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

21st November 2019

Reference: 190746.01FA

Jacobs
Level 7, 177 Pacific Highway
North Sydney, NSW 2060
Attention: Stevens Myall

PEER REVIEW OF THE TRAFFIC AND PARKING ASSESSMENT OF THE PROPOSED MIXED USE DEVELOPMENT AT 187 - 203 PEATS FERRY ROAD

Dear Stevens,

Reference is made to your request to provide a Peer Review for the Proposed Mixed Use Development at 187 - 203 Peats Ferry Road.

M^CLaren Traffic Engineering (MTE) has undertaken a review of the *Jacobs Traffic and Transport Impact Assessment* dated 14th November 2019, referred to as the JTP Report in relation to 187 – 203 Peats Ferry Road. The documents provided as part of this peer review are outlined below:

- Jacobs Traffic and Transport Impact Assessment dated 14th November 2019.
- SIDRA outputs as provided by Jacobs.
- Sidra files as provided by Jacobs.
- Architectural Plans prepared by Turner Studio provided by Jacobs on the 15th of November 2019.
- TCS plans for the signalised intersections of Edgeworth David Avenue / Pacific Highway / George Street / Peats Ferry Road, Peats Ferry Road / William Street / Station Street and Coronation Street / Peats Ferry Road.

The relevant plans are reproduced in **Annexure A** and the JTR Report in **Annexure B**.

This peer review focuses on the analysis of the proposed development within the JTP Report, with consideration to traffic, parking and statutory controls applicable to mixed use developments outlined in the Hornsby Shire Council Development Control Plan (DCP) for the proposed development at 187 – 203 Peats Ferry Road.

The findings of this peer review are provided in **Section 2** are arranged to match the structure of the JTP Report and are proceeded by a general outline of the proposal.

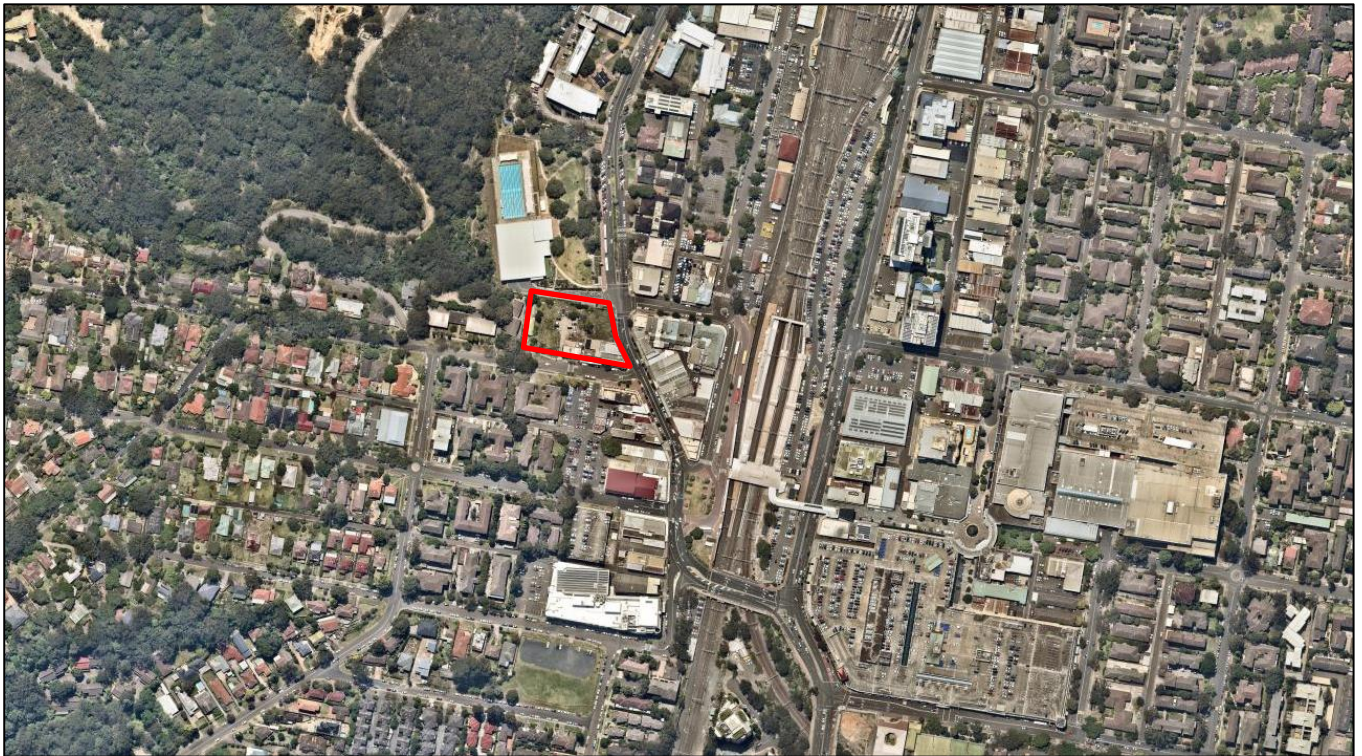
1 Outline of Existing Premises and Proposed Development

The proposed development includes the demolition of existing structures consisting of commercial and retail uses and the construction of a mixed-use development consisting of two residential buildings, retail shops, commercial offices, child care centre and a shopping centre. The location of the site is depicted on aerial imagery and a street map in **Figure 1** and **Figure 2** respectively.

The JTP Report indicates that the existing site has the following scale:

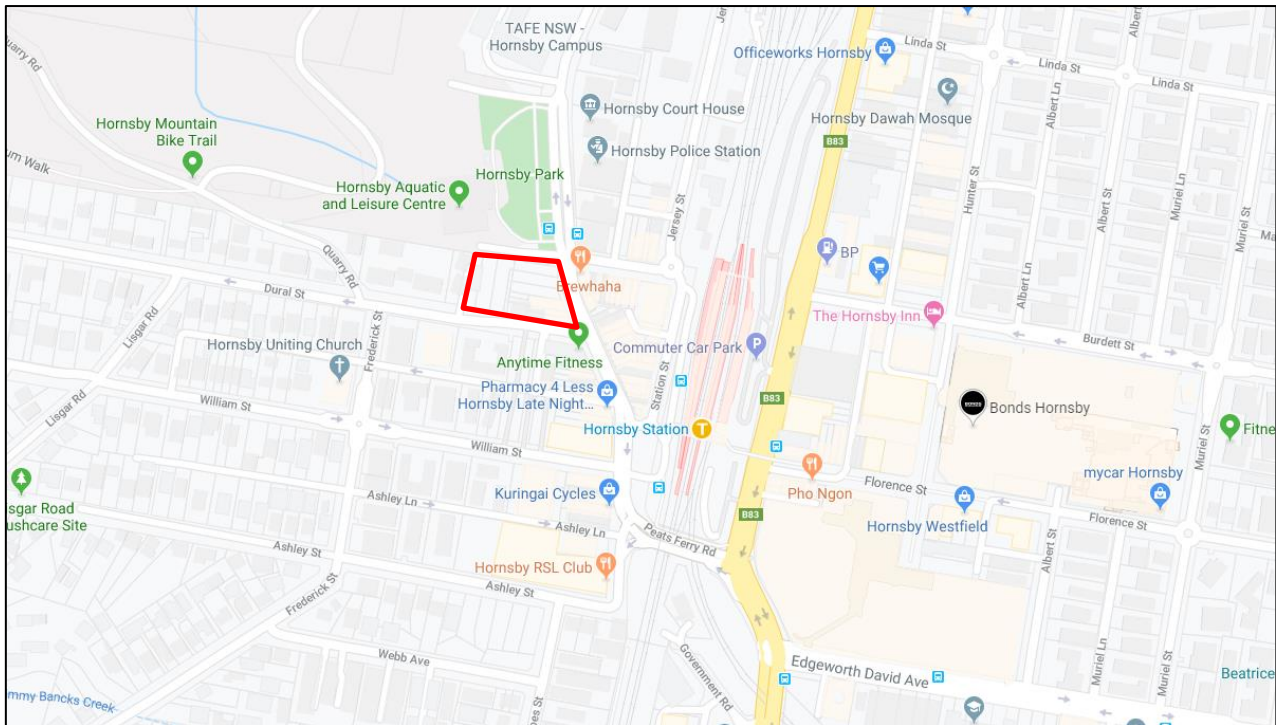
- Restaurant with a 180m² of land, opening between 12:00pm to 2:30pm and 5:00pm to 9:30pm.
- Retails building with a floor area of 1,500m² on two floors (grocery, convenience shop, hairdresser, travel agency, solicitors office, property agent offices).

It should be noted that no floor plans or detailed information, including the number of existing car parking spaces on-site has been provided with regards to the existing uses on-site.



— Site Location

FIGURE 1: SITE CONTEXT – AERIAL IMAGE



■ Site Location

FIGURE 2: SITE CONTEXT - STREET MAP

The detailed scale of the proposed development, relevant to this peer review is outlined below:

- 191 dwellings units with the following unit split:
 - 58 x one-bedroom apartments;
 - 112 x two-bedroom apartments; and
 - 21 x three-bedroom apartments.
- Childcare Centre as per the following:
 - 30 Children.
- Retail shops with a GFA of 3,423m² split between the following uses:
 - 1,543m² GFA supermarket;
 - 1,880m² GFA retail speciality shops.
- Commercial office with a GFA of 2,136m² GFA.

2 Findings of Peer Review of JTP Report

2.1 Existing Land Use and Traffic Generation

- 2.1.1 The JTP states that the adopted traffic generating rates used were from the RTA Guide to Traffic Generating Developments (RMS Guide) for slow trade speciality shops, but does not provide the direct quote from the RMS Guide.
- 2.1.2 Based upon the RMS Guide, the restaurant is expected to generate 5 vehicle trips per 100m² GFA, which is adopted in the JTP Report (Table 2.2).
- 2.1.3 Based upon the RMS Guide, slow trade shops are expected to generate 2 vehicle trips per 100m² GLFA on Thursday and 1.1 vehicle trips per 100m² GLFA on Friday. This is contrary to the adopted rate of 2.2 trips per 100m² GLFA during the PM peak hour period in the JTP Report (Table 2.2).
- 2.1.4 The RMS Guide does not outline traffic generating rates during AM peak hour periods, as such it is not known how the AM peak hour rate has been derived (shown to be 1.1 per 100m² GLFA in the JTP Report).
- 2.1.5 No assessment of the existing car parking requirements has been undertaken for the existing use of the site. Noting that it is highly likely that the parking demand of the site is not fully contained wholly on the existing site. This would mean that the existing development traffic impact is not fully occurring at the site driveway, but rather within the town centre.
- 2.1.6 No existing surveys of the site driveway have been undertaken to validate Jacobs adopted existing traffic generation of the site. This is required to be undertaken if any discount is to be given to the existing use within the surveyed road network.
- 2.1.7 The GLFA has been assumed to be 75% of the GFA. This should be validated and not just assumed. The architect should provide the GLFA.

2.2 Existing Traffic Volumes

- 2.2.1 The JTP Report gathers data on Tuesday the 31st of October 2017. Considering that the proposal is for a supermarket and specialty retail shops, survey data should have been gathered on a Thursday. Typically shopping centre / supermarkets have higher traffic generation rates on Thursday nights due to extended operating hours (late night shopping).
- 2.2.2 The JTP Report gives no consideration to existing traffic flows on weekends. Retail specialty shops generate almost double the vehicle trips on a weekend compared to weekdays based upon the *Guide to Traffic Generating Developments 2002*. Considering the site has a large portion of specialty retail shops floor space, consideration should be made to modelling the weekend traffic impact.
- 2.2.3 It is not known if the results of the survey data take into consideration any residual queues.
- 2.2.4 No assessment has been carried out outside of peak commuter periods, when vehicles have the ability to turn right into Dural Road from Peaks Ferry Road or when parking restrictions do not apply along Dural Street.

2.3 Turn Restrictions

- 2.3.1 The JTP Report outlines that in the existing conditions there are turn restrictions at the intersection of Dural Street and Dural Lane with Peats Ferry Road, where vehicles are disobeying the signposted turn restrictions.
- 2.3.2 Considering the access arrangements of the site and the expected traffic generation of the site, the illegal right turns can be expected to increase if no design changes are

implemented.

- 2.3.3 Peats Ferry Road is a single lane southbound, with no dedicated turning lanes provided to enter either Dural Street or Dural Lane. Any vehicle turning right into Dural Street or Dural Lane will block the through lane and result in queuing of the through movement if there are following vehicles. This can potentially queue back to the signalised intersection, affecting the operations of the signalised intersection of Coronation Street / Peats Ferry Road and therefore reducing the traffic flow efficiency of the entire corridor.

2.4 Car Parking Provision

- 2.4.1 The adopted car parking rates as shown in Table 3.1 of JTP Report are based upon the rates in *Hornsby Shire Council DCP Part 1 - General* which is the relevant planning control. It is also noted that the RMS Guide high residential density parking rates are the same as the *Hornsby Shire Council's DCP* requirements.
- 2.4.2 The loading parking rate outlined within Table 3.1 of JTP Report does not appear to relate to any Hornsby Shire Council DCP control. No justification has been provided for the variation to the stated required delivery parking spaces.
- 2.4.3 The development requires the provision of 10% of units to be adaptable as per the DCP requirement. This results in the requirement for 19.1 adaptable units (rounded to 19). Under the DCP each adaptable unit should be provided a disabled car parking space as per AS2890.6:2009 design requirements. Table 3.2 of JTP Report indicates that only 13 disabled car parking spaces have been provided which is a shortfall of six (6) disabled spaces for the residential component of the site.
- 2.4.4 The provision of 10 disabled car parking spaces for the supermarket component greatly exceeds the DCP car parking requirement.
- 2.4.5 The number of bicycle spaces that can be provided within the bicycle parking area should be shown on the plans, rather than stating how many bicycle spaces can be provided.

2.5 Design of Car Parking Areas

- 2.5.1 As stated above no justification has been provided for the variation to the specified number of parking spaces required for loading for the development.
- 2.5.2 The JTP Report indicates that a maximum of a 12.5m length Heavy Rigid Vehicle will be used for deliveries, but Figure 3.2 clearly shows at least a 15.5m length Vehicle using the loading area.
- 2.5.3 The haulage route for the delivery vehicle is stated to be right in, right out. This promotes delivery vehicles going through residential areas which is typically not supported by Council's due to residential amenity considerations. It is recommended that the design of the delivery area be designed so to ensure that delivery vehicles do not travel through residential areas.
- 2.5.4 The swept paths undertaken for delivery vehicle movements into and out of the development have not been undertaken with any vehicle clearances shown. Swept path testing should be undertaken showing vehicle clearance (0.5m vehicle clearance for heavy vehicles and 0.3m clearance for passenger vehicles). These clearances should be provided to parked vehicles. The following are relevant to note with respect to the swept paths undertaken:
- The 12.5m length Heavy Rigid vehicle turning right into Dural Road encroaches into the parking lane along Peats Ferry Road;

- The right turning 12.5m length Heavy Rigid from Peats Ferry Road travels over the centreline of Dural Street which is unacceptable;
 - The statement that the left turning HRV into Peats Ferry Road is legal is simply incorrect. The swept paths clearly show that it is impossible for a 12.5m length Heavy Rigid Vehicle to turn left onto Peats Ferry Road;
 - Clearance at intersection on public roads should comply with the requirements in *Austroad Design Vehicle and Turning path Templates Guide 2013*;
 - The left turn movement from William Street onto Peats Ferry Road is not successful. The swept path clearly cuts the corner of the road;
 - The 12.5m length HRV is unsuccessful turning left onto Frederick Street from Dural Street. The HRV is required to travel on the other side of the carriageway.
- 2.5.5 The internal swept paths of the basement car parking areas are unsuccessful with the following relevant to note:
- The entry and exit swept paths do have any vehicle clearance in accordance with AS2890.1:2004 requirements (Figure 3.6 of JTP Report);
 - The swept paths in Basement 1 are shown to travel over car parking spaces and have no vehicle clearances. This applies to all basement levels (Figure 3.7 to Figure 3.9);
- 2.5.6 The development is a Class 3 driveways under *Table 3.1 of AS2890.1:2004* and as such shall have separate entry and exit driveways. This is a very important aspect for supermarkets due to the high number of vehicle trips generated from supermarkets and is required to ensure internal circulation efficiency, pedestrian safety and minimise internal two-way passing conflicts.
- 2.5.7 The basement car parking areas is not appropriate for a supermarket design due to the entire basement layout being two-way and within only one circulating aisle. Typically, supermarkets adopt multiple one-way circulating aisles, with separate entry and exits to provide for an efficient car park circulation. The inadequate design is likely to result in internal traffic congestion, resulting in queues. This is made worse when considering the high turn over of parking, pedestrian movements to and from the supermarket, which in some cases are required to walk past the circulating ramps and share circulating aisles with two-way traffic flows.
- 2.5.8 There is no separation between the commercial parking and retail parking and as such there is no guarantee that the commercial parking will be reserved for the commercial use.
- 2.5.9 There should not be any dead-end aisles within the supermarket car parking area.
- 2.5.10 The entry circulation requirements (undertaking a U-turn upon entry and exit) is not favourable and is a poor design for a supermarket.
- 2.5.11 The entry driveway into the basement car park does not comply with *Figure 3.3 of AS2890.1:2004*.
- 2.5.12 The swept paths in the report have been undertaken on different plans to the Architectural drawings provided. The design of the entry driveway into the basement is slightly different on the Architectural plans, compared to what has been assessed. It may appear that two-way passing into the site is not possible due to the modifications.
- 2.5.13 No swept paths have been undertaken for the entry or exit from the supermarket loading dock spaces.

2.6 Traffic Forecast

- 2.6.1 Considering the site is located within a town centre next to a train station the use of a

discount of 20% for multi-purpose trips would be appropriate.

- 2.6.2 Commercial office trip distribution should be 90% in / 10 out in the AM peak hour period and 10% in, 90% out in the PM peak hour period.
- 2.6.3 The GFLA should not be assumed to be 75% of the GFA but derived from the architectural plans and provided by the architect.
- 2.6.4 The use of the traffic generation rate of 12.3 per 100m² GLFA should be justified. As this rate is typically applied in planning stages when it is not known what specific retail use will be provided in a proposed shopping centre development. This is not the case for this proposed development which will have a supermarket and specialty retail shops. As the uses of the retail shops are known the more specific traffic generation rates should be adopted as outlined in the *RMS Guide to Traffic Generating Developments 2002* and as reproduced in **Annexure C**.

2.7 Traffic Distribution

- 2.7.1 The review of the *Hornsby West Side Traffic Study (2013)* is outside the scope of this document and as such *McLaren Traffic Engineering (MTE)* cannot comment on the adopted traffic distribution. It is noted that there is no difference in the adopted traffic distribution between retail uses, commercial uses or residential uses.
- 2.7.2 Model assumes that vehicles cannot turn right from Dural Street into Peats Ferry Road and that most traffic would use signalised intersection at William Street. There is nothing within the report as to why this has been adopted for the model. There are no existing turn restrictions, and this is the most direct route to Peats Ferry Road from the site which the majority of vehicle would use.
- 2.7.3 The assumption that most vehicles would use the signalised intersection of William Street to turn right is not accepted unless justified.
- 2.7.4 Further, any restriction to the right turn onto Peats Ferry Road will result in the promotion of vehicles trips through residential areas, impacting upon residential amenity.

2.8 Model Description

- 2.8.1 There is no analysis of the impact of the development during the weekend peak periods.
- 2.8.2 There is no analysis of the impact of the development on the Peats Ferry Road / Bridge Road intersection.
- 2.8.3 The JTP report has not included the site driveway within the SIDRA model. Considering its proximity to Peats Ferry Road and high generation analysis of the driveway should be included especially considering the rat-run nature of Dural Street for northbound vehicles.
- 2.8.4 The impact of the development should also be assessed under the case where no upgrades are completed, unless confirmation can be provided that the included "Do Minimum" road upgrades have already been approved.
- 2.8.5 The adopted cycle time of 140 seconds should be validated with the RMS, as it may significantly change how the corridor operates if any of the signalised intersections are linked.

2.9 Intersection Performance Assessment

- 2.9.1 The following general comments are made that apply to each of the SIDRA scenarios:
 - Network SIDRA setup:
 - No common command groups have been implemented in the network setting for those intersections that rely upon common phasing. The intersection of Station

Street / William Street / Peats Ferry Road has common phasing based upon the TCS plan and the intersection of Peats Ferry Road / George Street / Edgeworth David Avenue / Pacific Highway have common phasing based upon the TCS plan.

- The actual phasing adopted for the intersection of Peats Ferry Road / George Street / Pacific Highway is Phases A, B and D, whilst the phasing adopted for the signalised intersection of Edgeworth David Avenue / George Street / Pacific Highway is A, C and B. This is contrary to the TCS plan;
- All TCS plans state that all signalised intersections are SCATS linked, such that the entire corridor would operate, so to optimise traffic flow. That is the cycle times for each signalised intersection would either be the same, or a multiple of one another and all signalised intersections would be coordinated. Only some of the signalised intersections are shown to be coordinated in the model, but not all;
- Multiple geometric layouts within the SIDRA file are incorrect and have been modelled to reflect the TCS indicated line-marking, they do not reflect the realistic capacity of the turn lanes within the model. The following are relevant to note:
 - The lane length between Dural Street and Dural Lane is 10m longer than exhibited and does not accurately capture the distance between Dural Lane and Dural Road;
 - Priorities for pedestrians are not included as per provided TCS plans for the signalised intersections;
 - Not all phases within the signalised intersections are included within the model, missing the potential for variable phases to be implemented based on increased development demands;
 - The signalised intersection of George Street / Peats Ferry Road / Pacific Highway does not correctly set up the staged pedestrian crossing.
- Within the PM case for the 2017 and 2031 Networks the Coronation Street / Peats Ferry Road Intersection is set up as a “Coordinated Site / CCG”, while in the AM networks it is not modelled as this. This intersection cannot effectively or realistically be coordinated with the George Street and Edgeworth intersections, as the coordination does not include the intersections situated between them being the William Street / Peats Ferry Road, and the signalised pedestrian crossing intersection, which is not allocated as a coordinated intersection within the network model.
- The pedestrian signalised intersection (proposed) is unlikely to operate at a 140 second cycle time considering the site is located within a town centre (i.e. highly pedestrianised). The input of the pedestrian volumes is the default value and it is likely that during the peak hour period the cycle time would be between 60-90 seconds.

2.10 Base Scenario SIDRA Model

2.10.1 Coronation Street / Peats Ferry Road

- Peats Ferry Road South – RHT Turn Lane Length is incorrect and does not reflect realistic lane capacity.
- Aquatic Centre Road – LFT Turn Lane length incorrect and does not reflect realistic lane capacity.
- This intersection only includes Phase A & D in the AM, despite the TCS4322 indicating all phases A through to E2 – There is no justifiable reasons for these phases not to be included,

unless observed through a site visit or RMS history data. The phases should be included even if they are included as variable phases.

- As a SCAT Linked site the application of pre-specified non-variable phase times, and cycle times is unrealistic. This intersection should be run under a variable phase sequence .
- This intersection only includes Phase A, C & D in the PM, despite the TCS4322 indicating all phases A through to E2 – There is no justifiable reasons for these phases not to be included.
- User given phase and cycle times should not be applied.
- Priorities are incorrect within the model, with left and right turning movements not opposed by their respective pedestrian movements, this includes Left Turn into Aquatic Centre, Coronation Street as well as left and right turns out of both the Aquatic Centre and Coronation Street.

2.10.2 Dural Street / Peats Ferry Road

- The lane lengths along Peats Ferry Road south of the intersection are too long when networked with the Dural Lane intersection. The lengths should be approximately 64m, not 75m as they currently stand within the model.

2.10.3 Dural Lane / Peats Ferry Road

- The lane lengths along Peat Ferry Road north of the intersection are too long when networked with the Dural Street intersection. The lengths should be approximately 64m, not 75m as they currently stand.

2.10.4 Station Street / Peats Ferry Road

- Phasing not linked via a Common Command Group to the William Street / Peats Ferry Road Intersection as per combined TCS phasing Plan.
- Phasing not set as Optimum Cycle Time. User-Given Phase times should not be applied due to SCATs system phase time variability.
- Only A and C phases included, all phases should be included to model for completeness even if they are provided as a variable phase.

2.10.5 William Street / Peats Ferry Road

- William Street – The West LHT Lane length along William Street is incorrect and does not consider the kerbside parking present within the lane, restricting lane capacity. The lane is modelled currently as 51m, it should be approximately 19m in length.
- William Street – The West exit short-lane length is incorrect and does not consider kerbside parking present within the lane, restricting lane capacity. The lane is modelled currently as a 24m, it should be approximately 13m in length.
- Phasing not linked via a Common Command Group to Station Street / Peats Ferry Road intersection as per the Combine TCS phasing Plan.
- Phasing not set as Optimum Cycle Time. User-Given Phase times should not be applied due to SCATs system phase time variability.
- Only A and C phases included, all phases should be included to model for completeness even if the additional phases are included as a variable phase.
- Priorities are incorrect. Right and Left turns movements into William Street are not opposed by pedestrians crossing William Street, as required by the TCS plan.

2.10.6 High Street / Peats Ferry Road

- High Street South – Due to the width of the approach lane for High Street, the approach should be modelled with a separate short-lane right turn lane, to represent the realistic operation of this leg of the intersection.

- The Approach Distance for Peats Ferry Road (East) of 70m is considered too small, a distance of 80-85m is considered more representative of the approach's capacity.

2.10.7 George Street / Peats Ferry Road / Pacific Highway

- The approach distance for Peats Ferry (West) of 70m is considered too small, a distance of 80-85m is considered more representative to the approach's capacity.
- The approach lane length of Lane 2 of the Peats Ferry Road (West) approach is considered too short at 60m, and a length of approximately 75m is considered to reflect the lanes actual capacity better.
- The approach lane length of the left turn/through lane along George Street (North) is considered too short, being modelled at only 53m, where it should have a lane length of approximately 75 meters, to better reflect its real capacity.
- The Pacific Highway to Peats Ferry Road slip lane is not modelled as a signalled slip lane. Additionally, considering the location of the lanes stop line, it should only be modelled approximately as a 48m lane, rather than its current 62m lane length.
- Phasing of the intersection not linked via a Common Command Group to the Edgeworth David Ave / Pacific Highway intersection, to reflect the combined phasing of TCS0736.
- The intersection should be operating under an Optimum Cycle Time, rather than the User-Given Phase Time. This Optimum Cycle Time should include reasonable Lower and Upper Limits, such that the intersection operates with the inherent demand driven variability found within SCATs based intersections.
- The Staged pedestrian crossing across Peats Ferry Road is incorrectly implemented, the two-stage pedestrian crossing should include the slip lane from the Pacific Highway onto Peats Ferry Road. There staging is not split between approach and exit lanes as modelled.
- The priorities of the intersection are wrong. Movements within the intersection are not opposed by their respective pedestrian movements as required by the TCS plan, including left Turns into George Street (North), Left turns into the carpark and the slip lane movements from Pacific Highway (South) into Peats Ferry Road (West).

2.10.8 Edgeworth David Ave / Pacific Highway

- Phasing of the intersection not linked via a Common Command Group to the George Street / Peats Ferry Road / Pacific Highway intersection, to reflect the combined phasing of TCS0736.
- The intersection should be operating under an Optimum Cycle Time, rather than the User-Given Phase Time. This Optimum Cycle Time should include reasonable Lower and Upper Limits, such that the intersection operates with the inherent demand driven variability found within SCATs based intersections.
- Priorities within the intersection are wrong. Movements within the intersection are not opposed by their respective pedestrian movements, as required by the TCS plan.

2.10.9 Variability of Model

- Notwithstanding the above, the model variability has not converged as event by the diagnostic error, such that it questions the validity of the entire results. Due to the number of intersections modelled in the network, it may be more appropriate to model the corridor in a micro simulation model to get more accurate results.

2.10.10 MTE Results

- MTE has modelled the AM peak base case scenario by only changing the network to a coordinated system ensure that the relevant intersections were operating under a common control group. The results are summarised in **Table 1** below.
- It should be noted that the model was run through SIDRA 8 rather than SIDRA 7 and the variability of the model is stable, that is the results converged through the iterative process and provides a more accurate representation of the road network.

TABLE 1: INTERSECTION PERFORMANCES (SIDRA INTERSECTION 8.0)

Intersection	Peak Hour	Degree of Saturation ⁽¹⁾	Average Delay ⁽²⁾	Level of Service ⁽³⁾	Control Type	95 th Percentiel Queue Length (m)
			(sec/veh)			
EXISTING PERFORMANCE (2017)						
Peats Ferry Road / Coronation Street	AM	0.88	17.3	B	Signal	76m (Peats Ferry Road North)
Peats Ferry Road / Dural Street	AM	0.39	0.5	N/A (A)	Give-way	3m (Dural Street)
Peats Ferry Road Dural Lane	AM	0.29	0	N/A (A)	Give-way	72m (Peats Ferry Road North. This queue is caused by the signalised intersection)
Peats Ferry Road / Station Street	AM	0.5	3.9	A	Signals	12m (Peats Ferry Road South)
Peats Ferry Road / William Street	AM	0.57	7.6	A	Signals	57m (Peats Ferry Road South)
Peats Ferry Road / High Street	AM	0.42	4.4	N/A (C)	Give-Way	37m (Peats Ferry Road North)
Peats Ferry Road / George Street	AM	0.91	40.1	C	Signals	224m (George Street)
Pacific Highway / Edgeworth David Avenue	AM	1	33.9	C	Signals	186m (Pacific Highway South)

NOTES:

(1) Degree of Saturation is the ratio of demand to capacity for the most disadvantaged movement.

(2) The average delay is the delay experienced on average by all vehicles. The value in brackets represents the delay to the most disadvantaged movement.

(3) The 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.

- As shown above, no one single intersection is operating at level of Service F, with the corridor along Peats Ferry Road shown to be operating with significantly less queues and an overall better level of Service for each signalised intersection.

3 Summary of Findings

McLaren Traffic Engineering has undertaken a peer review of the Traffic and Parking Assessment Report of the Proposed Mixed Use Development completed by *Jacobs*.

The findings of the peer review are detailed in **Sections 2** and indicate that the JTP Report:

- Insufficiently assesses the existing or future scale or nature of the development;
- Has incorrectly set up the network model with respect to the existing operation of the network corridor, such that the resulting SIDRA assessment are invalid due to the variability in the SIDRA results;
- Does not provide justification for any signification assumptions, such as that no vehicles will turn right onto Peats Ferry Road;
- Does not assess the weekend peak hour period or consider the operation of the site outside of peak commuter periods when turning and parking restrictions do not apply;
- Does not adequately cater for access to the development by delivery vehicles, or provide an adequate design with consideration to a shopping centre development;
- Gives no regard to the impacts of the proposed development on residential amenity based upon what is proposed;
- Does not model the site driveway;
- Does not adopt the correct traffic generating rates for shopping centre developments;
- The traffic model does not consider the proposed development in the scenario where no upgrades are undertaken along Peats Ferry Road.

In view of the foregoing, the JTP Report is generally unsuitable as a basis on which to determine the proposed development.

Please contact the undersigned on 8355 2440 should you require further information or assistance.

Yours faithfully

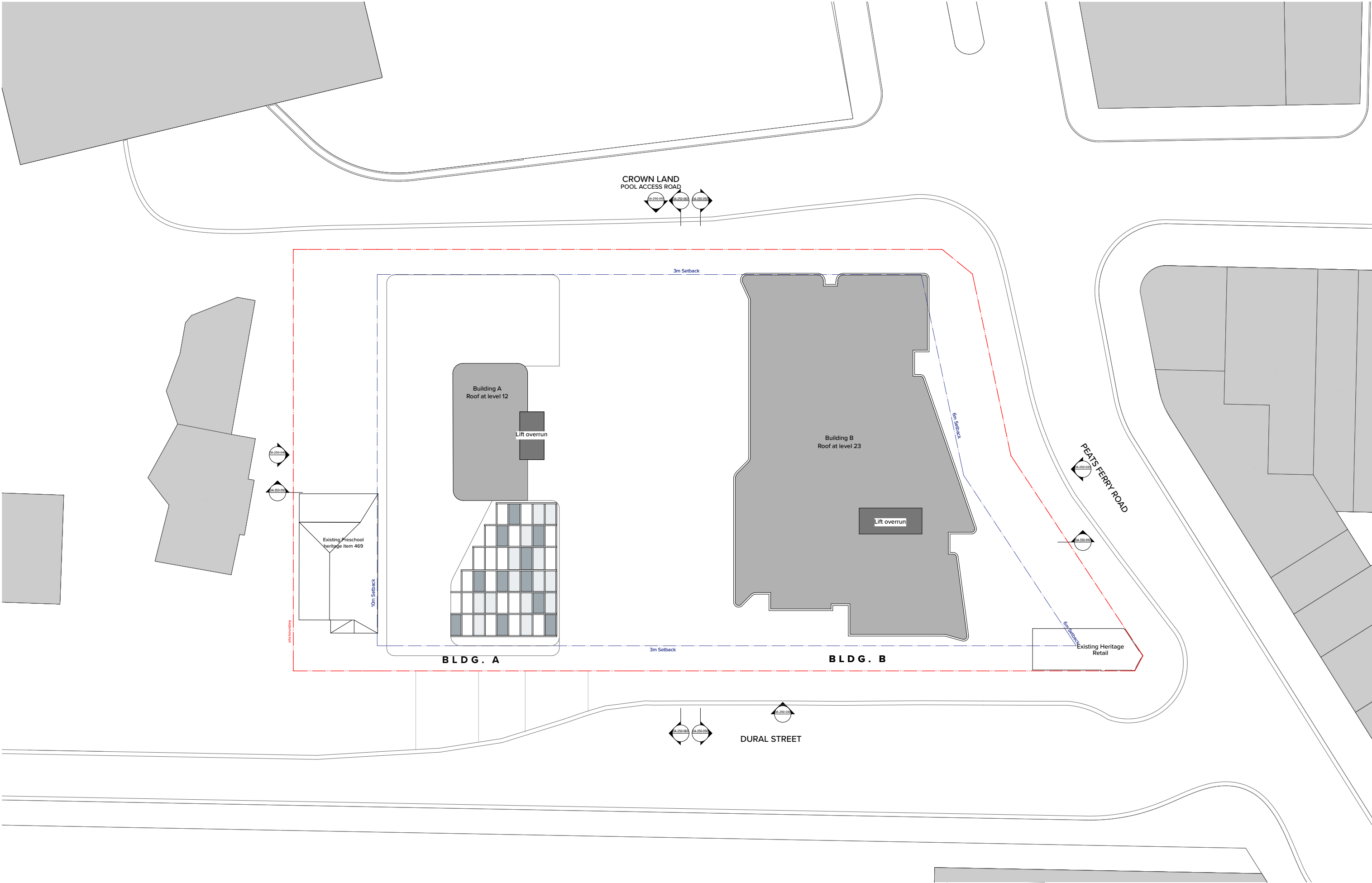
McLaren Traffic Engineering



Matthew McCarthy
Senior Traffic Engineer
BE Civil Engineering
Masters of Engineering Science
RMS Accredited Level 1 Road Safety Auditor
RMS Accredited Work Zone Traffic Management Plan Designer and Inspector



ANNEXURE A: REDUCED PLANS



NOTES
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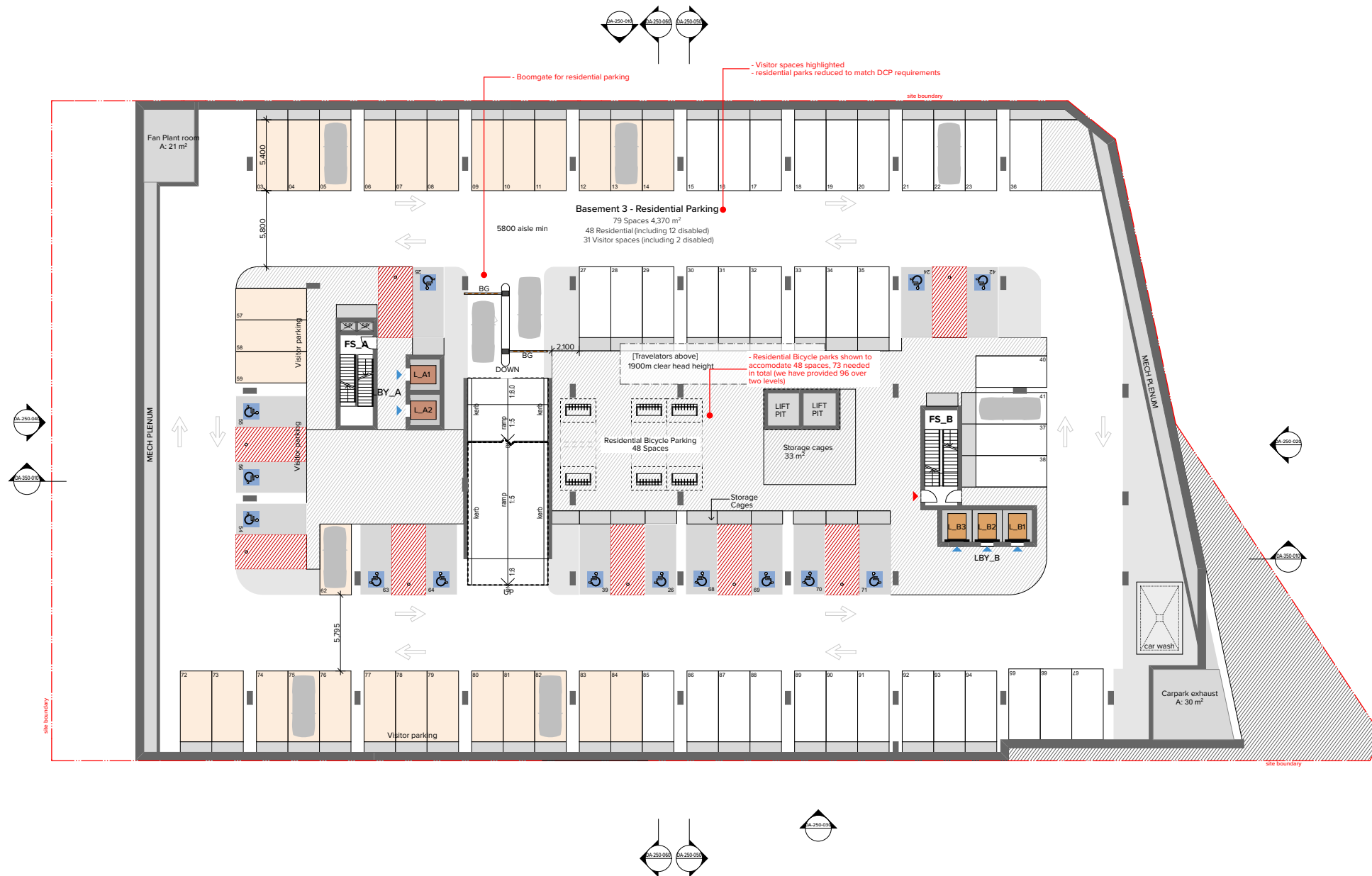
SLCS Quality Endorsed Company 152 8001 2008, Registration Number 20476
Notional Architect: Nicholas Turner 8000 480 90 004 804 010

Project Title
187-203 Peats Ferry Rd, Hornsby
Peats Ferry Road Hornsby NSW 2077 Australia

Drawing Title
GA Plans
Overall Roof Plan

UC 17.07.19 YO FOR DA AMENDMENTS			
Rev.	Date	Approved by	Revision Notes
1	17.07.19	YOCCAM	16104
2	17.07.19	YOCCAM	16104
3	17.07.19	YOCCAM	16104
4	17.07.19	YOCCAM	16104
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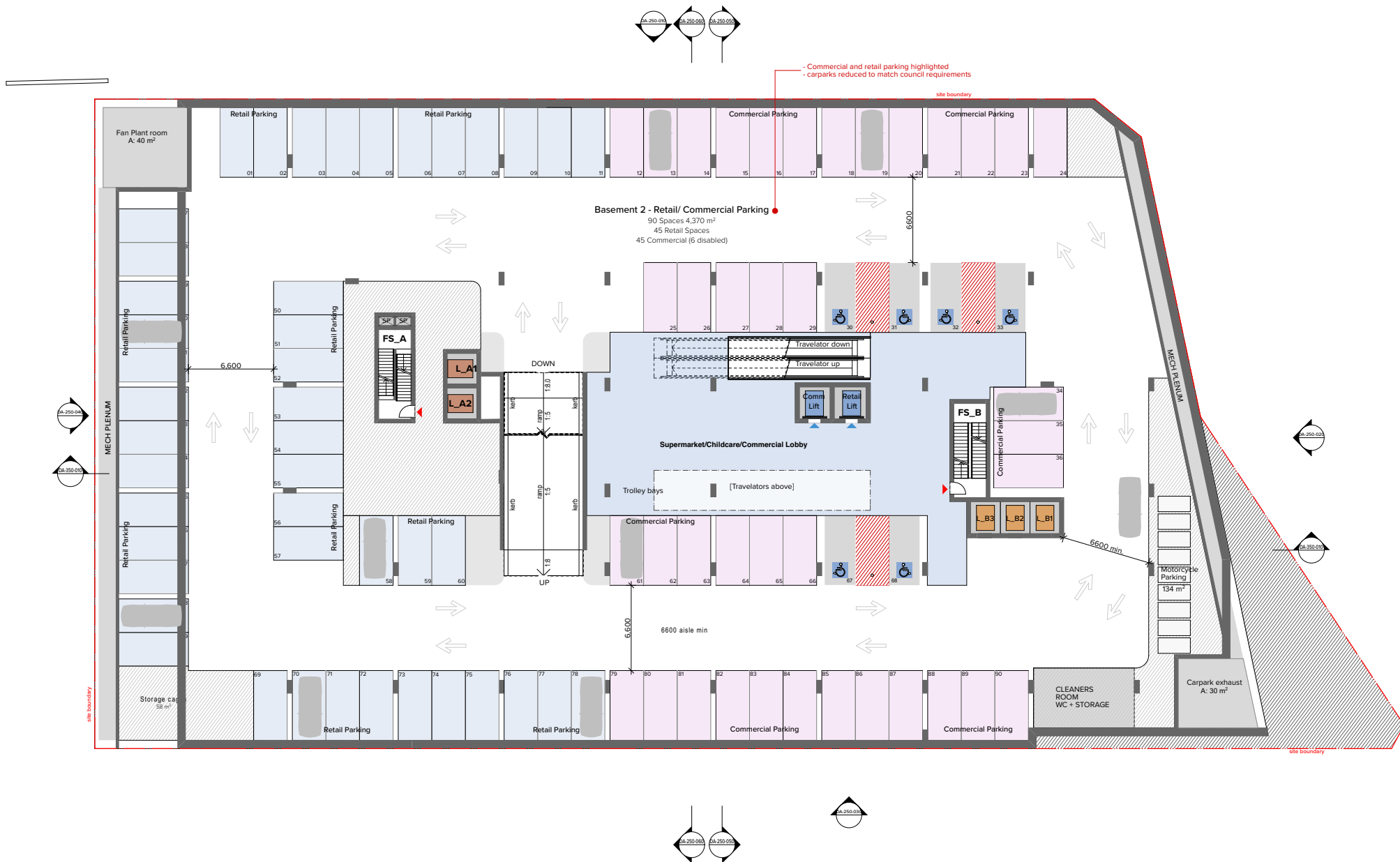
SLCS Quality Endorsed Company 152 8001 2008, Registration Number 20476
Notional Architect Nicholas Turner 8000 488 90 84 84 81

Project Title
187-203 Peats Ferry Rd, Hornsby
Peats Ferry Road Hornsby NSW 2077 Australia

Drawing Title
GA Plans
Basement 3 - Residential Carpark

Rev.	Date	Approved by	Revision Notes	Drawn by	North
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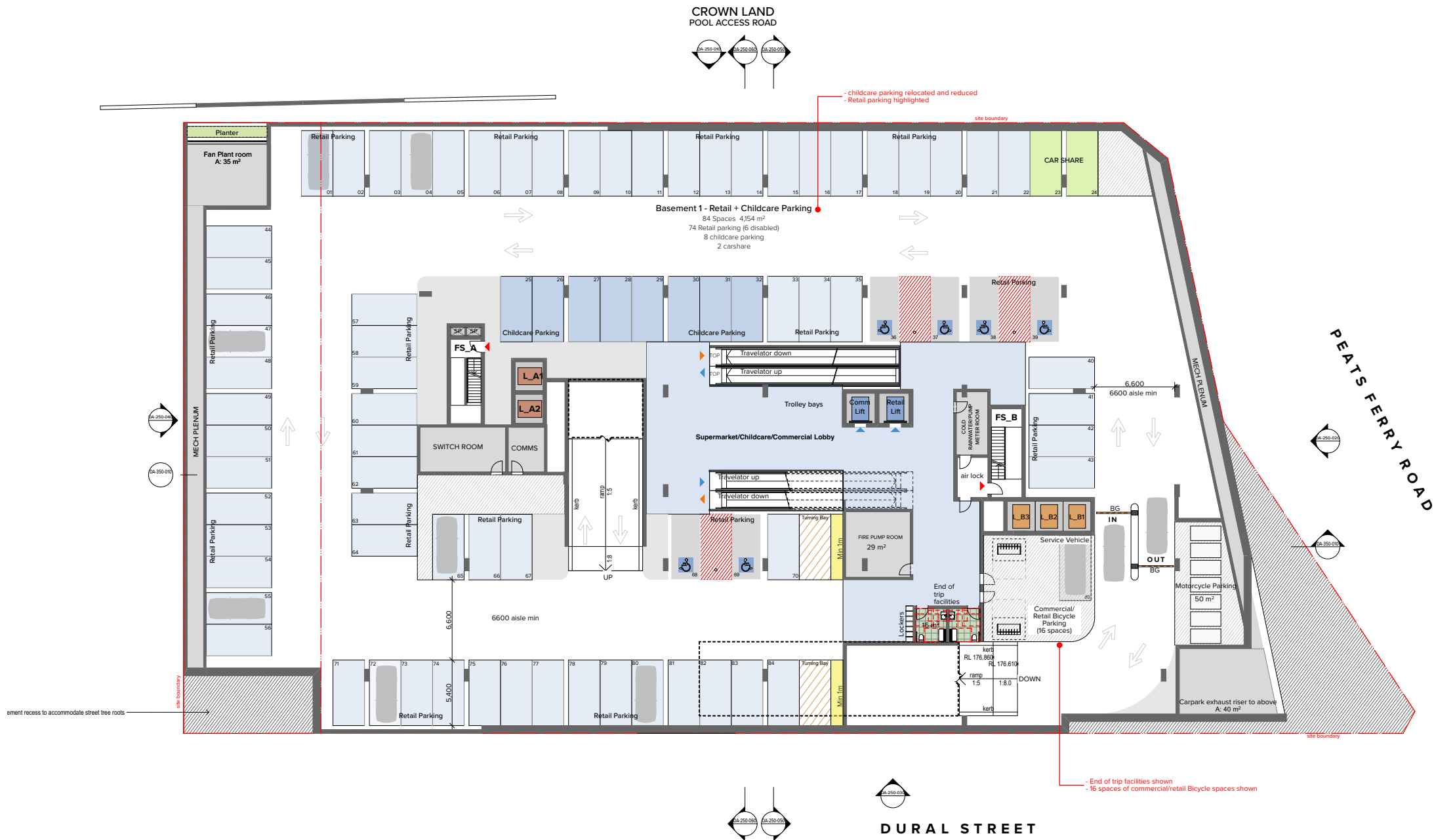
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Notwithstanding to whomsoever, 8800, 4800, 80, 804, 804, 810

Project Title
187-203 Peats Ferry Rd, Hornsby
Peats Ferry Road Hornsby NSW 2077 Australia
Drawing Title
GA Plans
Basement 2 - Retail Carpark

Rev.	Date	Approved by	Revision Notes	Drawn by	North
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Status	Development Application	Dwg No. DA-110-005	Rev K		

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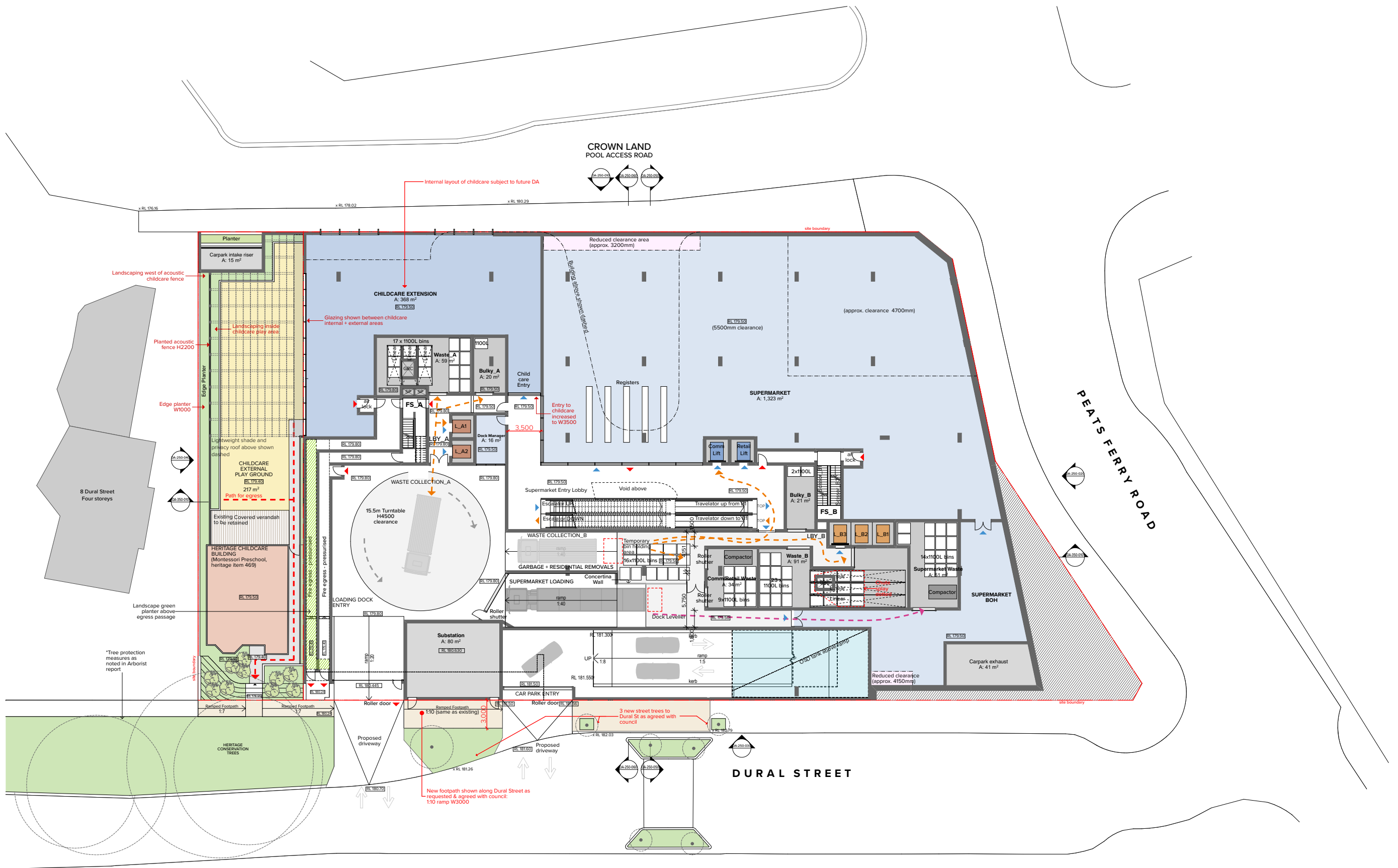
SLCS Quality Endorsed Company 152 8001 2008, Registration Number 20476
Notional Architect Notional Turner 8000 480 90 004 004 010

Project Title
187-203 Peats Ferry Rd, Hornsby
Peats Ferry Road Hornsby NSW 2077 Australia
Drawing Title
GA Plans
Basement 1 - Retail Carpark

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Scale			Project No.	16104	
Status			Drawn No.	YOCCAM	
Development Application			Rev	K	

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Project Title
187-203 Peats Ferry Rd, Hornsby
Peats Ferry Road Hornsby NSW 2077 Australia

Drawing Title
GA Plans
Lower Ground - Loading/Supermarket/Childcare

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Status				Devig No.	DA-110-007	J
Development Application						

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ANNEXURE B: VTP REPORT



187-203 Peats Ferry Road

Lyon Group Australia

Traffic and Transport Impact Assessment

| Final

14 November 2019



187-203 Peats Ferry Road

Project No: IA133100
 Document Title: Traffic and Transport Impact Assessment
 Document No.:
 Revision: Final
 Date: 14 November 2019
 Client Name: Lyon Group Australia
 Client No:
 Project Manager: Myall Stevens
 Author: Joey Huang, Stephen Read
 File Name: J:\IE\Projects\04_Eastern\IA133100\21 Deliverables\Reports\Traffic and Transport\IA133100 203 Peats Ferry Road-20191114.docx

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Document history and status

Revision	Date	Description	By	Review	Approved
0	15/12/2017	Draft Report for Comments	J. Huang	S.Read	
1	10/01/2018	Draft Report for Comments	J. Huang	S.Read	
2	15/02/2018	Draft Report for Comments	J. Huang	S.Read	
3	06/03/2018	Final	J. Huang	S.Read	M. Stevens
4	21/09/2018	Updated report for modified design	J. Huang	S.Read	
5	04/7/2019	Revised report	S. Read		
6	14/11/2019	Updated report with revised yields	R. Banzon	M. Stevens	

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Appendix A. Sidra Intersection Analysis

1. Introduction

Jacobs has been commissioned by Lyon Group Australia to assess the traffic and transport impacts of the proposed mixed-use development at 187 to 203 Peats Ferry Road. This report assesses the existing traffic and transport conditions, describes the proposed development and assesses the impact of the development on the transport network.

1.1 Background

The proposed development is located at 187 to 203 Peats Ferry Road Hornsby. The development will comprise a 10 storey and an 18 storey mixed use building including residential units, a supermarket, smaller speciality retail and commercial offices.

The subject site is bound by Peats Ferry Road to the East, Dural Street to the South and the access driveway to the Hornsby Aquatic Centre, an extension to Coronation Street, to the North. The site is identified as the Gateway Site for the Hornsby West Side Town Centre, in the Hornsby DCP 2013.

In preparing this document a Pre-Lodgement application was submitted to Council based on a proposal for only partial development of the site. Hornsby Shire Council's Traffic Branch provided comments and these comments have been addressed as part of this study.

This report provides our analysis of the existing conditions, review of the proposed development and the internal car park layout, identifies the impacts on traffic associated with the proposed development and identifies potential mitigation measures. This report also addresses key issues raised in the comments from the Hornsby Shire Council's Traffic Branch. These issues include:

- The need for a network model (morning and evening peak periods) to include the following 10 intersections:
 - a. Peats Ferry Road and Coronation Street
 - b. Peats Ferry Road and Dural Street
 - c. Peats Ferry Road and Dural Lane
 - d. Peats Ferry Road and Station Street
 - e. Peats Ferry Road and William Street
 - f. Peats Ferry Road and High Street
 - g. Peats Ferry Road and George Street
 - h. Peats Ferry Road and Edgeworth David Avenue
 - i. Dural Street and Frederick Street
 - j. Frederick Street and William Street
- Turning path analysis for the largest vehicle to enter/exit from the site
- Consideration of the difficulty of right turn movement from Dural Street into Peats Ferry Road during peak traffic periods.
- Vehicular access to the site from the north and the south

1.2 Site Location

The site is located at 187 to 203 Peats Ferry Road, Hornsby, near the intersection of Peats Ferry Road and Coronation Street, and Peats Ferry Road and Dural Street. The site fronts onto Peats Ferry Road and Dural Street. It is located within close proximity of the Hornsby Railway Station and shopping areas.

Figure 1.1 : Site Location



1.3 Report Structure

The report is structured as follows:

- Section 2 – Details the existing conditions including the site location, road network, public transport, active transport, traffic demand, and existing planning;
- Section 3 – Description of the proposed development including the development plan, vehicular access, car parking provision, parking layout and turning swept paths;
- Section 4 – Traffic and transport impacts and mitigations including the assessment methodology, traffic generation and distribution, existing intersection performance assessment, future year intersection performance, impacts on parking, active transport and public transport, as well as the mitigation measures.
- Section 5 – Conclusion is a summary of the findings of this study.

1.4 Assumptions

Based on the comments from Hornsby Shire Council and the understanding of the traffic operation of the local road network, following assumptions have been made for this study:

- The vehicle traffic impact on the road network would be identified by an assessment of the intersection performance assessment for 10 intersections as identified by Hornsby Shire Council.
- The background growth in traffic volumes of 2% per annum up to 2031.
- All the turn bans at existing intersections in Hornsby Town Centre would be maintained.

2. Existing Conditions

This section provides a description of the existing conditions and the transport network.

2.1 Site Description

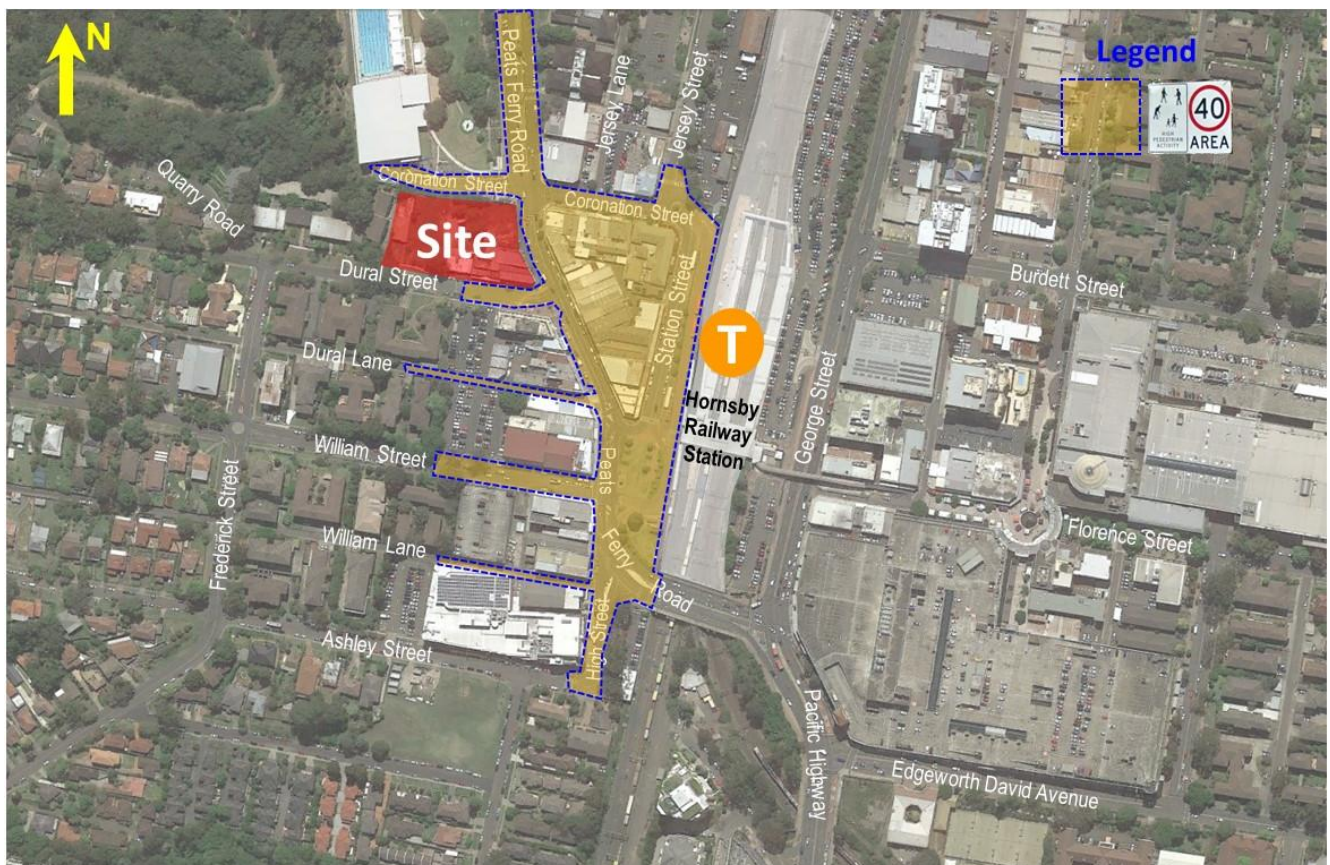
The site is currently used by a range of commercial and retail uses as well as vacant land that is currently used for informal parking. The land uses include real estate agents, solicitor's office, a small grocery shop and a Chinese Restaurant.

The site which includes small shops and vacant land on the corner of Coronation Street and Peats Ferry Road has multiple owners who have agreed to develop the land as one package.

2.2 Road Network

The site is situated within Hornsby town centre area. The area is zoned as a High Pedestrian Activity Area (HPAA) with a speed limit of 40 km/h (as shown in Figure 2.1).

Figure 2.1 : Hornsby Town Centre High Pedestrian Activity Area



The **Pacific Highway** is an arterial road with a sign posted speed limit of 60 km/h to the south of George Street. It has two or three lanes in each direction on a divided carriageway. Historically, Peats Ferry Road was part of the Pacific Highway, however changes to Peats Ferry Road and upgrades to George Street have been implemented to encourage most of the through traffic to bypass the town centre. The section of road in the study area had an AADT of 34,445 vehicles per day in 2009 (Traffic Volume Viewer website, Roads and Maritime Services).

Peats Ferry Road is a section of the Pacific Highway running south-north from George Street to Jersey Street. The road has a posted speed limit of 60 km/h to the north of Bridge Road, 50 km/h between Bridge Road and Jersey Lane, and 40 km/h south of Jersey Lane. It has generally been reduced to one through lane in each direction near the subject site.

Dural Street is a local road that runs from east to west between Peats Ferry Road and Rosemead Road. A short eastern section of the road forms the southern boundary of the proposed development site and has a posted speed limit of 40 km/h as shown in Figure 2.1. The remaining sections of the road has a posted speed limit of 50 km/h. The road is undivided with one lane in each direction with the exception of a short section between Lisgar Road and Quarry Road which is one-way westbound. The road width from kerb to kerb narrows to some 5m but widens to 13 metres at the eastern end. Kerbside parking is permitted on most sections of the road with a no parking restriction along most of the southern side during weekdays. The right turn into Dural Street from Peats Ferry Road is banned during the peak traffic periods.

Williams Street is a local road that runs from east to west between Peats Ferry Road and Rosemead Road. It has a posted speed limit of 50 km/h for most sections and a 40 km/h speed limit as it enters the HPAA. The road is undivided with a lane in each direction and kerbside parking permitted for both sides. The road width from kerb to kerb is 12m, and has a role of collecting traffic from the local road network.

Frederick Street is a local road and runs from north to south between Dural Street and Pretoria Parade. It has a posted speed limit of 50 km/h. The road has a single lane in each direction separated by a double barrier line. The road width from kerb to kerb in northern part is around 12 m and the southern part is narrower, and functions as a local collector. Kerbside parking on both sides in northern section is permitted but banned in southern sections.

Coronation Street is a local road and runs from east to west between Jersey Street and Hornsby Aquatic and Leisure Centre. It is located within the 40 km/h HPAA. The road has one lane in each direction. The eastern part of the road provides kerbside parking.

2.3 Public Transport

The proposed development has excellent access to public transport services at Hornsby Station and the bus interchange. The site is located:

- 160m from Hornsby Railway Station, which has frequent service to Sydney CBD via Chatswood or Strathfield, as well as services to Newcastle.
- Within 160m of the bus interchange at Hornsby Station, that services 14 bus routes.
- Five bus routes to and from the north stop at the intersection of Peats Ferry Road and Coronation Road which is adjacent to the development site.

Hornsby Station is the focus of many of the feeder services from the surrounding suburbs. A summary of the local bus routes is provided in Table 2.1 and the location of bus stops in Figure 2.2. All the services have a frequency of less than three per hour during the commuter peak periods with the exception for the M60 bus route which operates 6-8 times per hour during commuting peak periods.

Table 2.1 : Bus frequencies

Bus Route No.	Morning Peak Period (8-9am)	Evening Peak Period(4.45-5.45pm)
100	No service in AM peak and only 1 per day from Port Stephens to Sydney and vice versa	No service in PM peak and only 1 per day from Port Stephens to Sydney and vice versa
575	3 per hour from Hornsby to Macquarie University 2 per hour from Macquarie University to Hornsby	2 per hour from Hornsby to Macquarie University 3 per hour from Macquarie University to Hornsby
587	Loop route, 1 per hour	2 per hour
588	Loop route: 1 per hour	2 per hour
589	1 per hour both directions	1 per hour both directions
592	Loop route: no service during peak period	no service during peak period
594H	Hornsby to QVB: no service in AM peak period 2 per hour from QVB to Hornsby	2 per hour from Hornsby to QVB 3 per hour from QVB to Hornsby
595	Loop route: 2 per hour	2 per hour
596	Loop route: 3 per hour	3 per hour
597	1 per hour for each of directions	No service during this time period
598	Loop route: 1 per hour	2 per hour
M60	6 per hour from Hornsby to Parramatta; 7 per hour from Parramatta to Hornsby;	7 per hour from Hornsby to Parramatta; 8 per hour from Parramatta to Hornsby
N80	Night bus, not operate during AM/PM peak	Night bus, not operate during AM/PM peak
N90	Night bus, not operate during AM/PM peak	Night bus, not operate during AM/PM peak

Figure 2.2 : Bus routes and stops close to project site

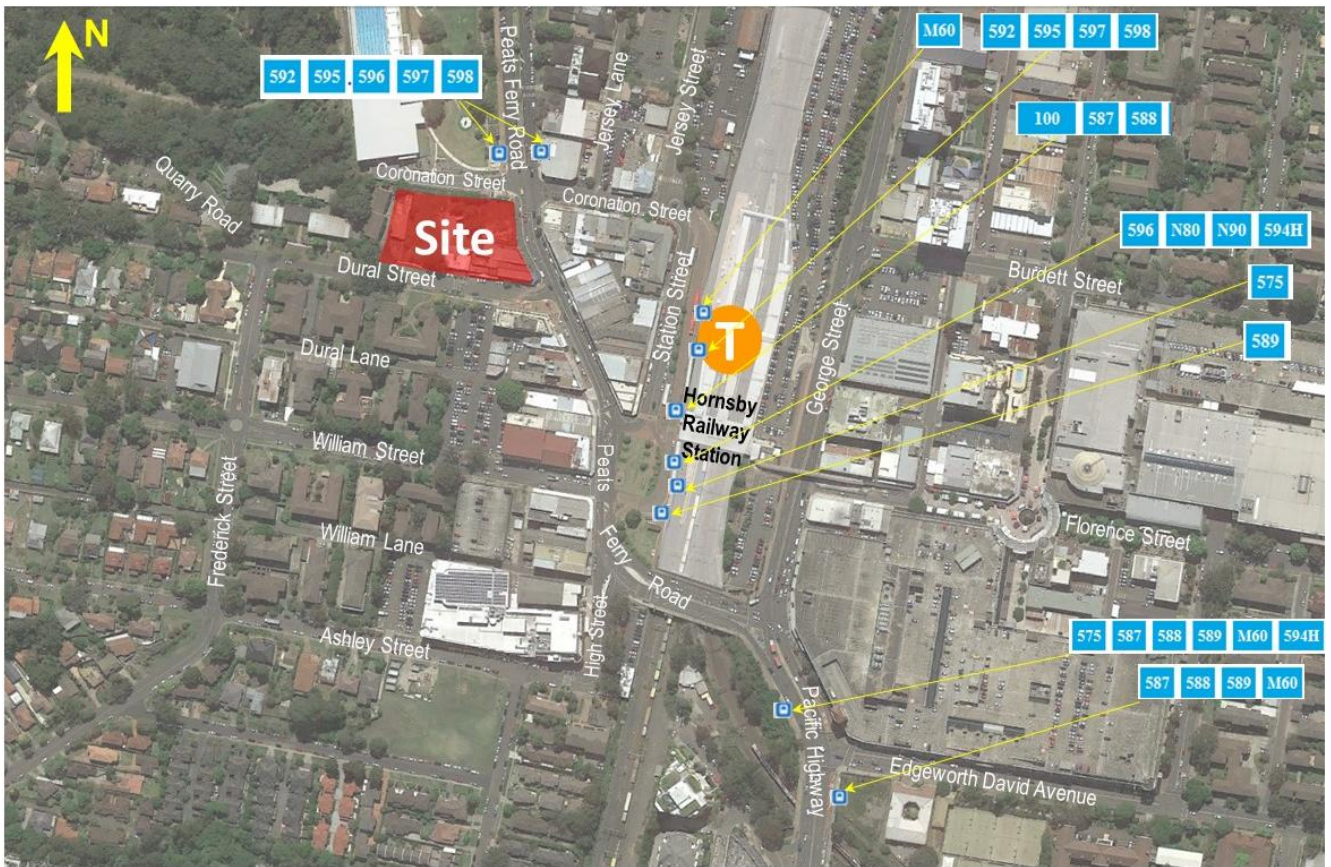
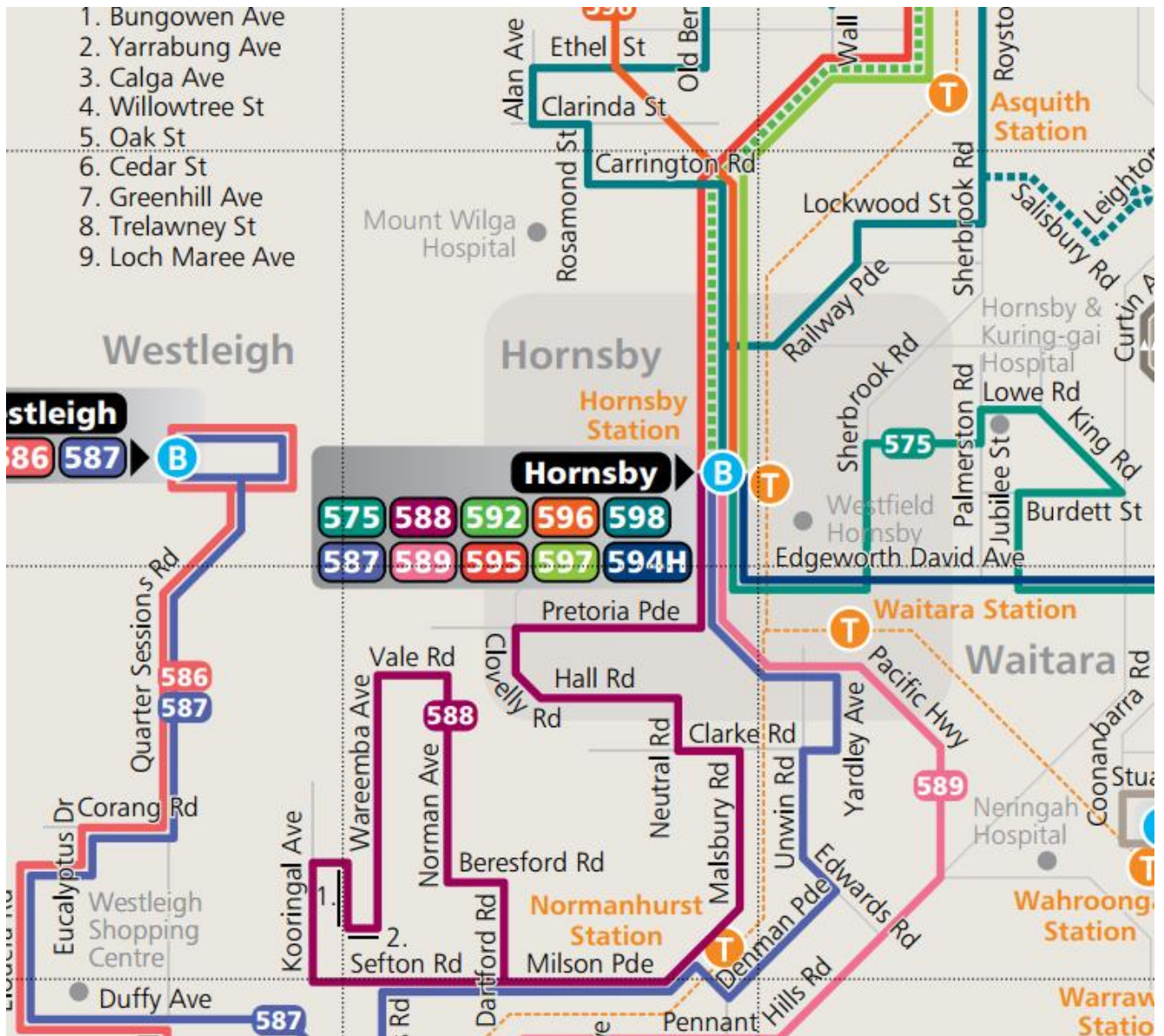


Figure 2.3 : Bus Routes Near Hornsby



Source: TransDev

2.4 Active Transport

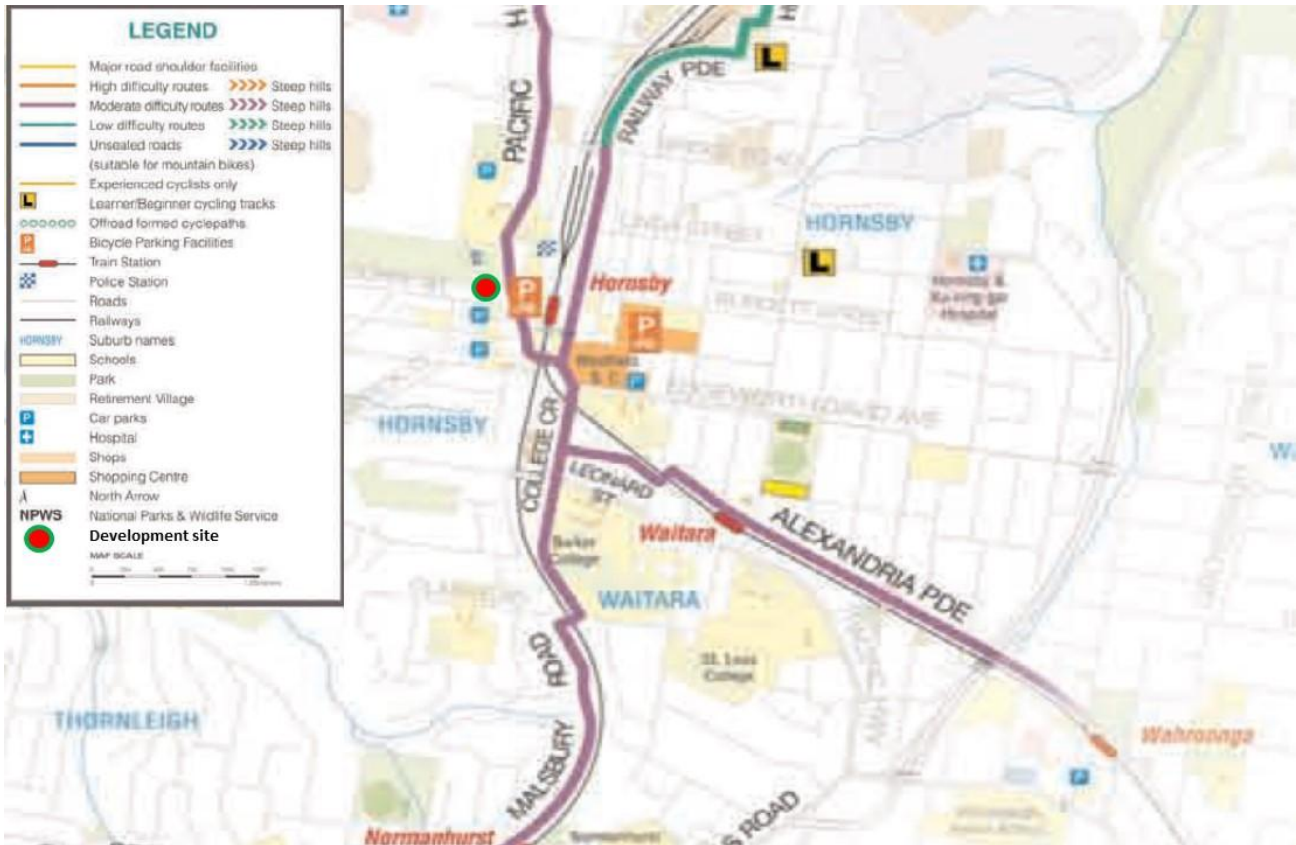
The Hornsby Town Centre is a High Pedestrian Activity Area (HPAA) which generally combines a lower speed limit of 40km/h and traffic calming measures to improve road safety. This encourages pedestrian trips in the area. The traffic calming measures include:

- On the roads that intersect with Peats Ferry Road, speed humps are provided including Dural Street, William Street and Ashley Street at the boundary location of the HPAA.
- The carriageway on Peats Ferry Road has been reduced to one through traffic lane, which assists pedestrian crossings.

Within the study area footpaths are provided on both sides of the streets and signalised pedestrian crossings that allow for crossing Peats Ferry Road to access the station.

There are no dedicated off-road bicycle paths within the town centre. Peats Ferry Road is identified as a bicycle route of moderate difficulty (as shown in Figure 2.4). High traffic volumes would make this route accessible only to confident and experienced cyclists.

Figure 2.4 : Bicycle routes in the surrounding road network of the proposed development site



Source: Hornsby Bike Plan

2.5 Existing Land Use and Traffic Generation

Most parts of the site are currently vacant, but the site has some existing retail shops, real estate agents and a restaurant with following features:

- The restaurant occupies around 180m² land with only one level and opens during 12pm-2.30pm and 5pm-9.30pm;
- The buildings for retail have a floor area of 1500m² on two floors. The buildings provide service such as grocery, convenience shop, hair dresser, travel agency, solicitors office, property agent offices etc.

Using rates from the RTA Guide to Traffic Generating Development for slow trade speciality shops, the existing land use is expected to generate around 12 vehicles trips during morning peak and 32 vehicles trips during evening peak as shown in Table 2.2.

Table 2.2 : Site existing land use and traffic generation

Land use category	Gross floor leasable area (GFLA) (sqm)	Vehicle trips per 100 sqm GFLA		Vehicle trips per hour	
		AM	PM	AM	PM
Restaurant	135	0	5	0	7
Retail	1,125	1.1	2.2	12	25
Total				12	32

Notes, according to RTA Guide to Traffic Generating Development, GFLA is around 75% of gross floor area.

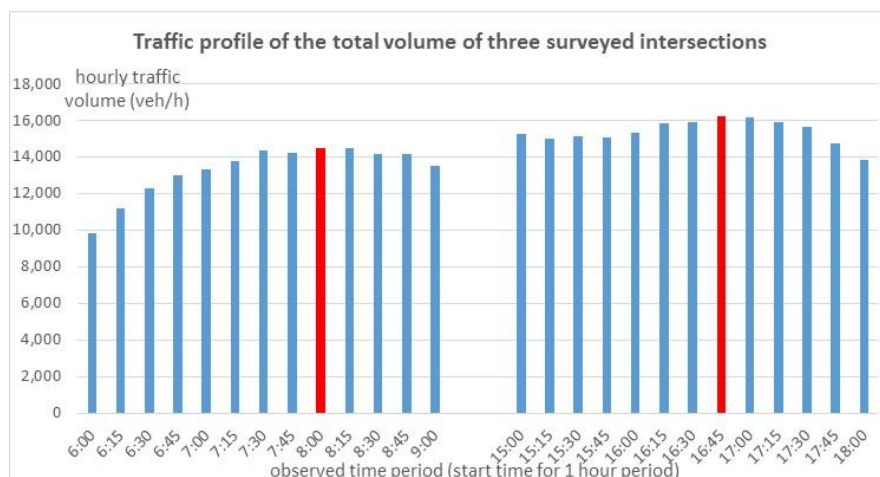
2.6 Existing Traffic Volumes

Intersection traffic counts were undertaken as part of the traffic study. The data was collected on Tuesday 31 October 2017 at the following sites:

- Peats Ferry Road and Coronation Street
- Peats Ferry Road and Dural Street
- Peats Ferry Road and Dural Lane
- Peats Ferry Road and Station Street
- Peats Ferry Road and William Street
- Peats Ferry Road and High Street
- Peats Ferry Road and George Street
- Peats Ferry Road and Edgeworth David Avenue
- Dural Street and Frederick Street
- Frederick Street and William Street

The counts covered the time period from 6:00am – 10:00am and 3:00pm – 7:00pm on a weekday. We have identified that the peak traffic hours occur from 8.00am - 9.00am in the morning and 16.45pm -17.45pm in the evening peak period. The assessment of intersection performance has been based on these peak periods.

Figure 2.5 : Peak period identification for local traffic volume



Figures 2.6 and 2.7 show the traffic volumes of 10 observed intersections during 8:00am - 9:00am and 4.45pm - 5.45pm peak periods.

The map displays the Hornsby area with 10 numbered locations. Red arrows point from each location to a detailed inset map showing the surrounding streets and landmarks. The locations are numbered 1 through 10. The map includes a north arrow in the top left corner.

Location 1: Near George St and Hornsby Station. Inset shows streets 493, 651, 180, 217, 704, 539, 74, 44.

Location 2: Near Hornsby Station and Hornsby Central Library. Inset shows streets 554, 710, 694, 489, 40, 89.

Location 3: Near Hornsby Station and Hornsby War. Inset shows streets 495, 683, 680, 671, 168, 580, 570, 583, 574, 162, 186, 618, 668.

Location 4: Near Hornsby Station and Hornsby War. Inset shows streets 499, 493, 671, 168, 580, 570, 583, 574, 162, 186, 618, 668.

Location 5: Near Hornsby Station and Hornsby War. Inset shows streets 499, 493, 671, 168, 580, 570, 583, 574, 162, 186, 618, 668.

Location 6: Near Hornsby RSL Club and Hornsby War. Inset shows streets 614, 668, 645, 628, 57, 94.

Location 7: Near Hornsby War and Hornsby RSL Club. Inset shows streets 797, 882, 154, 45, 1,314, 1,309, 630, 649.

Location 8: Near Hornsby RSL Club and Hornsby War. Inset shows streets 1,307, 1,315, 535, 547, 1,270, 1,290.

Location 9: Near Hornsby RSL Club and Hornsby War. Inset shows streets 16, 34, 29, 96, 28.

Location 10: Near Hornsby RSL Club and Hornsby War. Inset shows streets 95, 42, 165, 110, 90, 56, 165, 91.

2.7 Turn Restrictions

There are right-turn bans for southbound traffic on Peats Ferry Road at the intersections with Dural Street and Dural Lane during the weekday morning (7:00am – 9:00am) and evening (3:00pm – 6:00pm) peak traffic periods. We have noted that the traffic surveys have counted:

- 18 and 19 cars turning right into Dural Street during morning and evening periods respectively (see Figure 2.8).
- 3 and 2 cars turning right into Dural Lane during morning and evening periods respectively (see Figure 2.9).

This indicates that a small number of vehicles are illegally turning right. For our assessment we have assumed no cars turn right and that enforcement of the right turn bans would reduce this number.

Figure 2.8 : Vehicle right-turning violation at intersection of Peats Ferry Road and Dural Street



Figure 2.9 : Vehicle right-turning violation at intersection of Peats Ferry Road and Dural Lane



2.8 Hornsby Westside Master Plan

The site is within an area that was the subject of Council's master plan for the West Side Precinct and is part of the overall concept to redevelop the Hornsby town centre. The Hornsby West Side Precinct is shown in Figure 2.10.

Advice from Council has indicated that the planned extension of Station Street through the Cenotaph Park to opposite High Street would not be constructed. Therefore, the traffic models have assumed maintaining the existing road network alignment.

The Hornsby West Side Precinct was predicted to have yield of 1,000 dwellings and 18,000m² of non-residential floor space for retail and commercial uses, according to the Hornsby West Side Traffic Study report (2013). It is within this context that the proposal is for 249 dwellings and 5,600m² of retail and commercial uses.

Figure 2.10 : West Side Precinct Plan of Council's Development Control Plan

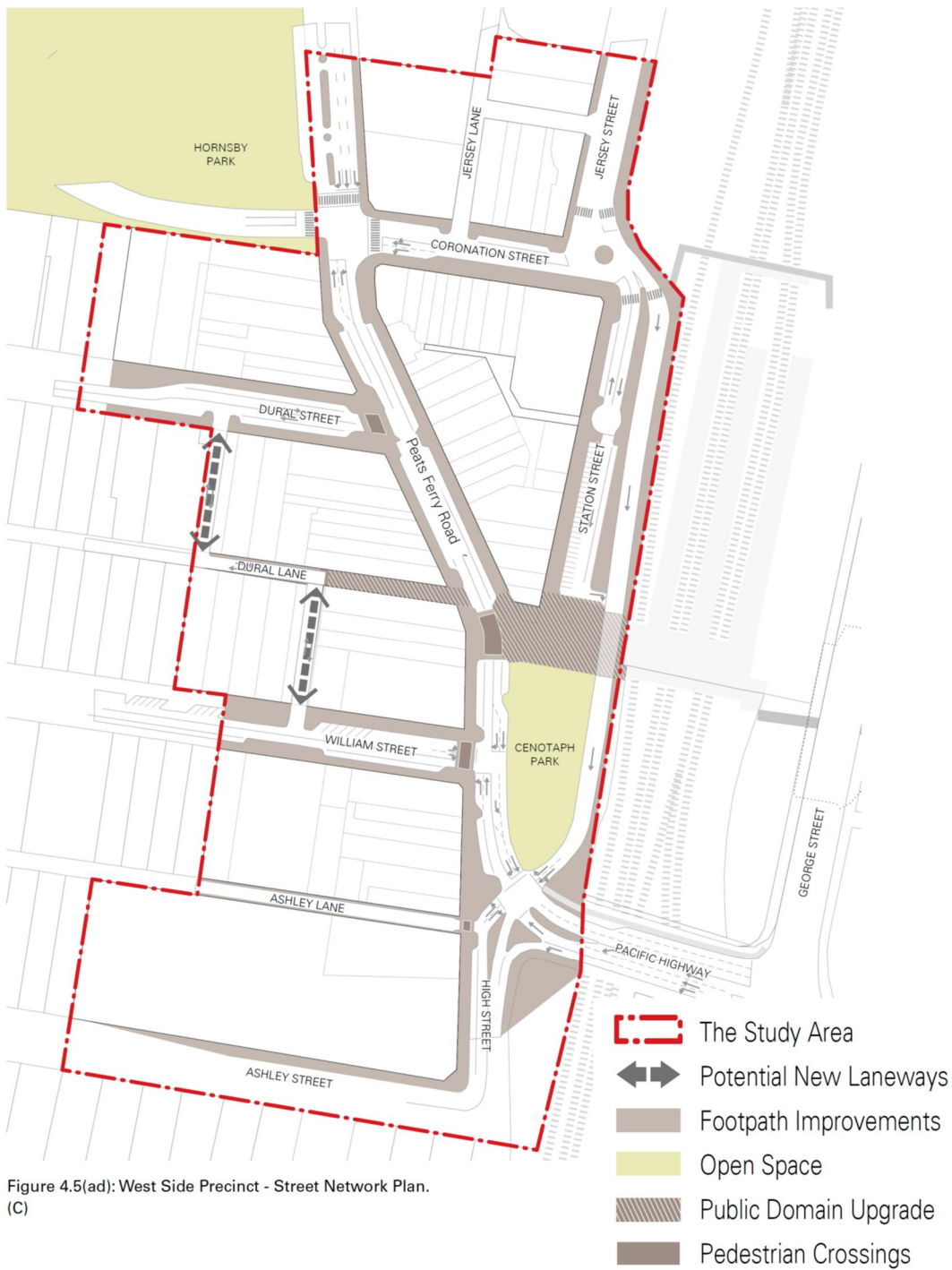


Figure 4.5(ad): West Side Precinct - Street Network Plan.
(C)

3. Proposed Development

The following section provides a description of the proposed development, parking provision and access to the site.

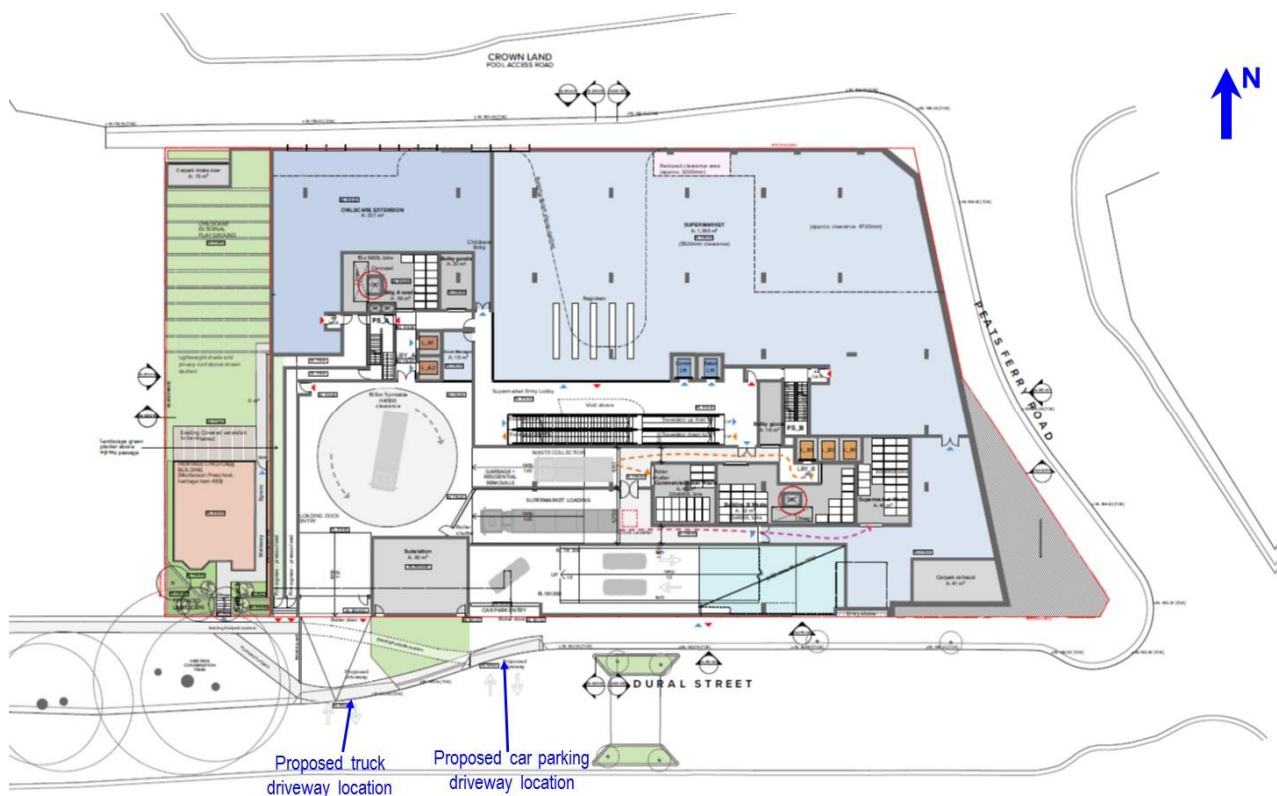
3.1 Description

The site is proposed to be a mixed land use development that features:

- Two residential buildings with a total of 191 dwelling units comprising 58 one-bedroom units, 112 two-bedroom units and 21 three-bedroom units.
- Retail shops including: 1,543 m² GFA for a supermarket and 1,880 m² GFA ground level retail speciality shops.
- Commercial office: 2,136 m² GFA.
- Childcare: 337m² GFA for a child care centre with a maximum of 30 children.
- A total of 331 car parking spaces would be provided across five levels. Levels B1 and B2 will be mainly for retail parking and levels B3 and B4 for residential parking. Of these, 157 car parking spaces will be for residents including 13 spaces for people with a disability, and 172 spaces for retail and commercial including 12 spaces for people with a disability and 2 car share spaces.
- Vehicular access is proposed from Dural Street as shown in Figure 3.1 with a loading dock access to be provided further west.

Figure 3.1 shows the design plan of the proposed development in lower ground level.

Figure 3.1 : Driveway Access Locations



3.2 Parking Provision

The Hornsby Development Control Plan (DCP) provides detailed requirements on the parking provision for each land use category. This section reviews the compliance of the proposed parking with the DCP. The relevant controls are for sites that are within 800m of a train station and requires a minimum amount of car parking.

The proposed development is comprised of residential, supermarket and other speciality shops, commercial office and a childcare centre. The DCP parking rates for each land use category are described in Table 3.1.

Table 3.1 : Car parking rates of each land use category required by Hornsby Council DCP

Category	Unit for parking rate	Car parking rate	Parking rate for visitors	Parking rate for delivery	Car share	Car parking for disability	Bicycle/ Motorcycle parking rate
Medium and High Density Dwellings	1- bedroom units	0.4 space/ per unit	1 space per 7 dwellings	4 + 1 per 100 units over 200 if the number of flat units > 200	For Hornsby West Side, a minimum of 1 space is to be allocated to car share for developments with 50 or more dwellings.	10% of all units to provide with 1 minimum disability parking space per unit	1 bicycle space per 5 units for tenants, and 1 space per 10 units for visitors 1 motorcycle space per 50 car parking spaces.
	2- bedroom units	0.7 space/ per unit					
	3- bedroom units	1.2 space/per unit					
Commercial (office)	GFA	1 space per 48 m2 GFA	-	1 space per 4,000m2 GFA if total GFA < 20,000m2 GFA		1-2% of spaces of commercial premises	1 space per 600m2 (GFA) for staff+ Developments 1 motorcycle space per 50 car parking spaces.
Supermarket/ retail (Shops/Cafes)	square metres gross leasable floor area (GLFA)*1	1 space per 29 square metres GLFA	-	1 space per 400m2 GFA, if total GFA < 2,000m2; 5+1 space per 1,000 m2 over 2000 m2		1-2% of spaces of commercial premises	1 motorcycle space per 50 car parking spaces.
Education: childcare centre	No. of children	1 space per 4 children	Not applicable			2-3% of spaces of educational premises	1 rack per up to 20 employees 1 motorcycle space per 50 car parking spaces.

Notes: *1, According to RMS Guide to Generating Traffic Development (2002), gross leasable floor area is around 75% of gross floor area (GFA)

Based on the parking rates in Table 3.1, the minimum parking provision for each of the land use categories is shown on Table 3.2.

Table 3.2 : Car parking provision complying with Hornsby Council DCP

Unit for parking rate	Car parking spaces	Parking bays for visitors	Car share	Parking for People with a Disability (provided)	Bicycle/motorcycle parking space
1-bedroom units: 58	24	28	2	13	58/4
2-bedroom units: 112	79				
3-bedroom units: 21	26				
Commercial office: 2,136 sqm	45	-	-	1	4/1
Supermarket and other retail GFA: 3,423sqm	119	-	-	10	6/3
No. of children: 30	8	-	-	1	1/1
Total	301	28	2	25	69/9

The DCP requires:

- A total minimum of 331 car parking spaces including 119 spaces for the retail and supermarket, 45 spaces for commercial offices, 8 spaces for the child care centre and the remaining 159 spaces for residents.
- Of the 159 car parking spaces for residents, 28 spaces will be for visitor parking, 13 designated for people with a disability for adaptable units, 2 spaces for car share (located on the retail levels), and the remaining 116 spaces for the tenants of other units (non-adaptable units). It should be noted that 13 designated spaces for people with disability are included in the calculated spaces on the basis of number of units.
- Of the 119 retail car parking spaces, 10 spaces are for people with a disability.
- Of the 45 commercial office car spaces, 1 space is for people with a disability and 44 spaces for other employees and visitors.
- Of the 8 childcare centre car parking spaces, 1 space will be for people with a disability.
- A total of 69 secure bicycle spaces are required including 58 for residents and 11 parking spaces for retail, commercial office and child care centre.
- A total of 9 motorcycle spaces are required including 4 for residents, 3 spaces for retail, 1 for commercial office, and 1 for childcare.

The DCP also requires 69 bicycle parking spaces and 9 motorcycle parking spaces. The proposed bicycle parking area has a total of 314 m² area, and may accommodate around 105 bicycle parking spaces by using 90-degree angle parking and two aisles layout. The proposed motorcycle parking areas can accommodate 16 motorcycles and exceeds the requirements of DCP.

A loading area will be provided on the lower ground floor that will provide two service bays for a 12.5m Heavy Rigid truck and a garbage truck or removalist truck (8.8m truck). The loading area arrangement is shown in Figure 3.2. The loading area will feature a turntable that will enable manoeuvring within the loading area so that trucks will arrive and leave in a forward gear.

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3.3 Vehicular Access and Car Park Circulation

3.3.1 Vehicle Access to Loading Area

As shown in Figure 3.1, the proposed car park driveway and driveway to the loading area are both located in Dural Street. The proposed driveways are located on the northern side of Dural Street, where a “No Parking” sign is currently located as shown in Figure 3.3.

As indicated by the truck turn path analysis an additional splay area of the driveway would be required to allow a truck to turn out of the driveway and comply with AS 2890.2 Parking Facilities Part 2: Off-street commercial vehicle facilities.

The opposite side of the street to the proposed driveways has “No Parking” restrictions for 8:00am-5:30pm weekdays, 8:00am-12:30pm on Saturdays.

Figure 3.3: The traffic management at the kerbside close to heavy vehicle driveway of the proposed development



The arrival of some trucks is likely to occur outside the ‘No Parking’ restriction time period. Therefore, the swept paths of vehicles arriving and leaving the site has been assessed for the proposed truck driveway with removal of parking spaces on the southern side of Dural Street as shown in Figure 3.4 and Figure 3.5.

A right-in, right-out access arrangement is proposed for trucks only.

Figure 3.4: The entering path of heavy vehicle without southern kerbside car parking on Dural Street

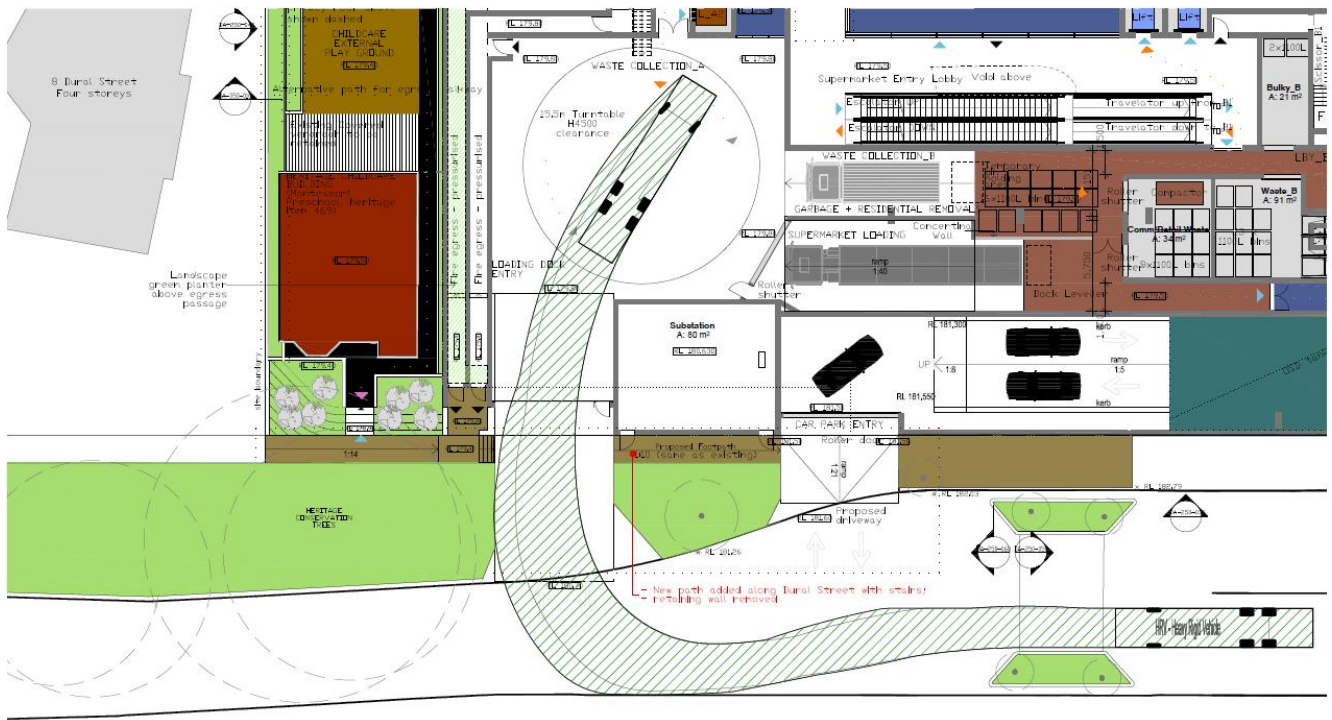
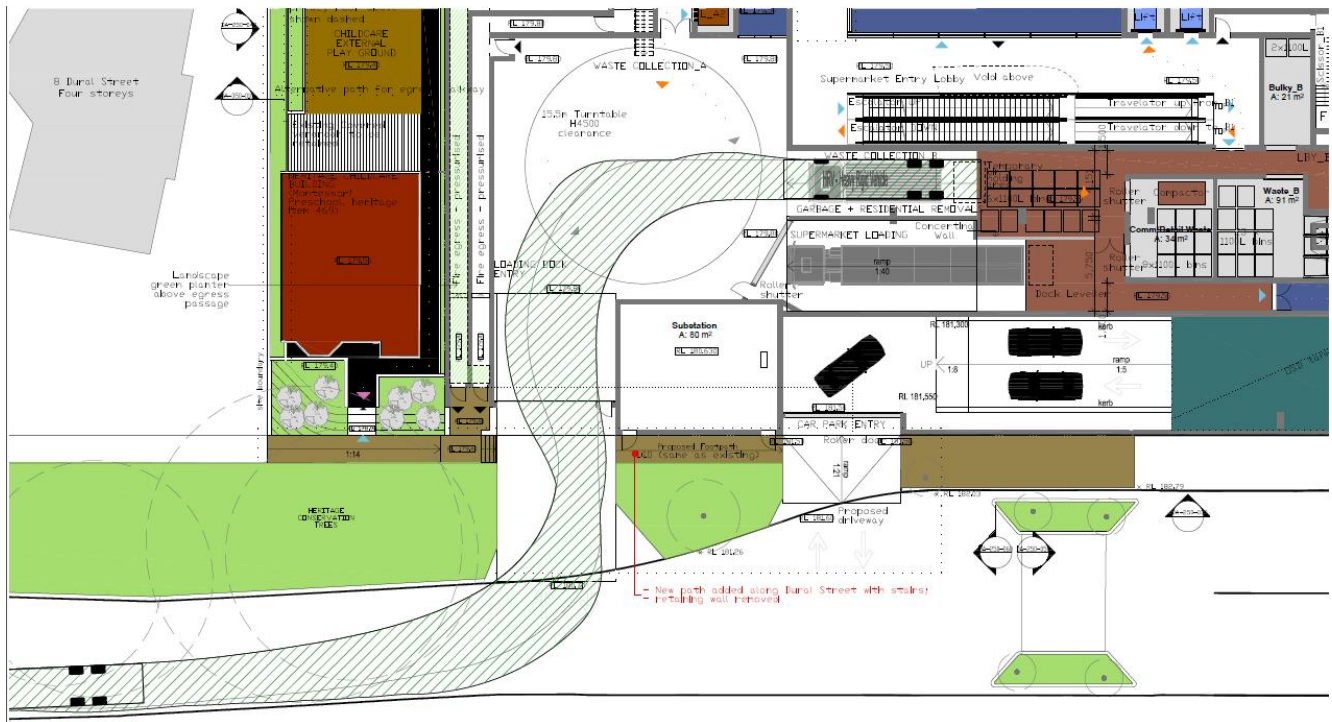


Figure 3.5: The exiting path of heavy vehicle without southern kerbside car parking on Dural Street



The above figures show that without southern kerbside car parking on Dural Street, a typical heavy rigid vehicle (12.5 metres long) is able to manoeuvre onto the turntable without obstruction.

3.3.2 Car Parking Access

Car park access will be controlled by a boom gate. The peak inflow is forecast to be 163 vehicles per hour. AS2890.1 guidance on the amount of queuing area required suggests 3% for the first 100 and 2% for the second 100 vehicles. Using this guidance queuing for 5 cars would be required or 30m from the boom gate. The boom gates are located on the 1st basement level so that queuing would be contained within the site.

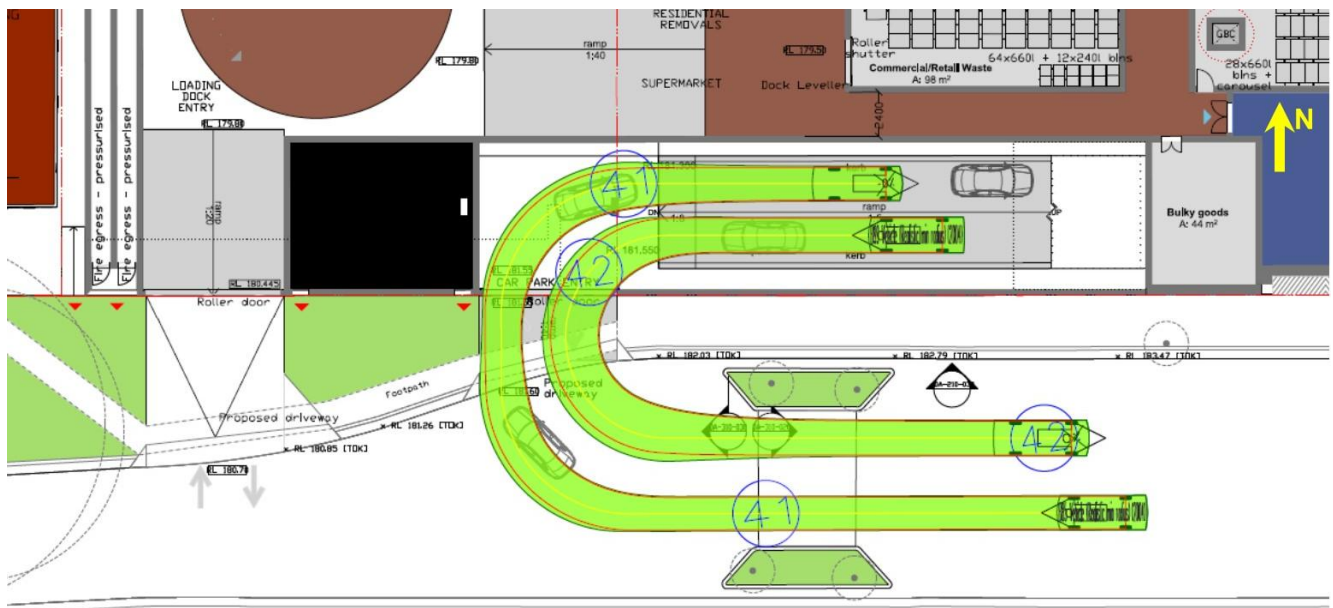
3.3.3 Car Parking Circulation

There will be five levels of car parking on levels B1 to B5. Levels B1 and B2 provide parking for supermarket, retail, childcare, and car share spaces. Levels B3-B5 provide parking spaces for residents.

Traffic enter the car park via a two-way ramp. Central two-way ramps will provide access between parking levels.

The car park entrance and exit have a moderate radius, and the swept path analysis shows a B85 vehicle to pass a B99 is smooth as shown in Figure 3.6.

Figure 3.6: Swept paths for car park entrance/exit (B99 and B85 vehicles)



The parking aisles are some 6.6 m wide for B1 and B2, and 5.8 m wide for B3 - B6 which meet the requirements of AS2890.1 and is acceptable for manoeuvring into and out of car spaces as well as circulating in two-way for levels B1 – B6. The swept path analysis shows all levels would allow a B85 vehicle to pass a B99 in all areas of the car park.

Figure 3.7: Swept Paths for B1 (B99 and B85 vehicles)



Figure 3.8: Swept Paths for B2 (B99 and B85 vehicles)

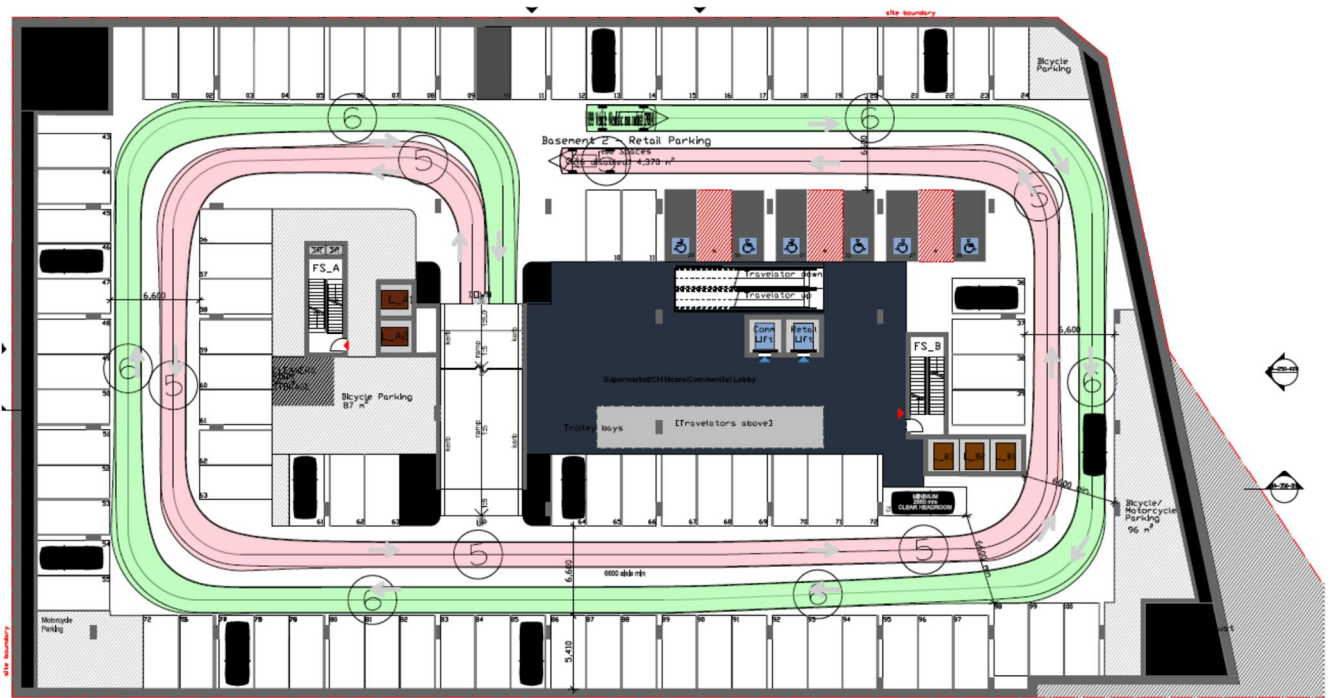
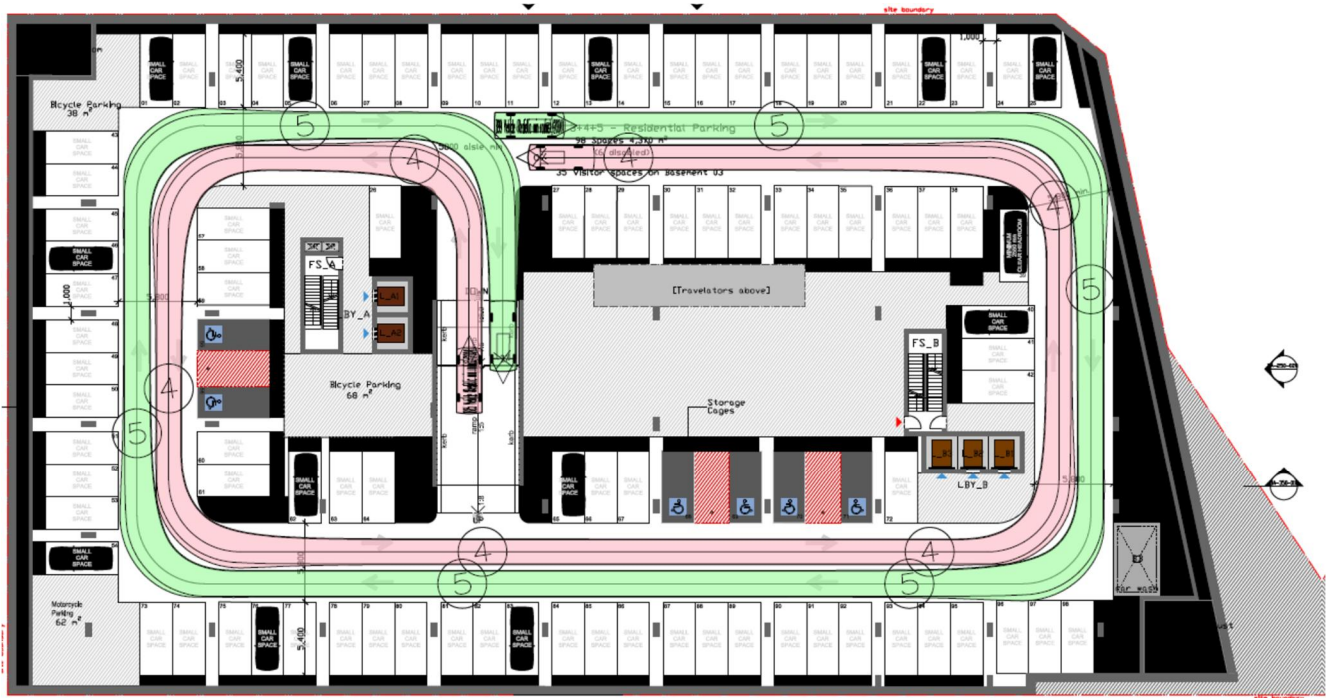


Figure 3.9: Two-way car parking circulation for levels B3-B6



3.3.4 Ramp Gradients

The proposed ramps will have a maximum gradient of 1 in 5 and provide 1 in 8 transition to avoid scraping. This would comply with AS2890.1.

3.3.5 Turn path analysis

Peats Ferry Road / Dural Street intersection

The turn path of a 12.5m Heavy Rigid Vehicle has been tested for paths between Dural Street and Peats Ferry Road. Given that a right-in, right-out access arrangement is proposed, turn paths for heavy vehicles turning into Dural Street from Peats Ferry Road has been assessed as illustrated in Figure 3.10 and Figure 3.11. Turn paths for heavy vehicles turning into Peats Ferry Road from Dural Street has also been assessed as illustrated in Figure 3.12 and Figure 3.13.

The turn path analysis shows that a 12.5m truck can turn right or left from Peats Ferry Road into Dural Street legally, however would require some minor adjustments to the curb on the southern corner of Dural Street and Peats Ferry Road to avoid encroachment of vehicles into the oncoming land on Dural Street.

The turn path analysis shows that a 12.5m truck can turn right or left from Dural Street into Peats Ferry Road legally, however, due to the encroachment of the HRV into the southbound traffic for a left turn, vehicles exiting the loading dock will be directed with a right turn only sign when entering Dural Street.

Figure 3.10 : Right turn path from Peats Ferry Road to Dural Street



Figure 3.11 : Left turn path from Peats Ferry Road to Dural Street

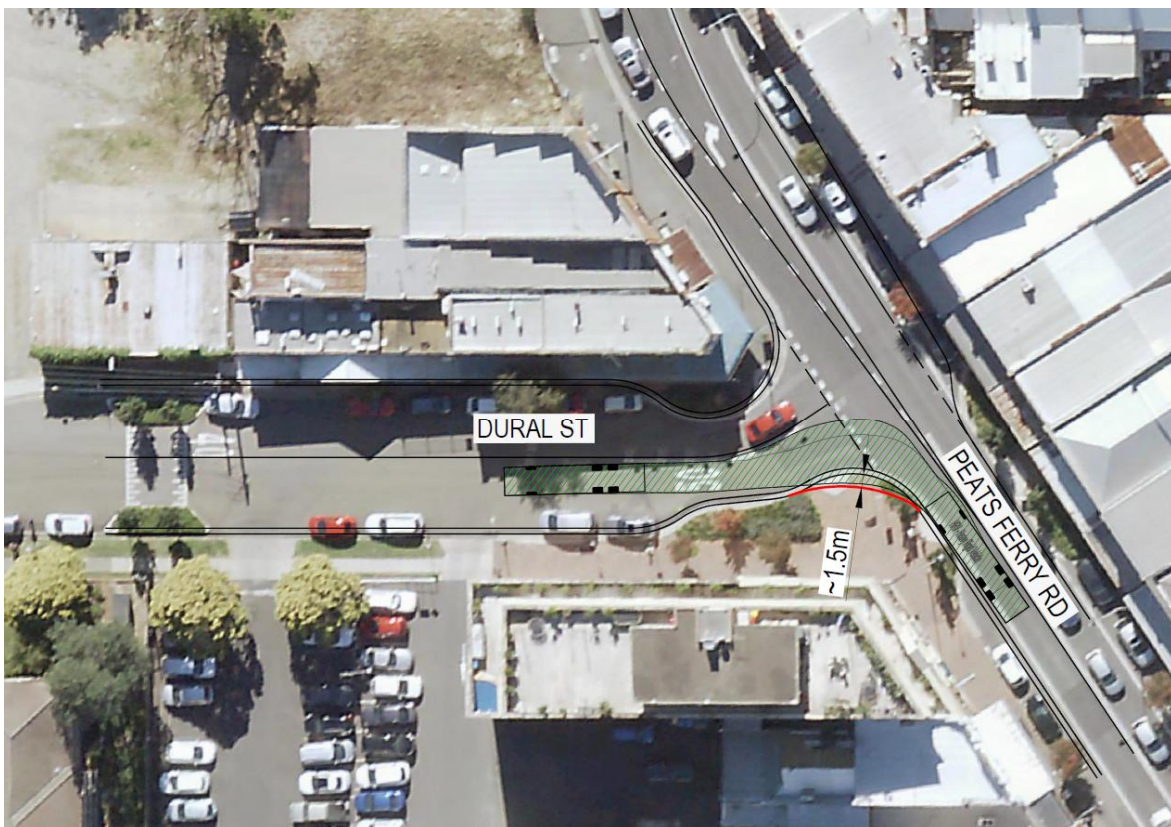


Figure 3.12 : Right turn path from Dural Street to Peats Ferry Road without encroaching opposing traffic lane

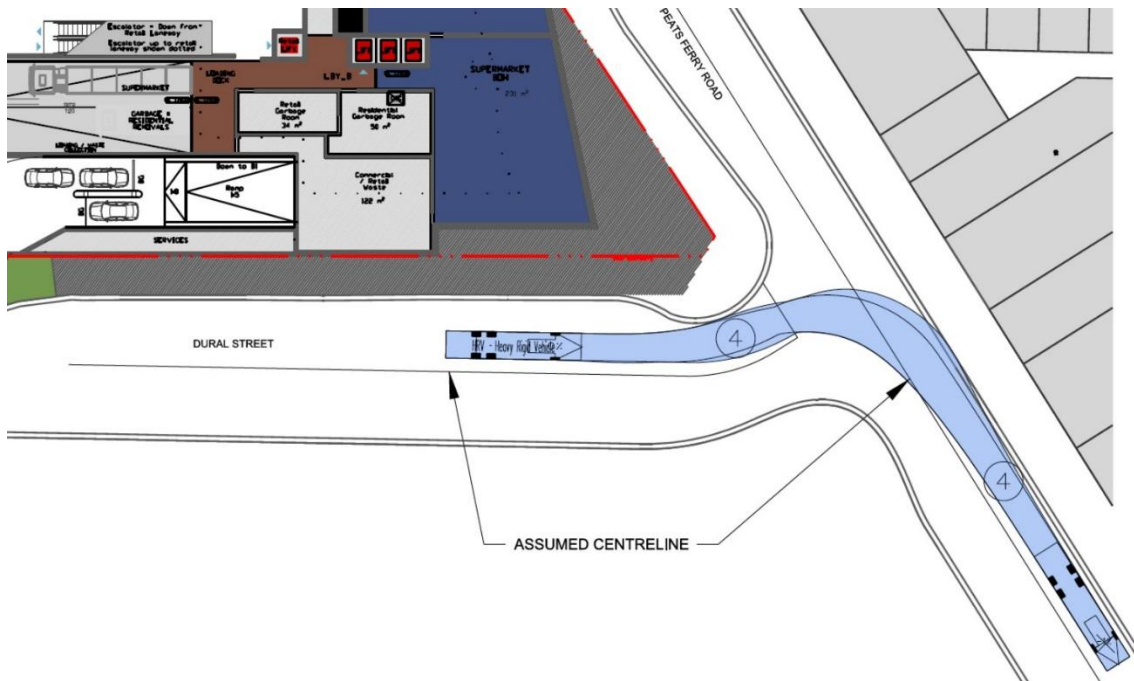
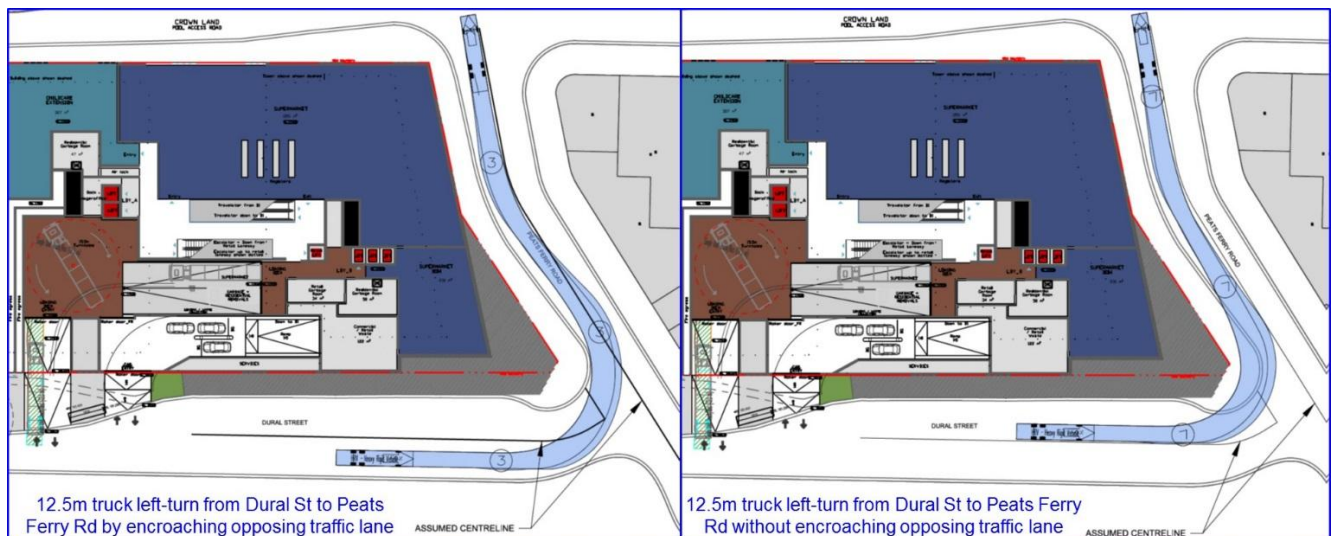


Figure 3.13 : Left turn path from Dural Street to Peats Ferry Road with/without encroaching opposing traffic lane



Other intersections

The turn path of a 12.5m Heavy Rigid Vehicle has been tested at other intersections which may be used by heavy vehicles intending to access the development. These intersections are:

- Peats Ferry Road / William Street (Figure 3.14)
- William Street / Frederick Street (Figure 3.15)
- Dural Street / Frederick Street (Figure 3.16 and Figure 3.17)

The turn path analysis shows that a 12.5m truck can perform the required turning movements at these intersections without any adjustments to existing curbs.

Figure 3.14 : Left turn path between Peats Ferry Road and William Street

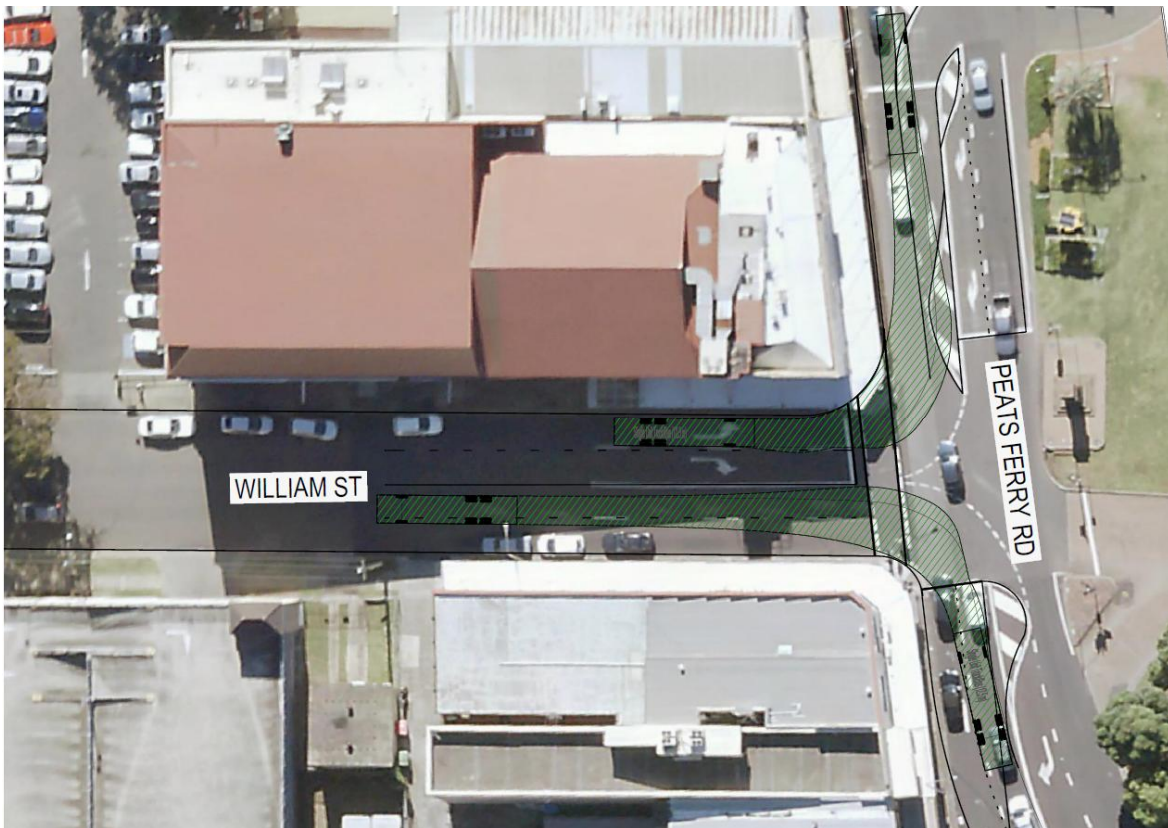


Figure 3.15 : Right turn path from William Street to Frederick Street



Figure 3.16 : Right turn path from Frederick Street to Dural Street



Figure 3.17 : Left turn path from Dural Street to Frederick Street



4. Traffic and Transport Impacts

The following section provides an assessment of the impacts on traffic and transport. This includes assessment of growth in background traffic, forecast traffic generation and assignment, traffic modelling and an assessment of the impacts on public transport and active transport.

The traffic modelling was undertaken in Sidra version 7 using a network model to model the corridor along Peats Ferry Road.

4.1 Background Traffic Growth

Background traffic growth of 2% per annum has been assumed as part of this assessment in accordance comments received from Council. However, the growth in background traffic, that is trips through the study area, is constrained by the regional road network and is unlikely to be this high. Evidence suggests that background traffic will not grow at this rate as evidenced by:

- Hornsby Shire Council acknowledge in their pre-DA advice that the road network has limited capacity.
- The Hornsby West Side traffic study (Bitzios Consulting, 2013) assumed no background traffic growth.
- Historical traffic data from Roads and Maritime permanent count stations show no appreciable growth in traffic over the last 10 years.

The memo provided by the Hornsby Shire Council on 14 March 2017, stated “Peats Ferry Road currently operating at capacity or very near capacity during peak periods and has limited capacity to absorb additional traffic, particularly the section between William Street and Coronation Street”.

In addition, the three Roads and Maritime traffic counts stations closest to the proposed development site show that the background traffic volumes have not increased in years. These three traffic counts stations are located at:

- 70m North of Pennant Hills Road, Wahroonga,
- 80m South of Clarinda Street, Hornsby
- 70m South of Mills Avenue, Asquith

The traffic counts data for weekday morning and evening peaks at these three are shown in following Figures 4.1-4.3. This demonstrates traffic volumes have not increased significantly.

Figure 4.1: Past average weekday traffic volume at three closes RMS traffic counts stations

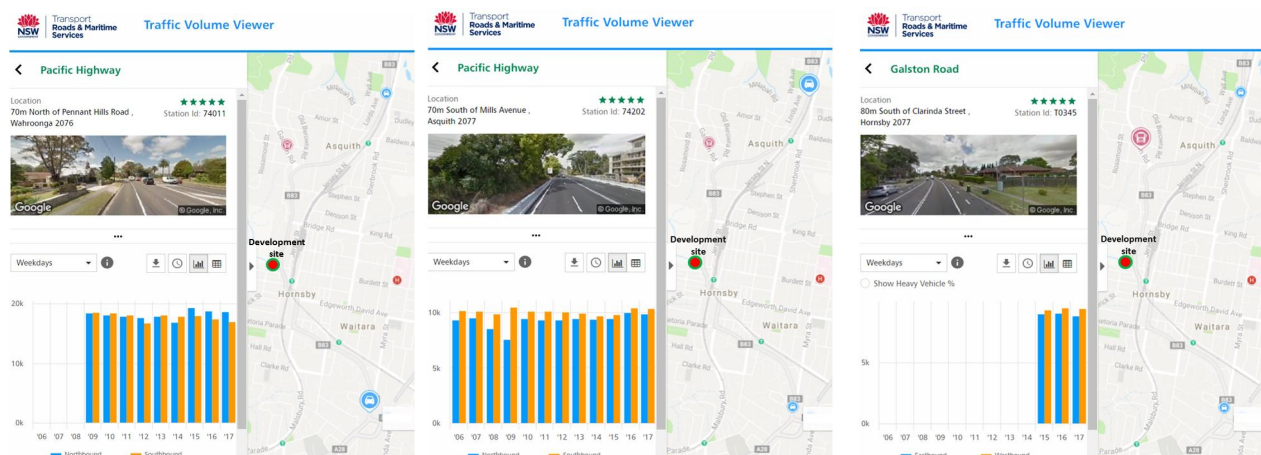


Figure 4.2: Past average AM peak traffic volume at three closes RMS traffic counts stations

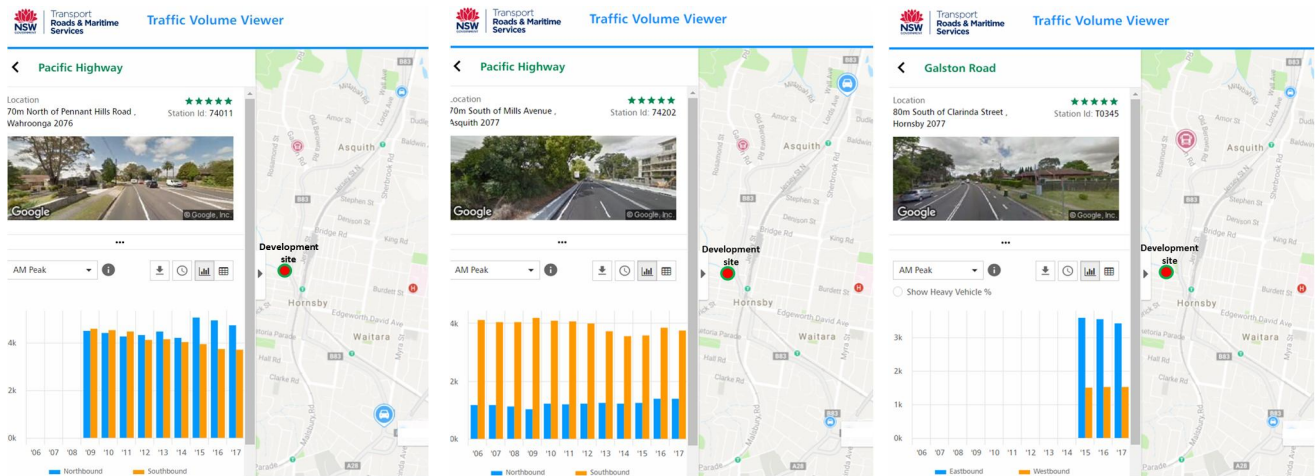
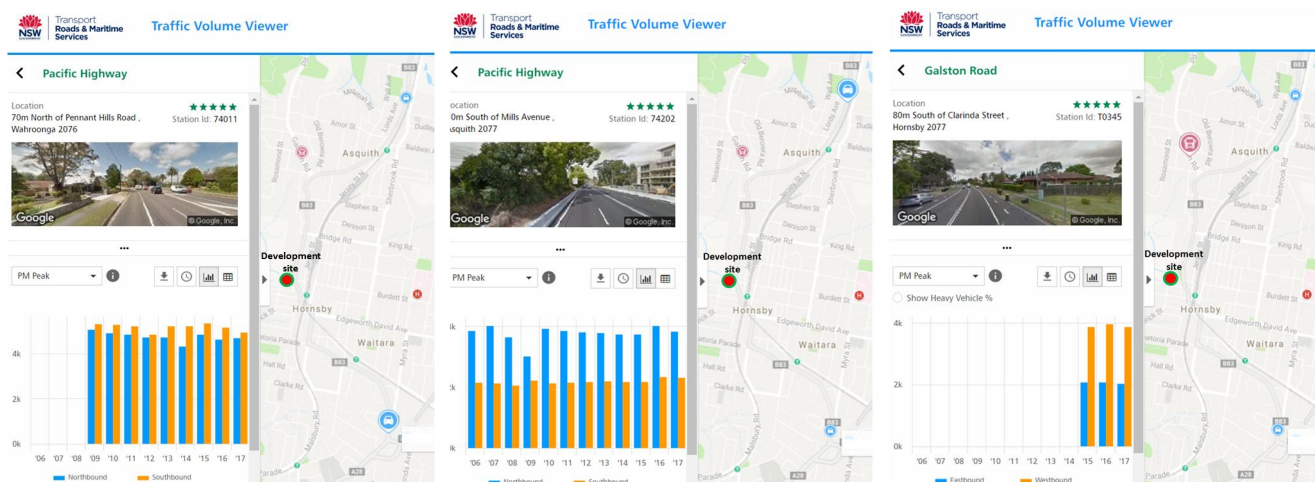


Figure 4.3: Past average PM peak traffic volume at three closes RMS traffic counts stations



Notwithstanding this assessment has included a 2031 scenario in which a 2% per annum growth factor has been applied.

4.1.1 Road Network Assessment Criteria

This study has used the Sidra intersection software package and RTA level of service method to assess intersection performance. The following indicators have been used to measure the intersection operation:

- Level of service (LOS)
- Degree of saturation
- Average of vehicle delay
- 95% percentile queue length

Level of Service (LoS) is a basic performance parameter used to describe the operation of an intersection. Levels of Service range from A (indicating good intersection operation) to F (indicating over-saturated conditions with long delays and queues). At signalised intersections, the LoS criteria are related to average intersection delay (seconds per vehicle). At priority controlled (give-way and stop controlled) and roundabout intersections, the LoS is based on the modelled delay (seconds per vehicle) for the most delayed movement (refer to Table 4.1).

Table 4.1 : Level of Service Criteria for Intersections

Level of Service	Average delay (seconds per vehicle)	Traffic signals, roundabout	Give Way and stop signs
A	Less than 14	Good operation	Good operation
B	15 to 28	Good with acceptable delays and spare capacity	Acceptable delays and spare capacity
C	29 to 42	Satisfactory	Satisfactory, but accident study required
D	43 to 56	Operating near capacity	Near capacity and accident study required
E	57 to 70	At capacity. At signals, incidents would cause excessive delays. Roundabouts require other control mode.	At capacity; requires other control mode
F	Greater than 71	Unsatisfactory with excessive queuing	Unsatisfactory with excessive queuing; requires other control mode

Source: Roads and Maritime Services Guide to Traffic Generating Developments, 2002

Degree of Saturation (DoS) is the ratio of demand flow to capacity, and therefore has no unit. As it approaches 1.0, extensive queues and delays could be expected. For a satisfactory operation, DoS should be less than the nominated practical degree of saturation, usually 0.9. The intersection DoS is based on the movement with the highest value.

Average delay is the difference between interrupted and uninterrupted travel times through the intersection and is measured in seconds per vehicle. At signalised intersections, the average intersection delay for the whole intersection is reported. At roundabouts and priority controlled intersections, the average delay for the most delayed movement is reported.

Queue length is measured in metres reflecting the number of vehicles waiting at the stop line and is usually quoted as the 95th percentile back of queue, which is the value below which 95% of all observed queue lengths fall. It reflects the number of vehicles per traffic lane at the start of the green period, when traffic starts moving again after a red signal. The intersection queue length is usually taken from the movement with the longest queue length.

Typically, acceptable intersection performance in peak periods for urban environments is defined as follows:

- LoS D or better (the worst case scenario of vehicle delay was less than or equal to 56 seconds)
- Degree of saturation (DoS) less than or equal to 0.8 at priority controlled intersection, and 0.90 at a signalised controlled intersection
- 95th percentile worst back of queue length not interfering with adjacent intersections.

4.2 Traffic Forecast

Traffic generation estimates for the proposed development has been based on the published traffic generation data in the Roads and Maritime, Guide to Traffic Generating Developments technical direction (2013) for the land use types including residential, supermarket, retail and child care.

The forecast trip generation is shown in Table 4.2 for morning peak period and Table 4.3 for afternoon peak period. The proposed development has mixed of land uses including residential, supermarket, retail and child care, which would induce linked and multi-purpose trips to the proposed development. The RTA Guide to Traffic Generating Developments suggests a discount of 20% to account for multi-purpose trips linked to the supermarket and retail land use. The column "Adjusted volumes" shows the traffic generation after the discount factor has been applied.

The assumed directional split for residential component is 80% out to 20% in during morning peak period, vice versus during afternoon peak period, and 50% out to 50% in for other land uses both in morning and afternoon peak periods.

Table 4.2 : Forecast Trip Generation for the Morning Peak Hour

Land use	Quantity	Measurement Unit	Trip Rate	Traffic generation (veh/hr)	Adjusted volumes (veh/hr)	Directional Split (out / in)	Outbound vehicle trips	Inbound vehicle trips
Residential	191	Dwellings	0.19	36	36	80% / 20%	30	6
Commercial office	2,136	GFA (m ²)	1.6 per 100m ²	34	34	20% / 80%	7	27
Supermarket	1,157	GFLA (m ²)	6 per 100m ²	69	56	50% / 50%	28	28
Retail	1,410	GFLA (m ²)	6 per 100m ²	71	57	50% / 50%	29	28
Child Care	30	No. of Children	0.8	24	24	50% / 50%	12	12
Total					207		106	101

Table 4.3 : Forecast Trip Generation for the Evening Peak Hour

Land use	Quantity	Measurement Unit	Trip Rate	Traffic generation (veh/hr)	Adjusted volumes (veh/hr)	Directional Split (out / in)	Outbound vehicle trips	Inbound vehicle trips
Residential	232	Dwellings	0.15	29	29	20% / 80%	6	23
Commercial office	2,136	GFA (m ²)	1.2 per 100m ²	26	26	80% / 20%	21	5
Super-market	1,157	GFLA (m ²)	12.3 per 100m ²	142	114	50% / 50%	57	57
Retail	1,410	GFLA (m ²)	12.3 per 100m ²	173	139	50% / 50%	70	69
Child Care	30	No. of Children	0.7	21	21	50% / 50%	11	10
Total					328		165	163

4.3 Traffic Distribution

The traffic distribution for this study has been based on the Origin / Destination matrices provided in the Hornsby West Side Traffic Study (2013) report provided by Hornsby Shire Council. The origin to destination (OD) was based on 32 traffic zones for the entire Hornsby town centre area as shown in Figure 4.4. It has been assumed that traffic would not be able to turn right from Dural Street into Peats Ferry Road and that most traffic would use the signalised intersection at William Street.

A map of the Development Site showing numbered locations 1 through 32. A blue circle with a white dot is located near location 27. The map includes a network of roads and various land parcels.

The traffic zone 27 in the Hornsby West Side Traffic Study represents the proposed development site. The traffic generated from zone 27 to all other traffic zones and from other traffic zones to zone 27 were adopted from the study. By merging some traffic zones, the distribution factors for inbound and outbound generated traffic of the proposed development site during morning and afternoon peak periods are shown in Figure 4.5 and Figure 4.6.

Project Site

AM: 41% PM: 40%

AM: 5% PM: 4%

AM: 1% PM: 0%

AM: 2% PM: 2%

AM: 1% PM: 2%

AM: 20% PM: 21%

AM: 14% PM: 12%

AM: 2% PM: 4%

AM: 8% PM: 6%

AM: 5% PM: 5%

The map displays the area around the 'Project Site' in Hornsby, with traffic flow and congestion levels indicated by blue arrows and red dashed circles. The congestion levels are provided for both AM and PM peak periods.

Project Site

Key Locations and Streets:

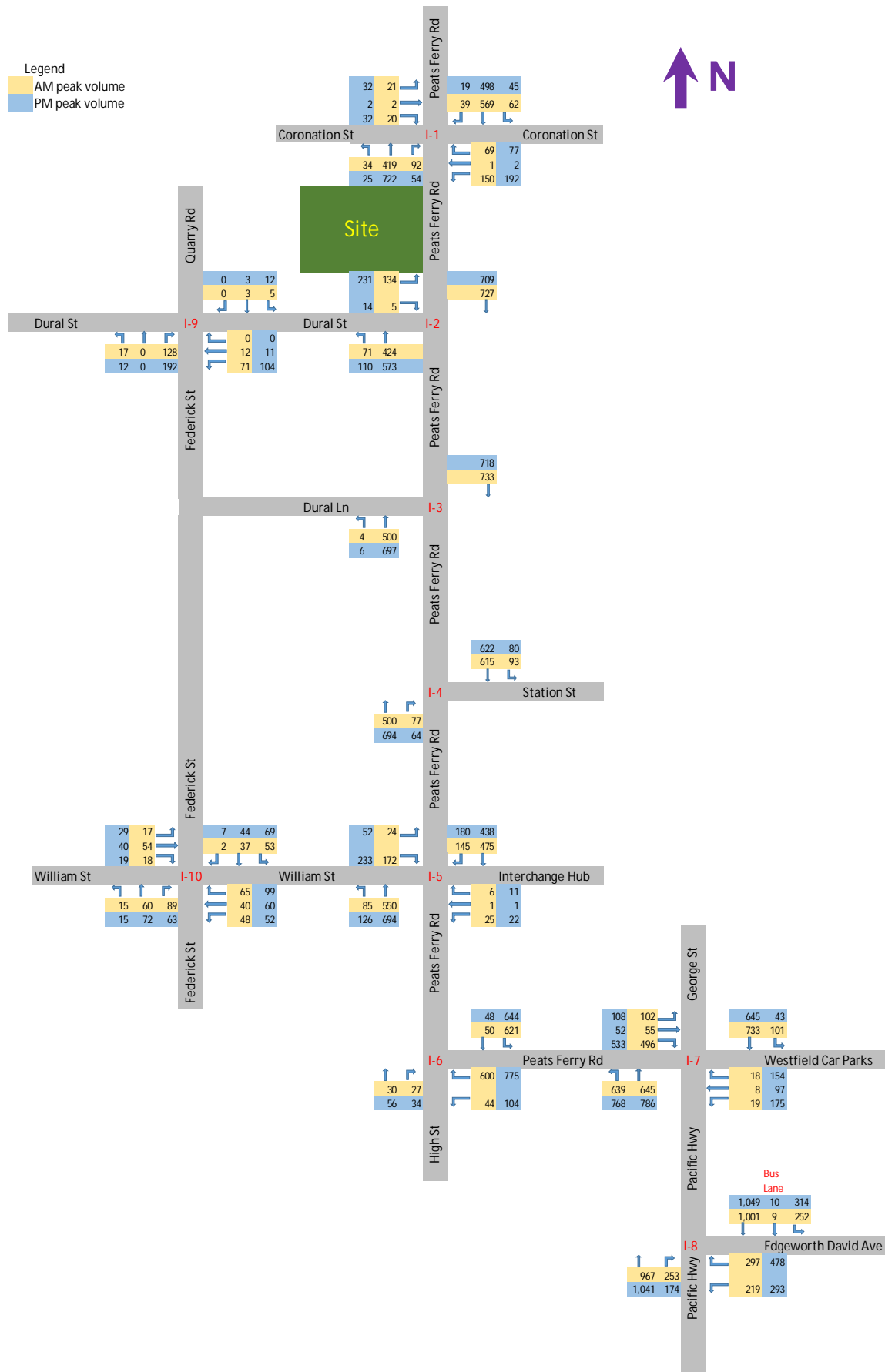
- Hornsby Mountain Bike Trail
- Bluegum Walk
- Quarry Road
- Dural St
- Lisgar Rd
- William Ln
- Ashley Ln
- Ashley St
- Frederick St
- Nursery St
- Webb Ave
- Forbes St
- Hornsby Park
- Hornsby Aquatic and Leisure Centre
- Hornsby Police Station
- Jersey Ln
- Hornsby Station
- Hornsby War Memorial, the Cenotaph
- Hornsby RSL Club
- Hornsby Water Clock
- Westfield Hornsby
- Target Hornsby
- Hornsby Girls High School
- Centrelink
- Jaam-e-Jam
- BP
- The Hornsby Inn
- Kmart
- Fitness First Hornsby
- ALDI Hornsby

Traffic Flow and Congestion Levels:

- Jersey Ln (Northbound):** AM: 40%, PM: 40%
- Jersey Ln (Southbound):** AM: 4%, PM: 7%
- Quarry Road (Eastbound):** AM: 1%, PM: 1%
- Dural Ln (Eastbound):** AM: 1%, PM: 1%
- William Ln (Eastbound):** AM: 1%, PM: 1%
- Ashley Ln (Eastbound):** AM: 31%, PM: 16%
- High St (Northbound):** AM: 0%, PM: 1%
- High St (Southbound):** AM: 7%, PM: 4%
- North David Ave (Westbound):** AM: 4%, PM: 7%
- North David Ave (Eastbound):** AM: 9%, PM: 18%

The forecast traffic volumes with the proposed development are shown in Figure 4.7.

Figure 4.7: Forecast Traffic Volumes



4.4 Model Description

The network model was developed in Sidra version 7 and included the Pacific Highway from Edgeworth David Avenue to Coronation Street. Traffic signal timing and phasing was coded according to the traffic signal plans and observations of signal timing taken from the observations and videos of the intersection performance. The model network layout is shown in Figure 4.8.

The intersections of William Street and Frederick Street and Dural Street and Frederick Street have been modelled as standalone intersections.

Figure 4.8 : Peats Ferry Road Sidra Model (Base Year)



For the future year modelling analysis, five scenarios have been tested to identify the traffic impacts of the proposed development under the different conditions of road network and traffic demand, as summarised in Table 4.4.

Table 4.4 : Future year scenarios summary

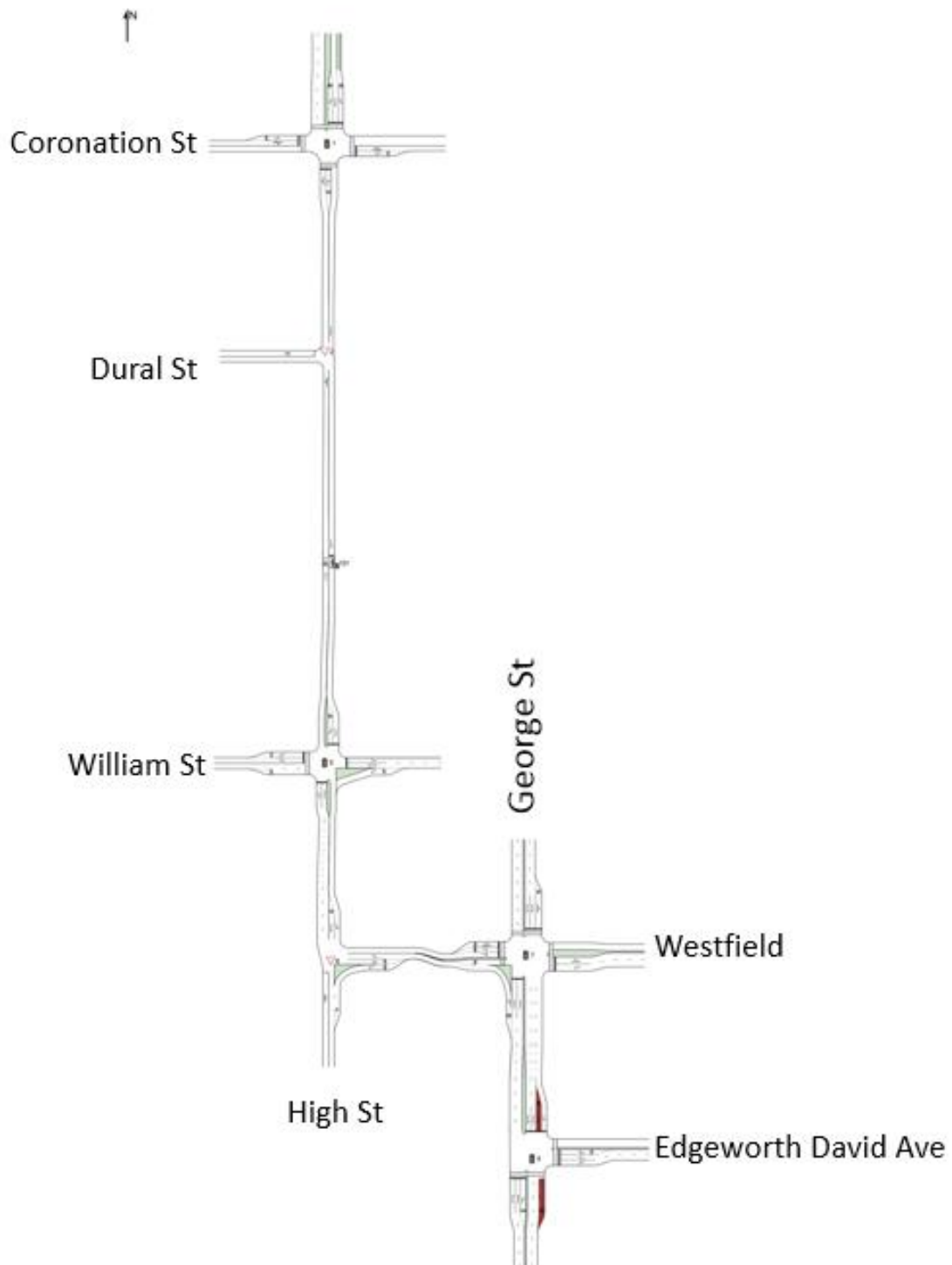
Scenario	Traffic demand		Road network
	Proposed development	Background traffic growth	Do Minimum
Future No Development Do Minimum	N	N	Y
Future with Development Do Minimum	Y	N	Y
2031 No Development Do Minimum	N	Y	Y
2031 with Development Do Minimum	Y	Y	Y

The background traffic growth scenarios assumed a 2% per annum growth in traffic as suggested by Hornsby Shire Council.

For the 'do minimum' modelling with development traffic, changes were made to the signal timing to reflect the adaptive signals of SCATS control, as well as the road network improvements including:

- Closure of Dural Lane at Peats Ferry Road, and the intersection removed from the networked model for the future years.
- Closure of Station Street at Peats Ferry Road and replaced with a mid-block crossing and redirection of traffic to Coronation Street.
- The major routes for the networked model include northbound and southbound movements have not been changed.
- The cycle time for all signalised intersections has been set to 140 seconds which is the same as the previous models.
- At Coronation Street and Peats Ferry Road, Phase C, the controlled right turn was added (phase time: 12 seconds) for the morning peak period to reduce delay for the northbound right-turn traffic volume. Currently phase C is called infrequently in the mornings so that the existing traffic modelling ignored phase C.

Figure 4.9 : Peats Ferry Road Sidra Model (Do Minimum in future year)



4.5 Intersection Performance Assessment

The existing intersection performance is shown in Table 4.5. The results show that two intersections during morning peak period and three intersections during evening peak period are operating at LoS F, and all other intersections operate at acceptable LoS D or better. The five intersections that are operating with LoS F are:

- Peats Ferry Road and Coronation Street during morning peak period
- Peats Ferry Road and Station Street during morning peak period
- Peats Ferry Road and William Street during evening peak period
- Peats Ferry Road and High Street during evening peak period
- Pacific Highway and Edgeworth David Avenue during evening peak period

Table 4.5 : Sidra Results Base Model

Intersection	Peak period	Degree of Saturation	Average delay(s)	95% percentile Queue length (m)	Level of service	Intersection leg with worst delay and movement
Peats Ferry Road / Coronation Street	Morning	1.16	87	433	F	North leg: through movement
	Evening	1.04	40	251	C	North leg: through movement
Peats Ferry Road / Dural Street	Morning	0.78	13	119	A	West leg: right turn movement
	Evening	0.71	17	119	B	West leg: right turn movement
Peats Ferry Road / Dural Lane	Morning	0.37	6	186	A	-
	Evening	0.36	2	186	A	-
Peats Ferry Road / Station Street	Morning	1.11	77	77	F	North leg: through movement
	Evening	1.00	47	47	D	North leg: through movement
Peats Ferry Road / William Street	Morning	1.06	54	57	D	South leg: through movement
	Evening	1.37	146	57	F	South leg: through movement
Peats Ferry Road / High Street	Morning	0.52	43	174	D	South leg: right turn movement
	Evening	0.93	120	120	F	South leg: right turn movement
Peats Ferry Road / George Street	Morning	0.75	28	129	B	East leg: parking lot
	Evening	0.98	47	161	D	East leg: right turn
Pacific Highway / Edgeworth David Avenue	Morning	0.90	31	176	C	East leg: right turn movement
	Evening	1.22	73	298	F	East leg: right turn movement
Frederick Street / Dural Street	Morning	0.08	5	2	A	-
	Evening	0.10	5	2	A	-
Frederick Street / William Street	Morning	0.13	7	5	A	-
	Evening	0.13	7	5	A	-

The intersection performance for future Do Minimum without proposed development scenario is shown in Table 4.6. This scenario shows only two intersections including Peats Ferry Road/High Street and Peats Ferry Road/Edgeworth David Avenue operate with LoS F during evening peak period.

Table 4.6 : Intersection performance without proposed development but with Do Minimum road network improvements

Intersection	Peak period	Degree of Saturation	Average delay(s)	95% percentile Queue length (m)	Level of service	Leg with worst delay
Peats Ferry Road / Coronation Street	AM	0.79	14	81	A	-
	PM	0.90	21	106	B	-
Peats Ferry Road / Dural Street	AM	0.41	8	3	A	-
	PM	0.79	17	75	B	-
Pedestrian Crossing at Station Street	AM	0.50	3	90	A	-
	PM	0.52	3	90	A	-
Peats Ferry Road / William Street	AM	0.82	14	57	A	-
	PM	1.14	67	169	E	-
Peats Ferry Road / High Street	AM	0.70	47	70	D	South leg: all movements
	PM	0.95	131	174	F	South leg: all movements
Peats Ferry Road / George Street	AM	0.74	31	139	C	East leg: right turn
	PM	0.98	49	140	D	East leg: right turn
Pacific Highway / Edgeworth David Avenue	AM	0.89	28	143	B	East leg: right turn
	PM	1.22	73	298	F	East leg: right turn
Frederick Street / Dural Street	AM	0.08	4	2	A	-
	PM	0.10	4	2	A	-
Frederick Street / William Street	AM	0.13	6	5	A	-
	PM	0.13	6	5	A	-

The intersection performance with the changes described above for the 'do-minimum' and development is shown in Table 4.7. It shows that one intersection during morning peak period and three intersections during evening peak period would operate at LoS E or F, and all other intersections operate at acceptable LoS. These intersections operating at LoS E or F would be:

- Peats Ferry Road and William Street during evening peak period (LoS F)
- Peats Ferry Road and High Street during morning peak period (LoS E)
- Peats Ferry Road and High Street during evening peak period (LoS F)
- Pacific Highway and Edgeworth David Avenue during evening peak period (LoS F)

Table 4.7 : Sidra Results with Development Traffic ('Do Minimum')

Intersection	Peak period	Degree of Saturation	Average delay(s)	95% percentile Queue length (m)	Level of service	Leg: movement with worst delay
Peats Ferry Road / Coronation Street	Morning	0.84	16	109	B	-
	Evening	0.89	21	129	B	-
Peats Ferry Road / Dural Street	Morning	0.41	14	5	A	-
	Evening	0.83	25	109	B	-
Pedestrian Crossing at Station Street	Morning	0.50	3	84	A	-
	Evening	0.83	10	127	A	-
Peats Ferry Road / William Street	Morning	0.90	26	66	B	-
	Evening	3.59	>100	346	F	North leg: right turn
Peats Ferry Road / High Street	Morning	0.77	64	148	E	South leg: right turn
	Evening	1.13	>100	174	F	South leg: all movements
Peats Ferry Road / George Street	Morning	0.81	34	157	C	East leg: all movements
	Evening	0.97	47	162	D	East leg: all movements
Pacific Highway / Edgeworth David Avenue	Morning	0.89	28	153	B	East leg: right turn
	Evening	1.28	78	320	F	East leg: right turn
Frederick Street / Dural Street	Morning	0.13	4	3	A	-
	Evening	0.18	4	5	A	-
Frederick Street / William Street	Morning	0.15	7	5	A	-
	Evening	0.17	7	7	A	-

A comparison between the existing and future intersection performance is shown in Table 4.8, which shows following changes:

- During morning peak period in the future, the intersection of Peats Ferry Road and High Street would downgrade from LoS D into LoS E.
- All other intersections in the future would operate with acceptable LoS D or better. Particularly, the signal control adjustments in the future model would remove the existing LoS F for the intersection of Peats Ferry Road and Coronation Street.
- During afternoon peak period, three intersections including Peats Ferry Road and William Street, Peats Ferry Road and High Street, and Pacific Highway and Edgeworth David Avenue would maintain existing operation LoS F with a significant increase of the average time delay for the first two intersections
- All other intersections have no significant impact without LoS changes.

Comparing with future year Do Minimum without development scenario, the only one impacted intersection is Peats Ferry Road and William Street during evening peak period, which degrades LoS from C to F.

Table 4.8 : The comparison between existing and with development intersection performance

Intersection	Peak period	Existing LoS	With Development LoS	Change from existing to future
Peats Ferry Road / Coronation Street	Morning	F	B	Worse, but currently high delays
	Evening	C	B	Increase in delay
Peats Ferry Road / Dural Street	Morning	A	A	Slightly higher delays, but good LoS
	Evening	B	B	negligible impact
Peats Ferry Road / Dural Lane	Morning	A	Dural lane closed	no impact
	Evening	A		
Peats Ferry Road / Station Street	Morning	F	Station Street closed	No impact
	Evening	D		
Peats Ferry Road / William Street	Morning	D	B	Improvement
	Evening	F	F	Worse, but currently high delays
Peats Ferry Road / High Street	Morning	D	E	Increase in delay
	Evening	F	F	Worse, but currently has high delays
Peats Ferry Road / George Street	Morning	C	C	negligible impact
	Evening	D	D	negligible impact
Pacific Highway / Edgeworth David Avenue	Morning	C	B	negligible impact
	Evening	F	F	No change, but currently has high delays
Frederick Street / Dural Street	Morning	A	A	negligible impact
	Evening	A	A	negligible impact
Frederick Street / William Street	Morning	A	A	negligible impact
	Evening	A	A	negligible impact

4.5.1 Mitigation Measures

The modelling has identified capacity constraints for the road network given that four intersections would operate at LoS F with the development traffic. A range of mitigation measures were previously proposed in the Hornsby West Side Traffic Study report. Advice from Council has been that these options are unlikely to be supported by TfNSW as they require using land located between Peats Ferry Road and the Railway. These options for widening between William Street and George Street.

4.5.2 Future traffic growth 2031

Sidra a model outputs for the scenarios of 2% annual background traffic growth to 2031 with/without the proposed development are shown in Table 4.9 and Table 4.10.

Table 4.9 : Sidra Results with do minimum without proposed development in 2031

Intersection	Peak period	Degree of Saturation	Average delay(s)	95% percentile Queue length (m)	Level of service	Leg with worst delay
Peats Ferry Road / Coronation Street	AM	0.84	114	698	F	-
	PM	1.36	84	299	F	-
Peats Ferry Road / Dural Street	AM	0.89	21	193	B	-
	PM	0.91	28	194	B	-
Pedestrian Crossing at Station Street	AM	1.07	73	127	F	-
	PM	1.00	79	127	F	-
Peats Ferry Road / William Street	AM	2.77	>100	450	F	-
	PM	1.136	>100	151	F	North leg: right turn
Peats Ferry Road / High Street	AM	0.88	106	174	F	South leg: right turn
	PM	2.45	>100	355	F	South leg: all movements
Peats Ferry Road / George Street	AM	0.96	44	258	D	East leg: all movements
	PM	4.10	>100	904	F	East leg: all movements
Pacific Highway / Edgeworth David Avenue	AM	0.91	37	284	C	East leg: right turn
	PM	2.70	>100	787	F	East leg: right turn
Frederick Street / Dural Street	AM	0.10	4	3	A	-
	PM	0.13	4	3	A	-
Frederick Street / William Street	AM	0.17	7	7	A	-
	PM	0.17	7	6	A	-

Table 4.10 : Sidra Results with Do minimum with proposed development in 2031

Intersection	Peak period	Degree of Saturation	Average delay(s)	95% percentile Queue length (m)	Level of service	Leg with worst delay
Peats Ferry Road / Coronation Street	AM	1.23	>100	801	F	East leg: all movements
	PM	1.60	>100	421	F	East leg: all movements
Peats Ferry Road / Dural Street	AM	0.92	24	194	B	-
	PM	0.96	63	194	F	West leg: right turn
Pedestrian Crossing at Station Street	AM	1.05	65	127	F	North leg
	PM	1.15	>100	127	F	North leg and south leg
Peats Ferry Road / William Street	AM	3.05	>100	558	F	North leg: right turn
	PM	3.39	>100	718	F	North leg: right turn
Peats Ferry Road / High Street	AM	1.05	>100	174	F	South leg: all movements
	PM	1.75	>100	262	F	South leg: all movements
Peats Ferry Road / George Street	AM	1.02	54	288	E	North leg: all movements
	PM	2.17	>100	693	F	East leg: all movements
Pacific Highway / Edgeworth David Avenue	AM	0.90	43	396	D	East leg: right turn movement
	PM	2.70	>100	787	F	East leg: right turn movement
Frederick Street / Dural Street	AM	0.15	4	4	A	-
	PM	0.21	4	6	A	-
Frederick Street / William Street	AM	0.19	7	7	A	-
	PM	0.20	7	8	A	-

The modelling test with 2% annual background traffic growth shows that:

- Without the proposed development, the intersections of Peats Ferry Road at Coronation Street, William Street, High Street, George Street and Edgeworth David Avenue all operate with high delays and Level of Service F.
- With the proposed development, the above intersections still operate with similar increases delay.

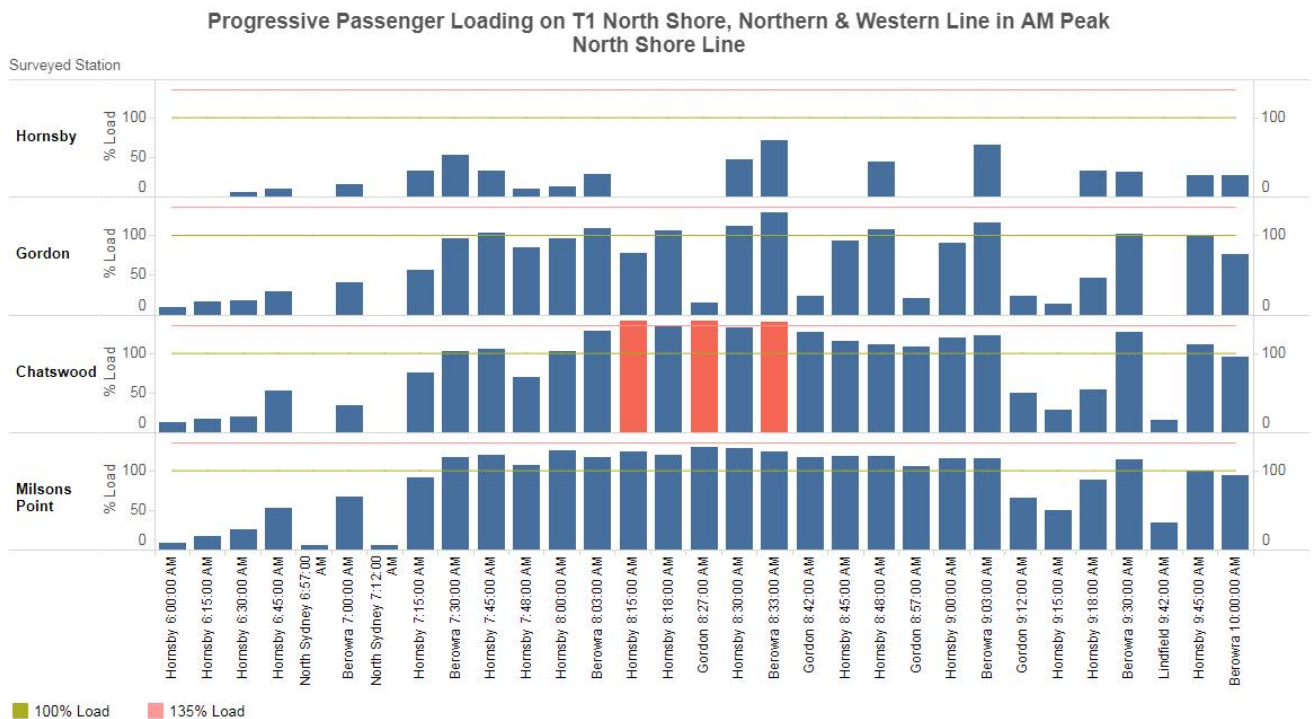
The additional traffic from the development does not significantly increase the delays on the road network compared to the delays caused by the growth in background traffic. The assumed 2% increase in background traffic is higher than the capacity of the road network and is unlikely to occur unless significant regional increases in road capacity are created.

4.6 Public Transport Impact

The proposed development has excellent access to public transport as it is within 200m walking distance from Hornsby Station and bus interchange. Hornsby Station has services that use the T1 north shore line both via Epping and Gordon.

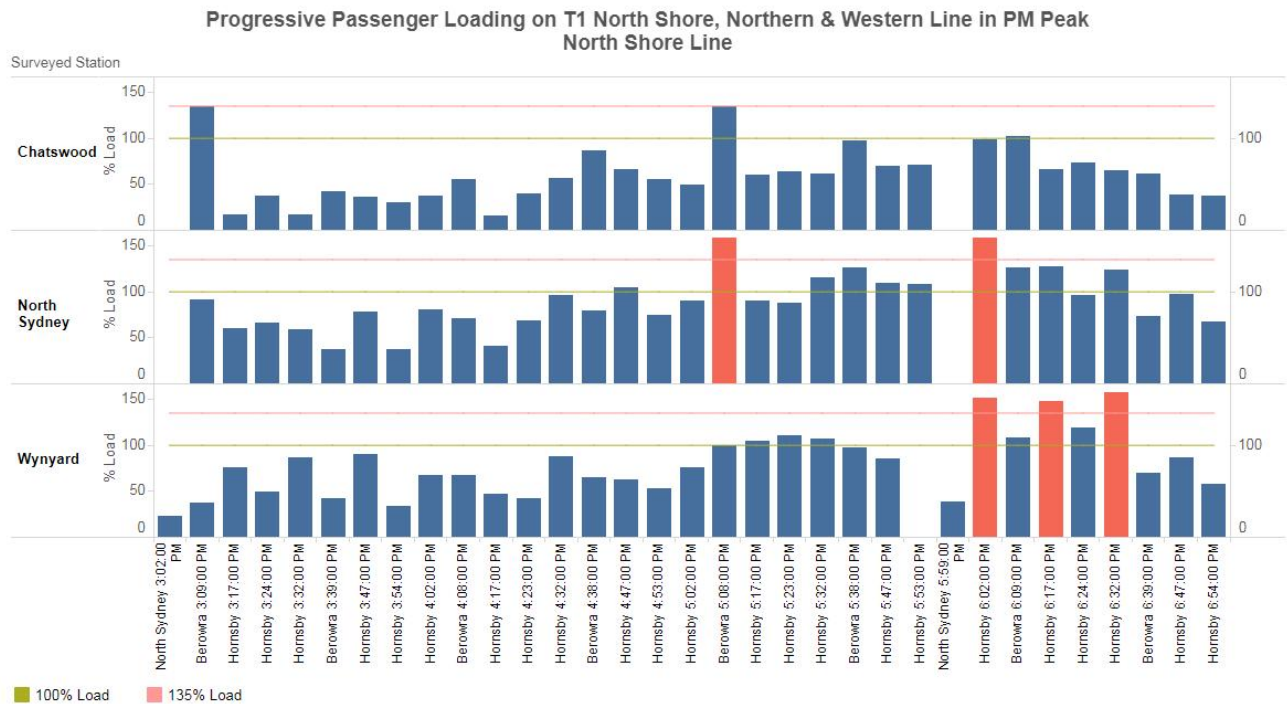
Surveys of passenger loading published by Sydney Trains is provided in in Figure 4.10 and Figure 4.11.

Figure 4.10 : Morning Peak Passenger Loading



Source: Sydney Trains Passenger Loading Surveys 2016

Figure 4.11 : Evening Peak Passenger Loading



Source: Sydney Trains Passenger Loading Surveys 2016

The data shows that most trains leaving Hornsby in the morning peak toward the Sydney CBD have plenty of capacity. Some trains that leave Hornsby in the period from 8:00am – 8:30am are at capacity by the time they reach Chatswood. Trains returning in the afternoon are generally under capacity with peaks occurring after 6:00pm.

4.7 Active Transport Impact

The proposed development would generate pedestrian trips between the site and public transport. The existing pedestrian paths and signalised crossings provide connections. This increase in pedestrian traffic would also provide a benefit for local businesses.

The proposed development would also generate some bicycle trips, which could be served by the existing bicycle route along Peats Ferry Road, as well as other local roads to access the subject site.

In particular, the existing 40 km/h speed limit HPA (as shown in Figure 2.1) centred with Peats Ferry Road and Hornsby Railway Station offers excellent environment for active transport. Within this speed-regulated area, Peats Ferry Road and other roads provide active transport users with sufficient facilities such as cycle routes, continuous footpaths and crossings, which would accommodate the new demand of the proposed development.

4.8 Travel demand management

Travel demand management seeks to identify strategies and policies to manage vehicle trips generated by the development. The transport assessment has identified that road network is currently close to capacity, but the site has excellent access to public transport which makes public transport very attractive over private vehicles for many trips including for commuting. would encourage use of public transport over private vehicles.

The subject site is within 200m of a major train station and a bus interchange and therefore has a higher mode share to public transport. The journey to work mode share for Hornsby (suburb) is 37.5% car driver compared to the Sydney average of 53% based on the 2016 census data. Closer to the station and the town centre, the public transport model share would invariably be significantly higher as residents would be able to undertake many of their daily activities by walking, bus or rail. It is therefore reasonable to expect that ~~expected that~~ the proposed development will have a low mode share to car even without intervention.

Travel demand management measures typically include a number of tools some of which may be suitable for implementation at this development. These measures are discussed below and include initiatives from the provision of infrastructure to providing of travel information to employees and residents.

4.8.1 Trip containment

Trip containment is the reduction of trips through providing services within the development reducing the need for people to travel. The mixed-use development is conducive to trip containment as the supermarket allows residents to do their shopping within the same building. The supermarket is expected to service mostly local residents as Westfield shopping centre would cater for people intending to do their major shopping.

The major Westfield shopping centre is within 300m walk of the site reducing the need to drive to a shopping centre.

4.8.2 Active transport

The site will provide more bicycle storage than required by the DCP and shower facilities for employees to use as end of trip facilities.

4.8.3 Travel behaviour change and public transport

Travel behaviour of residents are often developed in the first weeks of moving into a development. Therefore, the building management can take steps to encourage public transport use within the first week of people moving into the building. This may include:

- Display of map in prominent location with information on location of train stations, bus stops and walking routes to key locations.
- Providing \$100 opal cards to new residents to encourage them to try public transport within the first weeks of moving in.

4.8.4 Provision of car share

The aim is to reduce the reliance on owning a vehicle by providing car share in car park of the development. This can be accomplished by say providing 2 car share spaces within the basement car park and made available to all people. This offers residents the flexibility of not needing to own a car.

4.8.5 Green travel plans

It is recommended that the building management develop and adopt a Green Travel Plan. The Green Travel Plan should identify key performance measures, targets and initiatives to meet those targets.

5. Conclusion

Jacobs has been commissioned to undertake a traffic and transport impact assessment for the proposed mixed land use development at 187 to 203 Peats Ferry Road, Hornsby. The proposed development features:

- Two buildings with a total of 191 dwelling units with 58 one-bedroom units, 112 two-bedroom units and 16 three-bedroom units.
- Retail land use: 1,543m² for a supermarket and 1,880m² ground-level retail space,
- Commercial office land use: 2,136 m².
- Childcare: 337m² for a child care centre with a maximum of 30 children;
- A total of 331 car parking spaces provided on four levels, with levels B1 and B2 for retail parking and the remaining levels B3-B4 for residential parking. Of the 331 parking spaces, 157 car parking spaces are for residents including 13 for people with a disability and 2 car share spaces on B1 and B2 levels, and 172 spaces for retail, childcare centre and commercial including 12 spaces for people with a disability, 2 exclusive service vehicle parking spaces on level B1 are also provided. In addition, 314 m² bicycle parking area and 349 m² motorcycle parking area are also provided.
- A loading area for two trucks including a 12.5m medium rigid and an 8.8m medium rigid garbage truck will be provided that features a turntable.

The key findings of the study were:

- The proposed car parking provision complies with the Hornsby Shire Council Development Control Plan. The internal one-way car parking circulation would provide for good traffic flow. The proposed heavy vehicle entrance provides an additional splay and meets the requirements of Australian Standard 2890.2.
- A right-in, right-out access arrangement is proposed for trucks entering and exiting the development and requires the removal of some parking spaces on the southern side of Dural Street.
- A northbound left turn and southbound right turn from Peats Ferry Road to Dural Street can be undertaken by HRV's with a minor encroachment on the adjoining lane of traffic on Dural Street. A minor adjustment to the curb on the southern corner of Dural Street and Peats Ferry Road will facilitate no encroachment of the HRV on other traffic lanes.
- The estimated vehicle trips generated would be 207 during morning peak period with 106 outbound trips and 101 inbound trips, and 328 during the afternoon peak period with 165 outbound trips and 163 inbound trips.
- The background traffic forecast is assumed not to increase in the future due to the constrained nature of the surrounding road network and the historical trends. But two scenarios with an additional 2% increase rate per annum to 2031 are also provided as per required by Hornsby Shire Council.
- The distribution of the generated traffic of the proposed development has been based on the origin and destination forecast provided by the Hornsby West Side Traffic Study (Bitzios Consulting (2013)).
- Traffic modelling a Sidra network model was undertaken at 10 key intersections including:
 - Peats Ferry Road and Coronation Street
 - Peats Ferry Road and Dural Street
 - Peats Ferry Road and Dural Lane
 - Peats Ferry Road and Station Street
 - Peats Ferry Road and William Street
 - Peats Ferry Road and High Street
 - Peats Ferry Road and George Street
 - Peats Ferry Road and Edgeworth David Avenue

- Dural Street and Frederick Street
- Frederick Street and William Street
- Currently, five intersections operate at LoS F. Two during morning peak period and three during afternoon peak period:
 - Peats Ferry Road and Coronation Street during morning peak period
 - Peats Ferry Road and Station Street during morning peak period
 - Peats Ferry Road and William Street during evening peak period
 - Peats Ferry Road and High Street during evening peak period
 - Pacific Highway and Edgeworth David Avenue during evening peak period
- For the 'do minimum' modelling, Dural Lane and Station Street are closed, and the cycle time for all signalised intersections has been set to 140 seconds.
- Based on the comparison between existing and scenarios the with development with 'do minimum', the traffic generated by the proposed development would impact the local road network as follows:
 - During morning peak period in the future, the intersection of Peats Ferry Road and High Street would downgrade from LoS D into LoS E.
 - All other intersections in the future would operate with acceptable LoS D or better. Particularly, the signal control adjustments in the future model would remove the existing LoS F for the intersection of Peats Ferry Road and Coronation Street.
 - During afternoon peak period, three intersections including Peats Ferry Road and William Street, Peats Ferry Road and High Street, and Pacific Highway and Edgeworth David Avenue would maintain existing operation LoS F with a significant increase of the average time delay for the first two intersections
 - All other intersections have no significant impact without LoS changes.
- The proposed development is located within the Hornsby West Side HPAA which has a 40 km/h speed limits, sufficient kerbside parking, dense intersections and high demand of pedestrians due to adjoining the public transport hub. All of these make it hard to completely remove the LoS F for the intersections of Peats Ferry Road and William Street, and Pacific Highway and Edgeworth David Avenue at present and in the future.
- The proposed development would produce negligible impacts on the public transport and active transport system, that currently provides excellent service for the site. The assumed 2% increase in background traffic is higher than the capacity of the road network and is unlikely to occur unless significant regional increases in road capacity are created.

Appendix A. Sidra Intersection Analysis

ANNEXURE C: RMS GUIDE TRAFFIC GENERATION RATES

Peak Period Traffic Generation.

Models.

For Thursdays and Fridays, the models are for the vehicle trips in the evening peak hour - V(P) - where this period has been taken as 4.30-5.30 pm.

For Saturday morning, the peak vehicle hour has been used - PVT. This is typically 11.00 am-12.00 pm. Localised variations in these peak hours can occur.

Thursday:

$$V(P) = 20 A(S) + 51 A(F) + 155 A(SM) + 46 A(SS) + 22 A(OM)$$

(vehicle trips per 1000m²).

Friday:

$$V(P) = 11 A(S) + 23 A(F) + 138 A(SM) + 56 A(SS) + 5 A(OM)$$

(vehicle trips per 1000m²).

Saturday:

$$PVT = 38 A(S) + 13 A(F) + 147 A(SM) + 107 A(SS)$$

(vehicle trips per 1000m²).

where:

A(S): Slow Trade gross leasable floor area (Gross Leasable Floor Area in square metres) includes major department stores such as David Jones and Grace Bros., furniture, electrical and whitegoods stores.

A(F): Faster Trade GLFA - includes discount department stores such as K-Mart and Target, together with larger specialist stores such as Fosseys.

A(SM): Supermarket GLFA - includes stores such as Franklins and large fruit markets.

A(SS): Specialty shops, secondary retail GLFA - includes specialty shops and take-away stores such as McDonalds. These stores are grouped as they tend to not be primary attractors to the centre.

A(OM): Office, medical GLFA: includes medical centres and general business offices.