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**TRAFFIC IMPACT ASSESSMENT
PROPOSED MIXED USE DEVELOPMENT
21 ATKINSON STREET
LIVERPOOL**

Ref: 15-146

AUGUST 2016

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1. INTRODUCTION

The Practice of Thompson Stanbury Associates has been engaged by Synergy Development Group to prepare a transport, traffic and parking impact assessment associated with a development application ('DA' or 'application') for the demolition of existing site structures and the construction of a mixed-use development comprising 134 residential apartments and 272m² of commercial floor space within three blocks on land situated at 21 Atkinson Street, Liverpool.

This report assesses and documents likely traffic and transportation impacts resulting from the development proposal and recommends, where appropriate, treatments to ameliorate such impacts. In this regard, this assessment focuses on the following issues:

- The adequacy of the proposed off-street parking provision based on Liverpool City Council's parking guidelines;
- The suitability of the proposed vehicular access arrangements having regard to the traffic conditions surrounding the site and the number of off-street parking spaces;
- The suitability of the proposed internal circulation arrangements with respect to compliance or otherwise with relevant Australian Standards specifications;
- The existing traffic conditions in vicinity of the site, including the existing traffic network, traffic volumes and the available public transport network;
- The likely traffic generation from the proposed development and the ability of the surrounding road network to accommodate this additional traffic.

Throughout this report, reference is made to the following:

- Roads and Maritime Services' *Guide to Traffic Generating Developments*;
- Australian Standard *Parking Facilities Part 1: Off-Street Parking* (AS 2890.1-2004) and *Part 6: Off-Street Parking for People with Disabilities* (AS2890.6-2009); and
- Liverpool City Council's *Liverpool Development Control Plan 2008* (DCP 2008).

Architectural plans have been prepared by Mosca Pserras Architects and should be reviewed in conjunction with this report.

2. SITE DETAILS

2.1 Site Location

The subject site is located on the north-western corner of the junction of Shepherd and Atkinson Street. The exact site location is shown overleaf by **Figure 1** within a local context, being an extract of UBD's *Australian City Streets – Version 4*.

2.2 Site Description

The subject site comprises a single allotment legally described as Lot 101 within Deposited Plan 777404, with a street address of 21 Atkinson Street, Liverpool. The subject lot form an irregular development site that provides frontages to Shepherd Street and Atkinson Street of approximately 130m and 64m respectively. Total site area is 5412m².

2.3 Existing Uses

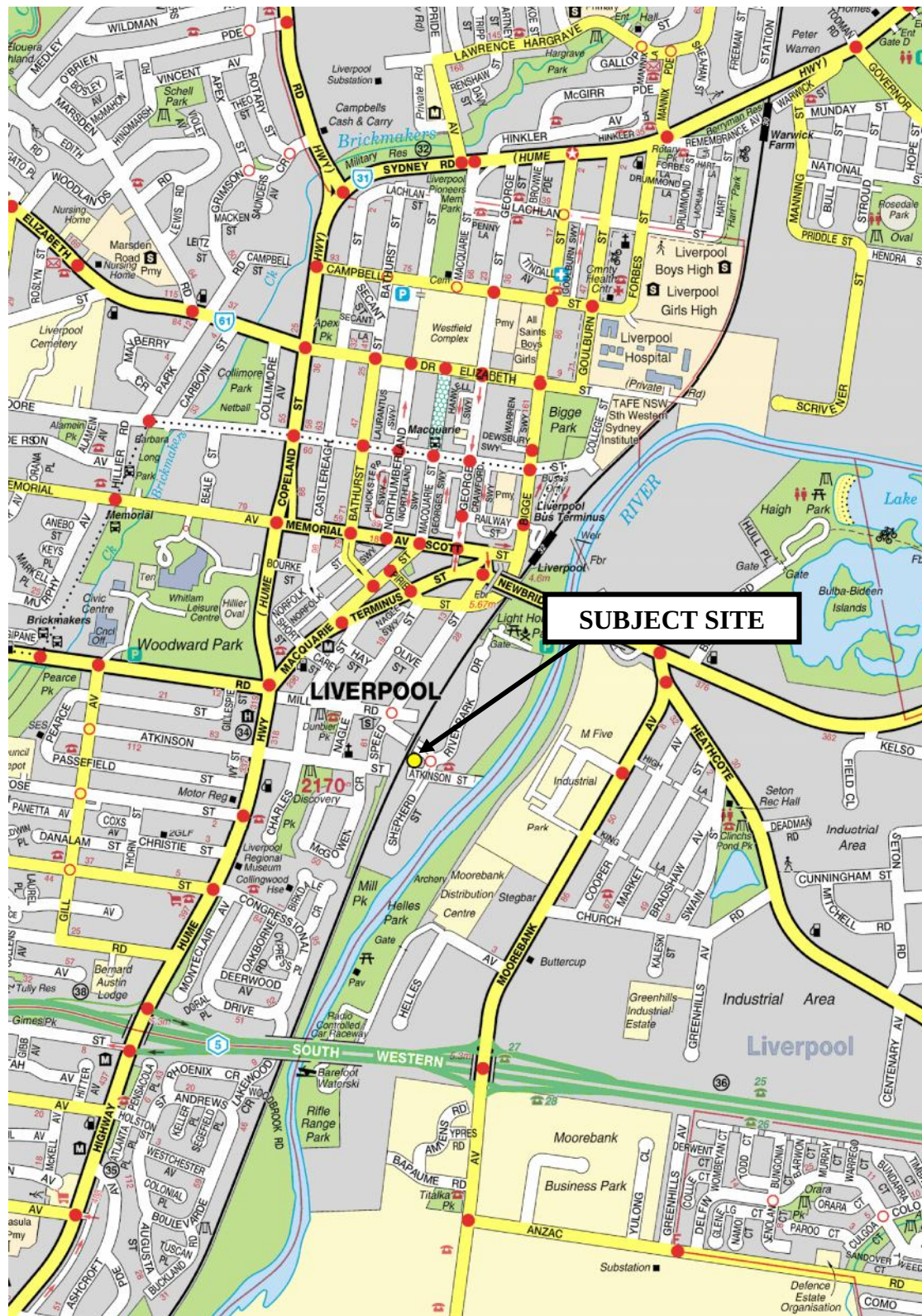
The subject site currently accommodates an automotive dismantling facility that is proposed to be demolished under the subject DA.

This industrial development is currently being serviced by a single width driveway connecting with Atkinson Street, approximately 14m west of its intersection with Shepherd Street, Liverpool.

2.4 Surrounding Uses

High density residential flat building developments occupy the land to the immediate north and east of the subject site, while single storey dwellings form the predominant land use to the west of the subject site (to the west of the railway corridor).

Land to the immediate south of the subject site is occupied by a mix of commercial and industrial developments adjoining both sides of Shepherd Street.

**FIGURE 1 – SITE LOCATION**

3. PROPOSED DEVELOPMENT

3.1 Built Form

The subject DA proposes the demolition of existing site structures and the construction of an eight (8) storey mixed use residential/commercial development comprising:

- 134 residential apartments with the following dwelling mix:
 - 24 x 1 bedroom dwelling;
 - 103 x 2 bedroom dwellings; and
 - 7 x 3 bedroom dwellings.
- Four (4) retail tenancies providing a total gross floor area of 272m²;

The development is proposed to be serviced by an at-grade parking area within the ground floor level in conjunction with two upper levels of car parking, yielding an ultimate parking provision of 162 car spaces.

Vehicular access to the site is proposed to be facilitated by a combined ingress/egress driveway connecting with Atkinson Street in the south-western corner of the site.

4. ACCESS ARRANGEMENTS & INTERNAL CONSIDERATIONS

4.1 Access Arrangements

4.1.1 Vehicular Access

Vehicular connectivity between the subject development and the adjoining public road is proposed to be facilitated via a 9.0m wide combined ingress/egress driveway, located at the south-western corner of the site.

AS2890.1-2004 provides specifications with respect to driveway configuration based on the function (major or minor) of the access road, the proposed land-use and the number of spaces the driveway is expected to serve. Atkinson Street is considered to perform a minor function while the proposed driveway is to serve 162 off-street parking spaces, predominantly residential in nature. Based on Tables 3.1 and 3.2 within AS2890.1-2004, a Category 2 type driveway is required as a minimum, being a combined ingress/egress width of 6.0 – 9.0m. The proposed 9.0m wide combined ingress/egress driveway is therefore more than compliant with the minimum AS2890.1-2004 specifications and accordingly, is considered to be satisfactory.

The appropriateness of the proposed driveway location, from an operational traffic perspective, is largely dependent on the provision of adequate sight distance along the frontage road. Atkinson Street provides a reasonably consistent vertical and horizontal alignment in the immediate vicinity of the site, thereby resulting in good sight distance being facilitated between the site access location and the frontage road, suitably complying with the minimum sight distance specifications of AS2890.1-2004 for a sign posted speed limit of 50km/h.

The access driveway design provides a suitable area free of any obstructions to sight distance adjoining the northern side of the driveway, thereby resulting in sight distance between pedestrians along the northern Atkinson Street footpath and motorists exiting the site according with the relevant AS2890.1-2004 requirements. In consideration of this and the above discussion, the proposed site access arrangements are considered to be satisfactory.

4.1.2 Pedestrian Access

Pedestrian access to the development is proposed via entrances fronting Shepherd Street adjoining the northern and eastern property alignment, separate to the abovementioned vehicular access driveway.

4.2 Parking Provision

The proposed development is serviced by a total of 162 off-street parking spaces within the ground floor and two upper floor levels comprising:

Ground Floor Level

Resident spaces	45 (inclusive of 2 disabled spaces)
Commercial staff/Visitor spaces	3
Servicing bay	3
Bicycle rack spaces	10
Subtotal	51 car and 10 bicycle spaces

Level 1 Parking

Resident spaces	36 (inclusive of 6 disabled spaces)
Residential visitor spaces	13
Motorcycle spaces	11
Bicycle rack spaces	27
Subtotal	49 car, 11 motorcycle and 27 bicycle spaces

Level 2 Parking

Resident spaces	62 (inclusive of 6 disabled spaces)
Bicycle rack spaces	25
Subtotal	62 car and 26 bicycle spaces

Total	162 car, 62 bicycle and 11 motorcycle spaces
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4.2.1 Vehicular Parking Compliance

Liverpool City Council provides locally sensitive parking requirements relevant to the subject development within Part 1 and 4 of DCP 2008:

Car parking for residential development

1 space per 1 and 2 bedroom units

1.5 spaces per 3 bedroom unit

1 visitor space per 10 units

1 space per 40 units for service vehicle

Car parking for all other development

1 space per 100m²

Table 1 overleaf identifies the off-street parking requirements based on Council's rate and development yield presented within section 3.1 of this report.

TABLE 1 OFF-STREET PARKING REQUIREMENTS LIVERPOOL DCP 2008			
Item	Rate	Spaces Required	Spaces Provided
Residential Component			
1 or 2 bedroom dwellings	1 space per dwelling	$(1 \times 24) + (1 \times 103) + (1.5 \times 7) = 138$	143
3 bedroom dwellings	1.5 space per dwelling		
Visitor Parking	1 space per 10 dwellings	$(138/10) = 13.4$	13
Service vehicles	1 space per 40 dwellings	$(138/40) = 3.4$	3
Commercial Component			
Item	Rate	Spaces Required	Spaces Provided
-	1 space per 100m ²	$(272\text{m}^2/100\text{m}^2) = 2.7 \text{ spaces}$	3
	Total	157.5 (adopt 158) spaces	162

The proposed development therefore requires a total of 162 off-street parking spaces based on Liverpool DCP 2008, comprising 143 resident spaces, 13 residential visitor spaces, 3 service vehicle spaces and 3 commercial spaces. Accordingly, as indicated in **Table 1**, the proposed parking provision readily complies with Liverpool DCP 2008 requirements.

4.2.2 Motorcycle Parking Compliance

A total of 10 motorcycle parking spaces are proposed to be provided within the first parking level of the building.

Council provides the following locally sensitive numerical requirements for the provision of motorcycles within developments providing more than 50 parking spaces within DCP 2008:

1 space per 20 vehicle spaces

Based on a total passenger vehicle parking provision of 162 spaces, a total of 8 motorcycle spaces are required. The proposed motorcycle parking provision of 11 spaces is therefore considered to be compliant with respect to Liverpool DCP 2008 requirements.

4.2.3 Bicycle Parking Compliance

The subject development is proposed to provide up to 62 bicycle racks within the ground and second floor levels of the building, allocated for parking.

Liverpool City Council provides the following locally sensitive parking requirements relevant to the subject development within Part 1 and 4 of DCP 2008:

*1 bicycle space per 200 square m. of gross floor area.
15% of this requirement is to be accessible to visitors.*

The development is designed to provide a total gross floor area of 12,495m², therefore it is required to provide up to 62.4 (adopt 62) bicycle spaces based on the above parking rate.

The proposed bicycle parking provision of 62 bicycle racks is therefore considered to suitably accord with DCP 2008 requirements.

4.3 Internal Circulation

Upon entering the site via the vehicular access driveway from Atkinson Street, vehicles can proceed in a forward direction accessing the first level parking via an internal road/ramp connecting with the vehicular access driveway at the south-western corner of the site. A second straight ramp is proposed adjacent to the lifts, which will provide connectivity to the ground and second floor parking levels. The internal ground and upper floor level parking areas are to comprise a series of 90 degree angled parking rows serviced by circulating parking aisles.

The internal circulation of the parking areas have been designed to accord with the relevant requirements of AS2890.1-2004 and AS2890.6-2009, providing the following base dimensions:

- Resident/Residential Visitor parking space width = 2.4m;
- Disabled parking space width = 2.4m (plus an adjoining 2.4m wide shared area);
- Service vehicle/car wash space width = 3.6m;
- Normal and disabled parking space length = 5.4m;
- Service vehicle/car wash space length = 5.5m;
- Additional space width adjoining obstruction = 0.3m;
- Motorcycle parking space width = 1.2m;
- Motorcycle parking space length = 2.5m;
- Parking aisle width = 5.8m;

- Two-way straight roadway / ramp width = 6m;
- Straight roadway kerb width = 0.3m;
- Column set-back from parking space opening = 0.75m;
- Clearance throughout parking area = 2.2m;
- Clearance above disabled parking spaces = 2.5m;
- Maximum internal ramp grade = 1 in 4; and
- Maximum change in grade = 1 in 8.

A desktop analysis of the site plans with respect to B85 vehicle specifications provided within AS2890.1-2004 has also been undertaken throughout the site plans. Whilst section B4.4 of AS2890.1-2004 states that *'constant radius swept turning paths, based on the design vehicle's minimum turning circle are not suitable for determining the aisle width needed for manoeuvring into and out of parking spaces... drivers can manoeuvre vehicles within smaller spaces than swept turning paths would suggest'* this analysis has indicated that passenger vehicles can access and exit parking spaces and manoeuvre throughout the site with a reasonable level of efficiency.

In consideration of the abovementioned compliance with AS2890.1-2004 and AS2890.6-2009, the proposed internal circulation and parking arrangements are projected to provide site users with safe and efficient internal manoeuvring conditions.

4.4 Site Servicing

Waste generated by the future occupants will be stored within standard residential garbage and recycling bins accommodated within a waste storage area located within the ground floor parking level. These bins will be wheeled to the Shepherd Street frontage for collection on a weekly basis in a similar manner to other surrounding residential uses.

5. EXISTING TRAFFIC CONDITIONS

5.1 Surrounding Road Network

Atkinson Street performs a local access function under the care and control of Liverpool City Council. It generally forms an east-west route, intersecting with Pearce Street at its western end and terminating in a cul-de-sac at its eastern end in the vicinity of Georges River. Atkinson Street provides a pavement width of 6m, providing one through lane of traffic in each direction in conjunction with parallel parking along both kerb alignments.

In the immediate vicinity of the subject site, there is a discontinuation in Atkinson Street to accommodate a railway corridor adjoining the western boundary of the subject site. In this regard, traffic associated with the proposed and adjoining developments abutting both sides of road (within this portion of Atkinson Street) will originate solely from Shepherd Street in the west, which forms a Cross-intersection with Atkinson Street, under major/minor priority control with Shepherd Street forming the priority route.

Shepherd Street is considered to perform a minor collector function within the surrounding road hierarchy distributing traffic from adjoining and surrounding developments (predominantly residential) to Hume highway, being a higher order arterial road. It primarily has a north/south alignment that connects Speed Street and Riverpark Drive in the north with the Powerhouse Arts Museum in the south via Powerhouse Road. Shepherd Street forms a 12m wide undivided carriageway, accommodating on through lane of traffic in each direction.

5.2 Existing Traffic Volumes

In order to obtain an indication of the existing operation of the local road network, reference is made to morning and evening peak hour traffic surveys undertaken by staff of this Practice. Traffic surveys were undertaken at the intersection of Shepherd and Atkinson Street between 7.00am – 9.00am and 4.00pm – 6.00pm on the 10th of November 2015.

Figure 2 overleaf provides a graphical representation of the surveyed peak hour traffic volumes, whilst full details are available upon request.

FIGURE 2
EXISTING WEEKDAY PEAK HOUR (7:30 - 8:30 PM and 4:30 - 5:30 PM)
TRAFFIC VOLUMES
INTERSECTION OF SHEPHERD AND ATKINSON STREET

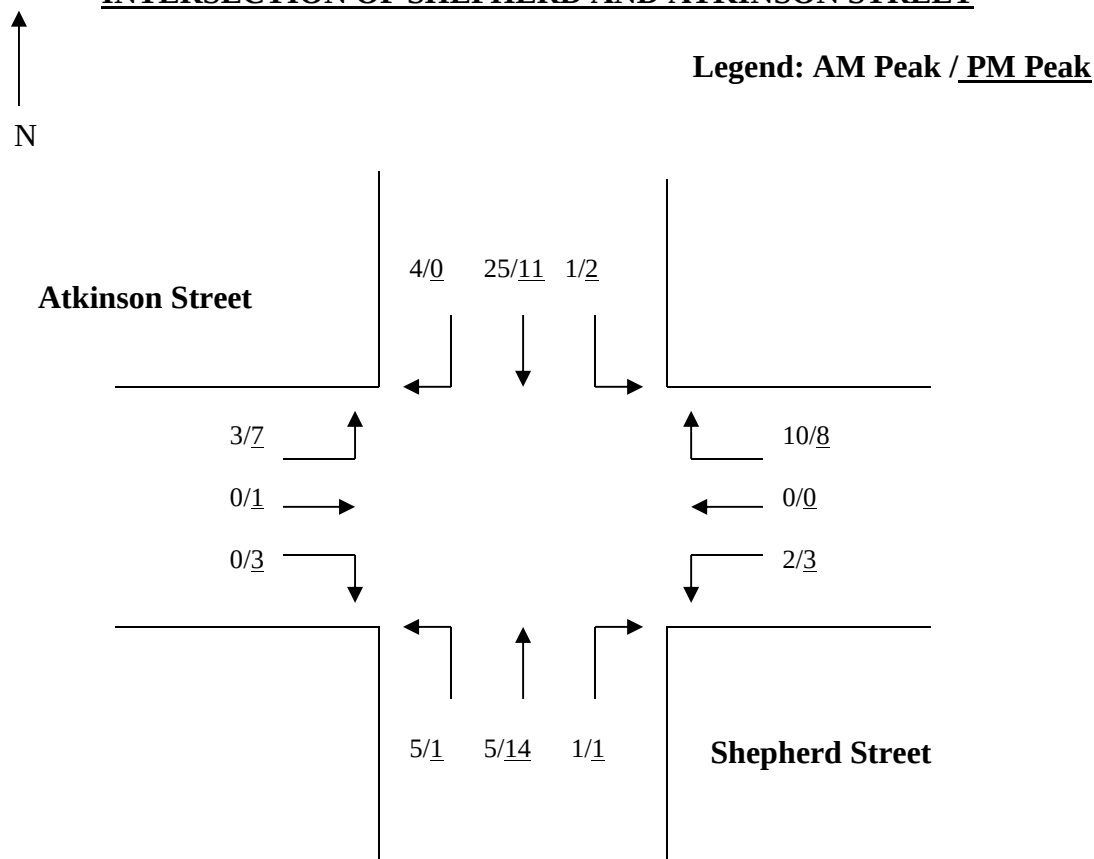


Figure 2 indicates the following:

- Shepherd Street accommodates two directional traffic demands in the order of approximately 25 - 50 vehicles per hour during peak periods;
- Directional traffic flow within Shepherd Street is tidal during peak periods, with southbound traffic dominating during the morning peak and northbound traffic dominating during the evening peak commensurate with commuters' journeys to and from work; and
- Atkinson Street accommodates two directional traffic flow in the order of approximately 10 - 30 vehicles per hour during peak periods.

5.3 Existing Road Network Performance

In order to objectively assess the operational performance of the adjoining road network (Shepherd and Atkinson Street) in the immediate vicinity of the subject site, reference is made to the Roads and Maritime Services' (RMS) *Guide to Traffic Generating Developments*. This publication indicates that for an urban two lane two way carriageway accommodating peak unidirectional traffic volumes of up to 200 vehicles per hour provides a level of service 'A'.

Such a level of level of service represents free flow conditions where drivers are virtually unaffected by others in the traffic stream. Freedom to select desired speeds and to manoeuvre within the traffic stream is high, and the general level of comfort and convenience provided is excellent.

In addition to the above, The Roads & Maritime Services (RMS) also provide environmental capacity performance standards to measure the level of amenity experienced by the general community within the immediate vicinity of the subject site. The Roads & Maritime Services specify an environmental capacity for local roads of 300 vehicles in both directions in any one hourly period. The existing surveyed peak hourly traffic demands presented within **Figure 2** indicate that the surrounding local roads are not just capable of satisfying the environmental threshold of 300 vehicles per hour identified above, but also the desirable threshold of 200 vehicles per hour, thus demonstrating that the existing level of residential amenity experienced in the surrounding area is high.

Our observations of the surrounding road network concur with the above empirical assessment. In this regard, we note that the low traffic volumes identified within Shepherd and Atkinson Street meant regular gaps in the traffic stream, which allows motorists to manoeuvre within the surrounding precinct with a good level of safety and efficiency.

5.4 Public Transport & Non Car Travel

5.4.1 Train

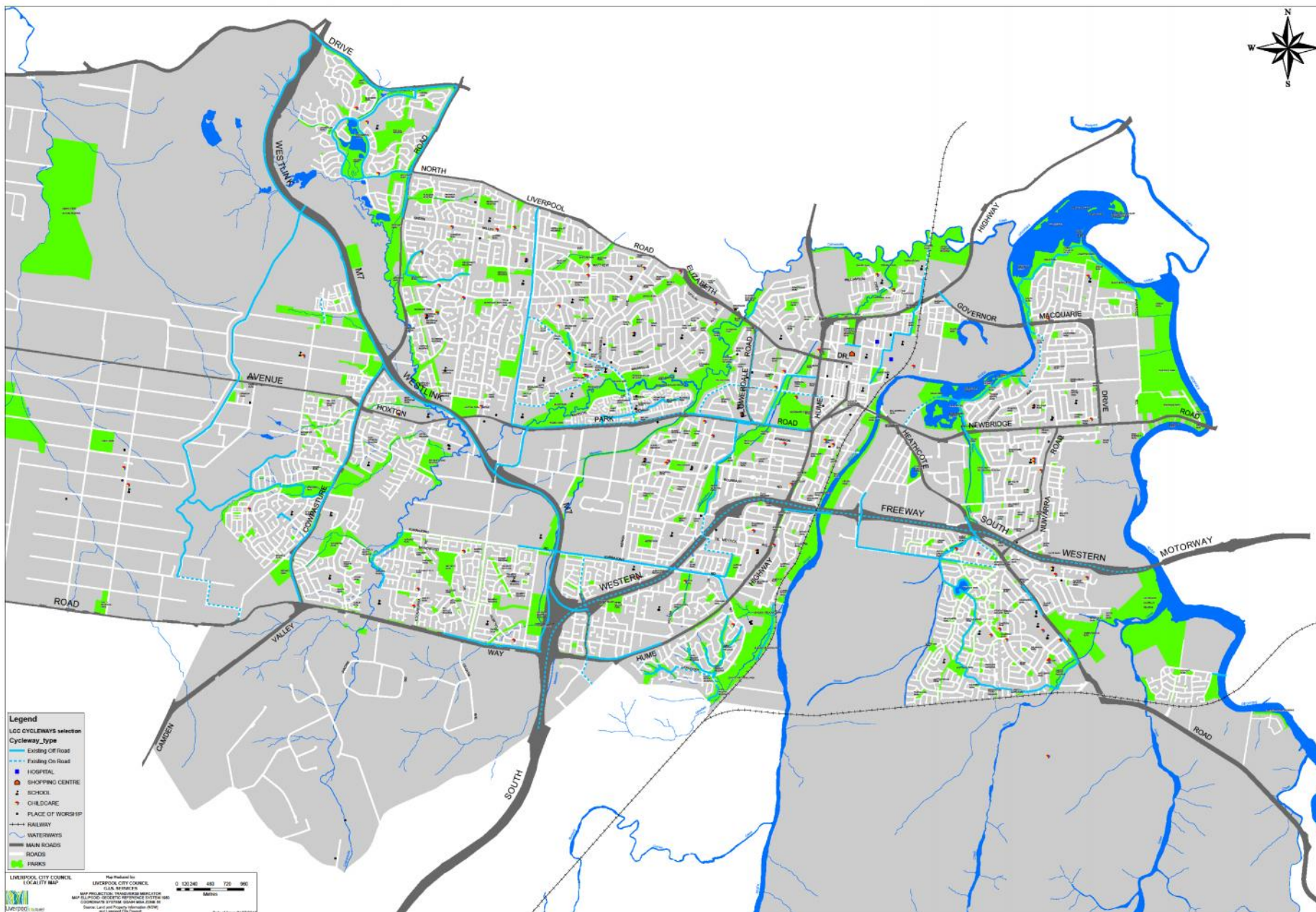
The site is located approximately 1100m walking distance from Liverpool Train Station (via River Park Drive). This station is served by the Inner West & South Line, Bankstown Line as well as the Cumberland Line. The Inner West & South Line services Macarthur to the south-west and the City to the north-east via Sydney airport. The Bankstown Line links Bankstown in the west with the City in the east. The Cumberland Line runs from Schofields in the north-west to Campbelltown to the south-west.

5.4.2 Bicycle

The *Liverpool City Council Bike Plan 2009* provides a comprehensive bicycle network strategy incorporating a convenient, efficient and safe network of cycleway paths for the use of the community, within precincts under its governance. **Figure 3** provides an extract from this Bike Plan illustrating the existing bicycle network for the entire Liverpool region.

5.4.3 Pedestrian Conditions / Infrastructure

The surrounding roads in the immediate vicinity of the subject site all provide paved footpaths to facilitate safe and efficient pedestrian connectivity.



6. DEVELOPMENT TRAFFIC GENERATION & IMPACTS

6.1 Existing Site Traffic Generation

Section 2.3 of this report indicates that the subject site currently accommodates an industrial warehouse development, with an approximate gross floor area (GFA) of 3050m², occupying the central portion of the site. Based on RMS traffic generation rates for warehouse type developments established within their *Guide to Traffic Generating Developments*, this existing site use could be expected to generate up to 15.25 (say 15) peak hour vehicle trips to and from the site, based on the rate of 0.5 trips / 100m² GFA.

6.2 Projected Development Traffic Generation

It is not known what type of users (standard retail, office, restaurant etc) will accommodate the commercial tenancies, however for the purposes of this assessment and accounting for a worst case scenario, it is assumed, based on the widths of the commercial car parking spaces that the commercial component of the mixed use development is dedicated towards retail use. In this regard, this Practice has applied the following standard retail floor space traffic generation rate as provided by the Roads & Maritime Services in their *Guide to Traffic Generating Developments*:

Retail

4.6 trips per 100m²

Based on a development yield of 250m², the commercial component of the development is projected to generate in the order of 11.5 (say 12) peak hour vehicle trips. Further, the Roads & Maritime Services provide the following peak hour traffic generation rates for residential development within TDT 2013/04, are as follows:

Residential

0.19 trips per dwelling

Based on the provision of 143 dwellings, the subject development is projected to generate 27.2 (adopt 28) peak hour trips. The subject development is therefore projected to generate in the order of 40 peak hour vehicle trips to and from the site. This level of post-development traffic generation represents an additional 25 peak hour trips over and above that currently being generated by the existing site improvements.

6.3 Trip Assignment

In order to gauge the impact of the traffic projected to be generated by the proposed development on the local road network, it is necessary to determine the impact on surrounding intersection efficiency. The objective of this section is to distribute the traffic generated by the proposed development along the major approach routes before it dissipates throughout the general road network. Based on the surrounding road layout within the context of the subject site as illustrated in **Figure 2**, it is evident that all traffic will approach and depart the subject site via Shepherd Street, given its collector function and the limited connectivity of other local roads to other higher order roads. In this

regard, the projected trips anticipated to be generated by the subject development has been assigned within Shepherd Street as follows:

- 90% of vehicles will approach/depart the site along the northbound lanes of Shepherd Street; and
- The remaining 10% of vehicles will approach and leave the subject site via the southbound lanes of Shepherd Street.

Further to the above, the following assumptions have been made in order to generate a trip assignment:

- All commercial based vehicular trips have been evenly assigned as ingress and egress trips during both peak periods;
- 80% of residential based vehicular trips have been assigned to constitute outbound trips during the morning peak with the remaining 20% comprising inbound trips; and
- The reverse of the abovementioned residential assignment has been applied during the evening peak.

6.4 Traffic Impact

The proposed development has been projected to generate in the order of 25 additional vehicle trips to and from the subject development above that which is currently generated during peak hours. This represents approximately one additional vehicle movement every 2.4 minutes during peak periods. The previous assessment contained within this report has revealed that the immediately surrounding road network currently operates with a good level of service with sufficient capacity to accommodate larger traffic volumes. The abovementioned projected medium level of traffic is anticipated to have negligible impacts on the operation of the surrounding road network and nearby intersections.

The impact of the subject development is therefore most likely to be a factor of the level of safety afforded by the site access arrangements. In this regard, Section 4 of this report presents that the consistent vertical and horizontal alignment of Atkinson Street in the vicinity of the site is envisaged to result in good sight distance provisions between the site access and the frontage road thereby allowing vehicle movements to be capable of travelling to and from the site in a safe manner.

Notwithstanding the above, we have predicted during the afternoon/evening peak period that the majority of the inbound trips will originate from the north, which will involve a right hand turn from Shepherd Street into Atkinson Street. Such movements are envisaged to occur unimpeded due to the low northbound volumes observed during the afternoon peak leading to frequent breaks in the northbound traffic. In consideration of this and the abovementioned discussion, the surrounding road network is projected to be suitably capable of accommodating the additional traffic projected to be generated by the subject development.

7. **CONCLUSION**

This Practice has undertaken an assessment of the likely traffic implications resulting from a proposed mixed use development on land located at 21 Atkinson Street, Liverpool. Based on this assessment, the following can now be concluded:

- The proposed access, internal circulation and manoeuvring arrangements are capable of providing for safe and efficient vehicular movements during peak times;
- The proposed parking provision suitably complies with Council's DCP requirements;
- The immediately adjoining road network currently operates with a good level of service during peak periods;
- The proposed development is expected to generate 25 additional peak hour vehicle trips to and from the site, over and above that currently generated by existing site improvements; and
- The subject development is therefore not projected to have any unreasonable impacts on the level of safety and efficiency afforded by the surrounding road network.

Having regard to the above, we do not consider that there are any traffic related issues that should prevent Council's approval of the subject DA. Accordingly, from a traffic perspective, we recommend that action to Council.