

## Appendix F: Transport Impact Statement

# Byford Rail Extension

## Armadale Station - Temporary Bus Station Transport Impact Statement

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Metronet November 2022





Urbsol

# Document Control

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# 1 Introduction & Background

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MetCONNx is responsible for the design, procurement, manufacture, construction, installation and commissioning of rail infrastructure and ancillary works to support an electrified operational passenger rail between Armadale and Byford, as part of the Byford Rail Extension (BRE) Design and Construction Project. A key component of these works is the delivery of two new train stations, namely the Armadale Station and the Byford Station.

Urbsol has been commissioned by MetCONNx on behalf of the Public Transport Authority (PTA) to prepare appropriate impact assessments as required for the project. The subject of this assessment is the temporary Armadale Bus Station, which is required to enable the development of the permanent station. The temporary bus station is required due to the closure of rail operations during the construction period. The temporary bus station will maintain existing bus services, and will be supplemented with additional rail replacement services. The latest temporary station layout is included in Appendix A of this report. The layout for the permanent station is still in the development phase.

This report has been prepared in accordance with the Transport Assessment Guidelines for Development, Volume 4 – Individual Developments (Western Australian Planning Commission, August 2016). Given the nature of temporary station, it is likely that there will be very little impact, however there are specific issues around access and bus movements that require consideration and as such, the requirements of a Transport Impact Statement (TIS) are addressed in this report. It has been structured in accordance with that document for ease of assessment.

Accordingly, the intent of this TIS is to provide the approving authority with sufficient transport information to confirm that the proponent has adequately considered the transport aspects of the temporary station arrangement and that it would not have an adverse transport impact on the surrounding area.

## 2 Existing Situation

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### 2.1 Land Uses

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The development site use is the Armadale Station, which is currently the last station on the Armadale Line of Perth's metropolitan rail network. Land uses immediately surrounding the station includes various retail (including Armadale Shopping City and Armadale Central Shopping Centre), various office and commercial, restaurants, residential, recreational uses, educational (including TAFE and Armadale Senior High School), etc.

### 2.2 Road Network

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Referring to Figure 1 and Figure 2, the key road links surrounding Armadale Station consist of the following (road names highlighted in yellow):

- Green Avenue: aligned parallel and west of the railway line, single carriageway, 50 km/h posted speed limit and classified as a "Distributor B" within the MRWA Road Hierarchy. Transitions into Abbey Road north of the station complex, which also connects to Armadale Road as a four-way signal.
- Commerce Avenue: aligned parallel and east of the railway line, single carriageway, 50 km/h (or less) posted speed limit and classified as an "Access Road" within the MRWA Road Hierarchy.
- Forrest Road: an east-west link that intersects the two aforementioned roads as well as the existing Armadale railway line (at-grade boom gates), single carriageway, mainly 60 km/h posted speed limit and classified as both "Distributor B" and "Local Distributor" within the MRWA Road Hierarchy, depending on location.
- Church Avenue: a somewhat east-west link that also intersects the two aforementioned roads as well as the existing Armadale railway line (at-grade boom gates), single carriageway, 50 km/h posted speed limit and classified as a "Distributor B" within the MRWA Road Hierarchy. Also connects to Armadale Road a three-way priority intersection.





Figure 1 Key road links around Armadale Station, on aerial map view



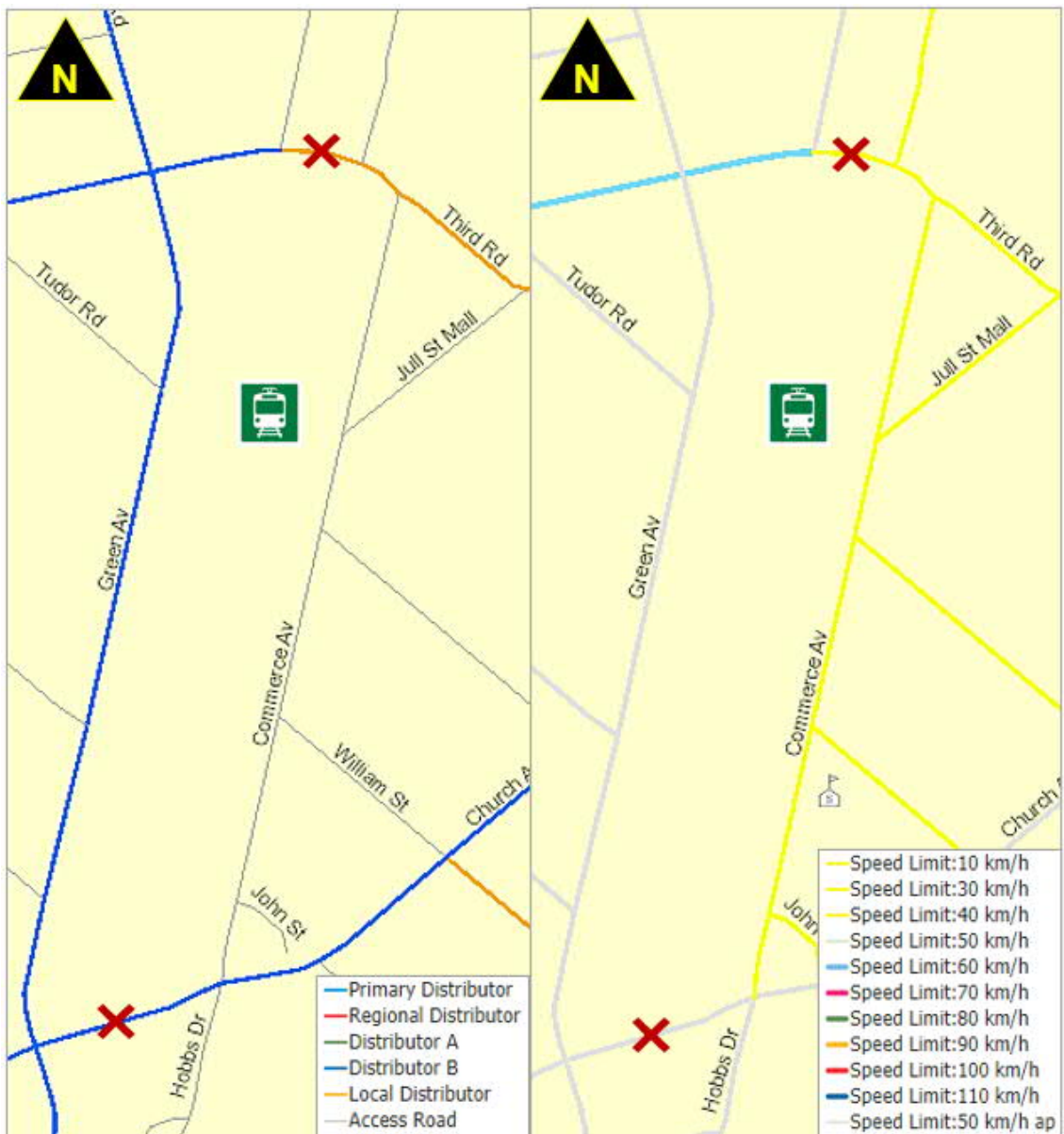


Figure 2 Key road links around Armadale Station, showing Main Roads Road Hierarchy classifications and posted speed limits (MRWA, Road Information Mapping)

In terms of the MRWA Road Hierarchy, “Distributor B” are locally governed roads with reduced capacity due to flow restrictions caused by frequent property accesses and roadside parking. “Local Distributors” have similar functions that also discourages through as well as heavy vehicle traffic. “Access Roads” are similar again but emphasising on higher priority for pedestrians and cyclists over vehicle movement function. It should be noted that the roads listed in this particular area are under the responsibility of both the Western Australian Planning Commission (WAPC) and City of Armadale.

## 2.3 Parking and Access

The park and ride (PnR) facilities on Armadale Station currently cater for approximately 234 at-grade parking bays for Transperth and TransWA patrons, divided into three main areas:

- Western car park (130 bays, paid): accessible via 3 access points on Green Avenue between Fifth Road and Tudor Road
- Eastern car park (78 bays, paid): accessible via 1 access point on Commerce Avenue between William Street and Fourth Road
- Northern car park (26 bays, free): accessible via 1 access point on Commerce Avenue between Jull Street mall and Third Avenue; informal/overflow car park

Figure 3 visually shows the location of these PnR facilities.

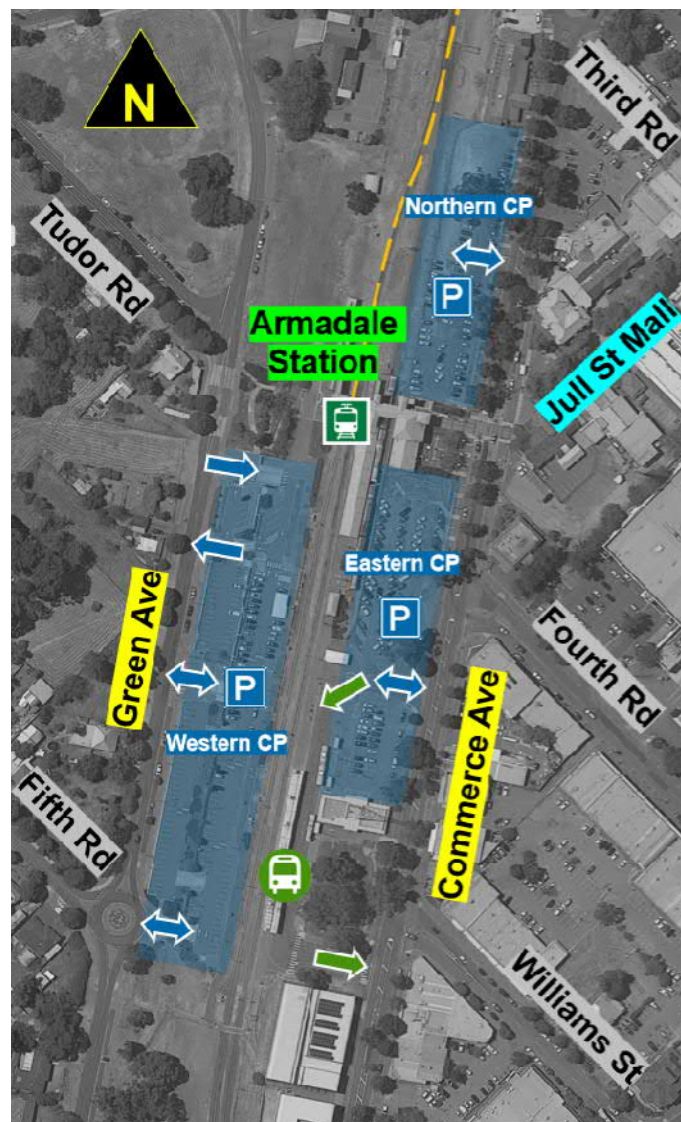


Figure 3 Park and ride (PnR) facilities on Armadale Station

Other parking facilities include (referring to Figure 4):

- PTA secure car park (32 bays): for authorised vehicles only, accessible from 1 access point on Green Avenue
- Short-term parking/kiss and ride (KnR, 16 bays): on both western and eastern car park sides
- ACROD parking (8 bays): on both western and eastern car park sides
- Motorcycle parking (15 bays): on both western and eastern car park sides

There are therefore approximately 305 bays (general and private) in Armadale Station.

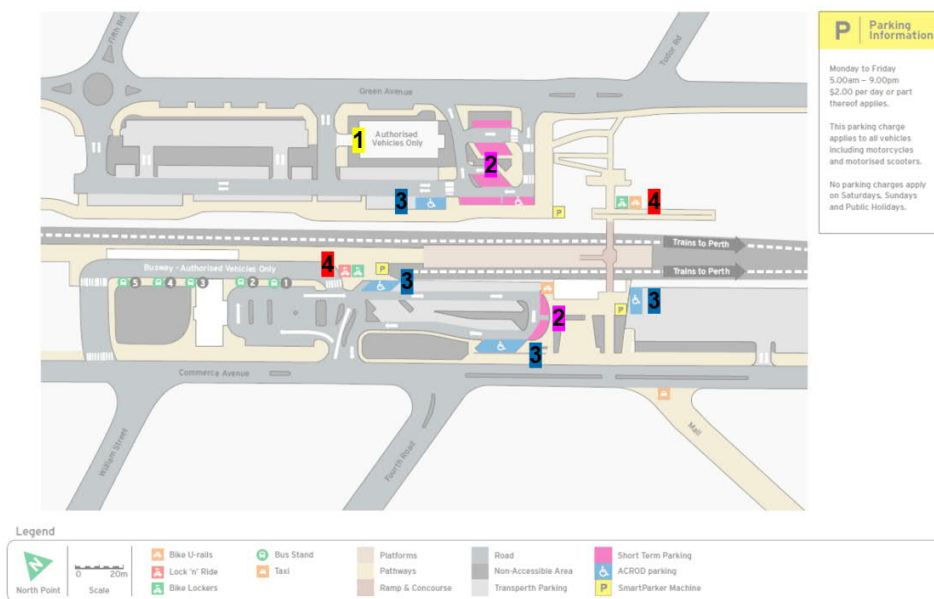


Figure 4 Station access map for Armadale Station (PTA)



Figure 5 Aerial view of the PnR facilities at Armadale Station (PTA)



## 2.4 Traffic Flows

Figure 6 shows the traffic survey locations undertaken in June 2022 by Surveytech.

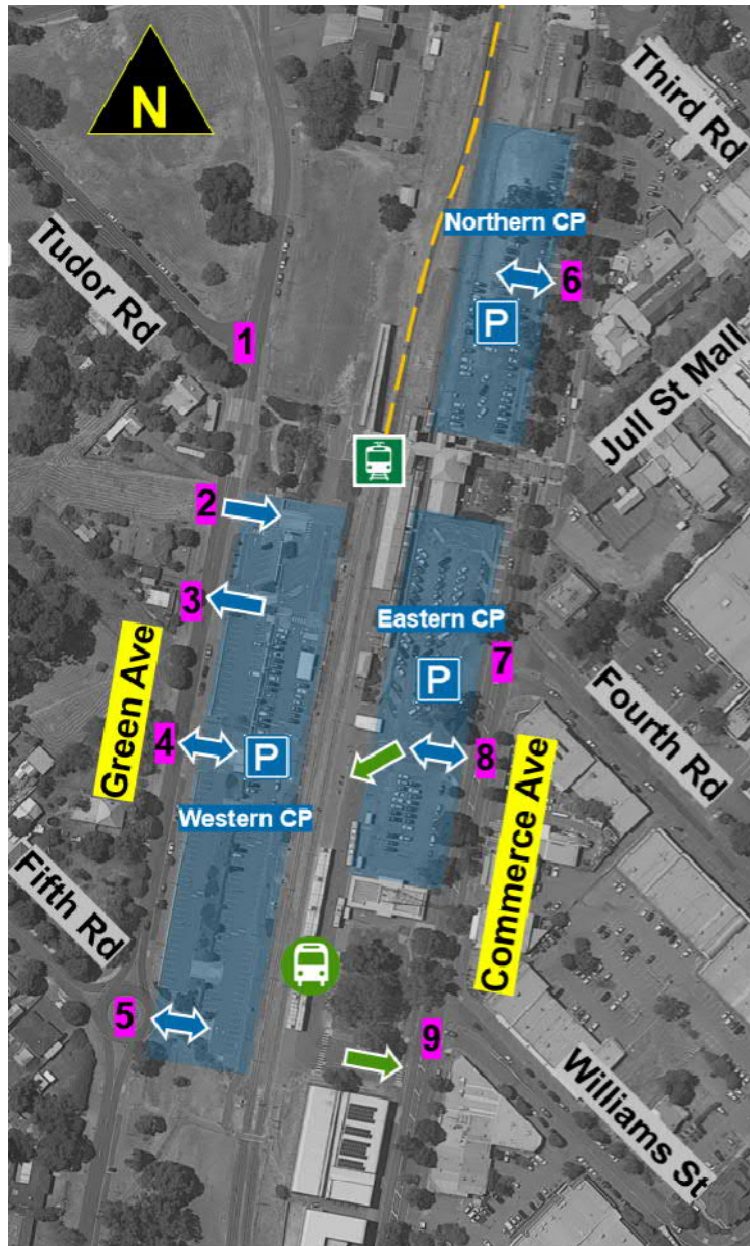


Figure 6 Traffic survey locations (with ID numbers in pink)

## 2.4.1 Site Generation

Table 1 summarise the traffic survey locations and their associated individual peak hour periods; Figure 7 shows the hourly volume profile for all the surveyed sites (with the sites along Green Avenue and Commerce Avenue coloured in blue and green, respectively; the dashed lines indicate those related to the car parks).

ID	Site Name	AM Peak Hour	PM Peak Hour
1	Green Avenue/Tudor Road	8-9	14:45-15:45
2	Green Avenue/Western Car Park North Entry	8-9	14:45-15:45
3	Green Avenue/Western Car Park North Exit	8-9	14:45-15:45
4	Green Avenue/Western Car Park Central Access	8-9	14:45-15:45
5	Green Avenue/Western Car Park South Access	8-9	14:45-15:45
6	Commerce Avenue/Northern Car Park Access	11:45-12:45	16:15-17:15
7	Commerce Avenue/Fourth Road	11:45-12:45	16:15-17:15
8	Commerce Avenue/Southern Car Park Access/Bus Entry	8:15-9:15	16:15-17:15
9	Commerce Avenue/William Street/Bus Exit	8:15-9:15	16:15-17:15

Table 1 Existing survey peak hour times for all individual sites

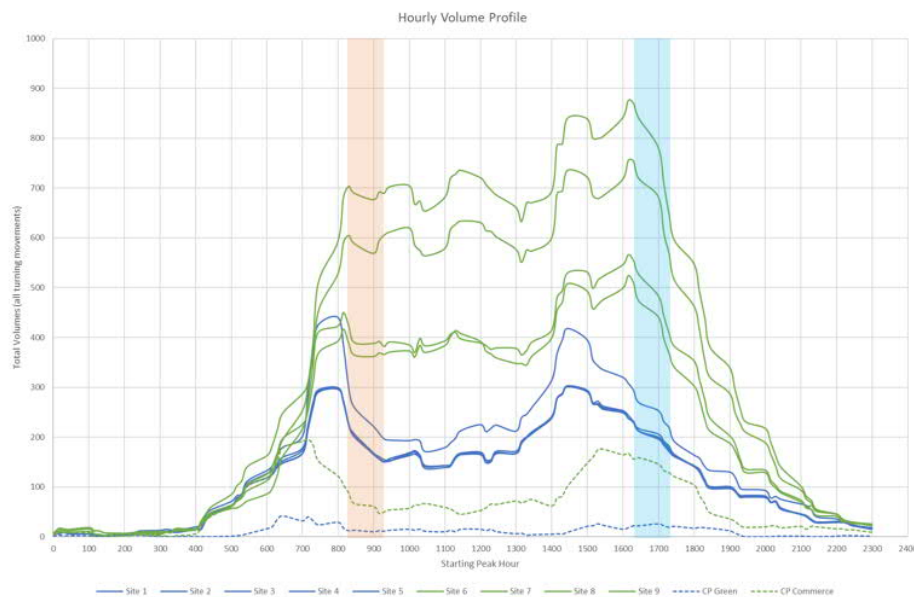


Figure 7 Hourly volume profile for all sites

It can be seen that there is some variability in the peak hour periods and is particularly distinguishable between the western (Green Avenue) and eastern (Commerce Avenue) sides of the railway. It should be emphasised, however, that these peak hours are typically determined by summing all turning movements in each site.

In comparison to the Armadale Rail Extension's *SIDRA Base Model Calibration and Validation Report* undertaken previously by WSP (commissioned by PTA, Rev F, December 2021), the peak hour periods observed in 2021 across a wider study area surrounding Armadale Station (covering several sites along Armadale Road, South Western Hwy, Church Avenue and Forrest Road) ranged from 8 to as late as 12:45 for the AM peak, and likewise 14:15 to 17:30 for the PM peak, are not that different to the recent 2022 surveys covered in this report.

The term 'peaking' can depend on the perspective of accounting every single movement, or the through movements along the main distributor, or the in- and outbound movements associated with the car parks. Thus, the objective of determining a pair of representative peak hour periods can be ambiguous depending on those aforementioned perspectives.

In the context for this TIS, it is most critical to assess/consider the combined network/station peak rather than the station peak. As such the following representative peak hour periods were chosen (as shaded in orange and blue in the previous figure):

- AM peak: 8:15-9:15
- PM peak: 16:15-17:15

And were chosen based on the following points:

- The total traffic volumes accounting for all turning movements on the two sites with 11:45 as their individual AM peak hour on Commerce Avenue (sites 6 and 7) were found to be associated with commercial/through route demands more than the car parks themselves, which occur much earlier in the morning. Accounting for this and to ensure consistency with the other Commerce Avenue sites (8 and 9), 8:15 was chosen as the representative AM peak.
- Commerce Avenue generally consists of higher traffic volumes than Green Avenue and thus was weighted more in terms of the area's representation – thus 16:15 was chosen as the representative PM peak.
- The *Armadale Station Access Strategy* report also prepared by WSP (commissioned by PTA, Rev 1, January 2021) also showed the 2017 average hourly boarding demand profile for Transperth's Armadale Line and was found to generally match the latest video surveys as far as the car park related traffic is concerned. The chosen peak hour periods for this TIS are shown in the orange and blue boxes are also superimposed, for context and comparison.

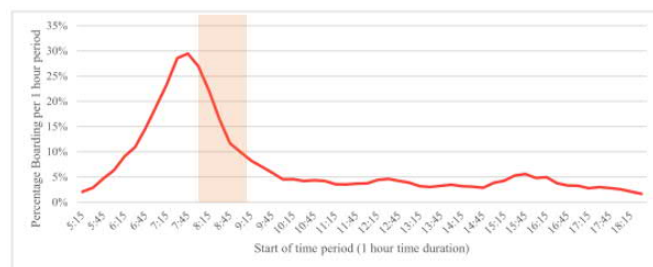


Figure 3.1 Boardings at Armadale Station (PTA March 2017)

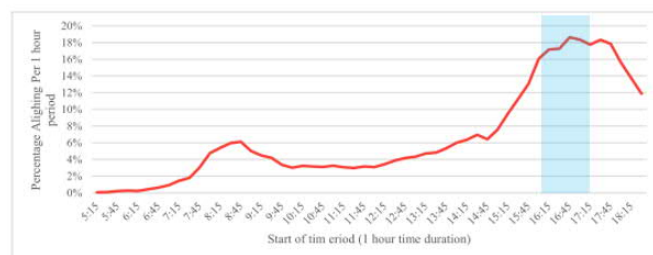


Figure 3.2 Alightings at Armadale Station (PTA March 2017)

Figure 8 2017 hourly boarding profile at Armadale Station (Credit: PTA/WSP)

Table 2 provides a summary of total trip generation for the station for the AM and PM peak network periods. For comparison and completeness, the AM and PM station peak trip generation is also provided.

For the purpose of this estimation it was assumed that any surveyed outbound trip in the AM peak was for Kiss N Ride (KnR) purposes and also entailed an inbound trip, with the balance relating to Park N Ride (PnR) purposes. Similarly for any inbound trip during the PM peak, it was assumed to be a KnR trip which also entailed an outbound trip.

Road	Car Park	AM Network Peak (8:15-9:15)								
		PnR			KnR			Bus		
		In	Out	Total	In	Out	Total	In	Out	Total
Green Ave	Western	3		3	6	6	12			
Commerce Ave	Northern	21		21	6	6	12			
	Eastern	2		2	22	22	44	25	25	50
Road	Car Park	AM Station Peak (7:15-8:15)								
		PnR			KnR			Bus		
		In	Out	Total	In	Out	Total	In	Out	Total
Green Ave	Western	18		18	11	11	22			
Commerce Ave	Northern	30		30	4	4	8			
	Eastern	4		4	61	61	122	32	32	64
Road	Car Park	PM Network Peak (16:15-17:15)								
		PnR			KnR			Bus		
		In	Out	Total	In	Out	Total	In	Out	Total
Green Ave	Western		5	5	6	6	12			
Commerce Ave	Northern		15	15	6	6	12			
	Eastern		30	30	40	40	80	31	31	62
Road	Car Park	PM Station Peak (15:30-16:30)								
		PnR			KnR			Bus		
		In	Out	Total	In	Out	Total	In	Out	Total
Green Ave	Western		2	2	12	12	24			
Commerce Ave	Northern		8	8	9	9	18			
	Eastern		24	24	47	47	94	31	31	62

**Table 2 Station traffic generation for station and network peak periods**

It can be seen that most of the traffic to/from the station is via Commerce Avenue rather than Green Avenue. Interestingly this holds true for the KnR related traffic. Although most of the short term and KnR bays are located within the western carpark, over 80% of KnR traffic enters via Commerce Avenue, with the vast majority of those trips using the eastern carpark where there are only 2 short term/KnR bays located within the carpark.



## 2.4.2 Network Traffic Flows

Figure 9 and Figure 10 summarise the network peak period traffic volumes across the nine sites. It should be noted that the inbound traffic volume on Commerce Avenue/Southern Car Park Access includes a fair percentage of buses as well, accounting for nearly 60% of the demand. This access also serves the eastern car park's KnR facility.

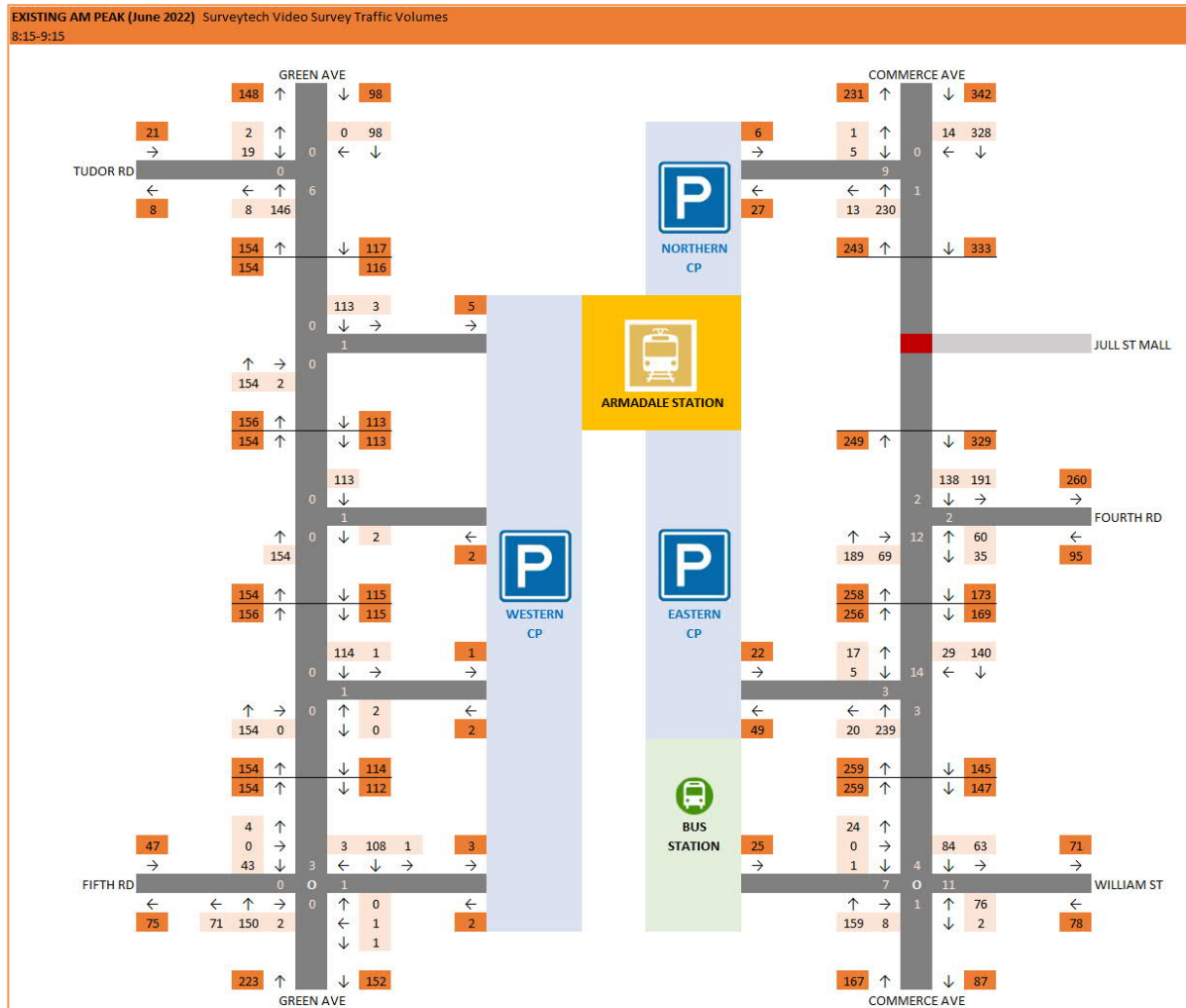


Figure 9 2022 AM peak hour network traffic flows

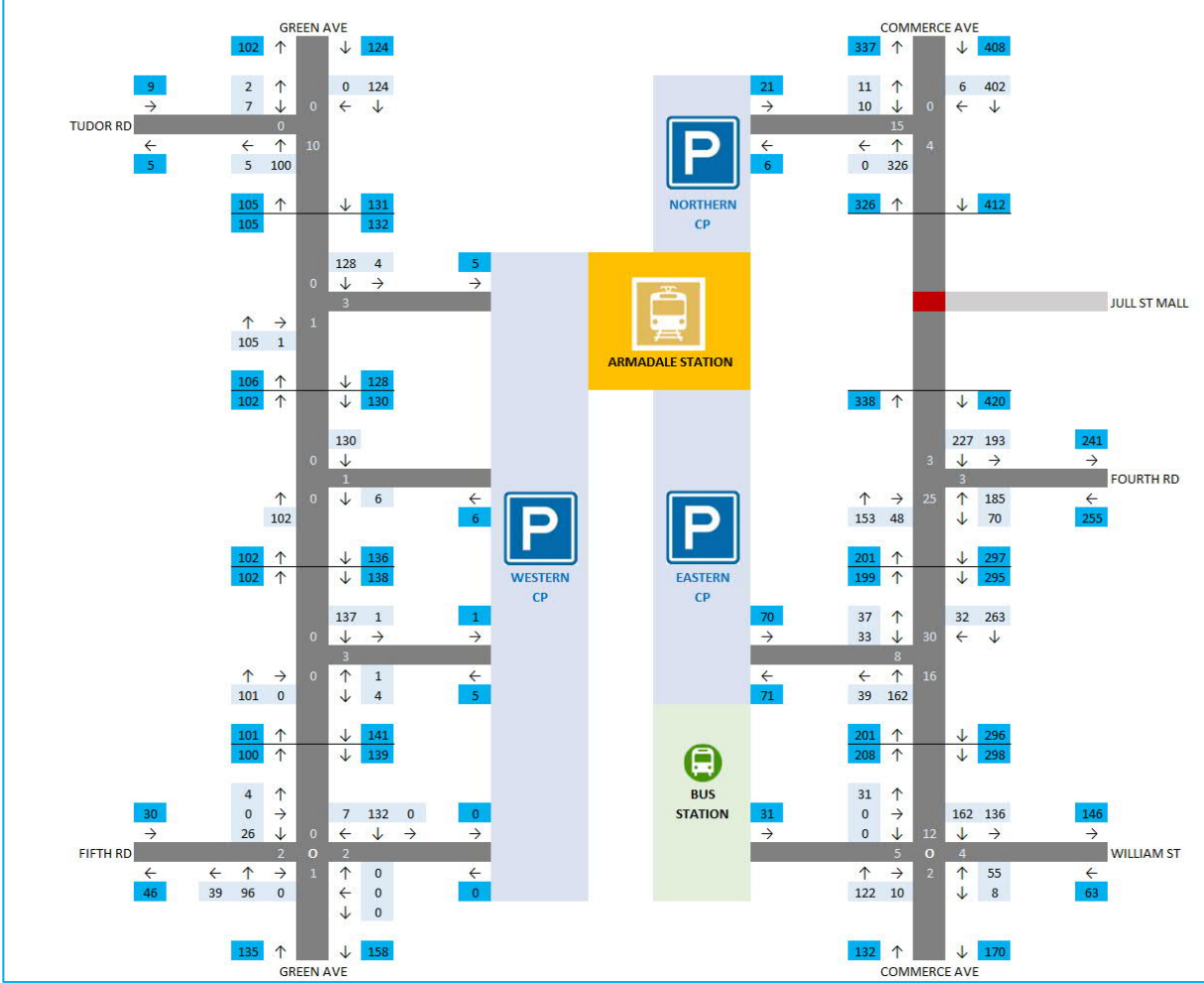


Figure 10 2022 PM peak hour network traffic flows

## 2.5 Pedestrian and Cyclist Access

Armadale Station is well-served in terms of pedestrian and cyclist amenity and accessibility, given its transit hub and end-of-line status along the Armadale Line. The shared paths for both modes are present along both Green and Commerce Avenues, with varying degrees of quality. Figure 11 shows the general state of existing paths to and from Armadale Station, on Green and Commerce Avenues as well as one particular at-grade gated crossing just south of the station (near Fifth Road).

Figure 12 shows the pelican (pedestrian light controlled) crossing intersecting Commerce Avenue and the Jull Street pedestrian mall, which provides direct access between Armadale Station and the adjacent commercial/government precinct. The raised pavement type ensures safety as well as priority to pedestrians and cyclists between these two areas.

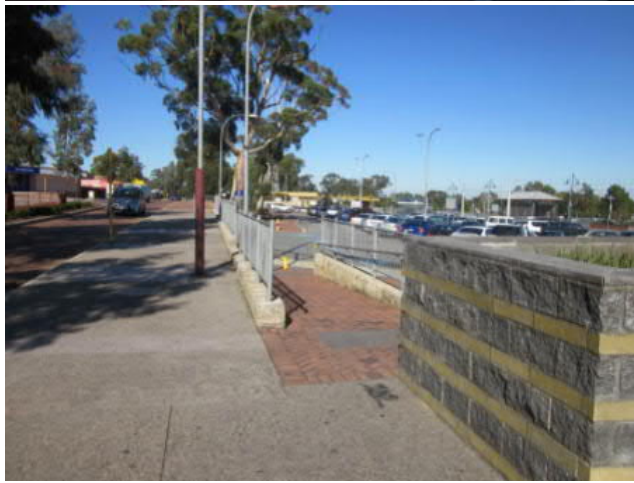


Figure 11 General pedestrian and cyclist accessibility along Green Avenue (top), Commerce Avenue (middle) and the at-grade gated crossing south of Armadale Station (bottom) (PTA)



Figure 12 Commerce Avenue/Jull Street mall pelican crossing (Google Maps)

The Armadale railway station itself consists of a grade-separated covered footbridge that forms as the station's mezzanine/unpaid area, which can be used by both Transperth patrons as well as the general public in order to cross from one side of the railway to the other. This station complex is also considered as DDA compliant, with elevators and ramps between the platforms, concourse and ground level on both Green and Commerce Avenues.

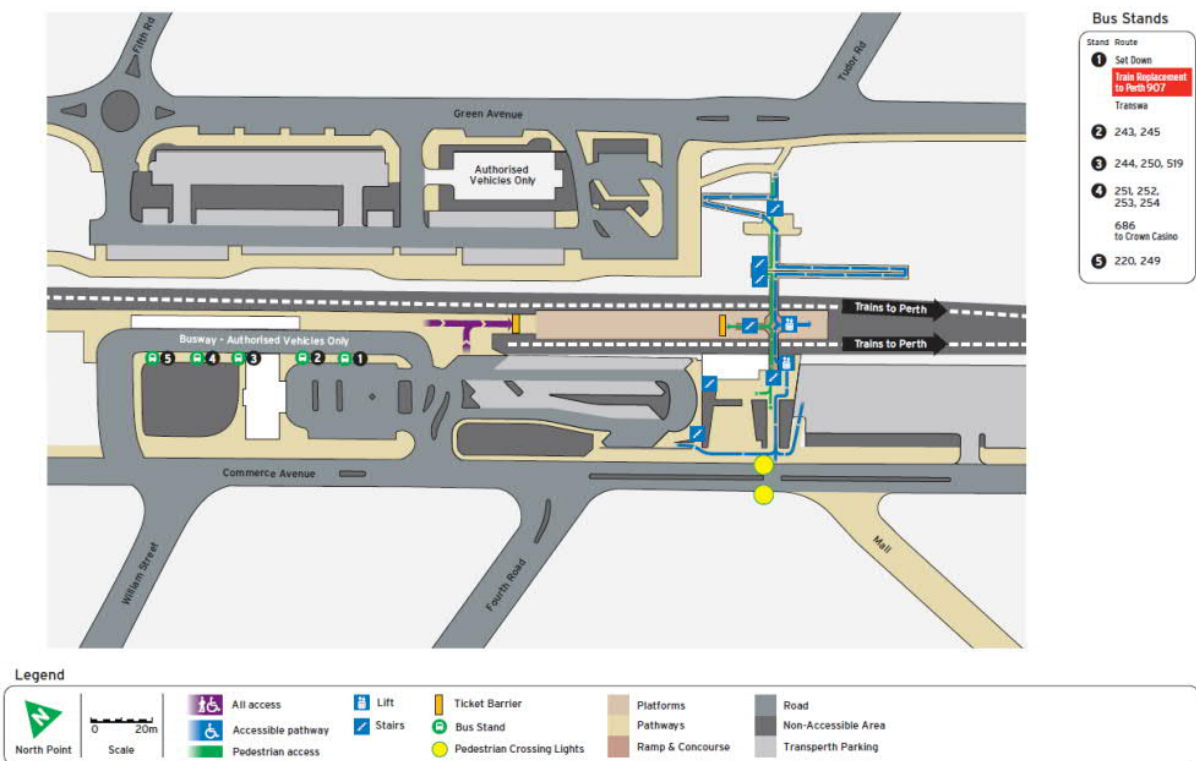


Figure 13 Station access map of Armadale Station



Figure 14 visually shows the extent of bike path provision surrounding Armadale Station – it can be seen that roads like Green and Commerce Avenue currently consist of a good overall cycling environment, with end-of-trip facilities at Armadale Station. Commerce Avenue currently also functions as the origin/terminus of the Perth Bicycle Network SW 18 route, which travels as far as Rowley Road.

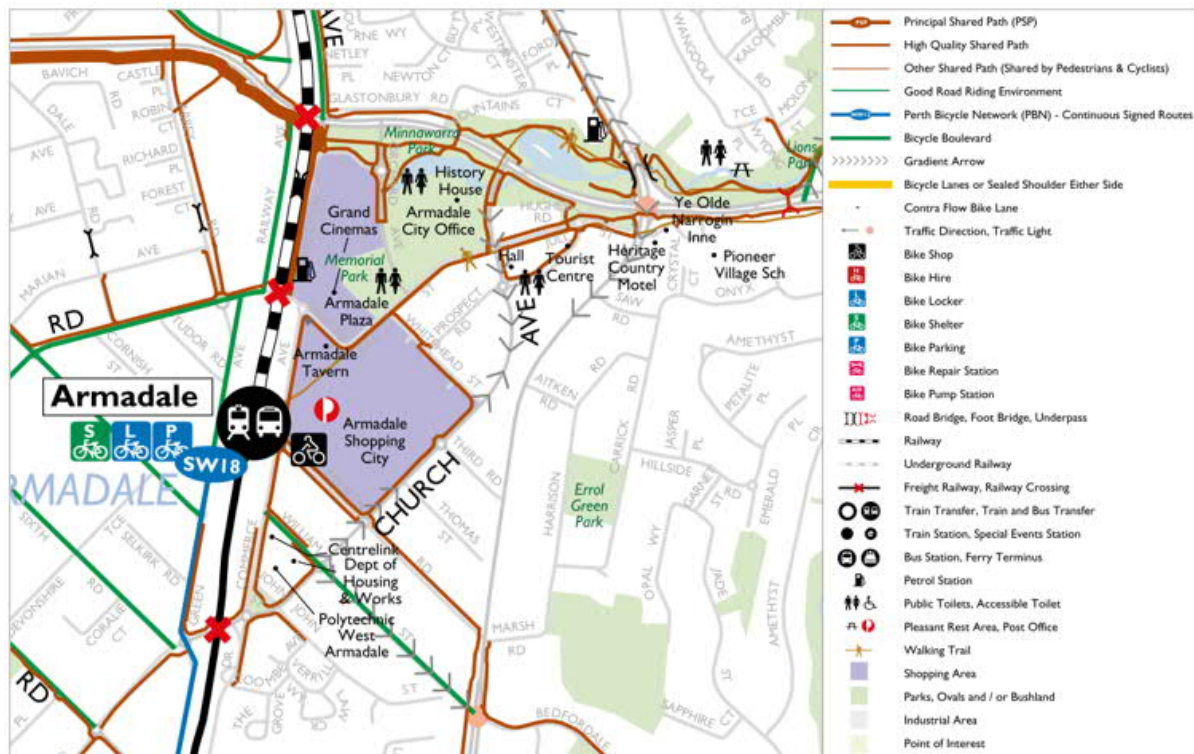


Figure 14 Comprehensive bike map surrounding Armadale Station (DoT)

## 2.6 Public Transport Provisions

Figure 15 shows the location of Armadale railway station in relation to the Armadale railway line, located within Transperth’s Zone 4 fare system as well as approximately being 35 kilometres from Perth railway station. In terms of average weekday day-/night-time travel time, it is approximately between 35 to 40 minutes of travel respectively, to and from Perth railway station, based on the C stopping pattern (express service between Cannington and Claisebrook, stopping at Oats Street). Trains currently run as low as five-minute headways during peak periods (approximately 10 trains per hour).

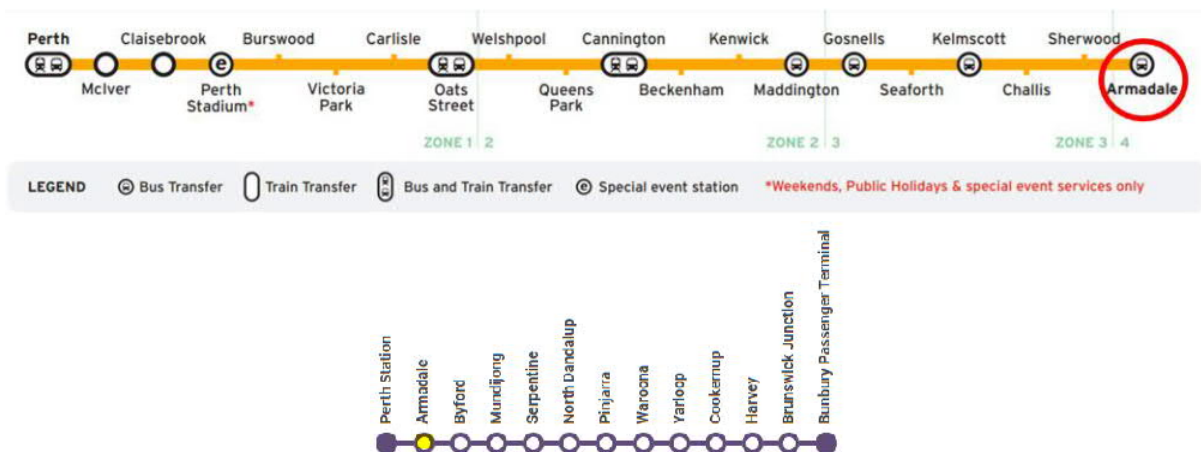


Figure 15 Armadale Station location in relation to the Armadale Line and Australind Line (PTA/TransWA)

Armadale railway station as it stands is a major transit hub between rail and buses, serving not only Armadale but also the surrounding suburbs. It is also a stopping point along the regional Australind Line (Perth-Bunbury, operated by TransWA).

Figure 16 shows the current Transperth bus routes operating to and from Armadale Station. Note that the 519 bus route along Armadale Road currently travels to and from Murdoch railway station/Fiona Stanley Hospital, via Nicholson Road and South Street. In all, there are 11 bus routes in total originating/terminating exclusively at Armadale railway station today, with 2 via Forrest Road and 9 via Fourth Road, both converging onto Commerce Avenue where the bus station is currently located.

The exiting bus interchange area is located at the southern and of the station, with access and egress via Commerce Avenue with one-way clockwise circulation. It includes 5 stands and 2 layover bays. Entry to the bus interchange is via the driveway just south of the Fourth Road interaction (access shared with the eastern carpark), whilst egress is via the driveway just south of the William Street intersection.

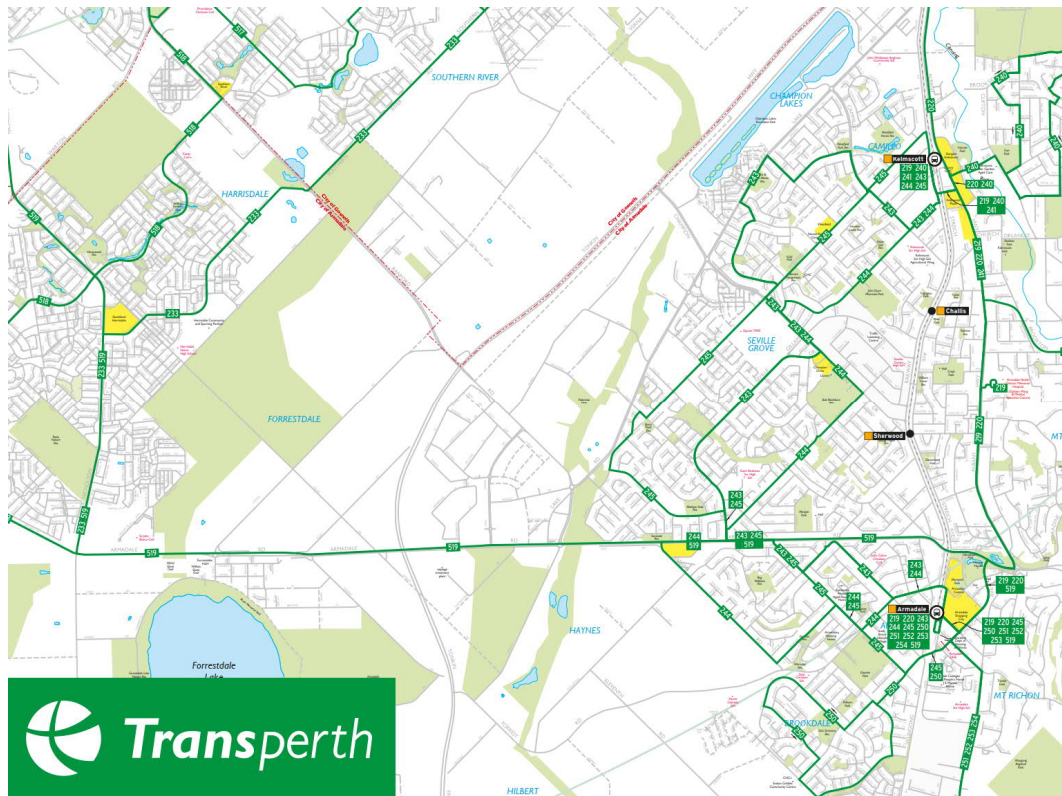


Figure 16 Bus routes to and from Armadale Station

## 2.7 Crash Data

Figure 17 shows the crash data summary obtained from Main Roads' Reporting Centre, focusing on Green and Commerce Avenues sections directly surrounding Armadale Station. This crash data covers a period of five years, between the start of 2017 and end of 2021.

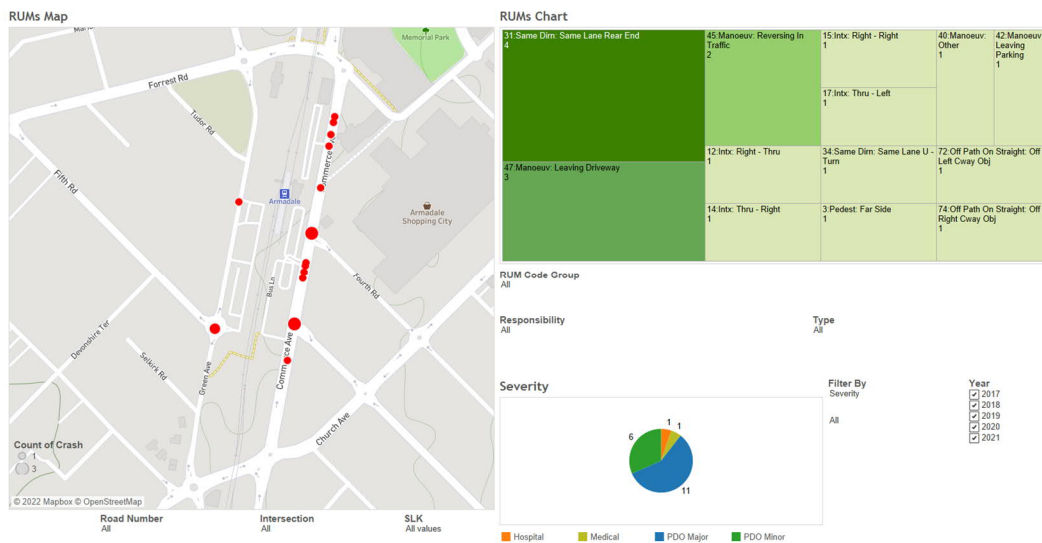


Figure 17 Crash data summary



There have been about 19 crashes for these defined road links, with 3 on Green Avenue and 16 on Commerce Avenue. Out of the total amount and in terms of Severity, 11 were classified as “PDO Major”, 6 as “PDO Minor”, 1 as “Medical” and 1 as “Hospital”. None of these crashes were classified as fatal.

The figure also shows a RUM chart that indicates the type of crash: the majority of them were related to rear ends, with others relating to driveway-related accidents and reversing in traffic manoeuvres.

There does not appear to be any particular crash patterns evident from the available data that would require specific consideration as part of this impact statement.

### 3 Proposed Development

PTA has commissioned MetCONNx for the design, procurement, manufacture, construction, installation and commissioning of rail infrastructure and ancillary works to support an electrified operational passenger rail between Armadale and Byford, as part of the Byford Rail Extension (BRE) Design and Construction Project. A key component of these works is the delivery of two new train stations, namely the Armadale Station and the Byford Station.

The redevelopment of the Armadale Station includes a reconfiguration of the Park N Ride (PnR), Kiss N Ride (KnR), bus interchange facilities as well as the access arrangement and cyclist/pedestrian path network. However to enable the station redevelopment, a temporary bus station with a revised layout and alternative public transport provisions needs to be provided. Most critically this includes the closure of rail operations and the provision of replacement bus services.

The latest plans for the temporary bus station design are attached to this report in Appendix A. The key components of the which are also shown in Figure 18. In broad terms the temporary facility includes:

- Formalisation of the existing northern carpark area
- Provision of a temporary bus interchange, including some on-street stands on Commerce Ave
- Secure parking area for PTA staff
- New bike shelter

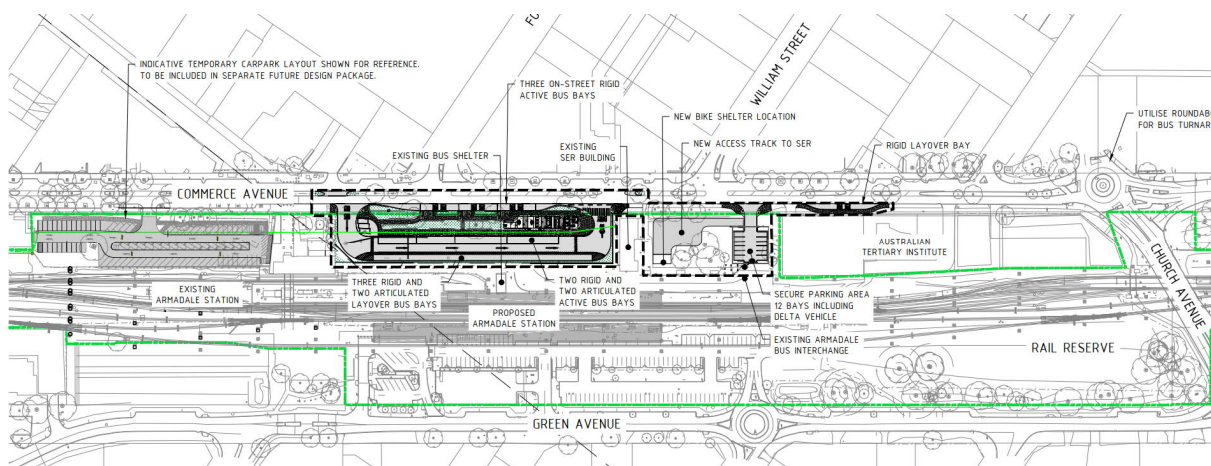


Figure 18 Proposed temporary station layout

The items on this plan that require consideration as part of this impact statement include:

- The operation and impact of additional bus services while the Armadale Line is closed.
- The proposed bus interchange arrangement
- The proposed parking and drop off/pick up arrangements
- Pedestrian and cyclist provisions

## 4 Vehicle Access and Parking

With the closure of the rail operations, it was not originally envisaged that there would be any requirement for parking as there would be no demand. However with the provision of bus services to replace some of the function and capacity of the rail operations, whilst the expected parking demand is expected to reduce, some on-site parking is considered necessary. This is planned to be provided in the location of the existing northern carpark on Commerce Avenue.

The proposed layout of the temporary parking area is shown in Figure 19. It should be noted that the layout is preliminary only and will be developed as a separate design package by MetCONNx and is subject to coordination with PTA and the City of Armadale. The majority of the existing facility has a poor surface and does not have marked bays. Site visits and traffic surveys indicate that the existing facility is used sparingly by station patrons.

The proposed facility essentially entails the formalisation of the existing area, including appropriate surfacing and marking of bays. It is currently proposed to consist of simple one-way loop with angled parking bays around the perimeter of the entire area and additional angled parking within the central area of the carpark, along with a spur at the north end providing additional 90 degree parking.

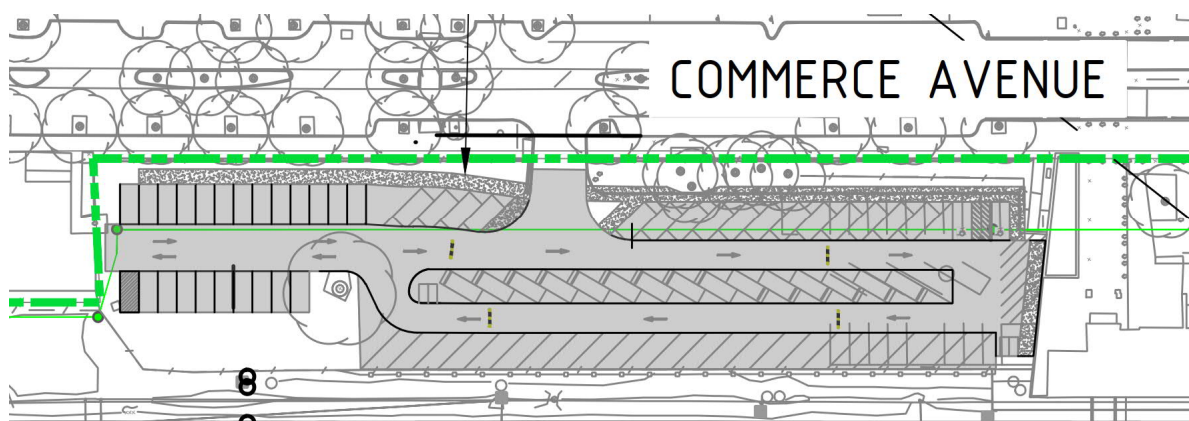


Figure 19 Temporary parking area layout

Access between Commerce Avenue and the carpark is proposed via a single crossover in the same location as the existing crossover that services the existing carpark. The proposed carpark includes approximately 80 bays plus 2 accessible bays and 4 motorcycle bays i.e. a total of around 86 bays.

An additional 12 secure parking bays are proposed for relevant staff at the southern end of the station. These are proposed to be accessed via Commerce Avenue, from about the location of the existing exit from the bus interchange. An additional 3 staff bays are located within the bus interchange area as required by Transperth.

In terms of parking demand, site visits undertaken indicated demand of approximately 100 bays in total, inclusive of patrons, staff, accessible bays, etc. As previously mentioned, whilst it is anticipated that parking demand will reduce during temporary operations, the proposed parking facility will almost meet that demand. Should there be any overflow, there are existing on-street facilities available on Green Street and other local roads.

With respect to KnR facilities, it should be noted that up to 81% of KnR traffic is via the eastern carpark where there are two KnR/short term bays (during the AM station peak of 7:15-8:15am). Whilst the current plans don't specifically assign any bays to a KnR purpose, it appears that it may be possible to add 2 or 3 bays at the southern turn around area for that purpose. It is intended that these elements will be determined during design development of the temporary carpark.

Furthermore, it is noted that immediately south of the carpark entrance on Commerce Avenue there is a bus bay with a shelter. This is approximately only 80m from the proposed temporary bus interchange. Should it be desirable to add further KnR bays, perhaps the bus bay could instead be used as a KnR facility. This may reduce the need for motorists to turn in and out of the carpark and unnecessarily circulate through the parking area. Instead they can pull in and out of the on-street bays, then use the roundabout at Third Road to access their desired route.

## 5 Provision for Service Vehicles

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The main service vehicle that will likely require regular access to the temporary bus station are rubbish collection vehicles. It is unlikely that these vehicles could be accommodated within the temporary carpark due to space constraints, however there is ample room for them to manoeuvre through the bus interchange area. As such, should on-site rubbish collection be required, appropriate arrangements would need to be integrated into the design and facility management. However these details are still under development.

With respect to fire emergency services, these vehicles will not require access to a specific area on-site as the hydrant is being decommissioned. As such, the station would be serviced via Commerce Avenue and the on-street hydrants. This has been discussed with DFES.

## 6 Hours of Operation

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It is anticipated that the hours of operations for the temporary station will be the same as the existing facility, which typically commence at around 5.30am and finish at around 10.00pm, 7 days a week.

## 7 Daily Traffic Volumes and Vehicle Types

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A detailed breakdown of the traffic generated by the existing station was documented in Section 2.4.1. That data indicated the following:

- Traffic generated during the existing AM network peak is approximately 144vph, consisting of:
  - 60 trips in and 34 trips out for regular traffic
  - 25 trips in and 25 trips out for buses
- Traffic generated during the existing PM network peak is approximately 216vph, consisting of:
  - 52 trips in and 102 trips out for regular traffic
  - 31 trips in and 31 trips out for buses

In addition to that data, traffic generated over an entire day is approximately 2,366vpd, consisting of:

- 850 trips in and 850 trips out for regular traffic
- 333 trips in and 333 trips out for buses

As discussed in Section 4, a reduction in patronage is expected during the operation of the temporary facilities.

For any regular patrons that currently use the parking areas on the western side of the rail line and continue to use the temporary facilities, they may be required to access the facility from Commerce Avenue. However based on site visits, the utilisation of those western parking areas appears very low, and therefore the amount of traffic that would shift to Commerce Avenue is expected to be minimal.

As a result, no noticeable change in the operational characteristics of the surrounding network due to patron vehicular activity is expected.

Whilst the temporary facility is operating, the Armadale Line will be closed. As a result, current planning includes the provision of additional bus services. PTA has provided information relating to the additional services.

A summary of both existing and additional facilities is provided in Table 3.



Existing Services					
AM Peak	8:15 to 9:15am		PM Peak	16:15 to 17:15	
Route	Frequency		Route	Frequency	
	In	Out		In	Out
219	1	1	219	0	0
220	1	1	220	2	1
243	1	2	243	3	2
244	1	1	244	3	3
245	2	2	245	2	3
250	4	4	250	5	4
251	0	0	251	1	0
252	1	0	252	0	1
253	1	0	253	0	1
254	3	1	254	1	3
519	1	1	519	2	2
Total	16	13		19	20
Additional Services					
AM Peak	8:15 to 9:15am		PM Peak	16:15 to 17:15	
Route	Frequency		Route	Frequency	
	In	Out		In	Out
221	6	12	221	12	6
529	3	6	529	6	3
907	6	12	907	12	6
Total	15	30		30	15

**Table 3 Bus traffic for the temporary station**

With respect to the additional routes:

- Route 221 (which will provide access to/from Perth Busport) is expected to be similar to the existing routes 219 and 220 in the vicinity of the station.
- Route 529 (which will provide access to/from Cockburn Central) is expected to be similar to the existing route 519 in the vicinity of the station.
- Route 907 (which will provide access to/from Perth Station) is expected to be similar to the existing route 519 in the vicinity of the station

In terms of the impact these additional busses may have on Commerce Avenue traffic, the northern section of this road is likely the most critical. During the AM peak it carries approximately 580vph (both ways) in the AM peak and approximately 750vph (both ways) in the PM peak. The additional bus traffic likely to use this section of Commerce Avenue includes the 529 and 907 routes, which would total 27 bus movements during each of the AM peak and PM peak periods. On average this additional traffic would be less than 1 bus movement every 2 minutes. This is not expected to have any impact on traffic operations during the peak periods, and Commerce Avenue would still operate within its functional capacity.

## 8 Traffic Management on Frontage Streets

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The road network in the vicinity of Armadale Station was described in Section 2.2. With respect to this assessment, Commerce Avenue is considered the critical road as it will be the sole provider of access to the temporary station parking areas and bus interchange.

Commerce Avenue is aligned parallel and east of the railway line. It is a single carriageway road, with a 50 km/h (or less) posted speed limit and classified as an “Access Road” within the MRWA Road Hierarchy. It contains a painted median, with some kerbed (and landscaped sections) fronting the existing station. The roadway has red coloured asphalt, which assists in identifying it as a town centre and calmed type roadway.

Commerce Avenue has paths on both sides of the road, is landscaped, contains some on-street parking, has numerous large trees, as well as a raised signalised pedestrian crossing at the station.

Overall, it is considered that Commerce Avenue currently provides an important function for access to/from the station and Armadale Town Centre in a well managed and traffic calmed environment. It is the intention to minimise any impact upon this environment throughout the time that the temporary station is in operation.

The temporary station will see a reduction in the number of crossovers for patron parking related access (as discussed in Section □), and a shift of existing bus station related access to the new interchange location. A new on-street bus layover bay south of the William Street intersection is proposed to assist with the bus interchange logistics and achieving the required number of bays required by PTA, however its expected use is minimal. Also, a new access point for staff parking is proposed just south of the William Street intersection, however use of this is also expected to be minimal given its size.

## 9 Public Transport Access

In order to construct the permanent station, as part of the temporary arrangement, it is necessary to relocate the bus interchange area further north of its current location. It will essentially replace the existing main eastern carpark, with a facility similar to the existing. A concept of the proposed layout is shown in Figure 20.

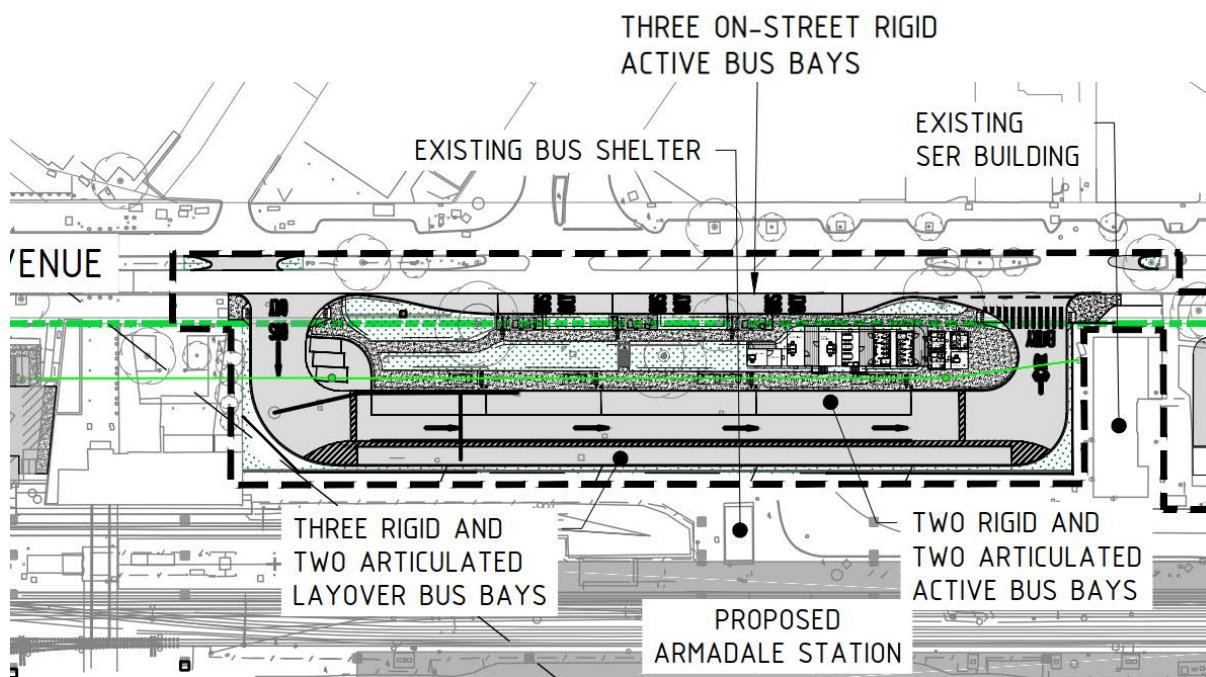


Figure 20 Temporary bus interchange layout

Access to and from the bus interchange area will be similar to the existing facility, with a one-way entrance provided on the north side of the Fourth Avenue intersection and a one way exit on the south side of that intersection, facilitating anti-clockwise bus movements through the interchange as required by PTA.

With the highly constrained area, it is not possible to facilitate all bus stands within the bus interchange area. As a result, it has been necessary to provide additional on-street stands. One layover bay has been provided south of the William Street intersection, which can't be facilitated internally due to space constraints (previously discussed), which is not likely to be utilised extensively. In addition to that bay, it has been necessary to provide three bus bays on-street, between the interchange exit and entry.

Planning has already been undertaken by PTA to assign bus routes to the various stands, and this has been done methodically, taking into account the length of bays required for the relevant service (i.e. articulated buses), position of the stand in relation to security, grouping like services, and the bus route as the buses exit the stands.

This process has resulted in the assignment of bus routes 519 and 529 to the northernmost on-street bay, and routes 243 and 244 to the central bay. All of those services would exit the bays, travel north along Commerce Avenue, then turn left at the Third Road roundabout to continue their routes. Bus routes 245 and 250 are currently assigned to the southern on-street bay. These routes require the buses to exit the bay and immediately turn right into Fourth Road to access their routes.

Under this scenario, movements in and out of the on-street bays will include:

- 12 movements in and 16 movements out during the AM network peak. This equates to one bus movement in every 5 minutes, and one bus movement out every 4 minutes on average.
- 21 movements in and 17 movements out during the PM network peak. This equates to one bus movement in every 3 minutes, and one bus movement out every 3-4 minutes on average.

In order to enter the stands, these buses would need travel south along Commerce Avenue (either from Commerce Avenue north, or via a left turn from Fourth Road), then undertake a U-turn at the Church Avenue roundabout. A field trial has been undertaken by Transperth, who have confirmed that the movements can be accommodated safely. In terms of the number of buses performing this movement, it is not expected that they would have a significant impact upon the roundabout from a capacity or Level of Service perspective.

Whilst these movements are expected to be accommodated from a capacity perspective, a potential issue has been raised and discussed with the City of Armadale and PTA, relating to the location of the on-street bays; they are located close to the intersection of Commerce Avenue with Fourth Road.

A number of options to minimise any safety risk were considered and discussed with PTA and the City of Armadale. These options included:

- Relocation of the proposed on-street bus stands further to an alternative location.

This option was not considered viable for the satisfactory operation of the bus interchange.

- Restricting movements at the Commerce Avenue/Fourth Road intersection to left in/out.

This would result in a redistribution of traffic that would most likely see existing right turning motorists utilise the Church Avenue/Commerce Avenue or Commerce Avenue/William Street intersections to complete their desired route. Alternatively for motorists exiting Fourth Road, they could turn left and then U-turn at the Commerce Avenue/Church Avenue roundabout. This option would also require the existing bus routes that use Fourth Road to modify their routes accordingly and also relocate the existing bus stops on Fourth Road to an alternative location or remove them.

This option was not favoured due to the heavy demand for the stops on Fourth Road and the potential inconvenience to patrons. Minutes from the discussions relating to this point are included in

Instead it was advised that suitable training would be provided to bus drivers to advise of the potential risk exiting the bus bays in the vicinity of the Commerce Avenue/Fourth Road intersection.

It is also worth noting that suitable pedestrian crossings of the bus interchange driveways are proposed along with a path through that section. No pedestrian crossings of Commerce Avenue either side of Fourth Road are present, so it is not anticipated that there would be any additional conflict compared to the existing situation. The existing Commerce Avenue signalised pedestrian crossing north of Fourth Road at the station will be maintained and will continue to form the major and safe pedestrian access to the site, further discussed in the following section.

## 10 Pedestrian Access

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The existing pedestrian facilities in the vicinity of the station were discussed in detail in Section 2.5. The existing station is well-serviced in terms of pedestrian and cyclist amenity and accessibility, given its transit hub and end-of-line status along the Armadale Line. Shared paths are present along both Green Avenue and Commerce Avenue.

In general terms, the existing routes and facilities will largely remain unchanged, with any construction related interruptions managed locally.

The facilities along Green Avenue are not expected to be significantly impacted during the temporary operations. It is anticipated that any construction related interruptions can be addressed locally.

The facilities along Commerce Avenue are also not expected to be significantly impacted during the temporary operations. Where access is modified, or new embayments are proposed, appropriate paths and crossover crossing facilities will be provided. It is anticipated that any construction related interruptions can be addressed locally. The existing pelican (pedestrian light controlled) crossing intersecting Commerce Avenue and the Jull Street pedestrian mall is expected to remain operational throughout the construction period.

## 11 Cycle Access and End of Trip Facilities

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The existing pedestrian facilities in the vicinity of the station were discussed in detail in Section 2.5. There are no impacts to the wider cycle network during the temporary operations. Any construction related interruptions to paths/crossings are expected to be managed locally, in line with the pedestrian facilities discussed in the Section 10.

A new temporary bike shelter is currently proposed to be located just south of the temporary bus interchange area accessed via the path on Commerce Avenue. The intention is to relocate the existing bike shelter to the new location subject to confirmation on site.

## 12 Site Specific Issues

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No other site specific issues additional to those already raised in the previous sections are expected.

## 13 Safety Issues

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No other safety issues additional to those already raised in the previous sections are expected.



## 14 Conclusions

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Urbsol was commissioned by MetCONNX on behalf of the Public Transport Authority (PTA) to prepare appropriate impact assessments as required for the BRE project. The subject of this assessment was the temporary Armadale Bus Station, which is required to enable the development of permanent station. The temporary bus station is required due to the closure of rail operations during the construction period. The temporary bus station will maintain existing bus services, and will be supplemented with additional rail replacement services

The intent of this TIS was to provide the approving authority with sufficient transport information to confirm that the proponent has adequately considered the transport aspects of the temporary bus station arrangement and that it would not have an adverse transport impact on the surrounding area.

This report was prepared in accordance with the Transport Assessment Guidelines for Development, Volume 4 – Individual Developments (Western Australian Planning Commission, August 2016).

In broad terms, given the nature of temporary bus station, and the likely reduction in patronage during this stage, it is likely that there will be very little impact to the surrounding transport networks. However a number of specific issues required consideration and were discussed accordingly. These included:

- The operation and impact of additional bus services

The number of additional buses has been documented and any potential impact is expected to be manageable.

- The proposed bus interchange arrangement

The proposed temporary facility is expected to operate in a similar manner to the existing facility. With respect to the bus stands in the vicinity of the Commerce Avenue/Fourth Road intersection, whilst alternatives options were suggested, the preference was to maintain the Commerce Avenue/Fourth Road intersection as is, and to not modify existing bus routes. The situation is considered to be manageable with some specific driver awareness training, as suggested could be undertaken by PTA.

- The proposed parking and drop off/pick up arrangements

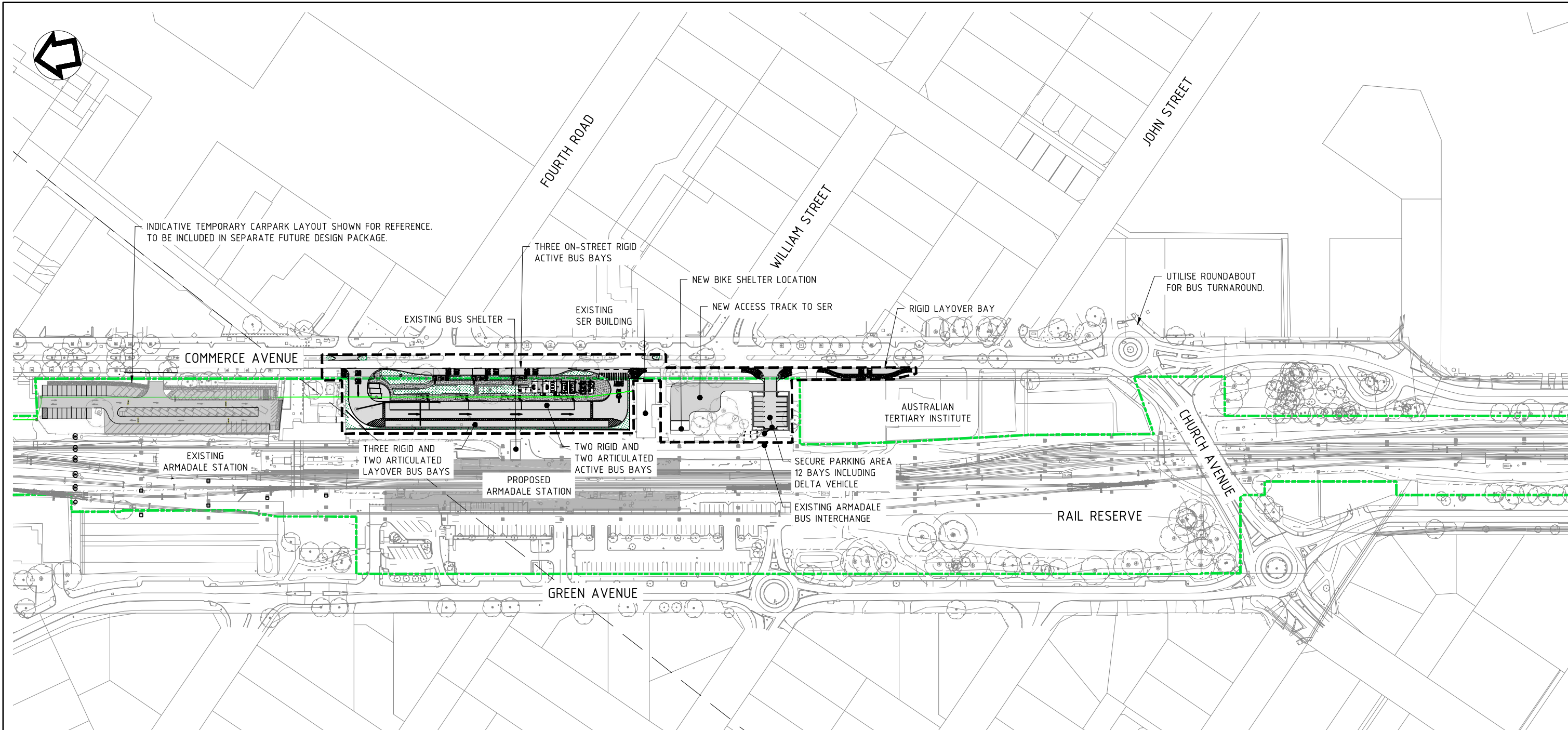
Whilst a reduction in patronage is expected during the temporary operations, a carpark to accommodate demand similar to current observed levels is proposed. It is recommended that 2 or 3 bays be considered at the turn around area within the carpark for KnR purposes. If additional KnR bays are desirable, the existing bus bay on Commerce Avenue just south of the carpark access point could be considered for this purpose. This may reduce the need for motorists to turn in and out of the carpark and unnecessarily circulate through the parking area.

- Pedestrian and cyclist provisions

In general terms, the existing routes and facilities will largely remain unchanged, with any construction related interruptions managed locally. Where access is modified, or new embayments are proposed, appropriate paths and crossover crossing facilities will be provided. The existing pelican crossing on Commerce Avenue is expected to remain operational throughout the construction period.

# Appendix A – Temporary Station Layout

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INDICATIVE TEMPORARY CARPARK LAYOUT SHOWN FOR REFERENCE. TO BE INCLUDED IN SEPARATE FUTURE DESIGN PACKAGE.

- NOTE: ENABLING WORKS TO FACILITATE TRANSPERTH BUS OPERATIONS DURING PROPOSED RAIL SHUT DOWN PERIOD AND BASED ON TRANSPERTH REQUIREMENTS:
- 7 ACTIVE BAYS (INCLUDING 2x ARTICULATED)
  - 6 LAYOVER BAYS (INCLUDING 2x ARTICULATED)
  - 1 X TRANSIT OFFICER OFFICE AND SIGN ON
  - 1 X TRANSIT OFFICER SUPERVISOR OFFICE
  - 1 X STAFF TOILETS
  - 1 X CRIB ROOM
  - PUBLIC TOILETS
  - 1 X OFFICE FOR SECURITY AND ADMIN TRANSIT OFFICER
  - 1 X SECURE STORAGE AREA
  - 1 X MALE STAFF SHOWER/CHANGE FACILITY
  - 1 X FEMALE STAFF SHOWER/CHANGE FACILITY
  - 1 X DDA TOILET
  - 1 X TRANSWA BOOKING OFFICE

**LEGEND**

	RAIL RESERVE BOUNDARY
	EXTENT OF WORKS BOUNDARY



<b>REFERENCE DESIGN</b>	
	BYFORD RAIL EXTENSION
ENABLING WORKS CIVIL WORKS - TEMPORARY BUS INTERCHANGE OVERALL LAYOUT PLAN	
PTA Drawing No:	11-C-04-0025
Rev:	B

REV	DATE	AMENDMENT	DSN	DRN	CHK	APP
B	14/11/22	ISSUED FOR IDD	FO	TM	YK	NM
A	5/07/22	ISSUED FOR RD	FO	TM	YK	NM
<p>ORIG SIZE A1</p> <p>AT ORIGINAL PLOT SIZE</p>						



<b>REFERENCES</b>	<b>SCALE</b>
XR01GN_SURVEY_CI_001_PCG2020 R30-DEA-CAD-ST-170-01001 XR01GN_RAIL_RESERVE_BODY_PCG2020 R30-MET-XRF-TR-100-00510 R30-MET-XRF-TR-100-00310 XR01GN_CADAstral_BODY_PCG2020 R30-MET-XRF-CI-001-0000T _LOGO_METCONNX Temp Car North_07.11.22_OPTION 1_RevA R30-MET-XRF-CI-080-00001 R30-MET-XRF-CI-200-00001_MBS	1:1000
<b>DATUM</b>	<b>VERTICAL:</b>
HORIZONTAL: PCG2020	AHD71

DESIGNED	RT
DRAWN	MBS
CHECKED	YK
APPROVED	AE
DATE	6/10/22

## Appendix B – Meeting Minutes

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# meeting minutes

Meeting details		
Meeting Title	Armadale Station Enabling Works	
Date of meeting	Wednesday, 17 August 2022	
Location	GPO Building Level 6, 3 Forrest Place, Perth 6000 and Microsoft Teams	
Attendee	Paul Sanders Carina Whittington Joy Avery Timothy Hodge Santosh Amasi Mike Andrews Attilio Romano Stephen Walker Duncan Ellis Lom Piggot	Bradley Cheaib Simon Cox Gary Merritt Fabio Otranto Mike Harris Alistair Eyres Jason Petsos Claire Sciorili Amanda Rimkus Catherine Atoms
Purpose	Review the document Letter to Metconnx Temporary Bus Interchange dated 27 July 2022 and discuss City of Armadale comments	
Distribution	Meeting attendees	
Item	Discuss	Action/Owner



1.1

Comment

1.1.1 The City, Metconnx (MX) and key stakeholders reviewed the document *Letter to Metconnx Temporary Bus Interchange* dated 27 July 2022 and discussed the City's comments, which related to:

- Engineering
- Parking
- Drainage
- Removal and Replacement of Trees
- Prior Notice for Tree Removal
- Retention of Trees
- Landscaping
- Street Lighting.

1.1.2 It was agreed the summary outcome of these can be resolved in the interim detailed design.

1.2

Actions

The following comments are in reference to the aforementioned letter.

- |       |   |       |
|-------|---|-------|
| 1.2.1 | Comments 1-4 in the letter are broader comments that would be addressed through the DA processes and landscape/arborist input.  | Noted |
| 1.2.2 | Comment 1 Engineering: MX/Transperth advised that although not ideal, placement of bus bays along Commerce Ave opposite Fourth Rd is the only feasible arrangement.   | MX    |
| 1.2.3 | MX to complete a high level traffic assessment, however buses will need to be conscious of vehicle movements.   | MX    |
| 1.2.4 | Transperth and City of Armadale were generally not supportive of restricting movements at Fourth Road to Left-in, Left-out. Also, modifications to Commerce Ave to provide temporary arrangements were not supported. | MX    |
| 1.2.5 | Transperth to Provide bus numbers and timetables for routes to Cockburn and those travelling from Fourth Road to enable traffic assessment.   | Trans |
| 1.2.6 | Provide arborist report with 'DA1'.   | MX    |
| 1.2.7 | A high-level traffic impact assessment is to be completed by MX and provided to CoA to address comment 1 – Engineering.   | MX    |
| 1.2.8 | Include signage for temporary bus station.  | Trans |





- 1.2.9 Comment 2: Parking. MX advised a separate scope of works was being coordinated with PTA regarding replacement of parking in Armadale precinct and this would likely be located to the north side of the existing train station where the existing carpark is. Noted
  
- 1.2.10 Comment 3: Drainage. Drainage along Commerce Ave is owned and operated by CoA, with Drainage within the rail reserve being PTA. However, they are connected with drainage continuing west and discharging to the west side of the Rail Reserve/Green Ave. Noted
  
- 1.2.11 MX advised the temporary bus interchange is not changing the existing drainage arrangement for this area. Noted
  
- 1.2.12 MX to provide proposed drainage plans to CoA. MX
  
- 1.2.13 MX advised there was drainage information obtained by PTA for existing drainage within the broader area, and this can be provided to PTA for information. Noted
  
- 1.2.14 CoA suggest there may be some historical drainage issues in the area. CoA suggested they could provide advice/information relating to problematic areas to MX. CoA
  
- 1.2.15 Comments 4, 5, 6: Tree removal, Tree retention. CoA are aware of the constraints of the site and acknowledge removal of trees is necessary, and support the design intent to salvage as many trees as possible. The City requested more information regarding the BRE project and overall tree removal requirements and intended tree replacement/offset and landscape strategies. This information will be necessary for development approval processes for and DA consideration. MX
  
- 1.2.16 Comment 7: Landscaping. MX to develop a basic landscape plan for the temporary bus interchange area for CoA review considering irrigation main. MX commented that there is little space available for landscaping in this area due to spatial constraints and the majority of the area being taken up by infrastructure. MX

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