Port Hedland International Airport
Terminal Redevelopment Project
Transport Assessment Report

Final | 25 July 2019

Job number 261720-00

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1 Introduction

Arup was appointed by Port Hedland International Airport (PHIA) to prepare a Transport Assessment for the proposed passenger terminal redevelopment project at the Port Hedland International Airport. This follows recent work undertaken for PHIA, including preparation of a landside surface access strategy to support the planned terminal expansion.

The proposed terminal redevelopment will upgrade and expand the existing terminal at the airport. The project is an opportunity to improve the user experience with the landside internal vehicular and pedestrian circulation in the forecourt improved, a reorganisation of landside access modes based on a modal hierarchy, and provision of new car parking areas.

In April 2019, a development application was lodged with the Town of Port Hedland to support the terminal development. The Town advised that a Transport Impact Statement was required "to be prepared in accordance with the Department of Planning, Lands and Heritage's Transport Impact Assessment Guidelines for Developments" and identified that the scale of the development "is likely to classify as a 'Moderate Impact' development (10-100 vehicle trips in peak hour)". The Town also noted that the transport statement should "support the resulting design of parking and access configuration to build on the "Transport Principles" that were stated in the development application.

This report has been prepared to address this requirement. While it is a valid statement that the airport would be a 'Moderate Impact' development, the nature of the proposed terminal development project will see a reorganisation of existing operations in more modern, sustainable and comfortable facilities, and does not propose a step change in new activity (i.e. no additional gates are proposed). Therefore, the traffic impact compared to current operations will be minimal.

The purpose of this Transport Assessment is to review and assess the transport modes associated with the redevelopment, including traffic impact on the external road network.

The PHIA site is located adjacent Great Northern Highway (GNH), to the southeast of Port Hedland, as shown in **Figure 1**.

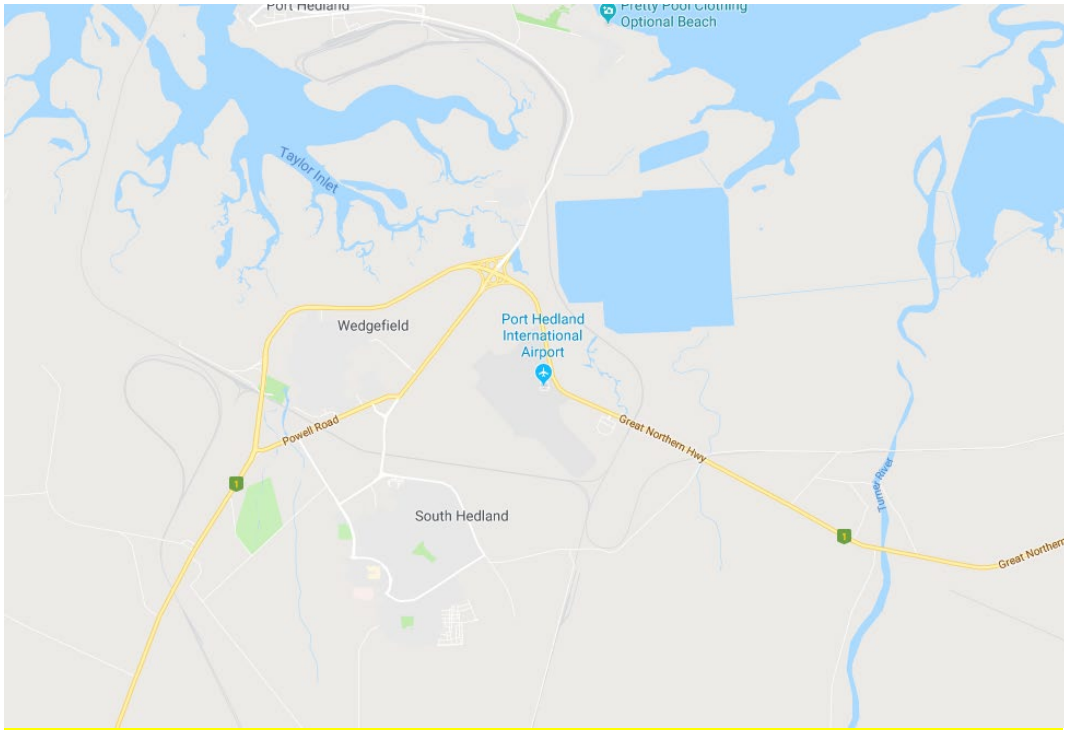


Figure 1 – Location of Port Hedland International Airport

Consultation

Arup engaged with the Town of Port Hedland and Main Roads Western Australia (MRWA) Central and Northern Regions regarding the preparation of this report. From this consultation the following information and desirables were advised:

- Access to the airport via Murray Avenue (to the south of the main airport access at Waldron Drive) has been restricted to emergency vehicles only for many years. General vehicle access is not desired at Murray Avenue and would likely not be approved by Main Roads WA due to its location on a bend of Great Northern Highway and the fact that it would create a four-way intersection with the accommodation complex access road to the east.
- Main Roads WA has planned for an eventual realignment of GNH to the east of its current alignment between Wilson Street and Madigan Road. This would divert the highway further away from the airport, with the superseded roadway becoming a local road for access to the airport and adjacent precincts.

2 Proposed Development

The proposed development comprises a redeveloped passenger terminal and significant changes to vehicle circulation and parking, including removal of the existing forecourt road. The proposed works also include a reduction in size of the existing short-term parking area, reconfiguration of the existing car rental parking area and a relocation of bus/coach parking closer to the new terminal. A new taxi pick-up/drop-off roadway and forecourt will also be provided. The new terminal will be connected to the parking areas via a proposed pedestrian boulevard, which will terminate at the long-term car park area to the north.

Figure 2 shows the proposed site and adjacent road layout. This plan is also attached in Appendix A.

The landside ground transport arrangements have been developed around the following principles:

- Integrate the landside transport concept of operations with the terminal functions;
- A modal hierarchy which gives priority and proximity to the most commonly used modes;
- Separate non-terminal and terminal related traffic streams (e.g. separating freight/ logistics related traffic from key passenger modes);
- Separate potentially competing modes (e.g. taxis and ride share/ CVLs);
- A transport network that responds to the upgraded terminal with respect to door locations for arrivals and departures;
- Adherence to a 25m blast offset from the terminal building. No roads or general public vehicle parking to encroach in this zone;
- Retention of existing roads and kerb lines where possible;
- Provide consistency in product supply/ location for car rental companies;
- Allow capacity for future growth; and
- Provide clear wayfinding and legibility for each mode.

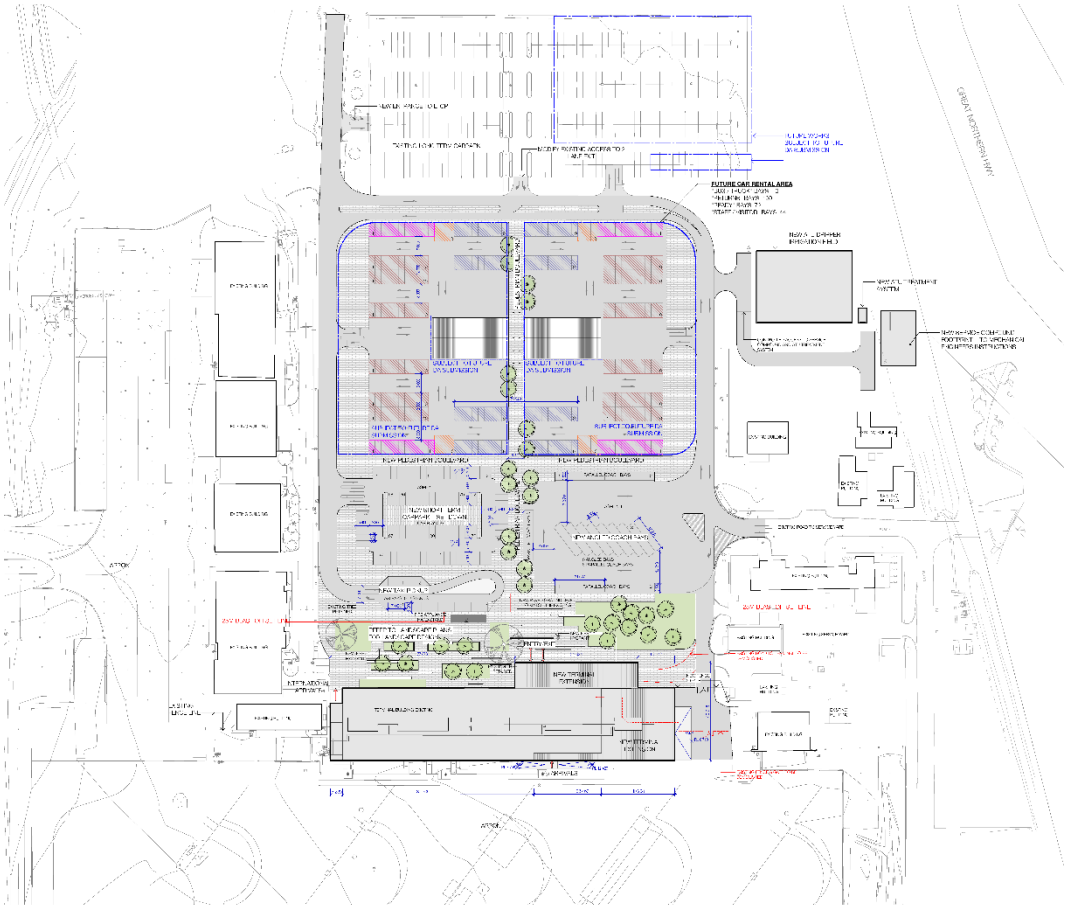


Figure 2 – Proposed site layout

A modal hierarchy has underpinned the ground transport layout, as shown in **Table 1**.

Table 1 – Mode hierarchy adopted for the ground transport plan

Hierarchy	Mode/ function	Rationale/ discussion
1	Emergency vehicles and drop off/ pick up for people with disabilities	Need to be proximate to terminal.
2	Coaches/ buses	High mode share and feedback from stakeholders indicates this mode must have a more central location
3	Car rental pick up	High mode share. Facilities amongst operators must be fair and equitable
4	Taxi, CVLs and ride share	These are two distinct modes and must have separate facilities but have comparable levels of access

5	Private vehicles: Drop off and pick up	Higher mode share than STCP and LTCP.
6	Private vehicles: STCP	Higher revenue potential and turnover compared to LTCP.
7	Car rental returns	Space is at a premium in the zone located between the LTCP and new terminal. There is insufficient space for rental returns and turnaround facilities to be co-located in this zone. This will require separation of pick up and returns. This may have repercussions on staffing levels for some operators.
8	Private vehicles: LTCP	Low mode share and turnover compared to other parking products.
9	Staff	Currently accommodated within the LTCP but aspiration to provide a separate car park for staff closer to the terminal noting that the previous staff car park was closed due to challenges associated with enforcing staff only access
10	Waste and logistics vehicles	Require access to service the terminal building

2.1 Future Flight Schedules

The forecast future flight schedule assumptions and associated busy hours underpinning the terminal redevelopment project are as follows:

- Based on the current flight schedules and given there will be no more than four aircraft stands (as per existing), the operational capacity of the redeveloped terminal building shall allow for processing passengers from three A320 aircraft over the 'busy hour'
- Based on the current flight schedules the estimated average arrivals busy hour is 313 passengers (pax) and the estimated average departures busy hour is 375 pax. Given the nature of the traffic at Port Hedland, less variation from week to week is expected than would be typical, so a +/- 7.5% range has been allowed. This provides a busy hour number of 336 arrival pax and 403 departing pax.
- In terms of future growth allowance for the redeveloped terminal it is assumed the current 'busy hour' arriving and departing pax numbers will not change substantially and that the number of busy hours will be increased throughout the day, i.e. the flight scheduling will change; (i.e. additional flights). This will see a spreading of the peak rather than existing peaks growing.

3 Existing Transport Conditions

3.1 Surrounding Road Network

Table 2 shows the characteristics of the surrounding road network, which is described below.

Great Northern Highway (GNH) is a primary distributor road under the MRWA functional road hierarchy. The highway provides access to Port Hedland and South Hedland from the airport via Wilson Street. A signposted speed limit of 70 km/h applies on GNH adjacent the site, increasing to 80 km/h approximately 300 metres north of Waldron Drive.

Waldron Drive is the principal access point to the PHIA terminal precinct and intersects GNH as a priority-controlled T-intersection (refer to **Figure 10)**. Waldron Drive is an access road under the care and control of the Town of Port Hedland.

Murray Avenue is an access road under the care and control of the Town of Port Hedland. The road is gated off at GNH, for access by emergency vehicles only.

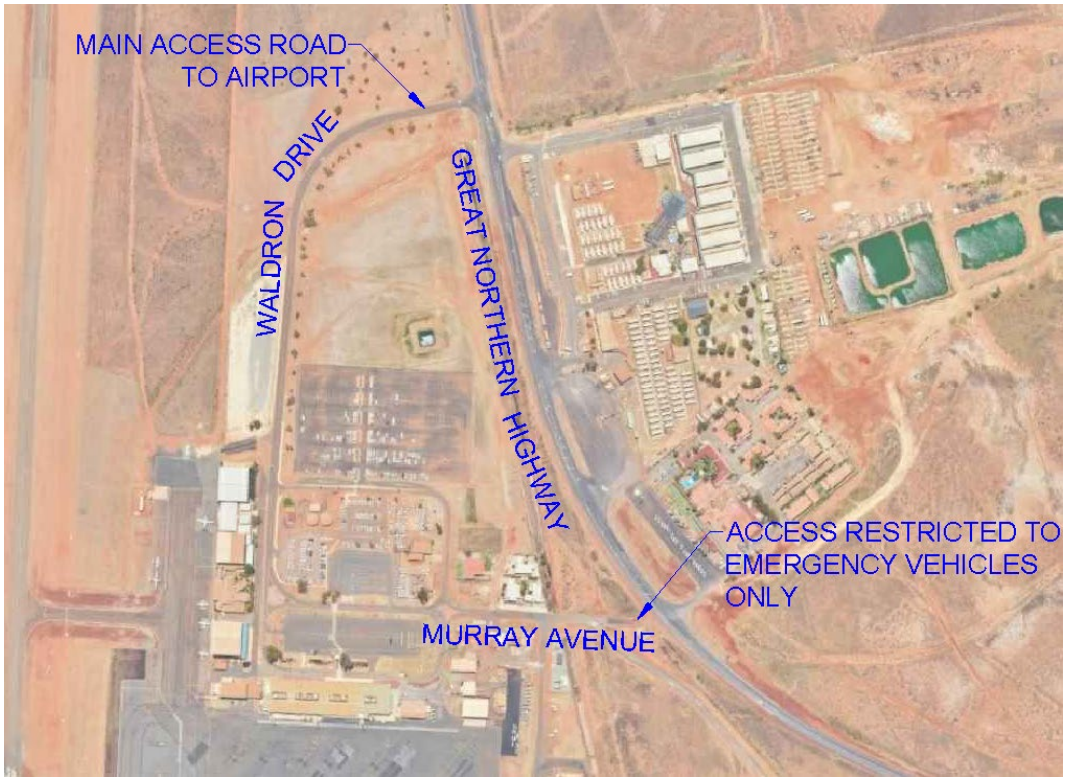


Figure 3 - Access to Port Hedland International Airport

Table 2 – Surrounding road network characteristics

Road Name	Speed Limit (kph)	Approximate Road Pavement Width (m)	Number of Lanes	AAWDT	Main Roads WA Road Hierarchy	Heavy Vehicle %
Great Northern Highway (S of Waldron Drive)	70	16 to 18	2 plus turn lanes	9,100 (MRWA 2015/16)	Primary Distributor	15% (MRWA 2015/16)
Waldron Drive	50	8	2	1,840 (Arup 2018)	N/A	10% (Arup 2018)
Murray Avenue	50	6.5	2	N/A	N/A	N/A

3.2 Internal Access and Parking

The current internal access arrangements and product locations are shown in **Figure 4**.

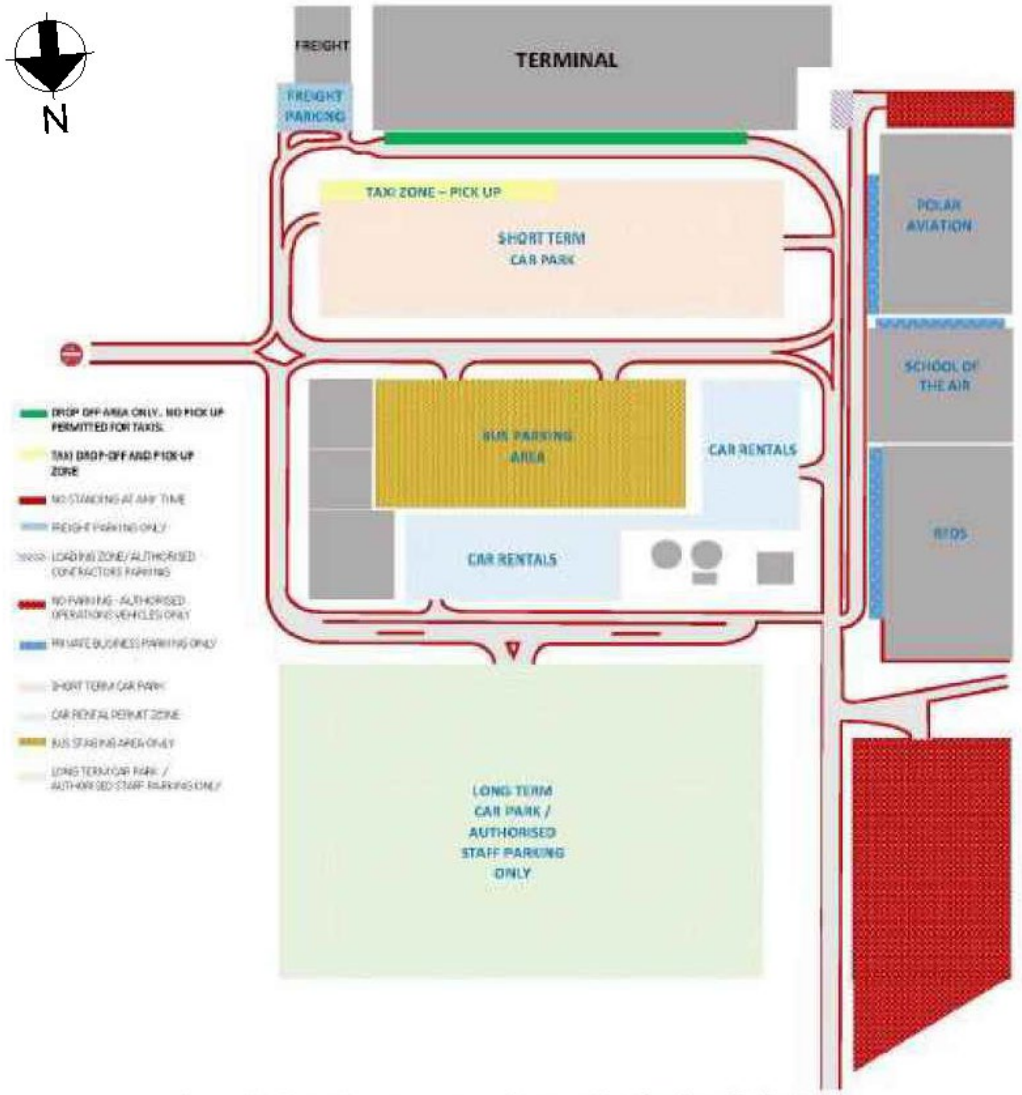


Figure 11: Ground access map and car parking facilities (PHIA, 2017)

Figure 4 – Existing internal circulation and parking product locations at Port Hedland International Airport

(Source: PHIA Master Plan and Land Use Report Feb 2018)

3.2.1 Circulation Roads and Parking Areas

The Port Hedland International Airport parking area has several one-way circulating roads. **Figure 5** depicts the directionality of the key landside roads and therefore the overall functionality of the network. There is one central road heading eastbound with a westbound road to the north past the long term car park (LTCP), and the terminal forecourt road operates in a clockwise direction.

Figure 5 – Forecourt Road directionality (Source: Department of Planning, Lands and Heritage, Plan WA Map Viewer)

The three key parking areas within the study area are:

- short-term parking (STCP) – approximately 140 bays
- car rental (ready bays) – approximately 100 bays
- long-term parking (LTCP) – approximately 540 bays
- bus – approximately nine bays.

These car parks are depicted in **Figures 6, 7 and 8** below.

Figure 6 – Short-term parking (Source: Department of Planning, Lands and Heritage, Plan WA Map Viewer)

Figure 7 – Car rental ready bays and bus/ coach area (Source: Department of Planning, Lands and Heritage, Plan WA Map Viewer)

Figure 8 – Long-term parking (Source: Department of Planning, Lands and Heritage, Plan WA Map Viewer)

3.2.2 Freight and Logistics

The freight and logistics yard servicing the terminal is located on the eastern side of the terminal and is accessed via the forecourt road. This sees a mixing of passenger related traffic with heavy vehicles (refer to **Figure 9**). A freight and logistics precinct (non-terminal related) is located to the south-east of the precinct (accessed through the terminal precinct and Petterssen Road).

Figure 9 - Service yard (servicing the terminal) (Source: Department of Planning, Lands and Heritage, Plan WA Map Viewer)

3.3 Pedestrians and Cyclists

An existing pedestrian link provides access from the terminal frontage to the short-term car park, car rental areas, bus/coach parking and the long-term car park, as shown in **Figures 6, 7 and 8**. No formal pedestrian or cycling facilities are provided for external access to the airport.

3.4 Public Transport / Charter Vehicles

There are currently no public bus services operating to and from the airport, however regular bus shuttle services operate for transporting fly-in/fly-out (FIFO) workers to and from their accommodation. As such, these services mostly operate during peak days and times (e.g. Tuesday morning “fly-in” days and Thursday afternoon “fly-out” days).

An on-demand chauffer style car service, known as H-Ride, also operates in Port Hedland and services the airport, however there are currently no dedicated pick-up and drop-off locations on site for this service (noting that the Department of Transport does not allow licensed charter vehicles to use the taxi ranks).

3.5 Traffic Surveys

Detailed pedestrian and traffic surveys were undertaken as part of preparation for the Landside Surface Access Strategy in 2018 to understand the existing conditions and to determine the amount of parking which is currently utilised by each mode. A Tuesday was targeted for the surveys in order to capture the 'busy day' of operations.

The surveys and observations revealed the following existing conditions and trends:

- Of all pedestrians approaching the terminal (excluding re-entries), approximately a third did so from bus transport, with a further 28 percent from short-term parking and 24 percent from pick-up/drop-off vehicles. Only 9 percent of pedestrians approached the terminal from the long-term parking area, and 6 percent from the car rental parking.
- A high proportion of pedestrians departing the terminal travelled towards the short-term parking area (44 percent), with 20 percent towards the car rental areas, 16 percent to bus transport, 10 percent to the pick-up/drop-off area and 8 percent to the long-term car parking. A further 4 percent of pedestrians were classified as 'unaccounted for', representing those who arrived through one of the terminal doors but did not cross the count locations. These pedestrians may be staff (accessing the hangar/ general aviation/ service yard).
- Tuesday 8 May was the busiest day over the survey period for ground transport with approximately 2,110 vehicles accessing the site on the busy day over a 24 hour period, compared to a five day average of 1,840 vpd. Most (98%) of traffic movements take place between 6am and 6pm.
- The existing short-term car park is underutilised with a maximum occupancy at any one time over the survey period of approximately 40 vehicles
- Approximately 15 vehicles at any one time are parked in the coach/ bus parking area. Coach/ bus accounts for the highest landside mode share. Sentiment amongst operators and anecdotal evidence from passengers is that the coach/ bus terminus is located a long walk from the terminal.
- Car rental accounts for 12% to 13% mode share. Facilities amongst the four car rental operators are not equal in terms of access to the terminal. Site observations confirm that legibility and wayfinding to the car rental ready bays is poor.
- Approximately 550 vehicles on a busy day and 135 on a busy hour access the forecourt road. The busiest hour on the forecourt road was measured between 5:00 and 6:00pm on Tuesday 8 May.
- As expected, the turnover of bays in the long-term car park is low (max 170 vehicle movements per day and a maximum of 25 movements in a single hour).

Further information and findings from the pedestrian and traffic surveys are provided in Appendix B.

3.6 GNH / Waldron Drive Intersection

SIDRA analysis has been undertaken at the priority-T controlled intersection of GNH and Waldron Drive, to determine the existing level of queues and delays for traffic movements into and out of the airport. **Figure 10** shows the existing situation at the intersection, while **Figure 11** shows the existing layout as modelled in SIDRA.

Figure 10: Great Northern Highway / Waldron Drive Intersection

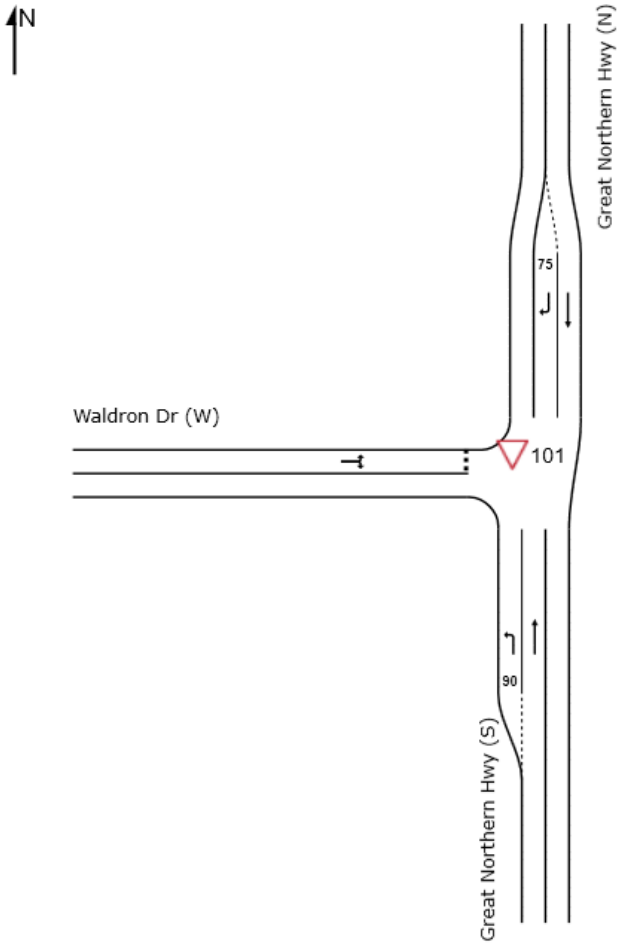


Figure 11: Existing Great Northern Highway / Waldron Drive SIDRA layout

In order to determine existing traffic flows at the intersection, traffic counts undertaken in 2018 on Waldron Drive have been used together with Main Roads traffic data along GNH. As MRWA data for GNH south of Waldron Drive is only available for 2015/16, historical data between 2015/16 and 2018/19 at a nearby site (GNH west of Wilson Street) has been used to factor the 2015/16 flows.

The existing two-way counts on Waldron Drive indicate that the AM peak hour for airport traffic is between 8:00am and 9:00am, with the PM peak hour between 5:00pm and 6:00pm. As no turning counts were undertaken at GNH, it has been assumed that 90 percent of this traffic travels to and from the north (towards Port Hedland), with the remaining 10 percent travelling to and from the south.

On the basis of the above, **Figures 11 and 12** show the estimated existing traffic flows at the intersection during the AM and PM Waldron Drive peak hours.

SIDRA analyses of the AM and PM peak hours show that all turning movements into and out of Waldron Drive currently operate at a high Level of Service A or B, with minimal queues and delays.

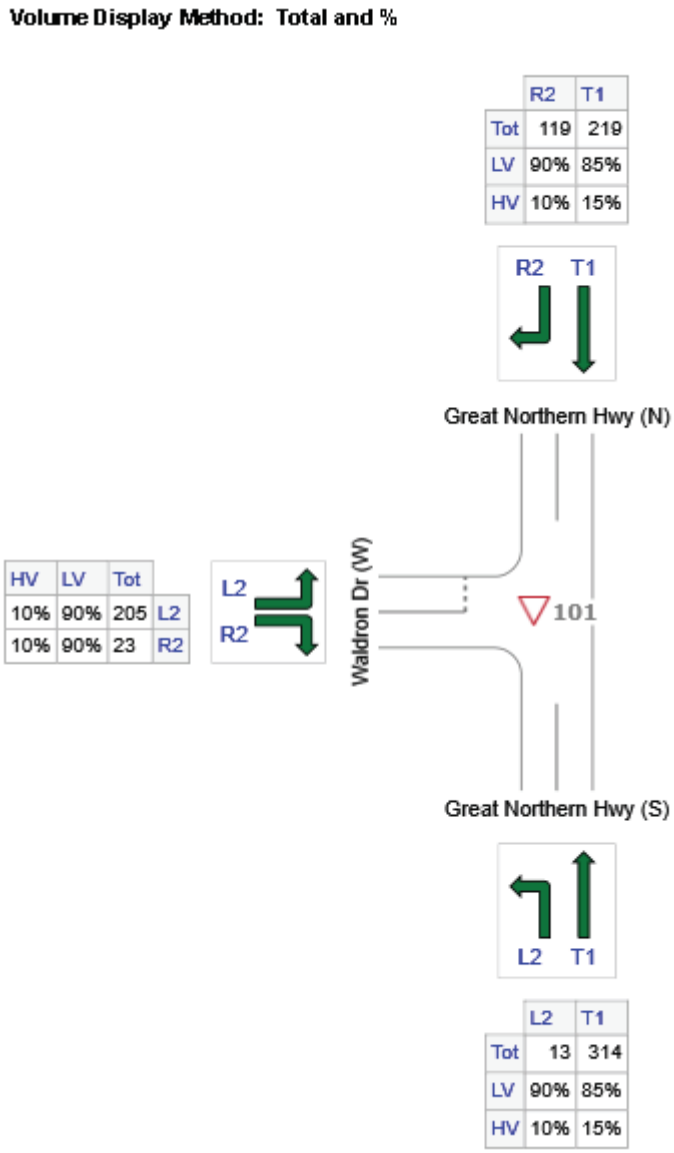


Figure 11: Existing AM Peak Hour Flows – Great Northern Highway / Waldron Drive

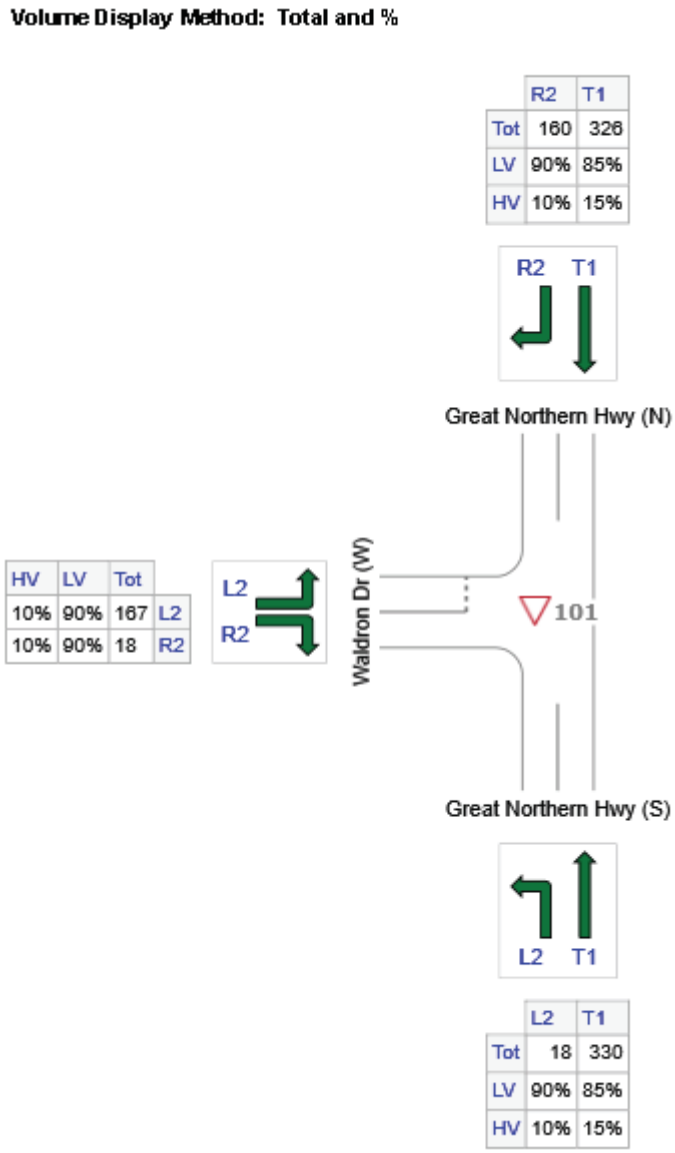


Figure 12: Existing PM Peak Hour Flows – Great Northern Highway / Waldron Drive

4 Parking

4.1 Provision

As noted in Chapter 2, the terminal redevelopment works include the relocation of the car rental and bus/coach parking areas, together with a reconfiguration of the short-term car park and pick-up/drop-off areas.

In the context of the fact that the busy hour is not forecast to change in scale but rather the frequency of busy hour across the day would increase, a new forecasting exercise of landside ground transport demands has not been undertaken. The forecast future surface access demands have been based on existing busy hour patterns, application of a 7.5% growth factor (to allow for weekly variations) and feedback from stakeholders. The target minimum provision for each transport mode/ product (as indicated in the Landside Surface Access Strategy Report) is shown in **Table 3**.

Table 3 - Target minimum provision for each transport mode/ product

Product/ mode	**Minimum provision/ requirement**	**Rationale**
Coaches/ buses	12-15 bays	Stakeholders see an immediate need for 12 bays. The required provision during the boom was for 15 bus bays.
Car rental pick up	135 bays	The number of bays is a function of the car rental operations and use of ready bays in connection with car servicing facilities and remote storage. There are approximately 100 ready bays provided presently. Suggest a minimum allowance of 150 bays to allow for growth in this sector (average of 2% over 10 years).
Taxi pick up	6 bays	6 taxi vehicles are in operation in Port Hedland. There is no opportunity to get any additional plates at this stage.
CVLs and ride share	20 bays	Feedback from H-ride is that they expect to grow to 12 vehicles due to obvious

		demand. Further provision for CVL parking is warranted to cover other operators and allow for growth associated with tourism
Private vehicles: Drop off and pick up	8 bays	Eliminating the effects of the service yard traffic, on the busy day, a maximum of 130 vehicles travel through the forecourt to drop off and pick up passengers in a single hour. Allowing for an average two minute dwell time, 7.5% increase due to variability and the effects of some bunching within the peak, a maximum of eight drop off/ pick up bays are required.
Private vehicles: STCP	51 bays	Maximum occupancy at present is approximately 40 bays. The supply should allow for 7.5% growth/ weekly variability and a maximum occupancy of 85%
Service yard	13 bays	A maximum of 13 vehicles access the facility over the single busiest hour over the week-long surveys.

The proposed total parking provision for the redevelopment is as follows:

- 86 bays within the short-term car park (which will accommodate the target provisions of 51 short-term bays, 20 CVL / rideshare bays and 8 private vehicle pick-up/drop-off bays)
- Approximately 540 long-term parking bays (i.e. existing bays)
- 342 parking bays associated with car rental
- 13 bus/coach parking bays
- 8 taxi bays (including 2 standing (waiting) bays)

4.2 Design

As per the AS 2890.1:2004 standards for off-street parking facilities, User Class 2 has been adopted for short-term, car rental and long-term parking bays. Off-street Commercial Vehicle parking requirements specified in AS 2890.2:2018 have also been used to review the coach parking bays provided within the development.

Table 4 details the various design specifications, showing that the proposed parking bay and aisle specifications are in accordance with the relevant standards.

Table 4 - Off-Street Parking Specifications

Specification	**Minimum Requirements (AS22890.1, AS22890.5 & NCC)**	**Provided with Design (Woods Bagot Concept Plans[1])**	
Short Term Car Parking Bays	2.5 x 5.4m with 5.8m aisle width	2.5 x 5.4m	
Car Rental Parking Bays	2.5 x 5.4m with 5.8m aisle width	2.5 x 5.4m	
Long Term Car Parking Bays	2.5 x 5.4m with 5.8m aisle width		
Coach Bays	3.5 x 14.5m	3.5 x 15.5 (min.)	
Taxi Bays (Parallel bays)	2.1 x 6.1m (unobstructed space) or 2.1 x 6.4m (obstructed end space)	4.0 x 7.0m	
ACROD Parking	1 bay	1 bay	

[1] Woods Bagot Concept Site Plan DA-11000

5 Future Vehicle Access & Traffic Assessment

5.1 Vehicle Access

It is proposed to maintain the existing external access arrangements for Port Hedland International Airport, with Waldron Drive continuing to be the sole access road for all but emergency vehicles (which will still be able to access the site via either Waldron Drive or Murray Avenue). No new access points to Great Northern Highway are proposed as part of the terminal project, with access to Murray Avenue to remain restricted for emergency vehicle movements only.

5.2 Traffic Growth and Future Traffic Flows

Correspondence with Main Roads WA has indicated that a realignment of GNH is proposed in the vicinity of Port Hedland International Airport. The proposal would realign the highway to the east of the existing Walkabout Motel accommodation complex, resulting in the section of the existing GNH adjacent the airport reverting to a local road. It is therefore expected that the through traffic past Waldron Drive will reduce significantly following realignment of the highway. However, for a conservative assessment, forecasting of future traffic volumes has been undertaken on the basis that the realignment will not take place until after the terminal redevelopment works are completed.

Given that the current busy hour of the airport is not expected to change in scale but rather the frequency of the busy hour across the day may increase (as noted in the Landside Surface Access Strategy Report), it is therefore forecast that the existing peak hour traffic volumes into and out of the airport will not change substantially. However, it is possible that overall traffic levels may rise back to those experienced in 2015/16 (i.e. during the period of high economic activity for the overall area). A future scenario based on adoption of 2015/16 levels on GNH has therefore been assessed.

Historical MRWA traffic data for GNH west of Wilson Street indicates that traffic volumes have decreased by 13.5 percent between 2015/16 and 2018/19. This factor has been applied to grow the airport traffic flows to an estimate of 2015/16 levels, whilst using the available 2015/16 data to obtain through traffic on GNH.

Figures 13 and 14 therefore show the resulting future AM and PM peak hour flows at the GNH / Waldron Drive intersection prior to the potential realignment of GNH.

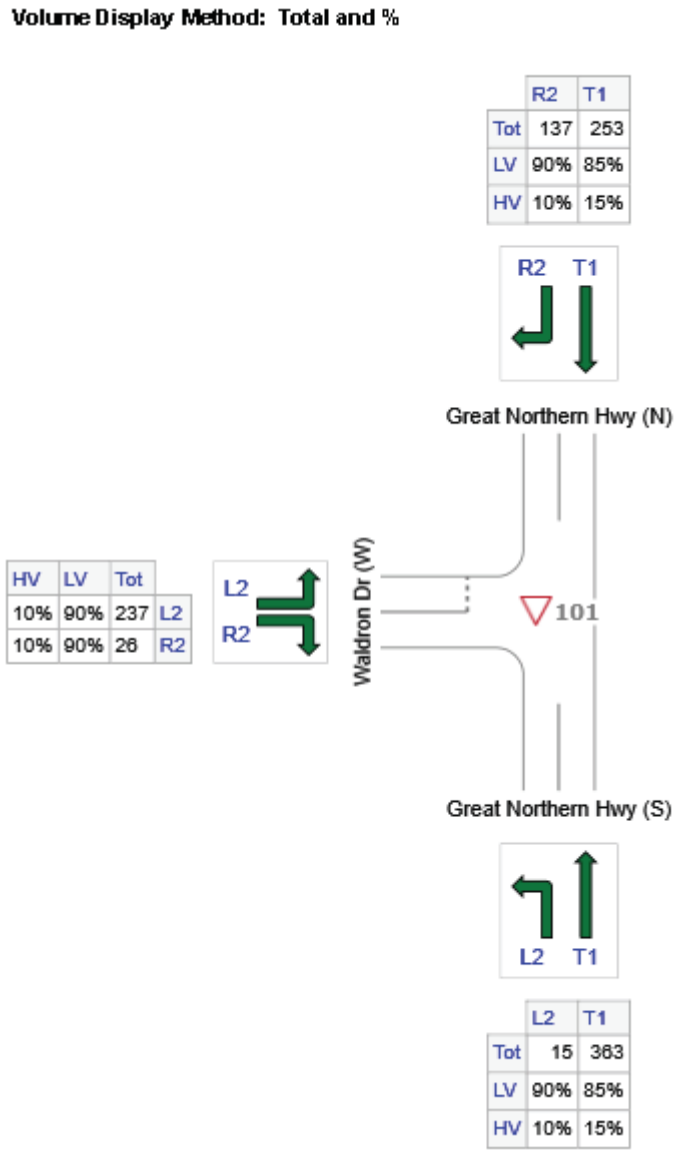


Figure 13: Future AM Peak Hour Flows – Great Northern Highway / Waldron Drive

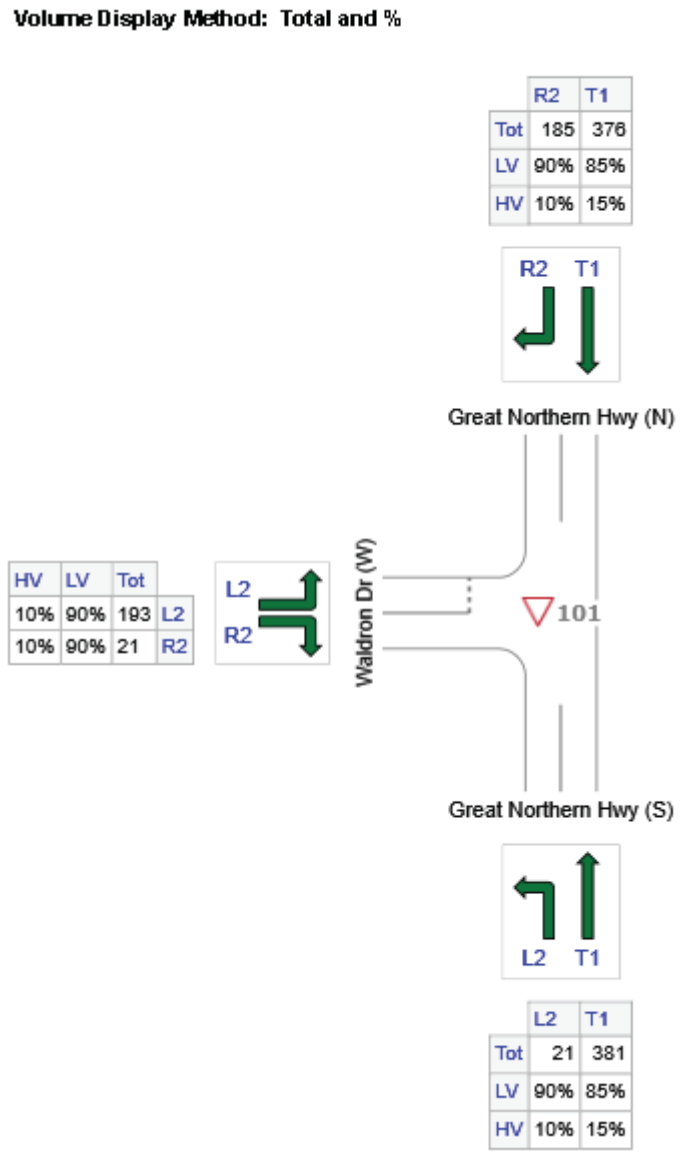


Figure 14: Future PM Peak Hour Flows – Great Northern Highway / Waldron Drive

5.3 Future Traffic Assessment

SIDRA analysis has been undertaken on the future AM and PM peak hour flows at the Great Northern Highway / Waldron Drive intersection. The analyses show that the intersection will continue to operate at existing Levels of Service, with minimal queues and delays experienced. The intersection is already channelised with turn pockets on GNH and the analysis confirms that the current configuration will work satisfactorily and no upgrades are required.

6 Pedestrian Access

As part of the terminal redevelopment the existing access road at the front of the terminal will be removed and replaced with a pedestrian plaza. The removal of the access road and the proposed pedestrian boulevard linking the terminal plaza to the long-term car park will improve both airport security and pedestrian safety/amenity.

7 Bus Transport / Charter Vehicle Access

The new bus/coach pick up and set down area will be located proximate to the redeveloped terminal, adjacent to the arrivals hall. This will improve pedestrian connectivity to bus services for fly-in/fly-out workers.

The expected increase in fleet size of H-ride vehicles (as indicated in Table 3) will improve access to this service, however it is recommended that as this mode share increases over time, dedicated pick-up/drop-off bays should be linemarked within the short-term car park for rideshare/charter vehicles as they will still be restricted from accessing taxi bays.

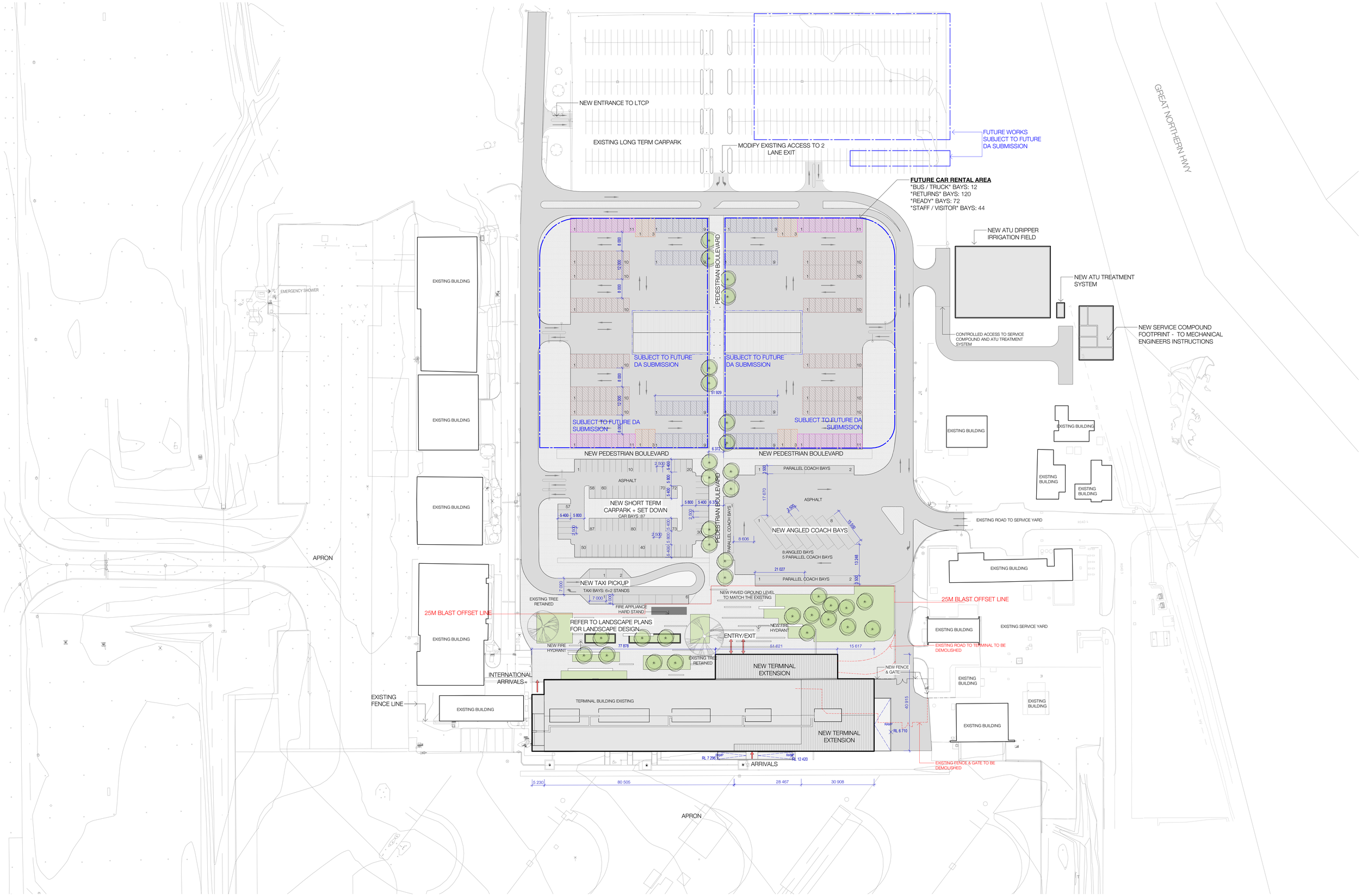
8 Summary

This transport assessment has been prepared to support the development application for the upgrade and refurbishment of the existing terminal at PHIA. The development does not represent an increase in existing operations, as no additional gates will be provided and therefore passenger numbers during busy hours will not increase. Instead it is envisaged that the number of busy hours will be increased throughout the day (i.e. additional flights during the day). Conclusions and recommendations in relation to access, parking and traffic impact for the proposed terminal redevelopment are as follows:

- The redeveloped internal circulation and parking layout will improve pedestrian access to bus and car rental services, with these areas relocated to be in closer proximity to the terminal.
- No new access points to Great Northern Highway are proposed, with the main access continuing to be provided via Waldron Drive, and only emergency vehicle access via Murray Street.
- The future realignment of GNH will significantly reduce the amount of through traffic at the existing intersection of GNH and Waldron Drive, however even if this realignment was not to proceed (or delayed to occur after the terminal upgrade) the intersection would still readily accommodate forecast traffic volumes. No upgrades to the intersection are required as part of the terminal redevelopment project.
- It is recommended that as rideshare patronage increases, the linemarking of dedicated pick-up/drop-off bays within the short-term car park for charter and rideshare vehicle providers should be considered as the existing restriction on these vehicles from using taxi bays will still exist.

Appendix A

Proposed Site Plan



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Client
PORT HEDLAND INTERNATIONAL AIRPORT

Project
PORT HEDLAND AIRPORT EXPANSION

Sheet title
SITE PLAN

Project number	Scale	Sheet size	© Woods Bagot
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Sheet number **DA-11000**	Revision **F**	Date **30/04/19**	

Appendix B

Current Surface Access Demands

B1 Current Surface Access Demands

B1.1 Pedestrian surveys

AusTraffic completed pedestrian surveys on Tuesday 8 and Wednesday 9 May 2018 to understand existing mode share splits in accessing the Port Hedland International Airport. As depicted in Figure 13, pedestrian counts were completed at the three main access doors into the terminal, the pick-up and drop-off area out the front of the terminal, the standing area adjacent to the terminal, and at five key pedestrian crossing locations in the parking area.

Figure 1 – Pedestrian count locations

Surveys were completed between 05:00 and 19:00 on Tuesday 8 May capturing pedestrian movements approaching and departing the terminal. A summary of the counts throughout the day are depicted in Figure 14 and Figure 15.

Figure 2 – Pedestrian counts approaching the terminal

Figure 3 – Pedestrian counts departing the terminal

From the analysis, it was found that 1,648 people entered the terminal and 1,909 exited the terminal throughout the day.

B1.1.1 Pick-up/ drop-off

To determine the mode share of pick-up/ drop-off at the terminal, the counts from the survey were used. It was found that 315 people arrived and 148 left from the pick-up/ drop-off area.

B1.1.2 Bus and Coach

The bus and coach mode share was estimated using the count locations Bus Parking 1 and Bus Parking 2. Approaching the terminal, there are 114 pedestrians that approach Bus Parking 2 and 526 that approach Bus Parking 1, resulting in the estimation that 407 people arrive from a bus or coach. Departing the terminal, there are 418 pedestrians that approach Bus Parking 1 and 174 that approach Bus Parking 2, resulting in an estimation that 244 people depart from a bus or coach.

B1.1.3 Taxi, SCVs and Ride share

Arrival and departure via Taxi, CVLs and ride share was not explicitly captured within the pedestrian survey counts. As the taxi pick-up/ drop-off area is located within the short-term parking area, it was hard to distinguish pedestrian arrival between Taxi and short-term parking. It was therefore assumed that all pedestrians arriving from that area utilised the short-term parking facilities.

B1.1.4 Car rental

To determine the mode share of the car rental area, it was assumed that any pedestrians crossing the Car Rental 1 and 2 locations that were not already counted within long term parking or bus and coach parking, arrived via the car rental area. From this it was found that 78 people arrived and 299 departed from the car rental area.

B1.1.5 Short term parking

The short-term parking mode share was estimated using the count locations Short Term 1 and 2, and Car Rental 1 and 2. Approaching the terminal, there are 609 pedestrians that approach Car Rental 1 and 2 and 971 that approach Short Term 1 and 2, resulting in the estimation that 362 people arrive via short term parking. Departing the terminal, there are 1343 pedestrians that approach Short Term 1 and 2, and 666 that approach Car Rental 1 and 2, resulting in an estimation that 677 people depart via short term parking.

B1.1.6 Long term parking

The long-term parking mode share was estimated using the count location Long Term Parking. As it was the most northern count location, any pedestrians crossing this count location were assumed to be using the long-term parking

facilities. From the long-term parking, there were 119 pedestrians approaching the terminal and 123 pedestrians departing the terminal.

B1.1.7 Mode share breakdown

Table 3 and Table 4 summarised the mode share breakdown from the pedestrian counts. The 'unaccounted for' mode share represents the pedestrians that arrive through one of the terminal doors, however were not counted as crossing the count locations Short Term 1 and 2, and Pick-up/ Drop-off Area 1 and 2. These pedestrians may be staff (accessing the hangar/ general aviation/ service yard). In addition, it was assumed that people counted in either Standing Area 1 or 2 re-entered the terminal.

Table 2 - Mode share approaching terminal

Mode Share	Number of Pedestrians
Pick Up / Drop Off	315
Short Term Parking	362
Car Rental Area	78
Bus	407
Long Term Parking	119
Unaccounted for	5
Re-entry	**362**
Total	**1648**

Table 3 - Mode share departing terminal

Mode Share	Number of Pedestrians
Pick Up / Drop Off	148
Short Term Parking	677
Car Rental Area	299
Bus	244
Long Term Parking	123
Unaccounted for	56
Re-entry	**362**
Total	**1547**

These tables are further summarised in the graphs depicted in Figure 16 and Figure 17.

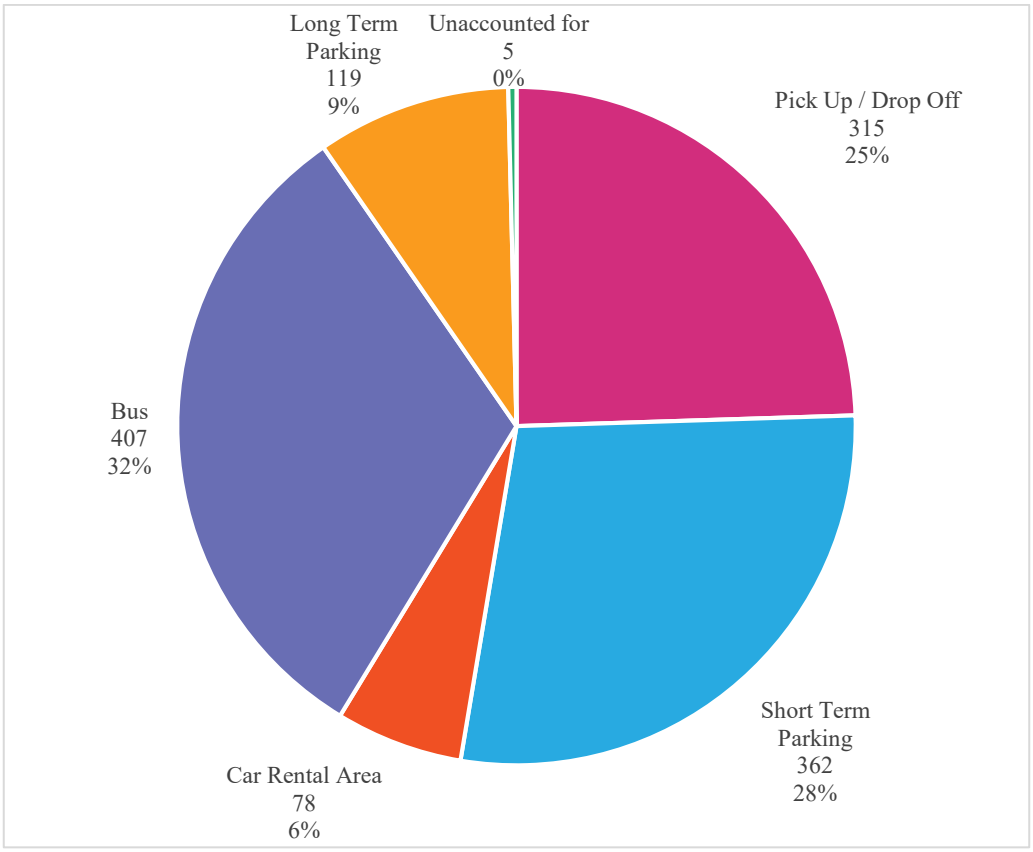

Figure 4 - Mode share approaching terminal

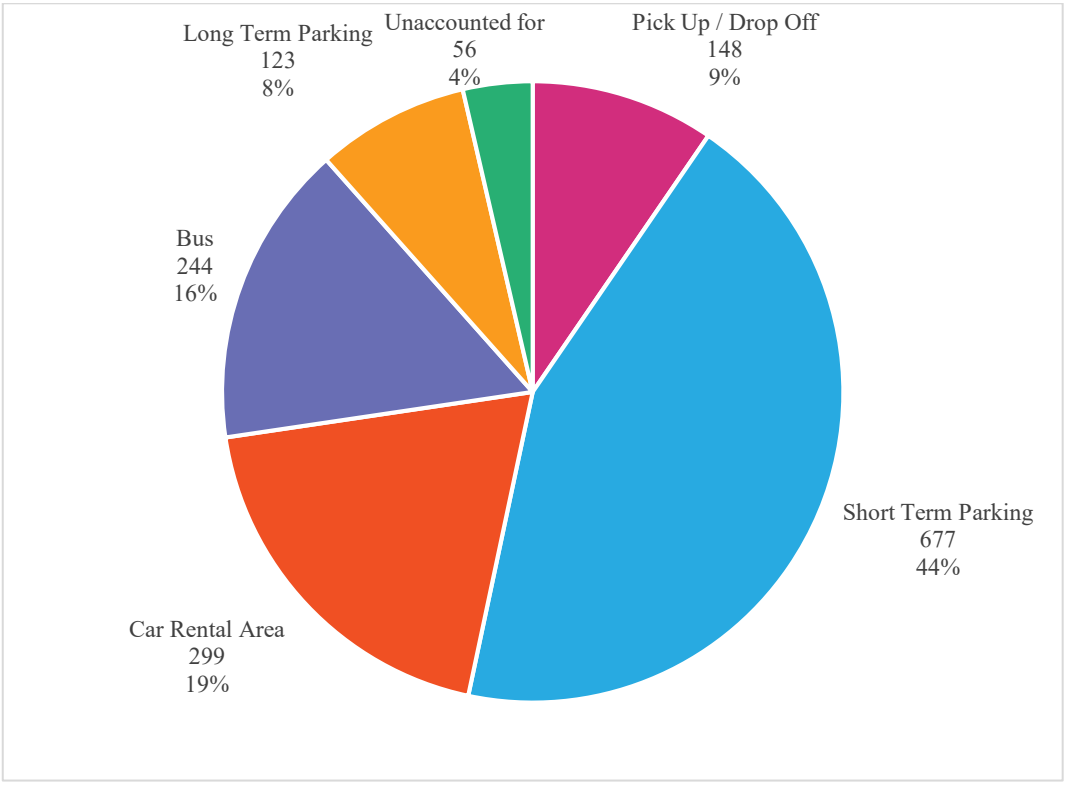

Figure 5 - Mode share departing terminal

B1.1.8 Arrival and departure summary

To further validate the pedestrian counts, the three terminal doors were analysed by 15-minute interval and referenced against flight arrival and departure times, and the number of passenger on each flight. As seen from the graph, when flights arrived and departed, there were significantly more movements through the terminal doors.

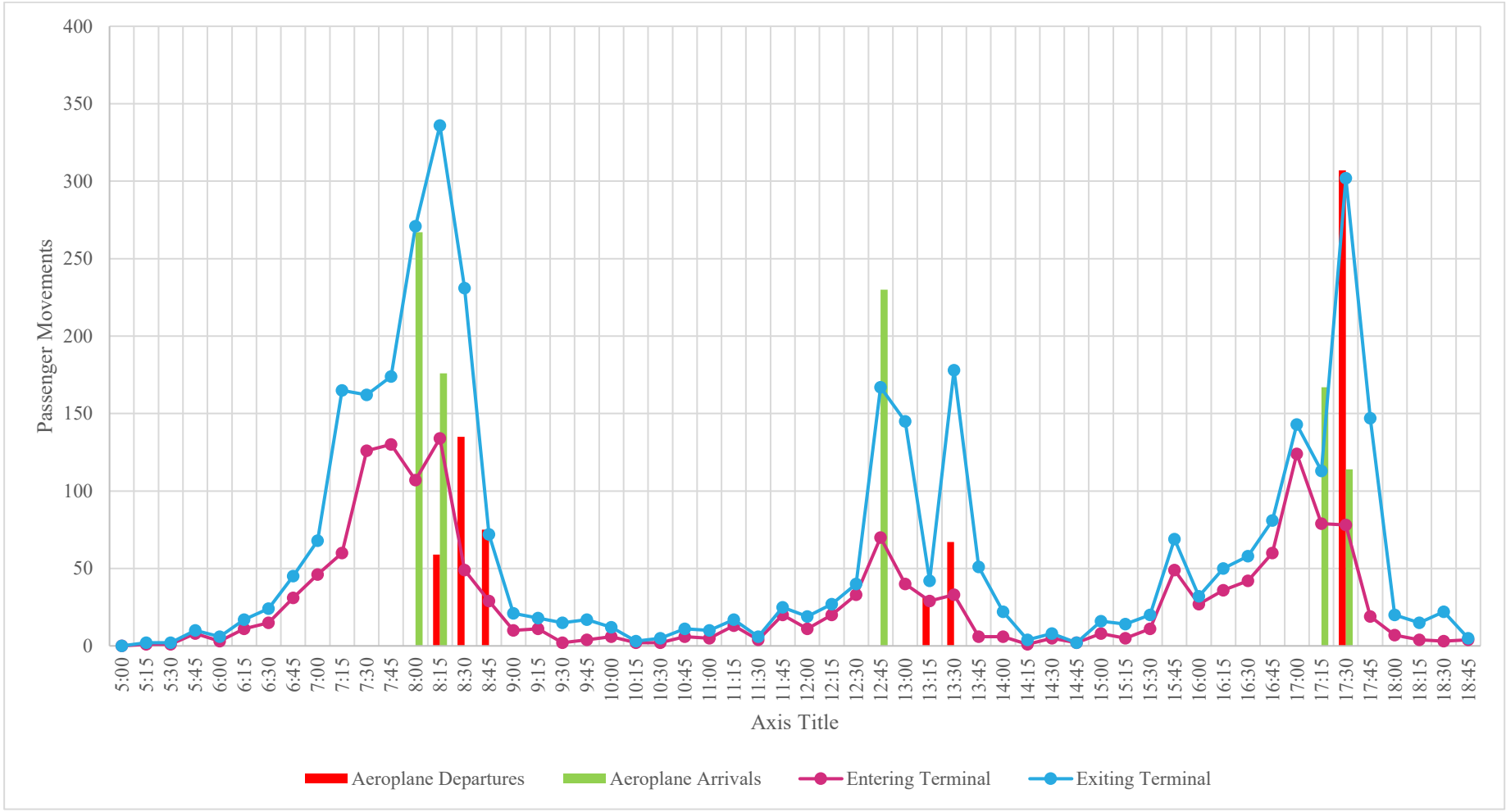

Figure 6 - Arrival and departure summary

B1.2 Vehicle surveys

AusTraffic also completed traffic surveys between the 8 and 14 May 2018 to further validate the findings of the pedestrian surveys in determining arrival and departure mode shares, as well as to determine existing occupancy levels of parking bays. Figure 19 displays the locations where traffic counts were completed.

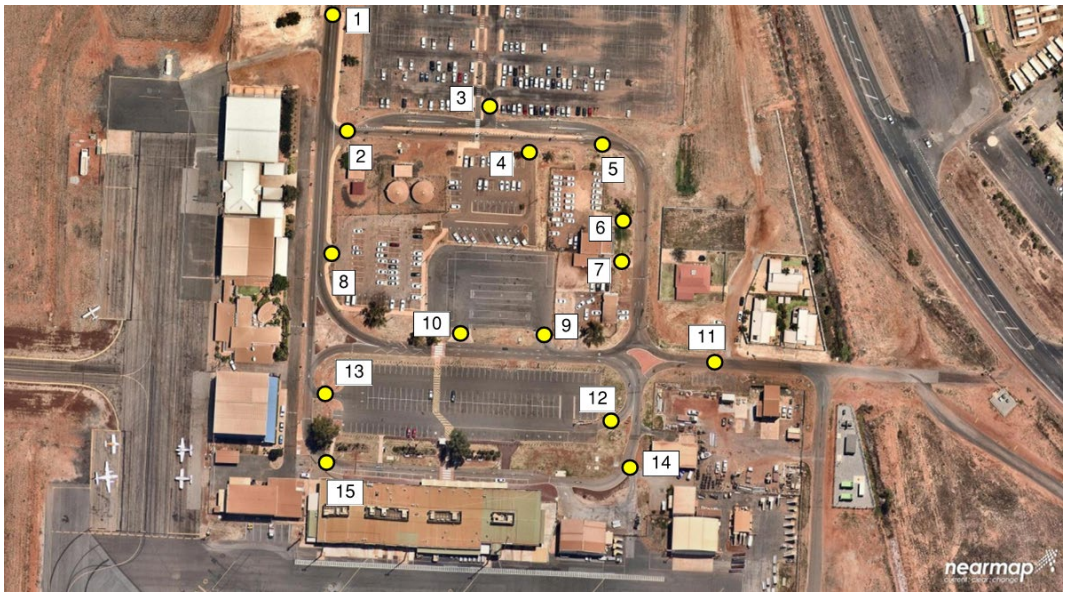

Figure 7 – Traffic survey locations

A brief description of the survey locations are as follows:

1. Main access road into the Port Hedland International Airport off Great Northern Highway
2. Circulation road
3. Access driveway to the long-term parking
4. Car rental entry and exit, large carpark
5. Circulation road east of the car hire entry
6. Budget car rental exit and entry
7. Hertz car rental exit and entry
8. Car rental exit and entry, large carpark
9. Bus area exit
10. Bus area entry
11. Restricted access road

12. Short term carpark entry
13. Short term carpark exit
14. Freight access road
15. Forecourt road exit from pick-up/ drop-off area

The average weekday traffic volumes were used to determine the vehicles entering and exiting the specific areas around the site.

B1.2.1 Bus and coach

On average, 41 vehicles entered and 35 vehicles exited the bus and coach area each day, with most arriving in the AM peak between 07:00 and 08:00.

B1.2.2 Car rental

On average, 11 vehicles entered and 3 vehicles exited the Budget car rentals area, and 27 vehicles entered and 22 vehicles exited the Hertz car rental area. The larger car rental area had on average 114 vehicles entering and 92 vehicles exiting. Car rental movements are largely associated with jockeying of vehicles (ie taking vehicles that have been returned for cleaning and refuelling and then returning the vehicle ready for re-hire).

B1.2.3 Short term parking

On average, 285 vehicles entered and 281 exited the short-term parking area. Figure 20 depicts the short-term parking movements throughout the day. As seen, there are three peak periods of movement, 07:00, 12:00 and 16:00.

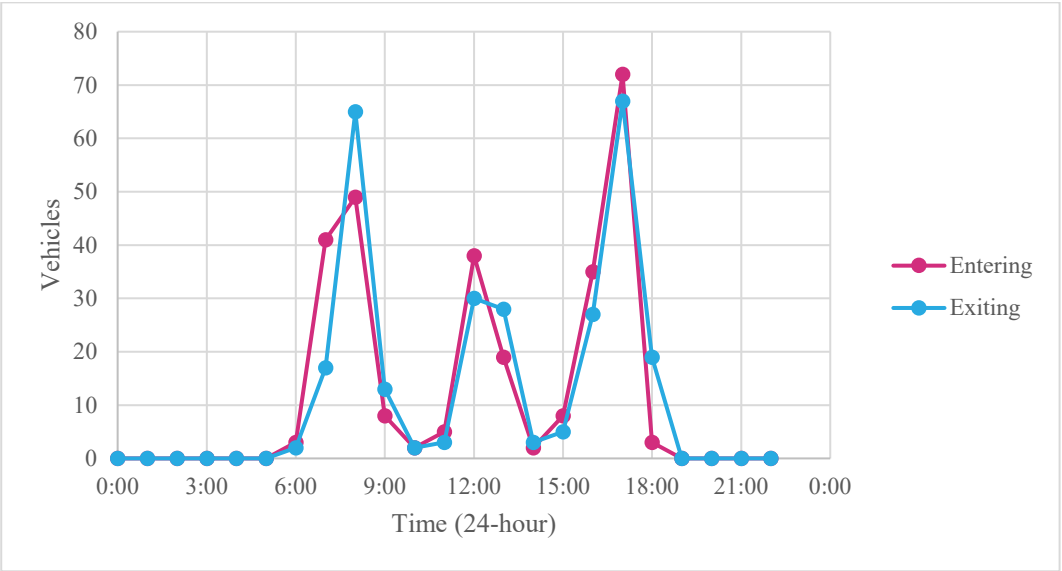

Figure 8 – Short-term parking trends

In addition to this analysis, total hourly instantaneous occupancy within the short-term carpark throughout the day was determined for each day. From this, it was found that Tuesday held the highest occupancy at 34 vehicles or 24% between 12:00 and 13:00. This compares to an average occupancy of 4.3% and a peak occupancy of 11.1% between October 2016 and January 2017 (as recorded as part of the PHIA Masterplan preparation). The parking occupancy is low and indicates that the replacement short term car park could have a smaller footprint compared to the current provision.

B1.2.4 Long term parking

On average, 61 vehicles entered and 70 vehicles exited the long-term parking area. Car parking data collected as part of the masterplan development (October 2016 to January 2017) showed an average occupancy of 13.6% and a peak occupancy of 18%. Similarly, to the short term car parking, it demonstrates that long term parking is over supplied.

B1.3 Freight and logistics

On average approximately 70 vehicles access the service yard on a typical day and a maximum of 13 vehicles accessed the service yard within a single hour. This is fairly consistent with feedback from stakeholders that parking for 10 freight vehicles is required.

Appendix C

SIDRA Analysis Results

MOVEMENT SUMMARY

Site: 101 [Existing AM Peak]

Great Northern Highway / Waldron Drive
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Great Northern Hwy (S)												
1	L2	14	10.0	0.008	5.7	LOS A	0.0	0.0	0.00	0.57	0.00	53.2
2	T1	331	15.0	0.186	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	60.0
Approach		344	14.8	0.186	0.2	NA	0.0	0.0	0.00	0.02	0.00	59.7
North: Great Northern Hwy (N)												
8	T1	231	15.0	0.130	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	60.0
9	R2	125	10.0	0.137	7.6	LOS A	0.6	4.2	0.46	0.69	0.46	51.2
Approach		356	13.2	0.137	2.7	NA	0.6	4.2	0.16	0.24	0.16	56.6
West: Waldron Dr (W)												
10	L2	216	10.0	0.281	7.9	LOS A	1.2	8.8	0.48	0.73	0.49	51.4
12	R2	24	10.0	0.281	9.5	LOS A	1.2	8.8	0.48	0.73	0.49	51.2
Approach		240	10.0	0.281	8.0	LOS A	1.2	8.8	0.48	0.73	0.49	51.4
All Vehicles		940	13.0	0.281	3.2	NA	1.2	8.8	0.18	0.29	0.19	56.2

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Existing PM Peak]

Great Northern Highway / Waldron Drive
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Great Northern Hwy (S)												
1	L2	19	10.0	0.011	5.7	LOS A	0.0	0.0	0.00	0.57	0.00	53.2
2	T1	347	15.0	0.196	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	60.0
Approach		366	14.7	0.196	0.3	NA	0.0	0.0	0.00	0.03	0.00	59.6
North: Great Northern Hwy (N)												
8	T1	343	15.0	0.194	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	60.0
9	R2	168	10.0	0.189	7.8	LOS A	0.8	6.0	0.49	0.72	0.49	51.0
Approach		512	13.4	0.194	2.6	NA	0.8	6.0	0.16	0.24	0.16	56.7
West: Waldron Dr (W)												
10	L2	176	10.0	0.238	7.9	LOS A	0.9	7.0	0.48	0.73	0.48	51.3
12	R2	19	10.0	0.238	10.7	LOS B	0.9	7.0	0.48	0.73	0.48	51.1
Approach		195	10.0	0.238	8.2	LOS A	0.9	7.0	0.48	0.73	0.48	51.3
All Vehicles		1073	13.2	0.238	2.8	NA	0.9	7.0	0.16	0.26	0.16	56.5

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Future AM Peak]

Great Northern Highway / Waldron Drive
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Great Northern Hwy (S)												
1	L2	16	10.0	0.009	5.7	LOS A	0.0	0.0	0.00	0.57	0.00	53.2
2	T1	382	15.0	0.215	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	60.0
Approach		398	14.8	0.215	0.2	NA	0.0	0.0	0.00	0.02	0.00	59.6
North: Great Northern Hwy (N)												
8	T1	266	15.0	0.151	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	60.0
9	R2	144	10.0	0.170	8.1	LOS A	0.7	5.2	0.50	0.73	0.50	50.8
Approach		411	13.2	0.170	2.8	NA	0.7	5.2	0.18	0.26	0.18	56.4
West: Waldron Dr (W)												
10	L2	249	10.0	0.350	8.9	LOS A	1.7	12.8	0.54	0.82	0.64	50.7
12	R2	27	10.0	0.350	11.0	LOS B	1.7	12.8	0.54	0.82	0.64	50.5
Approach		277	10.0	0.350	9.1	LOS A	1.7	12.8	0.54	0.82	0.64	50.7
All Vehicles		1085	13.0	0.350	3.5	NA	1.7	12.8	0.20	0.31	0.23	55.9

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [Future PM Peak]

Great Northern Highway / Waldron Drive
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Great Northern Hwy (S)												
1	L2	22	10.0	0.013	5.7	LOS A	0.0	0.0	0.00	0.57	0.00	53.2
2	T1	401	15.0	0.226	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
Approach		423	14.7	0.226	0.3	NA	0.0	0.0	0.00	0.03	0.00	59.6
North: Great Northern Hwy (N)												
8	T1	396	15.0	0.224	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
9	R2	195	10.0	0.237	8.4	LOS A	1.0	7.5	0.54	0.77	0.54	50.6
Approach		591	13.4	0.237	2.8	NA	1.0	7.5	0.18	0.25	0.18	56.5
West: Waldron Dr (W)												
10	L2	203	10.0	0.300	8.7	LOS A	1.3	9.9	0.53	0.80	0.60	50.6
12	R2	22	10.0	0.300	12.7	LOS B	1.3	9.9	0.53	0.80	0.60	50.4
Approach		225	10.0	0.300	9.1	LOS A	1.3	9.9	0.53	0.80	0.60	50.6
All Vehicles		1239	13.2	0.300	3.1	NA	1.3	9.9	0.18	0.28	0.19	56.3

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.