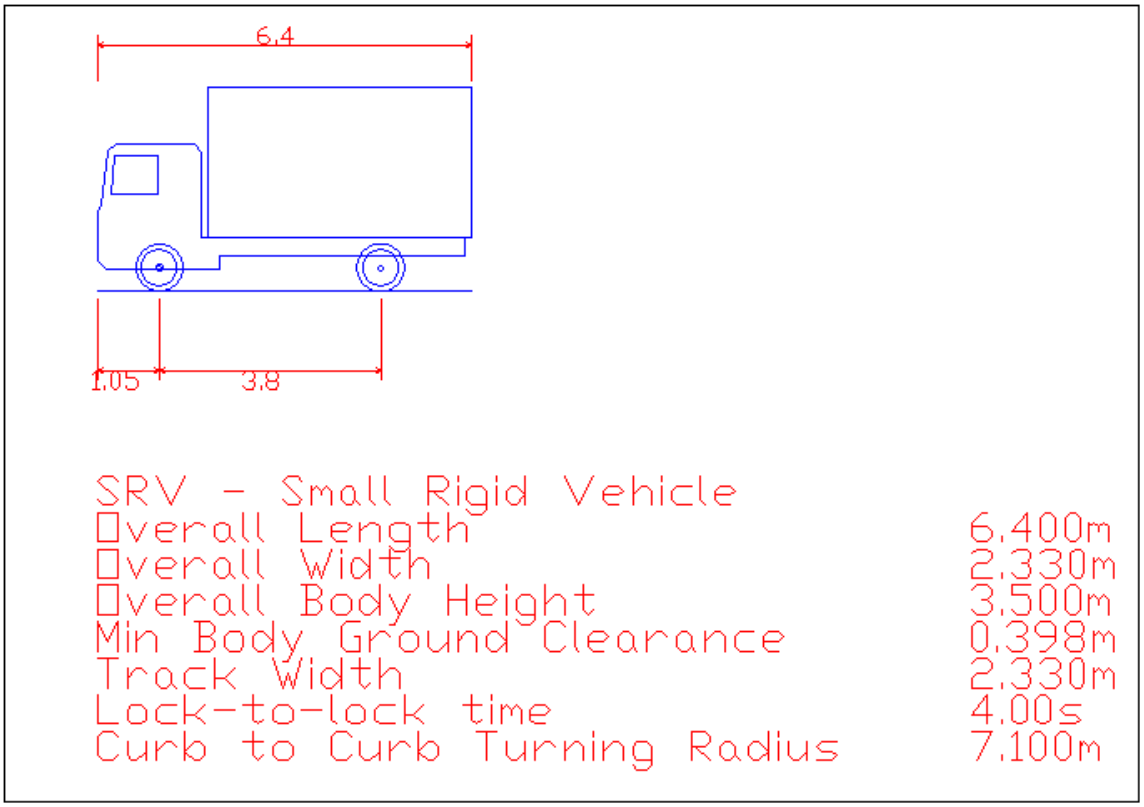
ANNEXURE D: SWEPT PATH TESTING

(Sheet 2 of 11)

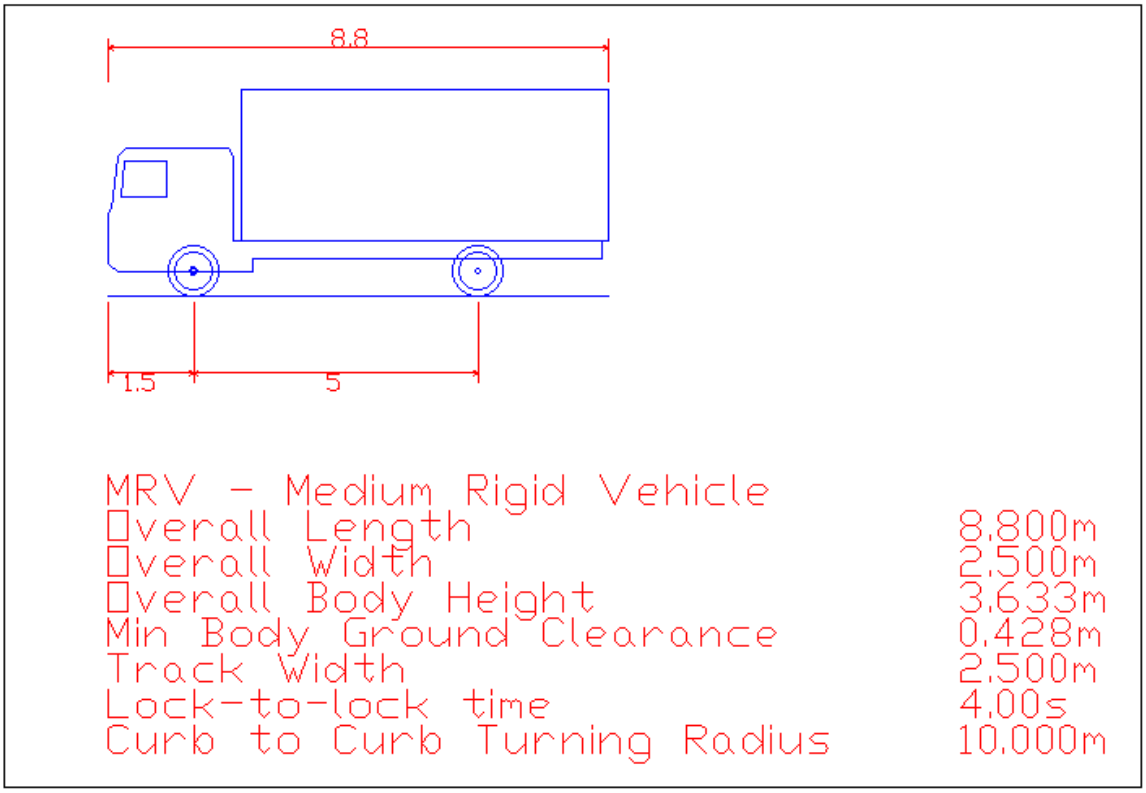


10.1m length truck representative of a General Appliance vehicle

(Based upon a 12.5m Heavy Rigid Vehicle as controlled by AS2890.2:2002, with details from the *NSW Fire Brigades Guidelines for Emergency Vehicle Access Policy No. 4 Version 02* dated 27th October 2010 included.)



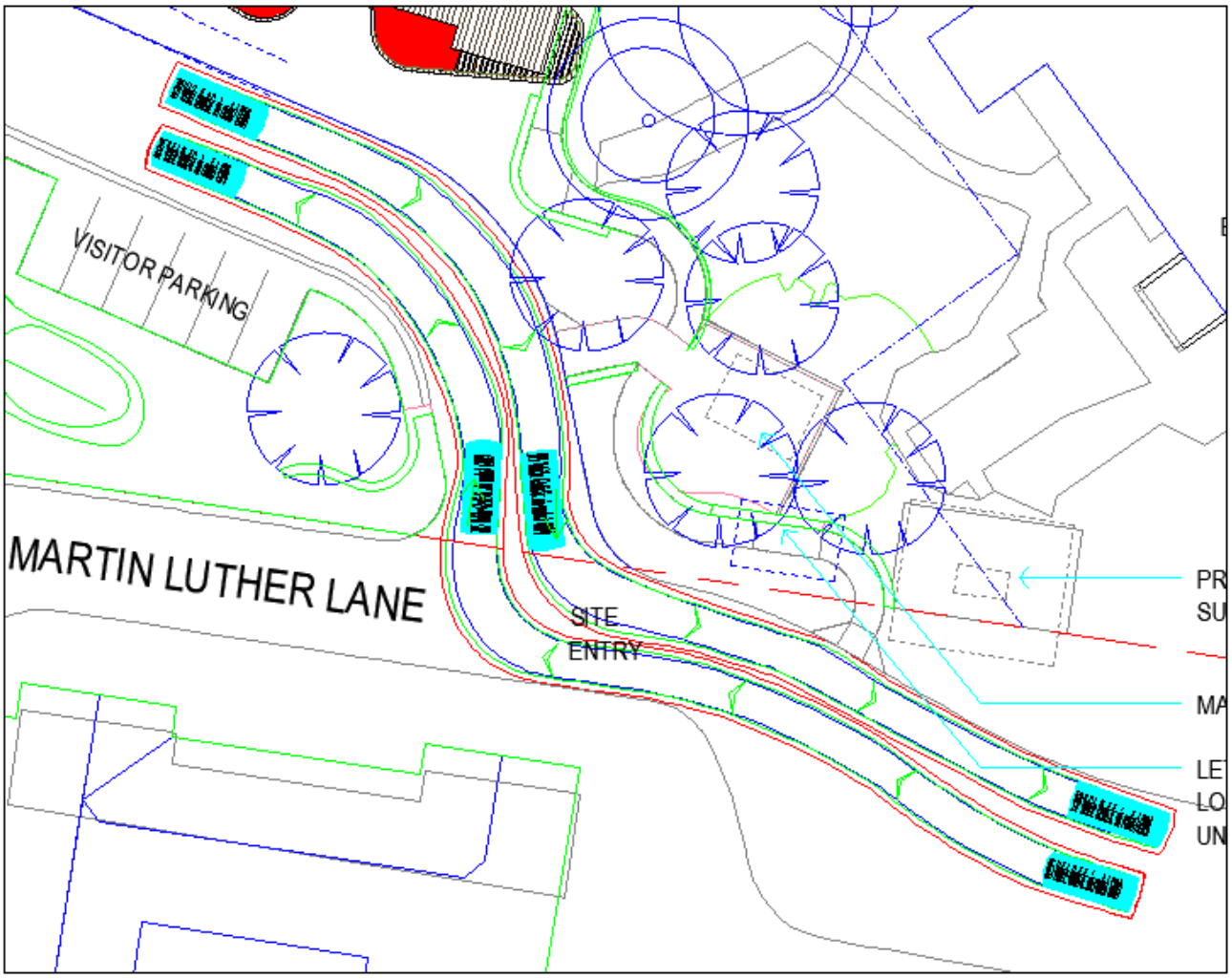
Small Rigid Vehicle (SRV)



Medium Rigid Vehicle (MRV)

ANNEXURE D: SWEPT PATH TESTING

(Sheet 4 of 11)

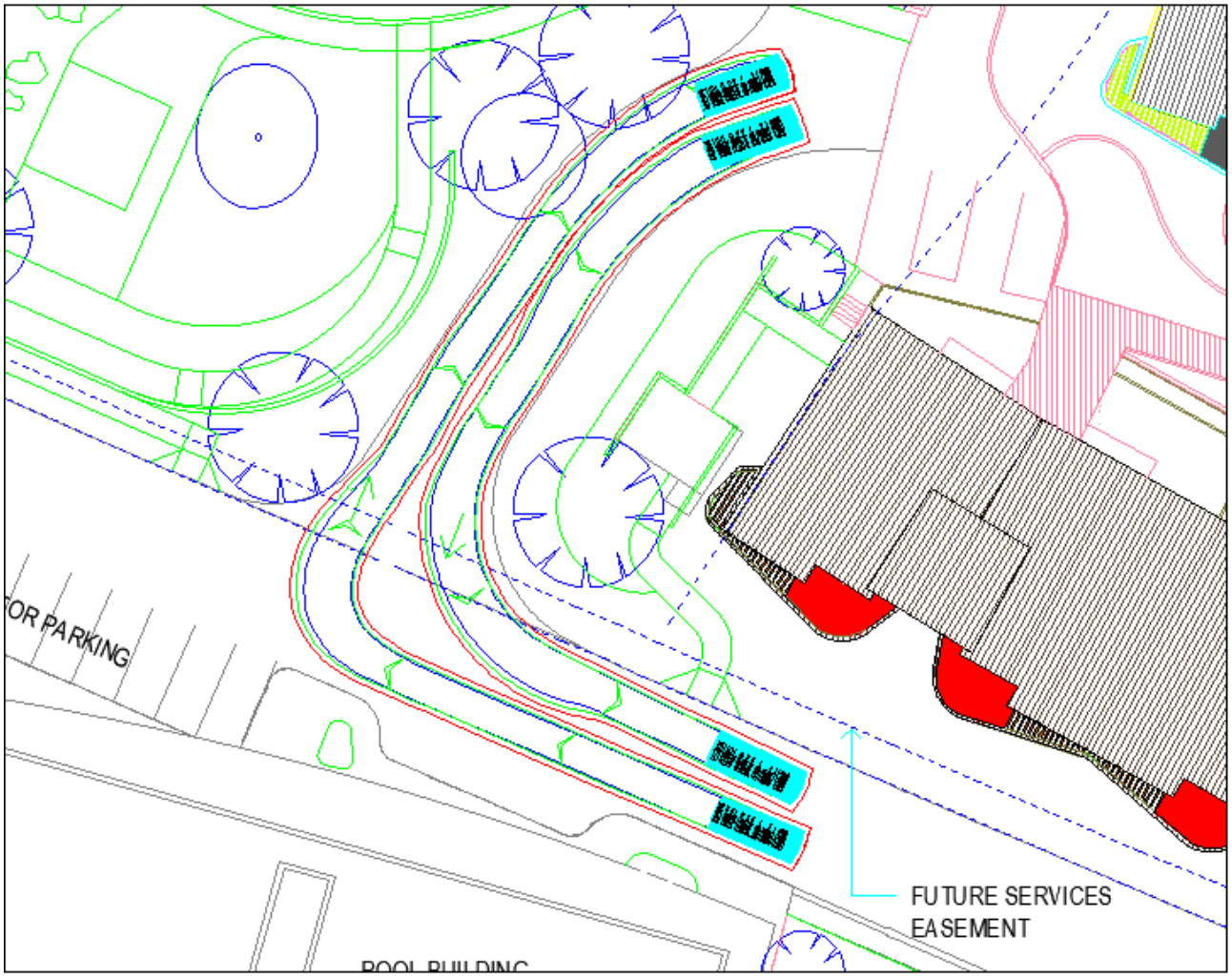


B85 passing B99 at intersection of Martin Luther Lane / Site Access Lane
Tested @ 10km/h
Successful

Blue – Vehicle Tyre
Green – Vehicle Body
Red – 300mm clearance

ANNEXURE D: SWEPT PATH TESTING

(Sheet 5 of 11)

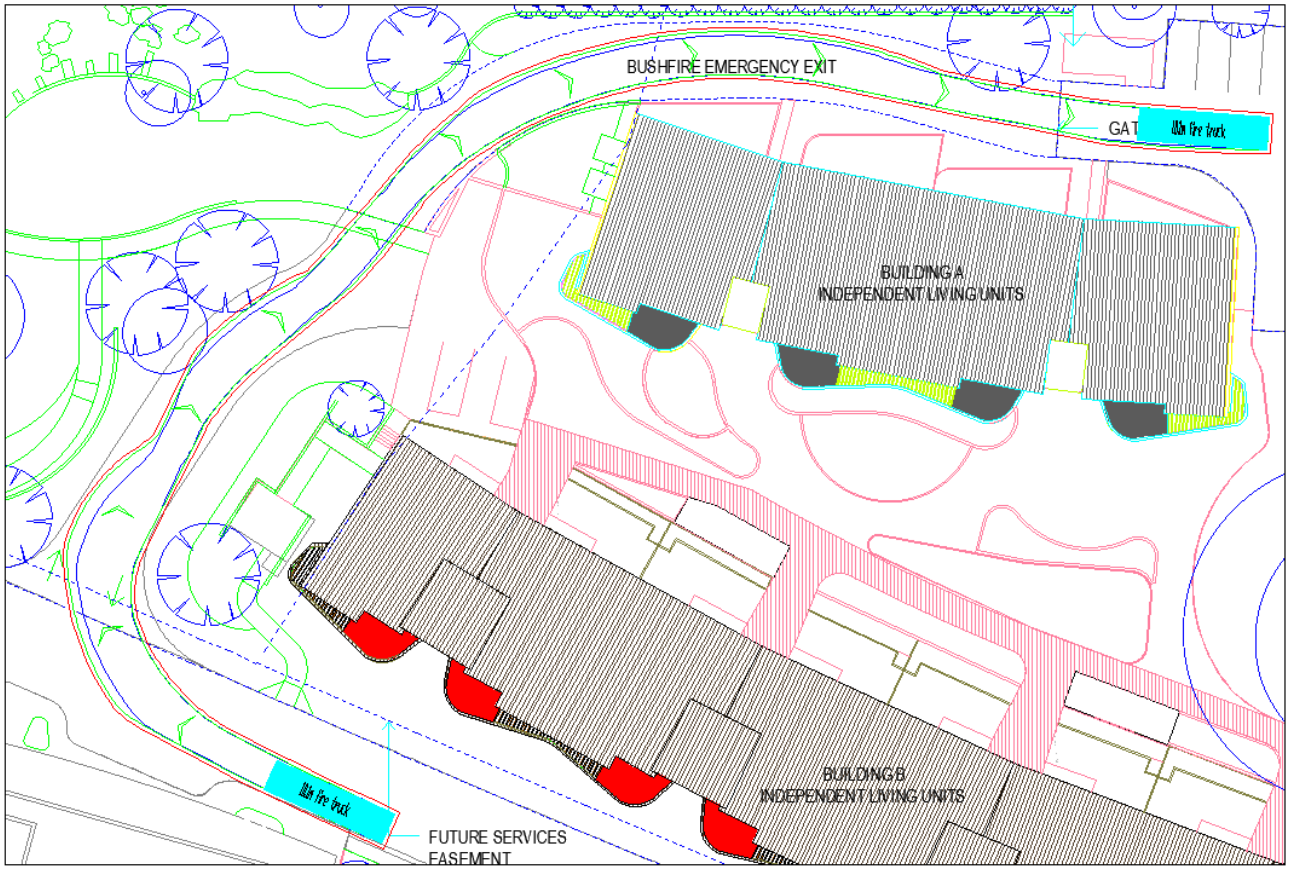


B85 passing B99 at intersection of Site Access Lane / Site Driveway
Tested @ 10km/h
Successful

Blue – Vehicle Tyre
Green – Vehicle Body
Red – 300mm clearance

ANNEXURE D: SWEPT PATH TESTING

(Sheet 6 of 11)

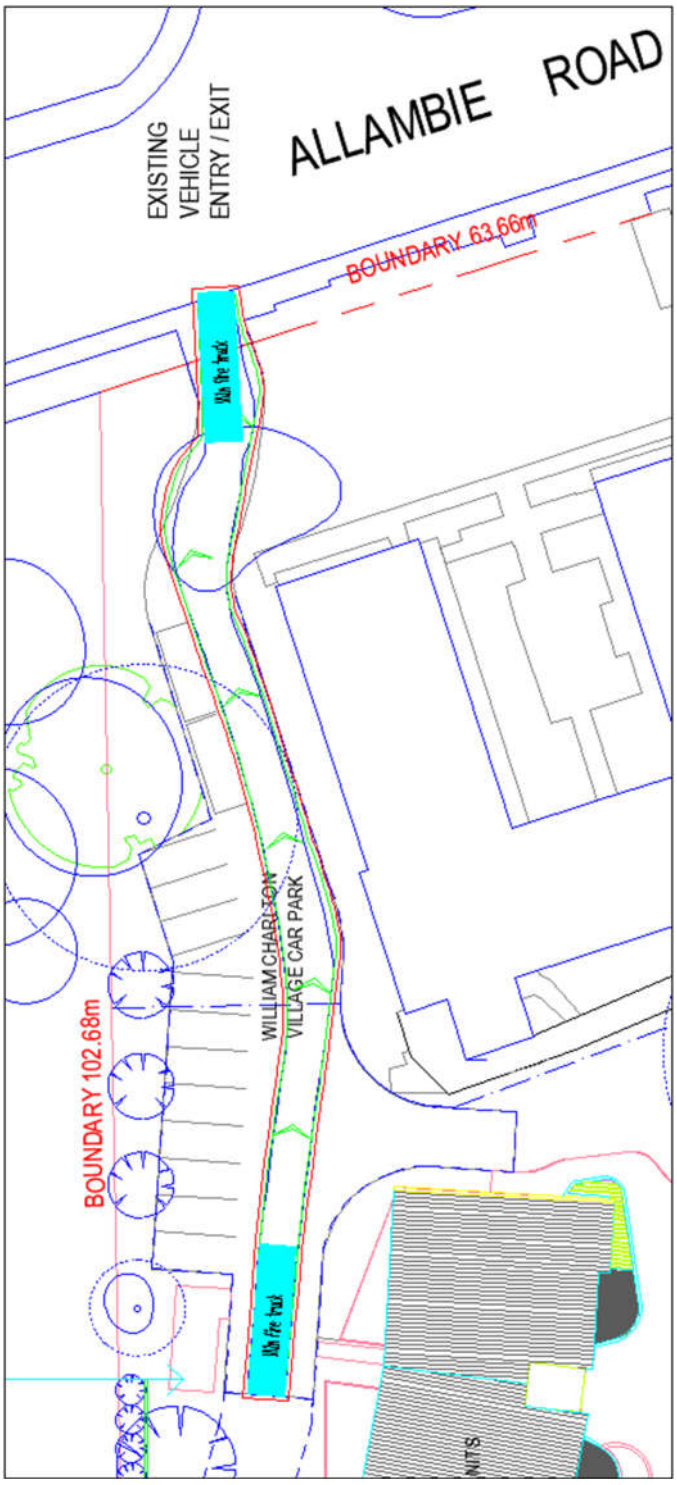


10.1m General Appliance EXIT along bushfire emergency egress road
Tested @ 5km/h
Successful

Blue – Vehicle Tyre
Green – Vehicle Body
Red – 300mm clearance

ANNEXURE D: SWEPT PATH TESTING

(Sheet 7 of 11)

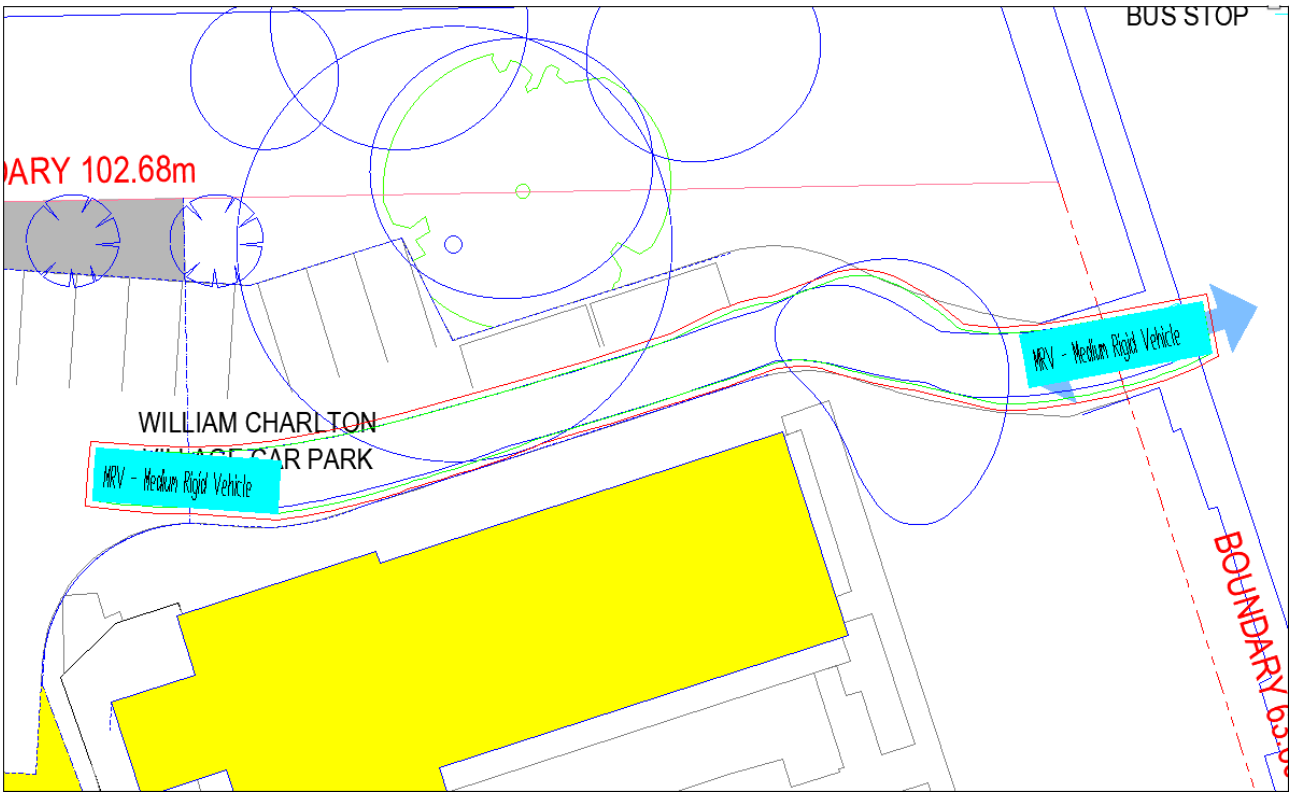


10.1m General Appliance EXIT along William Charlton Village roadway
Tested @ 5km/h
Successful

Blue – Vehicle Tyre
Green – Vehicle Body
Red – 300mm clearance

ANNEXURE D: SWEPT PATH TESTING

(Sheet 8 of 11)

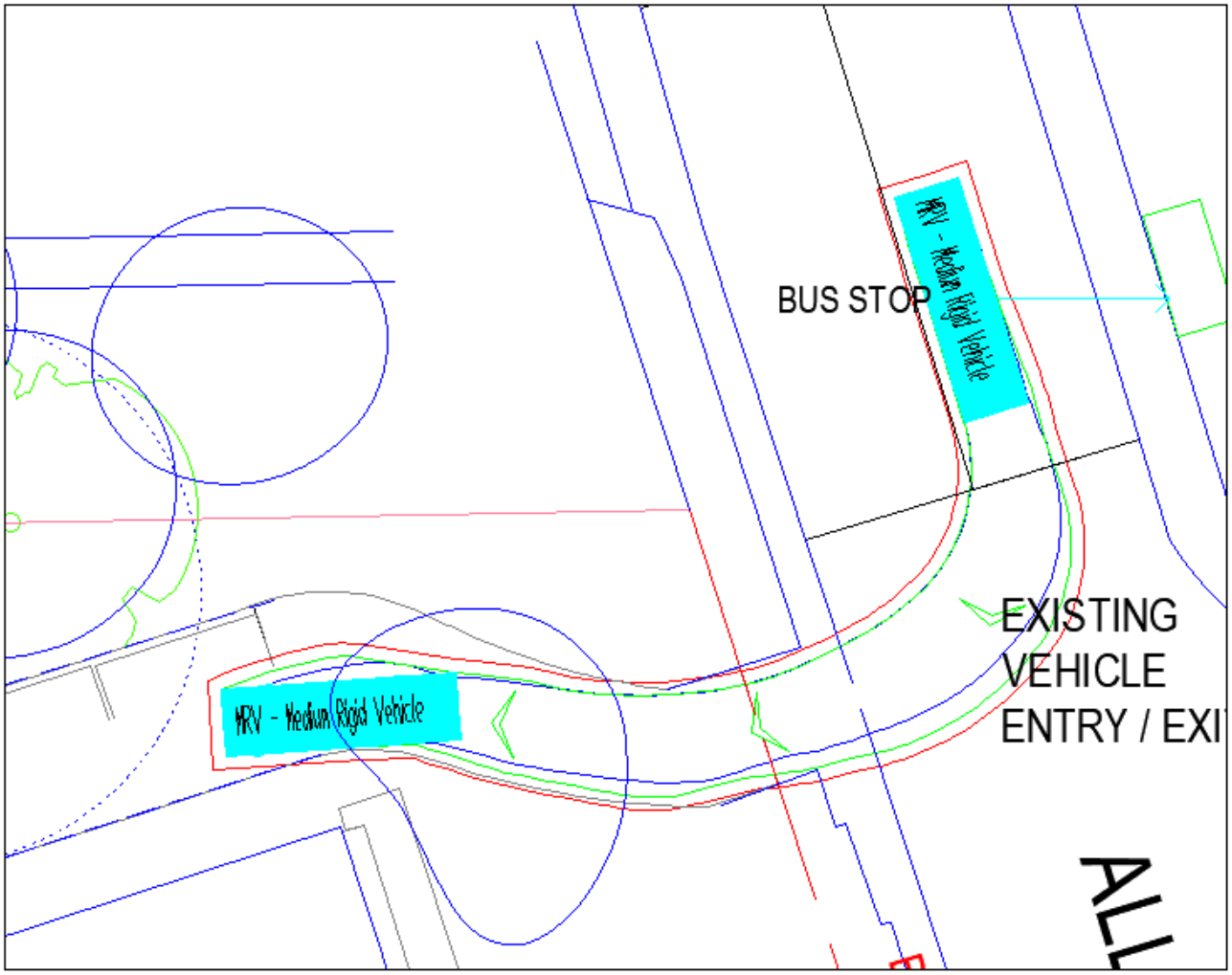


MRV EXIT along William Charlton Village roadway
Tested @ 5km/h
Successful

Blue – Vehicle Tyre
Green – Vehicle Body
Red – 300mm clearance

ANNEXURE D: SWEPT PATH TESTING

(Sheet 9 of 11)

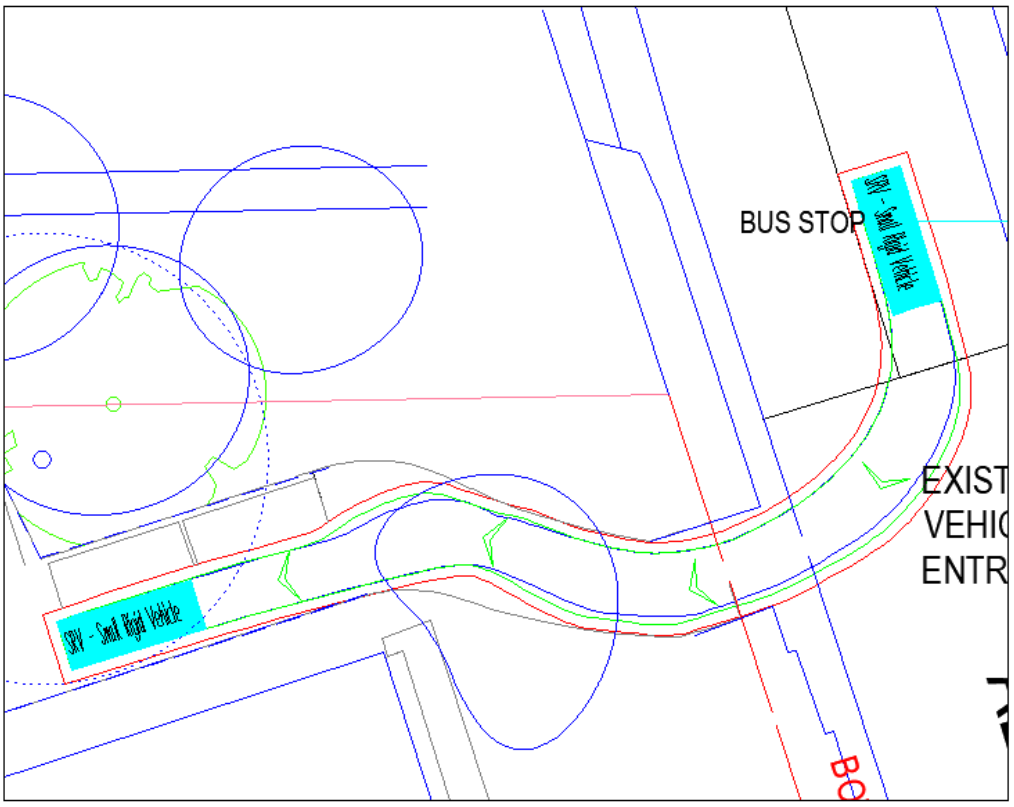


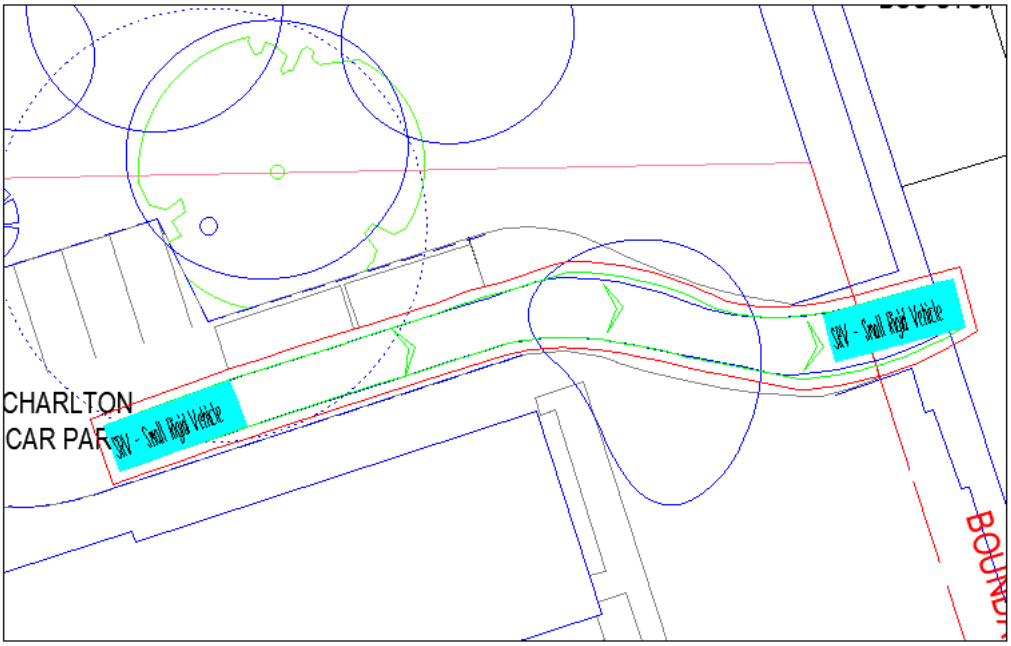
MRV Entry – William Charlton Village driveway
Tested @ 5km/h internally, 10km/hr on-road
Unsuccessful

Blue – Vehicle Tyre
Green – Vehicle Body
Red – 500mm clearance

ANNEXURE D: SWEPT PATH TESTING

(Sheet 10 of 11)





SRV Entry - William Charlton Village driveway
Tested @ 5km/h internally, 10km/hr on-road
Successful

Blue – Vehicle Tyre
Green – Vehicle Body
Red – 500mm clearance

ANNEXURE D: SWEPT PATH TESTING

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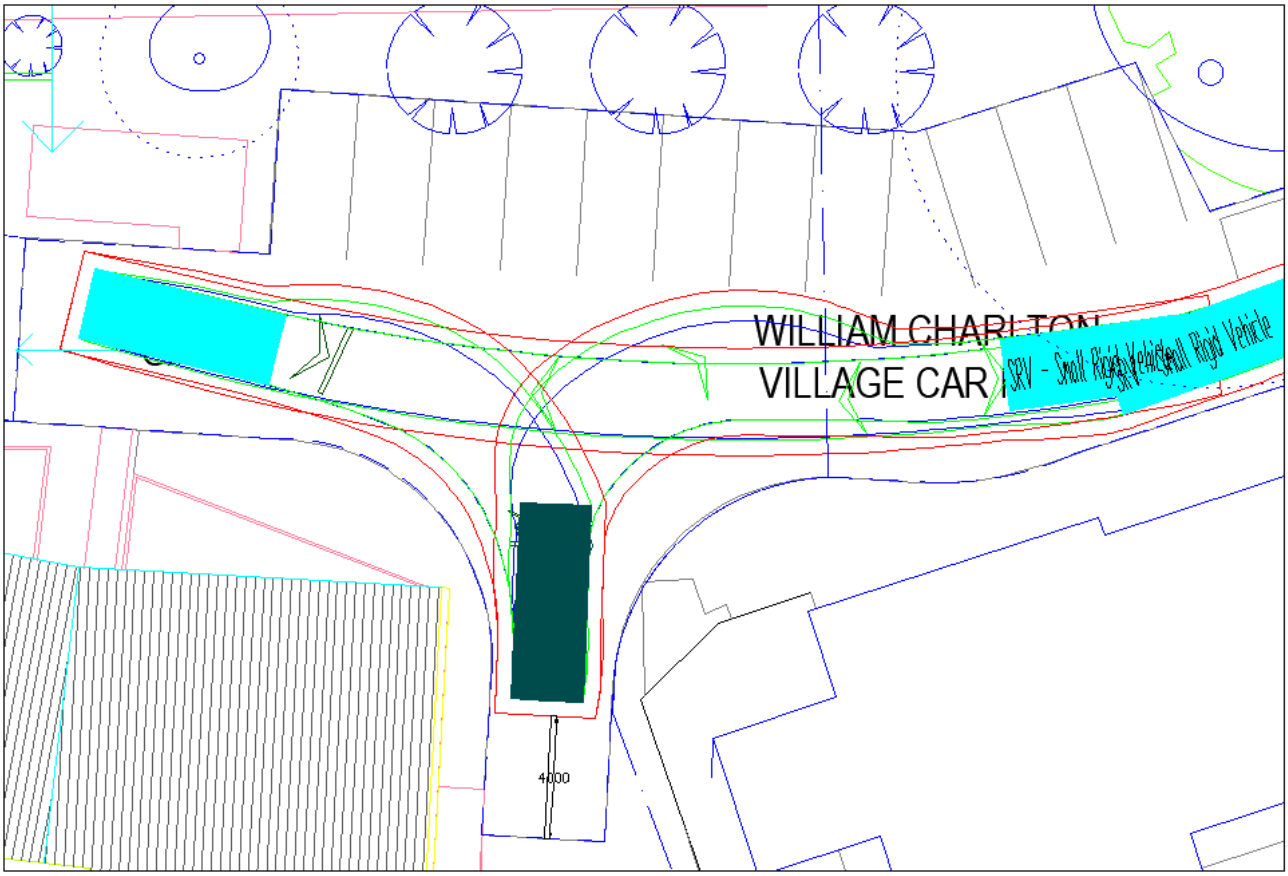

SRV Loading and Manoeuvring
Tested @ 5km/h internally
Total of 3 Manoeuvres
Successful

Blue – Vehicle Tyre
Green – Vehicle Body
Red – 500mm clearance

Note: The turning bay could potentially be reduced by up to a maximum of 4.0m in length

ANNEXURE E: STOP SIGN CONCEPT