PARKVIEW PENRITH PTY LTD

TRAFFIC AND ACCESSIBILITY IMPACT STUDY FOR CONCEPT PLAN APPLICATION FOR A MIXED USE DEVELOPMENT WITH STAGE 1 WORKS INVOLVING CONSTRUCTION OF A MASTERS STORE, 164 STATION STREET, PENRITH

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1. INTRODUCTION

1.1 Colston Budd Hunt and Kafes Pty Ltd has been commissioned by Parkview Penrith Pty Ltd to prepare a traffic and accessibility impact study for a proposed mixed use development in Penrith.

1.2 The site is at 164 Station Street, Penrith, with frontage to Station Street, Woodriff Street and Jamison Road, and is shown in Figure 1. Part of the site is occupied by an industrial building of some 8,000m^2. The remainder of the site is vacant.

1.3 The site was previously approved for a mixed use development comprising 1,100 apartments plus some 50,400m^2 of retail, commercial and other mixed uses.

1.4 The concept plan for the proposed development comprises 570 apartments, a 1,800m^2 tavern and 995m^2 commercial/retail on the southern part of the site. A concept plan and project application is being made for a Masters home improvement centre of 13,603m^2 on the northern part of the site.

1.5 The director-general's requirements for the project include the following:

7. Transport & Accessibility Impacts (Construction and Operational)

- *The EA shall provide a Traffic and Accessibility Impact Study prepared in accordance with the RTA's Guide to Traffic Generating Developments and relevant government transport policies, considering:*
  - *traffic generation and any required road / intersection upgrades,*
  - *the adequacy of on-site car parking for the proposal having regard to local planning controls, RTA guidelines and the public transport accessibility of the site,*

- *access, loading dock(s) and service vehicle movements,*
- *the potential for implementing a location-specific sustainable travel plan (e.g. 'Travelsmart' or other travel behaviour change initiative), and*
- *the implications of the proposed development for non-car travel modes (including public transport use, walking and cycling) and the provision of facilities to increase the non-car travel share, including bicycle connections from the site to the surrounding bicycle network and bicycle parking in both residential and commercial / retail portions of the proposed development (including the provision of amenities for cyclists).*

1.6 The supplementary director-general's requirements for the project include the following:

6. Transport & Accessibility Impacts (Construction and Operational)

(in addition to matters raised in the original DGRs)

- *The Traffic and Accessibility Impact Study to be provided with the EA must also consider cumulative traffic and accessibility impacts, having regard to traffic and accessibility impacts arising from other current planning proposals in the locality.*

1.7 This report has been prepared with reference to the RMS "Guide to Traffic Generating Developments". It assesses the traffic and accessibility impacts of the proposed development through the following chapters:

- Chapter 2 - describing the existing conditions; and
- Chapter 3 - assessing the traffic and accessibility implications of the proposed development.

2. EXISTING CONDITIONS

Site Location and Road Network

2.1 The site is at 164 Station Street, Penrith, in the southern part of the Penrith City Centre, as shown in Figure 1. It has frontage to Station Street, Woodriff Street and Jamison Road. There is an industrial building on the site, of some 8,000m^2, with vehicular access from Station Street.

2.2 Surrounding land use comprises a mix of retail and commercial development in the remainder of the Penrith CBD, including the Centro Nepean shopping centre which adjoins the site to the north. The Panthers stadium is west of the site and there is residential development to the east and south.

2.3 The road network in the vicinity of the site includes Mulgoa Road, Jamison Road, Station Street, Woodriff Street, Ransley Street and Derby Street. Mulgoa Road is west of the site. It is an arterial road, forming part of a route linking Mulgoa in the south with Penrith, Castlereagh and Richmond in the north. In the vicinity of the site it provides a four lane divided carriageway with two traffic lanes in each direction. Major intersections are signalised with additional lanes for turning traffic.

2.4 Jamison Road provides an east-west link through Jamisontown. It provides a four lane carriageway, with two traffic lanes in each direction and a central concrete median. The intersection of Jamison Road with Mulgoa Road is controlled by traffic signals.

2.5 Woodriff Street, Station Street and Ransley Street are four lane undivided roads with one traffic lane and one parking lane in each direction, clear of intersections. Station Street forms part of a bus route and provides a bicycle lane in each direction. The intersections of Station Street and Woodriff Street with Jamison Road are controlled by two lane roundabouts. The intersection of Station Street with Ransley Street is an unsignalised t-intersection.

2.6 Derby Street is north of the site and connects Station Street with Woodriff Street and other areas to the east. It provides for one traffic lane and one parking lane in each direction, clear of intersections. The intersection of Derby Street with Station Street is controlled by traffic signals. The intersection of Derby Street with Woodriff Street is controlled by a roundabout.

Previous Approval

2.7 The site was previously approved for a mixed use development comprising 1,100 apartments plus some 50,400m^2 of retail, commercial and other mixed uses. Vehicular access was approved in a number of locations from Station Street, Woodriff Street and Jamison Road.

2.8 A traffic report[1] was submitted with the application for the approved development. This report assessed a weekday afternoon peak hour traffic generation of 1,200 vehicles per hour two-way (sum of both directions).

[1] "Traffic Impact Assessment Masterplan for the Proposed Develoment: 164 Station Street, Penrith." Prepared for Davids Group Pty Ltd by Traffix, June 2008.

Other Development in the Area

2.9 Council has adopted the Riverlink Precinct Plan 2008 which identifies future development on land west of Mulgoa Road, between the railway line, M4 Motorway and Nepean River (west of the subject site).

2.10 Following adoption of the plan, a transport report[2] was prepared to assess the transport implications of future development in the Riverlink Precinct. This report drew upon previous traffic and transport studies for the area, including the Penrith Arterial Roads Study (October 2007) and the Access and Transport Analysis of Penrith City Centre and St Marys Town Centre (November 2004).

2.11 The traffic study for the Riverlink Precinct analysed future traffic conditions to 2036, including assessment of a series of other significant developments in the immediate and wider area. Additional infill residential development of some 4,000 dwellings was included in the assessment. As previously noted, the approved development on the subject site at that time included 1,100 dwellings plus a series of other uses. Therefore, the study for the Riverlink Precinct included allowance for the then envisaged development on the subject site.

2.12 A planning proposal has since been lodged with Council for the Penrith Panthers site, which forms part of the Riverlink Precinct. A transport assessment[3] has been lodged in association with the planning proposal.

[2] "Penrith Riverlink Precinct Traffic, Transport and Access Impact Assessment". Prepared for Penrith City Council by GHD, June 2009.

[3] "Supplementary Transport Assessment for Panthers Penrith Planning Proposal". Draft report prepared for ING Real Estate Investment Management, May 2011.

2.13 The transport assessment for the Panthers planning proposal builds upon the report prepared for the wider Riverlink Precinct. It includes consideration of the same series of developments to the year 2031, including, as previously, infill development of some 4,000 residential dwellings.

2.14 These previous studies have therefore included allowance for development previously envisaged on the subject site.

Traffic Flows

2.15 Traffic generated by the proposed development will have its greatest effects during weekday afternoon and Saturday peak periods when it combines with commuter and other traffic on the surrounding road network.

2.16 In order to gauge traffic conditions, counts were undertaken during weekday afternoon and Saturday peak periods at the following intersections:

- Mulgoa Road/Jamison Road;
- Jamison Road/Station Street;
- Jamison Road/Woodriff Street;
- Station Street/Ransley Street;
- Station Street/Derby Street; and
- Woodriff Street/Derby Street.

2.17 The results of the surveys are shown in Figures 2 and 3 and summarised in Table 2.1. Mulgoa Road carried some 2,850 to 3,200 vehicles per hour two-way during the weekday afternoon and Saturday peak hours. Flows on Jamison Road, Station Street, York Road and Woodriff Street were lower at some 750 to 1,700 vehicles per hour two-way.

2.18 Derby Street carried some 600 to 800 vehicles per hour and Ransley Street carried some 350 to 400 vehicles per hour two-way.

Table 2.1: Existing two-way (sum of both directions) peak hour traffic flows

Road	Location	Weekday PM	Saturday midday
Mulgoa Road	North of Jamison Road	2,855	2,955
	South of Jamison Road	3,215	3,135
Jamison Road	West of Mulgoa Road	500	500
	East of Mulgoa Road	1,680	1,580
	East of Station Street	1,330	1,505
	East of Woodriff Street	1,245	1,405
Station Street	North of Jamison Road	910	1,170
	North of Ransley Street	1,250	1,420
	North of Derby Street	1,300	1,370
Woodriff Street	North of Jamison Road	1,005	1,140
	North of Derby Street	770	755
York Road	South of Jamison Road	1,460	1,390
Derby Street	East of Station Street	760	575
	East of Woodriff Street	770	675
Ransley Street	West of Station Street	375	395

Intersection Operations

2.19 The capacity of the road network is largely determined by the capacity of its intersections to cater for peak period traffic flows. The surveyed intersections shown in Figures 2 and 3 have been analysed using the SIDRA computer program.

2.20 SIDRA provides a number of performance measures. The most useful measure provided is average delay per vehicle expressed in seconds per vehicle.

2.21 Based on average delay per vehicle, SIDRA estimates the following levels of service (LOS):

- For traffic signals, the average delay per vehicle in seconds is calculated as delay/(all vehicles), for roundabouts the average delay per vehicle in seconds is selected for the movement with the highest average delay per vehicle, equivalent to the following LOS:

0 to 14	=	“A”	Good
15 to 28	=	“B”	Good with minimal delays and spare capacity
29 to 42	=	“C”	Satisfactory with spare capacity
43 to 56	=	“D”	Satisfactory but operating near capacity
57 to 70	=	“E”	At capacity and incidents will cause excessive delays. Roundabouts require other control mode
>70	=	"F"	Unsatisfactory and requires additional capacity

- For give way and stop signs, the average delay per vehicle in seconds is selected from the movement with the highest average delay per vehicle, equivalent to following LOS:

0 to 14	=	“A”	Good
15 to 28	=	“B”	Acceptable delays and spare capacity
29 to 42	=	“C”	Satisfactory but accident study required
43 to 56	=	“D”	Near capacity and accident study required
57 to 70	=	“E”	At capacity and requires other control mode
>70	=	"F"	Unsatisfactory and requires other control mode

2.22 It should be noted that for roundabouts, give way and stop signs, in some circumstances, simply examining the highest individual average delay can be misleading. The size of the movement with the highest average delay per vehicle should also be taken into account. Thus, for example, an intersection where all movements are operating at a level of service A, except one which is at level of service E, may not necessarily define the intersection level of service as E if that movement is very small. That is, longer delays to a small number of vehicles may not justify upgrading an intersection unless a safety issue was also involved.

2.23 The analysis found that the signalised intersection of Mulgoa Road with Jamison Road is operating with average delays of less than 40 seconds per vehicle during weekday afternoon and Saturday peak periods. This represents LOS C, a satisfactory level of service.

2.24 The roundabout controlled intersections of Jamison Road with Station Street and Woodriff Street, and of Woodriff Street with Derby Street, are operating with average delays for the highest delayed movements of less than 20 seconds per vehicle during peak periods. This represents level of service B, a good level of service.

2.25 The signalised intersection of Station Street with Derby Street is operating with average delays of less than 15 seconds per vehicle during peak periods. This represents level of service A/B, a good level of service.

2.26 The unsignalised intersection of Station Street with Ransley Street is operating with average delays for the highest delayed movement of less than 20 seconds per vehicle during peak periods. This represents level of service B, a reasonable level of service.

Public Transport

2.27 Local bus services are provided by Westbus. There are bus stops on both sides of Station Street, adjacent to the site. Buses also use Derby Street and Jamison Road, north and south of the site. Routes include:

- 688 – Penrith to Emu Heights via Emu Plains;
- 690 – Penrith to Emu Plains, Springwood and Katoomba;
- 781 – St Mary to Penrith via Claremont Meadows and Glenmore Park;
- 791/793 – Penrith to South Penrith;
- 789/795 – Warragamba to Penrith via Silverdale, Wallacia, Mulgoa Road & Jamisontown; and
- 797/799 – Penrith to Glenmore Park via Mulgoa Road, Jamisontown and Glenmore Park shops.

2.28 Services include links to the interchange at the Penrith railway station. The site is therefore accessible by a number of bus services which connect to surrounding areas and the Penrith CBD.

2.29 There are footpaths on both sides of Station Street, Woodriff Street and Jamison Road, adjacent to the site. A bicycle route is provided along Station Street. There is also a bicycle route along Mulgoa Road which connects to the Penrith CBD in the north and will be extended to the south to connect with Glenmore Park.

2.30 The site therefore has good access to public transport services, and is readily accessible by walking and cycling. It is also close to other services and facilities within the Penrith CBD.

3. IMPLICATIONS OF PROPOSED DEVELOPMENT

3.1 The concept plan for the proposed development comprises 570 apartments, a 1,800m^2 tavern and 995m^2 commercial/retail on the southern part of the site. A concept plan and project application is being made for a Masters home improvement centre of 13,603m^2 on the northern part of the site.

3.2 Vehicular access to the development is proposed to be provided from a new internal road network connecting to Station Street and Woodriff Street. The Masters home improvement centre would also have access from Station Street, opposite Ransley Street, and Woodriff Street.

3.3 This chapter assesses the traffic and accessibility impacts of the proposed development through the following sections:

- policy context;
- public transport, walking and cycling;
- travel access guide;
- parking provision;
- access, servicing and internal layout;
- traffic generation and effects;
- principles of construction traffic management;
- director-general's requirements;
- matters raised by authorities; and
- summary.

Policy Context

3.4 There are a number of strategic state policies which are relevant to the development. The policies include NSW 2021, the draft Metropolitan Strategy for Sydney to 2031 and The NSW Long Term Transport Master Plan. These policies are discussed below.

- NSW 2021

3.5 NSW 2021: A Plan to Make NSW Number One sets targets to increase the proportion of commuter trips made by public transport for various areas within Sydney by 2016, including:

- 80 per cent in the Sydney CBD;
- 50 per cent in the Parramatta CBD;
- 20 per cent in the Liverpool CBD; and
- 25 per cent in the Penrith CBD.

3.6 It also has targets to:

- improve road safety and reduce fatalities to 4.3 per 100,000 population by 2016;

- double the mode share of bicycle trips made in the metropolitan area by 2016; and

- increase the proportion of the population living within 30 minutes by public transport of a city or major centre in the metropolitan area.

- Draft Metropolitan Strategy for Sydney to 2031

3.7 The draft Metropolitan Strategy for Sydney to 2031 provides a strategic plan to accommodate an additional 1.3 million people, 545,000 houses and 625,000 jobs.

3.8 The draft strategy identifies the following objectives for housing, employment and transport:

- provide 27,500 new houses per year, across all of Sydney's six sub-regions;
- provide higher densities closer to major centres;
- provide appropriate land to support jobs growth, including new business parks and industry clusters and hubs;
- provide cross-city transport connections;
- provide appropriate infrastructure to facilitate business growth, including an efficient port, airport and freight network, telecommunications and educational facilities;
- use of the Urban Activation Precincts to demonstrate greater use of public transport, walking and cycling, and integrating land use and transport;
- improve travel times and reduce congestion through improvements to six high priority transport corridors (Parramatta – CBD via Strathfield, Parramatta – CBD via Ryde, Liverpool – Sydney Airport, Sydney Airport – CBD, Mona Vale – Sydney CBD and Rouse Hill – Macquarie Park);
- key transport measures, as outlined in the NSW Long Term Transport Master Plan) to support the strategy;
- provision of other infrastructure, including schools and hospitals, to support the identified growth; and
- improved environmental management by use of resources and energy more efficiently, better planning for natural disasters and increased green space.

- NSW Long Term Transport Master Plan

3.9 The NSW Long Term Transport Master Plan has been developed, in association with the Sydney Metropolitan and Regional Strategies and State Infrastructure Strategy, to support NSW 2021. The key measures identified are as follows:

- providing a fully integrated transport system;
- providing a modern railway system and increase capacity by 60 per cent;
- providing a modern light rail system in the CBD;
- providing a modern bus system to complement the rail networks;
- connect the motorway network, including WestConnex, F3/M2 link and F6;
- reduce congestion in the CBD, including removing the monorail, increasing light rail, improving pedestrian links, increasing ferry use, providing increased capacity on the rail system and improved walking and cycling infrastructure;
- support the growth of new economic centres including the north west and south west rail links, new roads in growth areas and new bus infrastructure;
- connect regional communities through major highway upgrades, and improved rail, bus and air services;
- improve freight efficiency and productivity;
- improve access to Sydney Airport and Port Botany;
- boost walking, cycling and its integration with public transport; and
- preserve future transport corridors.

3.10 The following sections discuss how the proposed development satisfies these objectives and the measures proposed to achieve them.

Public Transport, Walking and Cycling

3.11 As previously discussed, the site is close to major bus services which operate along Station Street to and from the Penrith CBD. The site is served by a number of services which connect to surrounding areas.

3.12 The proposed development would increase residential, employment and retail densities close to existing public transport services.

3.13 As part of the proposed development, new pedestrian links will be provided through the site, along the new streets which are proposed to connect Station Street with Woodriff Street.

3.14 The proposed development will therefore satisfy the objectives of NSW 2021, the draft Metropolitan Plan for Sydney and the NSW Long Term Transport Master Plan as follows:

- enabling commuters to readily access the Penrith CBD, as well as buses close to the site, for journeys to work and other travel;

- providing pedestrian connections within, through and to the site, to improve accessibility for residents and employees in the development as well as the general public;

- providing an appropriate level of on-site parking, with reference to appropriate Council requirements, to encourage public transport use and increase the proportion of journey to work trips by public transport;

- providing services and facilities on site (a mix of uses including retail and the tavern), as well as being close to the Penrith CBD, to reduce the need for external travel;

- being located close to the Penrith CBD and other employment areas in Penrith, as well as local services and facilities, which are readily accessible by public transport, walking and cycling;

- providing appropriate bicycle parking on the site for residents and visitors to increase the proportion of trips made by bicycle; and

- increasing the proportion of the population living within 30 minutes by public transport of a city or major centre in the metropolitan area.

Travel Access Guide

3.15 To encourage travel modes other than private vehicle, it is proposed to adopt a travel demand management approach, through preparation of a travel access guide to meet the specific needs of the site, future residents, employees and visitors. The specific requirements and needs of the future residents and employees, including access to the Penrith CBD, plus local services and facilities, will be incorporated in the travel access guide to support the objectives of encouraging the use of public transport.

3.16 The principles of the travel access guide, to be developed in consultation with Council, RMS, Sydney Buses and other stakeholders, will include the following:

- encourage the use of public transport, including bus services along Station Street and in the Penrith CBD;

- identify existing bus routes which stop adjacent and close to the site, including the location of bus stops and pedestrian crossings at signalised intersections;

- work with local bus operators to improve services;

- encourage public transport by residents through the provision of information, maps and timetables in the travel access guide;

- raise awareness of health benefits of walking and cycling (including maps showing walking and cycling routes, including through and adjacent to the site);

- encourage cycling by providing safe and secure bicycle parking, including the provision of bicycle parking for residents, employees and visitors;

- provide appropriate on-site parking provision, consistent with appropriate Council/RMS controls and the objective of reducing traffic generation.

3.17 The travel access guide will be developed in accordance with the principles identified by Transport NSW and RMS, and distributed with marketing material for the site. The travel access guide will assist in delivering sustainable transport objectives by considering the means available for reducing dependence solely on cars for travel purposes, encouraging the use of public transport and supporting the efficient and viable operation of public transport services.

Parking Provision

3.18 Part 4 of the Penrith City Centre DCP 2007 includes the following maximum car parking requirements for residential development:

- 0.5 spaces per studio;
- one space per one or two bedroom apartment;
- 1.5 spaces per apartment with three or more bedrooms;
- one visitor space per 20 apartments or part thereof;
- one space for car washing for every 50 apartments, up to a maximum of four spaces per building;
- a minimum of two per cent of spaces provided for disabled users; and
- provision for service vehicles (with dimensions commensurate for delivery and removalists' vehicles).

3.19 The rates are lower than for residential development outside the CBD, to limit traffic generation and reflect the better accessibility of CBD sites to public transport and other services and facilities.

3.20 The concept plan provides for some 570 one and two bedroom apartments. On this basis, the residential component should provide 570 resident spaces plus 29 visitor spaces.

3.21 Parking will be provided in accordance with the above rates. Final parking provision for individual buildings will be determined at the time that project applications are made for these buildings, following confirmation of the final number and mix of apartments. The parking provisions will include appropriate disabled parking and car wash bays.

3.22 Service vehicles, including garbage collection and deliveries, will be accommodated on the new streets adjacent to the apartment buildings.

3.23 DCP 2006 indicates that shops in the Penrith CBD and commercial development should provide one space per 26m^2 and one space per 40m^2 respectively.

3.24 The proposed Nepean Green concept plan provides one per 100m^2 car spaces for the retail tenants within the basement of the Stage 3 building with visitors to park on the existing and the new local streets within the concept plan.

3.25 The car parking for retail development is provided at a reduced rate compared to the DCP. However, car parking for the proposed neighbourhood shops and cafés will be accommodated within the local road network, which is considered to be appropriate having regard to the number of on-street car parking spaces and the anticipated number of patrons who would walk to these facilities.

3.26 For pubs/registered clubs, Penrith DCP 2006 includes a minimum parking requirement is one space per 3.5m^2 bar area plus one space per 5.5m^2 lounge/dining area.

3.27 By comparison, we have undertaken surveys of a number of clubs and taverns, including at Ashfield, Balgowlah, Berowra, Central Coast, Chatswood, Epping, Pennant Hills, Penrith, Redfern, Revesby, St Marys, Wentworthville and West Pennant Hills. These surveys have found parking demands in the range one space per 10 to 15m^2.

3.28 On this basis, the proposed 1,800m^2 tavern would require some 120 to 180 parking spaces. It would be appropriate to provide parking toward the lower end

of this range, given the location of the site in the Penrith town centre, and consistent with government objectives to constrain parking and encourage alternative modes of travel in areas with good access to public transport.

3.29 DCP 2007 also notes that a maximum of 60 per cent of the parking spaces required by a development (apart from service vehicles, car wash bays and disabled parking) should be provided on site. The remaining spaces are subject to a contribution plan or the terms of a voluntary planning agreement.

3.30 On this basis, the tavern would require some 70 on-site parking spaces. It is proposed to provide some 70 spaces for the tavern in accordance with Council's requirements.

3.31 DCP 2007 indicates that bicycle parking should be provided for commercial and retail developments providing employment for 20 or more people. Appropriate parking for bicycles will be included in the development.

3.32 The DCP does not include a specific parking rate for home improvement centres such as Masters. By comparison, RMS has undertaken recent surveys of the parking demands of home improvement centres. The results of these surveys are attached as Appendix A. Two of the centres (Bankstown and Minchinbury) have areas (14,111m^2 and 11,915m^2 respectively) similar in size to the proposed Penrith Masters.

3.33 The RMS parking demand surveys found peak parking demands of 318 and 264 spaces at Bankstown and Minchinbury respectively. These demands represent rates of some 2.2 to 2.3 spaces per 100m^2 at peak times on weekends.

3.34 Based on these rates, the proposed Masters would have parking demands of some 300 to 310 spaces. The proposed provision is 375 spaces which satisfies this requirement and is considered appropriate.

3.35 The proposed provision will include appropriate disabled parking (some two per cent of spaces) in appropriate locations at the front of the Masters store.

Access, Servicing and Internal Layout

3.36 Vehicular access to the development is proposed to be provided from a new internal road network connecting to Station Street and Woodriff Street. The Masters home improvement centre would also have access from Station Street, opposite Ransley Street, and Woodriff Street.

3.37 A new road connection will be provided between Station Street and Woodriff Street. The intersections of the new roads with Station and Woodriff Streets will be priority controlled t-intersections. As discussed in the following section on traffic generation and effects, these intersections will have appropriate capacity to cater for the traffic flows from the proposed development.

3.38 Internally, new roads will be provided to provide access to the various buildings. Roads will be dedicated as public roads, and be provided with 15.6 metre reserves and eight metre carriageways, in accordance with Council's engineering specifications for local roads. On-street parking will be provided on the internal roads, clear of intersections and where appropriate. A cul-de-sac turning area will be provided at the southern end of the internal road near Jamison Road.

3.39 As previously discussed, service vehicles will generally be accommodated on-street. The tavern will provide a dedicated loading bay, with the ability to enter and exit in a forward direction.

3.40 For the Masters store, vehicular access will be provided from Station Street, opposite Ransley Street for customers. To cater for traffic volumes and provide for all traffic movements, it is proposed to signalise the intersection of Station Street/Ransley Street/Masters access. Access to Masters would also be provided from the new road connecting Station and Woodriff Streets (separate driveways for customers and service vehicles) and Woodriff Street (exit driveway for service vehicles).

3.41 Service vehicles will enter the Masters store from the new connection road between Station Street and Woodriff Street. Service vehicles to Masters will include 19 metre semi trailers and 12.5 metre large rigid trucks. The new roads, as well as the loading dock, manoeuvring areas and driveways to and from Masters, will provide for turns by these vehicles and will provide for entry and exit in a forward direction.

3.42 Within the Masters parking area, parking spaces will be a minimum of 5.4 metres long by 2.6 metres wide, with 6.6 metre wide circulation aisles. Spaces with adjacent obstructions will be 0.3 metres wider to provide for doors to open. Disabled spaces will be 2.4 metres wide, with an additional 2.4 metre wide adjacent area for wheelchairs. These dimensions are considered appropriate, being in accordance with the Australian Standard for Parking Facilities (Part 1: Off-street car parking), AS 2890.1:2004.

3.43 For the residential component and tavern, retail and commercial uses, the driveways, parking space dimensions and internal circulation will be provided in accordance with AS 2890.1:2004 at the development application stage.

Traffic Generation and Effects

3.44 As previously discussed, the traffic report prepared in association with the previously approved development on the site assessed a traffic generation of 1,200 vehicles per hour two-way during weekday afternoon peak hours.

3.45 RMS's "Guide to Traffic Generating Developments" indicates that high density residential developments in CBD locations generate 0.24 vehicles per hour per apartment (two-way) at peak times. On this basis, the 570 residential apartments would generate some 140 vehicles per hour two-way at peak times.

3.46 The previous traffic assessment assessed a traffic generation of 60 vehicles per hour two-way at peak times for a larger tavern (2,000m^2 compared to the proposed 1,800m^2 tavern). We have based our assessment on 60 vehicles per hour for the proposed tavern.

3.47 The relatively small component of other retail and commercial are expected to be largely ancillary and will therefore not generate significant additional external traffic. We have assessed 50 vehicles per hour two-way for these uses.

3.48 The RMS surveys of home improvement centres (copy appended) found the following two-way (sum of both directions) peak hour traffic generations for the home improvement centres at Bankstown and Minchinbury:

- 289 and 338 vehicles per hour two-way during the afternoon peak hour (representing rates of some 2.05 and 2.84 vehicles per hour per 100m^2 respectively); and

- 844 and 754 vehicles per hour two-way during the weekend peak hour (representing rates of some 5.98 and 6.33 vehicles per hour per 100m^2 respectively).

3.49 Using an average of the above rates, the proposed Masters home improvement centre would have the following two-way peak hour traffic generations:

- weekday afternoon peak hour: some 330 vehicles; and
- weekend peak hour: some 840 vehicles.

3.50 Total traffic generation would therefore be some 580 and 1,090 vehicles per hour two-way during weekday afternoon and Saturday peak hours respectively. These generations are less than the 1,200 vehicles per hour two-way associated with the approved development.

3.51 The RMS guidelines indicate that some 20 per cent of retail traffic is passing trade, i.e. traffic which would have driven past the site regardless of its visit to the site. We have based our assessment on 20 per cent passing trade for the Masters store.

3.52 The additional traffic has been assigned to the road network. Existing peak hour traffic flows plus development traffic are shown in Figures 2 and 3, and summarised in Table 3.1.

Table 3.1: Existing two-way peak hour traffic flows plus development traffic					
Road	**Location**	**Weekday PM**		**Saturday midday**	
		Existing	Plus development	Existing	Plus development
Mulgoa Road	North of Jamison Road	2,855	+40	2,955	+100
	South of Jamison Road	3,215	+100	3,135	+260
Jamison Road	West of Mulgoa Road	500	-	500	-
	East of Mulgoa Road	1,680	+100	1,580	+160
	East of Station Street	1,330	+20	1,505	+20
	East of Woodriff Street	1,245	+130	1,405	+260
Station Street	North of Jamison Road	910	+120	1,170	+180
	North of Ransley Street	1,250	+75	1,420	+140
	North of Derby Street	1,300	+75	1,370	+140
Woodriff Street	North of Jamison Road	1,005	+125	1,140	+250
	North of Derby Street	770	+25	755	+60
York Road	South of Jamison Road	1,460	+15	1,390	+10
Derby Street	East of Station Street	760	-	575	-
	East of Woodriff Street	770	-	675	-
Ransley Street	West of Station Street	375	+170	395	+360

3.53 Traffic increases on Ransley Street would be some 170 to 360 vehicles per hour two-way at peak times. Increases on Mulgoa Road, Jamison Street, Station Street and Woodriff Street would be lower at up to some 75 to 260 vehicles per hour two-way. Increases on York Road would be some 10 to 15 vehicles per hour two-way.

3.54 The intersections previously analysed in Chapter 2 have been re-analysed with SIDRA for the additional development traffic flows shown in Figures 2 and 3.

3.55 The analysis found that the signalised intersection of Mulgoa Road with Jamison Road would operate with average delays of less than 40 seconds per vehicle during weekday afternoon and Saturday peak periods. This represents LOS C, a satisfactory level of service.

3.56 The roundabout controlled intersections of Jamison Road with Station Street and Woodriff Street, and of Woodriff Street with Derby Street, would operate with average delays for the highest delayed movements of less than 20 seconds per vehicle during peak periods. This represents level of service B, a good level of service.

3.57 The signalised intersection of Station Street with Derby Street would operate with average delays of less than 15 seconds per vehicle during peak periods. This represents level of service A/B, a good level of service.

3.58 As previously noted, to cater for traffic volumes, it is proposed to signalise the intersection of Station Street with Ransley Street. With signals, the intersection would operate with average delays of less than 35 seconds per vehicle during peak periods. This represents level of service C, a satisfactory level of service.

3.59 The analysis found that with give way controls on the new road, the intersections of the new internal road with Station Street and Woodriff Street would operate with average delays for the highest delayed movements of less than 20 seconds per vehicle at peak times. This represents level of service B, a reasonable level of service.

3.60 Therefore, with the proposed road works and intersection treatments, the road network will be able to cater for the additional traffic from the proposed development.

Principles of Construction Traffic Management

3.61 At this stage the overall construction methodology, process and staging has not been defined. The builder will be responsible for the preparation of a traffic management plan, which will be prepared prior to the commencement of work, taking into account relevant consent conditions for each stage of development.

3.62 Construction of the development will commence with demolition of any existing buildings (on the northern part of the site) and site preparation works. Construction access will be provided to/from Station Street and/or Woodriff Street. It is not anticipated that works zones will be required along the site frontages to Station Street, Woodriff Street or Jamison Road.

3.63 Pedestrian footpaths adjacent to the site will be maintained during the construction period. Class A construction fencing will be erected around the perimeter of the various buildings, with overhead protection where required.

3.64 Openings in the construction fencing and at the construction access driveways will be managed and controlled by traffic controllers. The movement of trucks entering and exiting the site will be managed and controlled by traffic controllers.

3.65 The overall principles for traffic management during construction are:

- provide a convenient and appropriate environment for pedestrians;
- minimise effects on pedestrian movements and amenity;
- provide appropriate safety fencing/hoardings at the perimeter of the site;

- manage and control vehicular movements to and from the site;
- construction vehicles to enter and exit the site in a forward direction;
- maintain other existing on-street parking in the vicinity of the site;
- restrict construction vehicle activity to designated truck routes through the area (to be identified by the appointed builder);
- construction activity to be carried out in accordance with the approved hours of construction;
- maintain safety for workers; and
- the preparation of the construction traffic management plan, signage detail, control of pedestrians and control and management of construction vehicles in the vicinity of the site will be the responsibility of the appointed builder.

Director-General's Requirements

- *The EA shall provide a Traffic and Accessibility Impact Study prepared in accordance with the RTA's Guide to Traffic Generating Developments and relevant government transport policies, considering:*
  - *traffic generation and any required road / intersection upgrades,*

3.66 These matters are discussed in paragraphs 3.44 to 3.60.

- *the adequacy of on-site car parking for the proposal having regard to local planning controls, RTA guidelines and the public transport accessibility of the site,*

3.67 Parking provision is discussed in paragraphs 3.18 to 3.35.

- *access, loading dock(s) and service vehicle movements,*

3.68 These matters are discussed in paragraphs 3.36 to 3.43.

- *the potential for implementing a location-specific sustainable travel plan (e.g. 'Travelsmart' or other travel behaviour change initiative), and*

3.69 This matter is discussed in paragraphs 3.15 to 3.17.

- *the implications of the proposed development for non-car travel modes (including public transport use, walking and cycling) and the provision of facilities to increase the non-car travel share, including bicycle connections from the site to the surrounding bicycle network and bicycle parking in both residential and commercial / retail portions of the proposed development (including the provision of amenities for cyclists).*

3.70 These matters are discussed in paragraphs 3.11 to 3.14.

- *The Traffic and Accessibility Impact Study to be provided with the EA must also consider cumulative traffic and accessibility impacts, having regard to traffic and accessibility impacts arising from other current planning proposals in the locality.*

3.71 As noted in Chapter 2, previous studies, including the transport study for the Panthers planning proposal, have included allowance for development previously envisaged on the subject site.

3.72 As noted in paragraph 3.50, traffic generation of the proposed development would be less than the generation of the previously approved development.

Matters Raised by Authorities

3.73 In letters dated 24 October, 26 November, 7 December and 19 December 2012 respectively, SRDAC/RMS, Transport for NSW, Council and DoPI previously raised a number of traffic and parking matters in relation to an earlier version of the proposed development. Where relevant to the current scheme, these matters, and our responses, are set out below.

- Council

  - *The proposal has omitted the two signalised intersections required under the 2008 approval issued by Council for the site. These two intersections were critical in ensuring access to the precinct. Whilst the dynamics and access points of the new development have changed, the need for signalised access and support remains. This is to ensure safety and amenity is maintained. The traffic consultant (CBHK) has not provided a detailed SIDRA printout or detailed analysis and it is not clear if the LOS is accurately prescribed. The roundabouts at Jamison Road and Station Street and Jamison Road and Woodriff Street are therefore to be carefully scrutinised with volumes assigned and all detail shown. It is anticipated that these two intersections would warrant signals based on safety and amenity grounds once the site develops and pedestrian desire lines are further promoted from the nearby sporting fields to the multi-storey residential development. Furthermore, the proposal must cater for future traffic growth demand (year 2031) in line with the Panthers Penrith development.*

3.74 The SIDRA files will be separately emailed to DoPI. As previously noted, the analysis indicates that the Jamison Road intersections would operate satisfactorily with the traffic from the proposed development, without the need for traffic signals. The traffic assignment and volumes are included in the SIDRA files, as well as in Figures 2 and 3 of this report.

3.75 As noted previously, the traffic generation of the proposed development would be less than the previously approved development on the site (by some 10 per cent on weekend peak hours and some 50 per cent on weekday peak hours). We also note that the RMS comments in relation to the previous scheme indicate that the Jamison Road intersections do not meet the warrants for signalisation.

3.76 As also previously noted, a transport assessment has been lodged in association with the planning proposal for the Penrith Panthers site. The transport assessment for the Panthers planning proposal builds upon an earlier report prepared for the wider Riverlink Precinct. It includes consideration of a series of developments in the immediate and wider area to the year 2031. Additional infill residential development of some 4,000 dwellings was included in these assessments. At the time of preparation of those studies, the previously approved development on the subject site included 1,100 dwellings plus a series of other uses. Therefore, the study for the Riverlink Precinct and Panthers planning proposal includes allowance for development on the subject site in excess of that now proposed.

3.77 These previous studies have therefore included allowance for development previously envisaged on the subject site to 2031.

- *The proposal for the Ransley Street and Station Street intersection to be retained as an uncontrolled intersection is not supported. It is recommended that the Ransley Street and Station Street intersection be equipped as a signalised intersection to cater for traffic movements and provide pedestrian connectivity to the site. The proposal would also provide for a clear pedestrian access line to the tavern from Panthers Penrith and the Penrith showground site.*

3.78 It is proposed to signalize the Station Street/Ransley Street intersection, with a fourth approach to provide access to the Masters site.

- *There are significant concerns regarding the intersection of the proposed local road network with Station Street and Woodriff Street. Lengthy queuing will occur at these intersections due to high traffic volumes travelling along Station Street and Woodriff Street and traffic volumes leaving the high density residential/commercial area. Consideration should be given to intersection treatments/upgrades at these locations.*

3.79 As noted above, with give way controls on the new road, the intersections of the new internal road with Station Street and Woodriff Street would operate with average delays for the highest delayed movements of less than 20 seconds per vehicle at peak times. This represents level of service B, a reasonable level of service. Other intersection treatments are therefore not considered to be necessary.

- DoPI

Traffic and parking impacts surrounding uses

The traffic analysis needs to review traffic impacts in context of the busiest times for surrounding activities, including sporting events at the adjoining stadium and facilities in Station Street (noting that Centrebet Stadium has capacity of 22,500 and in 2012 experienced a crowd average of 10,714). In this regard consideration should also be given to any measures required to restrict non customer parking within the Masters site, and non resident/visitor parking on internal roads within the stage 2-6 area.

3.80 We have previously undertaken surveys of the parking demands associated with Panthers home games at the stadium. Attendance at these games was some

18,500 and 12,200 for the games surveyed on a Sunday afternoon and Saturday evening respectively.

3.81 Parking demands associated with these games was estimated at some 4,600 and 3,450 vehicles respectively, due to differences in car occupancies and the proportion of people being dropped off on each day.

3.82 These vehicles parked in a number of locations in the vicinity of the stadium, including the Panthers car park, showground, Penrith Park, Nepean Square, other off-street parking areas and on streets for some distance around the stadium.

3.83 In the context of some 3,500 to 4,500 parked vehicles during game days, the minor reduction in parking on Station Street associated with new roads and the proposed traffic signals at Station Street/Ransley Street would not be noticeable.

3.84 Traffic counts undertaken prior to and following these games found that prior to the game, traffic conditions, while busy, were less concentrated than following conclusion of the game. This may be due to factors such as people arriving over a longer period in order to find parking, find seating and pre-match entertainment.

3.85 In relation to traffic implications, we note that of the NRL games for the 2013 season, 12 have been or will be played at the stadium, at the following times:

- two at 2:00 pm on Sunday;
- three at 3:00 pm on Sunday;
- one at 6:30 pm on Sunday;
- one at 7:00 pm on Monday;
- two at 7:30 pm on Saturday; and
- three to be confirmed.

3.86 Of the above games, those in the evenings would not coincide with busy periods for the Masters store or the other uses. Based on our previous surveys at the stadium, the peak period following completion of the five games on Sunday afternoons would generally be around 3:30 to 5:30 pm. This is much later than the general network peak of between 11:00 am and 1:00 pm found by the RMS surveys of other home improvement centres.

3.87 The traffic generation of the proposed development would therefore be small in comparison to traffic associated with these events, and their peak periods would not coincide.

3.88 Finally, we would consider the very small number of occasions per year that games are played at the stadium to be special events, where there will be some congestion and additional parking demands in the area, regardless of other development. It is not appropriate or economic to design for this very small number of events.

3.89 In relation to restricted parking within the Masters car park, access controls are not proposed at this time for the reasons discussed above. However, there is space within the car park, as well as surplus parking to modify the car park and provide boom gates or other access controls, if required in the future.

- SRDAC/RMS

Concept Plan – Mixed Use Development:

1. *Penrith Council raised the issue of signalised access to the development from Station Street and/or Woodriff Street as was proposed in the original concept. RMS advised it would only support signalisation of these intersections should the*

projected traffic volumes at the final stages of the development indicated that the warrants for signalisation would be met. The traffic analysis does not provide traffic figures which would indicate that the warrants for signalisation would be met.

3.90 This matter is noted.

2. *Penrith Council does not support the Ransley Street/Station Street intersection being retained as a t-junction. To provide connectivity into the site and reduce the risk of accidents at this location, Council recommended that the Ransley Street/Station Street intersection be designed as a four-way intersection to provide connectivity into the site. A four-way intersection would also provide a connection between the site and the Panthers site on Mulgoa Road.*

3.91 The amended drawings provide a four-way intersection at Station Street/Ransley Street, with the fourth approach providing access to the development.

- Transport for NSW

  - *The proposal should consider and address the need for any changes to existing bus stops or for new bus stops in the immediate vicinity to provide better access by visitors/shoppers and future residents to/from the site.*

  - *There appears to be no consideration of any pedestrian crossing issues that might arise for accessing existing or new bus stops for northbound bus services on the western side of Station Street. To practically facilitate the encouragement of walking and public transport usage, the proposal should include safe, direct, comfortable and unobstructed pedestrian links to footpaths, and to/from existing or new bus stops on both sides of Station Street.*

- *The proposal should also ensure that adequate bus stop infrastructure is provided at bus stops adjacent to the site, as well as appropriate pedestrian crossing points, if required, in consultation with Penrith City Council.*

3.92 There is an existing bus stop on the northern side of Station Street, opposite the site. Pedestrians will be able to cross Station Street using the proposed traffic signals at the intersection of Station Street with Ransley Street.

3.93 However, it is noted that the majority of pedestrian movements to and from the site will be between the site and the CBD to the north. These will be readily catered for by the existing footpaths along Station Street and Woodriff Street, and by the proposed new road and pedestrian network within the site.

3.94 New bus stops are normally provided subject to demand as identified by operators. A bus stop could be provided on Station Street, adjacent to the site, if considered appropriate, by condition of consent.

Summary

3.95 In summary, the main points relating to the traffic and accessibility impacts of the proposed development are as follows:

i) the site was previously approved for a mixed use development comprising some 1,100 residential apartments plus other uses of some 50,400m^2;

ii) the proposed concept plan includes 570 residential apartments, a 1,800m^2 tavern and 995m^2 other retail/commercial uses. The project application is for a Masters home improvement centre of 13,603m^2;

iii) the proposed development would increase residential, retail and employment densities in the Penrith CBD and close to good public transport services. It is consistent with government objectives to reduce private car travel and encourage public transport use;

iv) a travel access guide will be prepared for the site;

v) parking provision for the Masters home improvement centre and the overall development is considered appropriate;

vi) a new road connecting to Station Street and Woodriff Street, as well as internal roads, will be provided for access to the development;

vii) the internal road layout will provide for good accessibility, including for pedestrians, cyclists and service vehicles;

viii) access, internal circulation and layout will be provided in accordance with AS 2890.1:2004 and AS 2890.2 – 2002;

ix) traffic generation of the proposed development will be less than the previously approved development for the site;

x) the intersection of Station Street with Ransley Street is proposed to be signalised, with a fourth approach providing access to the Masters site;

xi) give way controls are proposed at the t-intersections of the new internal road with Station Street and Woodriff Street;

xii) with the new roads and intersections proposed, the road network will be able to cater for the additional traffic from the proposed development; and

xiii) the director-general's requirements and matters raised by the authorities are addressed in paragraphs 3.66 to 3.94.

APPENDIX A

RMS SURVEYS

Table 2-2 Site Details of the Selected Sites – Hardware/DIY

Site ID	HW1	HW2	HW3	HW4	HW5	HW6	HW7	HW8	HW9
Name	Bunnings	Bunnings	Mitre10	Bunnings	Mitre10	Mitre10	Mitre10	Bunnings	Mitre10
Suburb	North Parramatta	Bankstown Airport	Windsor	Minchinbury	Narellan	Morisset	Picton	South Nowra	Orange
	2152	2200	2756	2770	2567	2264	2571	2541	2800
Region	Sydney	Sydney	Sydney	Sydney	Sydney	Northern	Northern	Northern	Southern
Network Peak Hours									
Year of Network Survey	2007	2005	2007	2007	2005	2004	2009	2009	2005
Dates							6/4-12/4	18/3-24/3	
AM Peak - Weekdays	0800-0900	0700-0800	0800-0900	0800-0900	0800-0900	0800-0900	0900-1000	0800-0900	0800-0900
PM Peak - Weekdays	1700-1800	1600-1700	1500-1600	1700-1800	1600-1700	1600-1700	1600-1700	1500-1600	1600-1700
Peak - Weekends	1200-1300	1200-1300	1100-1200	1100-1200	1100-1200	1100-1200	1200-1300	1100-1200	1100-1200
Site Details - Bulky Goods/Hardware									
Area Dimension (m^2)			6,700		3,500		3,600		Unknown
Gross floor area (m^2)	9,800	14,111	1,800	11,915	2,400	2,000	1,600	9,948	1,800
No. of Employee (Total)			42		20		12		23
No. of employee (at one time)			34		15	15	12		8
Year Constructed			1990		1991-1992		Unknown		1980
Accessibility Score	<79	<79	<79	<79	<79	0.5	1	0	2
Opening Hours									
Mon-Fri	0700-2100	0700-2100	0630-1700	0700-2100	0700-1730	0630-1730	0730-1700	0700-2100	0700-1730
Sat	0800-1800	0800-1800	0800-1600	0800-1800	0730-1600	0700-1600	0700-1600	0800-1800	0800-1600
Sun	0800-1800	0800-1800	0900-1500	0800-1800	0900-1600	0700-1600	0900-1400	0800-1800	0900-1600
Parking Spaces									
Customers	263	464	44	397	35	29	75	209	28
Disabled	2	8	0	6	2	1	0	4	2
Staff			0		0	0	0		10
Loading Bay			2		1	0	5		2
Total	265	472	46	403	38	30	80	213	42
Survey Results									
Date of Survey - Weekdays	12/03/09 (Thurs)	26/03/09 (Thurs)	19/03/09 (Thurs)	19/03/09 (Thurs)	19/03/09 (Thurs)	12/03/09 (Thurs)	26/03/09 (Thurs)	26/03/09 (Thurs)	19/03/09 (Thurs)
Weather	Sunny	Sunny	Sunny	Sunny	Sunny	Sunny	Sunny	Sunny/ Rain Evening	Sunny
Date of Survey - Weekend	14/03/09 (Sat)	28/03/09 (Sat)	21/03/09 (Sat)	21/03/09 (Sat)	21/03/09 (Sat)	14/03/09 (Sat)	28/03/09 (Sat)	28/03/09 (Sat)	21/03/09 (Sat)
Weather	Sunny	Sunny	Sunny	Sunny	Sunny	Sunny/ Rain Evening	Sunny	Sunny	Sunny

3.3.1 Hardware / DIY

Table 3-1 Traffic Results Summary – Hardware/DIY

	Sydney Metropolitan Area					Non-Metropolitan Area			
Site ID	HW1	HW2	HW3	HW4	HW5	HW6	HW7	HW8	HW9
Gross floor area (m2)	9,800	14,111	1,800	11,915	2,400	2,000	1,600	9,946	1,800
Weekdays									
Person-based Trips									
- Site Peak Hour	484	565	101	688	119	128	97	393	100
Trips/ 100m² GFA	4.94	4.00	5.61	5.77	4.96	6.40	6.06	3.95	5.56
- Vehicle Network AM Peak	162	92	49	273	65	49	76	127	61
Trips/ 100m² GFA	1.65	0.65	2.72	2.29	2.71	2.45	4.75	1.28	3.39
- Vehicle Network PM Peak	281	350	88	474	79	93	66	278	64
Trips/ 100m² GFA	2.87	2.48	4.89	3.98	3.29	4.65	4.13	2.79	3.56
Daily Total Person Trips	4,397	4,639	816	6,346	858	868	667	2,907	703
Trips/ 100m² GFA	44.87	32.88	45.33	53.26	35.75	43.40	41.69	29.22	39.06
Vehicle-based Trips									
- Site Peak Hour	403	444	84	491	98	112	75	273	83
Trips/ 100m² GFA	4.11	3.15	4.67	4.12	4.08	5.60	4.69	2.74	4.61
- Network AM Peak	140	84	40	243	51	42	62	108	53
Trips/ 100m² GFA	1.43	0.60	2.22	2.04	2.13	2.10	3.88	1.09	2.94
- Network PM Peak	225	289	64	338	66	76	50	198	58
Trips/ 100m² GFA	2.30	2.05	3.56	2.84	2.75	3.80	3.13	1.99	3.22
Daily Total LV Trips	3,441	3,643	514	4,558	605	718	523	2,055	575
Trips/ 100m² GFA	35.11	25.82	28.56	38.25	25.21	35.90	32.69	20.66	31.94
Daily Total HV Trips	122	139	111	178	51	45	19	69	33
Trips/ 100m² GFA	1.24	0.99	6.17	1.49	2.13	2.25	1.19	0.69	1.83
Daily Total Vehicle Trips	3,563	3,782	625	4,736	656	763	542	2,124	608
Trips/ 100m² GFA	36.36	26.80	34.72	39.75	27.33	38.15	33.88	21.35	33.78
% HV	3.4%	3.7%	17.8%	3.8%	7.8%	5.9%	3.5%	3.2%	5.4%
Peak Parking Accumulation	119	155	14	199	25	38	30	104	20
Peak Parking/ 100m² GFA	1.21	1.10	0.78	1.67	1.04	1.90	1.88	1.05	1.11
Weekend									
Person-based Trips									
- Site Peak Hour	1,000	1,331	123	1,256	205	184	122	739	147
Trips/ 100m² GFA	10.20	9.43	6.83	10.54	8.54	9.20	7.63	7.43	8.17
- Vehicle Network Peak	925	1,282	108	1,244	192	174	122	709	120
Trips/ 100m² GFA	9.44	9.09	6.00	10.44	8.00	8.70	7.63	7.13	6.67
Daily Total Person Trips	7,100	8,590	665	8,864	1,238	998	655	4,738	723
Trips/ 100m² GFA	72.45	60.87	36.94	74.39	51.58	49.90	40.94	47.63	40.17
Vehicle-based Trips									
- Site Peak Hour	656	844	77	754	151	112	78	447	111
Trips/ 100m² GFA	6.69	5.98	4.28	6.33	6.29	5.60	4.88	4.49	6.17
- Network Peak	593	805	65	754	119	104	78	426	96
Trips/ 100m² GFA	6.05	5.70	3.61	6.33	4.96	5.20	4.88	4.28	5.33
Daily Total LV Trips	4,780	5,493	396	5,440	882	644	489	2,809	571
Trips/ 100m² GFA	48.78	38.93	22.00	45.66	36.75	32.20	30.56	28.24	31.72
Daily Total HV Trips	27	116	16	60	3	5	0	15	2
Trips/ 100m² GFA	0.28	0.81	0.89	0.50	0.13	0.25	0.00	0.15	0.11
Daily Total Vehicle Trips	4,807	5,608	412	5,500	886	649	489	2,824	573
Trips/ 100m² GFA	49.05	39.74	22.89	46.16	36.88	32.45	30.56	28.39	31.83
% HV	0.6%	2.1%	3.9%	1.1%	0.3%	0.8%	0.0%	0.5%	0.3%
Peak Parking Accumulation	196	318	30	264	36	29	45	152	27
Peak Parking/ 100m² GFA	2.00	2.59	1.67	2.22	1.50	1.45	2.81	1.53	1.50