Appendix J – Transport Impact Assessment Report prepared by ALUA

Victoria Park Transport Impact Assessment

Victoria Park – Canning Level Crossing Removal Program

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ARMADALE LINE UPGRADE ALLIANCE

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ARMADALE LINE UPGRADE ALLIANCE

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ARMADALE LINE UPGRADE ALLIANCE

1. Introduction

1.1 Purpose of this report

Armadale Line Upgrade Alliance (ALUA) has been commissioned by Office of Major Transport Infrastructure Delivery (OMTID) to prepare a detailed Transport Impact Assessment (TIA) for the proposed Victoria Park to Canning Level Crossing Removal (VPCLXR) project within the Town of Victoria Park (the Town). This assessment has been prepared in accordance with the Western Australian Planning Commission (WAPC) Transport Assessment Guidelines for Developments Volume 4 – Individual Developments. They key components of the TIA as per the WAPC guidelines are as follows:

- Assess the proposed access arrangements for all modes, that is, vehicle, public transport, pedestrian and cyclist;
- Assess the level of transport integration between the development and the surrounding land uses
- Determine the impacts of the traffic generated by the development on the surrounding land uses; and
- Determine the impacts of the traffic generated by the development on the surrounding transport networks.

2. Proposed development

2.1 Project description

The Victoria Park to Canning Level Crossing Removal Project (VPCLXR) will involve all design and construction of the VPCLXR works including commissioning, interconnection with the existing passenger rail line network and Final Asset Acceptance of those works.

The VPCLXR project is Perth's first major elevated rail line that will improve public transport safety, reduce traffic congestion and create new publicly accessible spaces for ongoing use by the community within the existing rail corridor. The VPCLXR project includes the following key components:

- Three sections of new elevated rail line, or viaduct, comprising piers, pier headstock and 'U trough/s'
- The removal of six (6) existing level crossings at Mint Street, Oats Street, Welshpool Road, Hamilton Street, Wharf Street and William Street
- The development of five (5) new, modern elevated train stations at Carlisle, Oats Street, Queens Park, Cannington and Beckenham
- The removal of the existing Welshpool Train Station
- New station precincts at ground plane level around each of the new train stations including bus facilities at Oats Street and Cannington Stations, patron parking and landscaping
- New ground level public realm works between station precincts incorporating public spaces and facilities

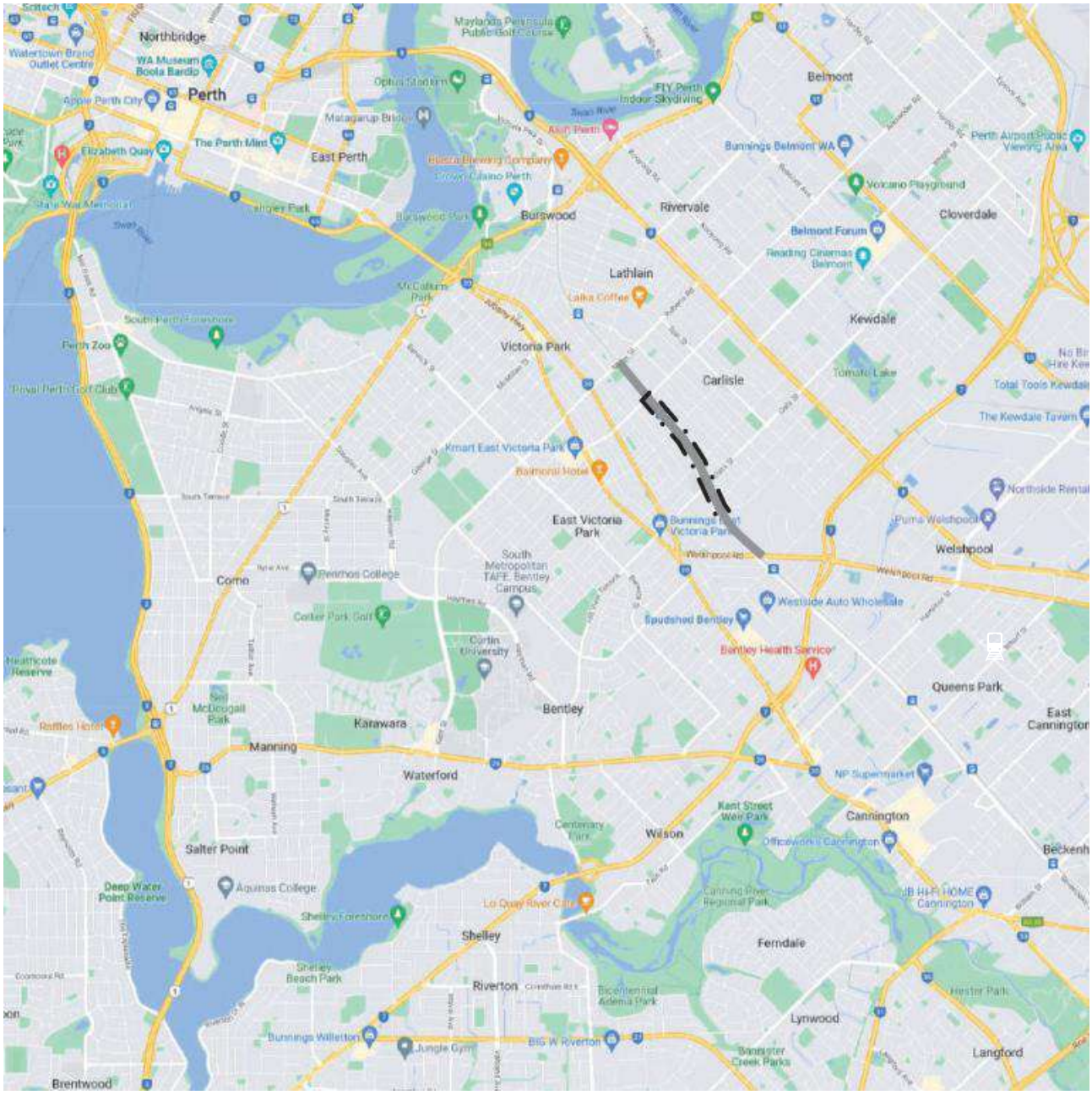
The scope of this Transport Impact Assessment is the extent of the development within the Town of Victoria Park. Within this scope, the project includes the following scope of works:

- Elevated train station at Carlisle, including ground level station entry and concourse
- Carlisle passenger Park and Ride car park
- Elevated train station at Oats Street, including ground level station entry and concourse
- Bus interchange at Oats Street
- Oats Street passenger Park and Ride car park
- At grade Principal Shared Path (PSP) modifications to augment the existing PSP adjacent to Rutland Avenue
- Public realm initiatives and improvements between the north abutment adjacent to Mint Street/ Archer Street and the southern abutment adjacent to Briggs Street, incorporating civic spaces, community activation spaces, community nodes, a nature playground, parkland, youth zone, pathways and landscaping, and
- Local road woks and intersection modifications.

2.2 Regional context

The proposed development follows the existing Armadale Train Line. The site context and location are shown in Figure 2.1 and Figure 2.2.

FIGURE 2.1 VICTORIA PARK-CANNING LEVEL CROSSING REMOVAL PROJECT, REGIONAL CONTEXT



Source: Armadale Line Upgrade Alliance, Carlisle and Oats Street Train Stations, Station Precincts and Public Realm – Development Application No. 2, 2022

FIGURE 2.2 VICTORIA PARK-CANNING LEVEL CROSSING REMOVAL PROJECT SITE

Source: Armadale Line Upgrade Alliance, Carlisle and Oats Street Train Stations, Station Precincts and Public Realm – Development Application No. 2, 2022

2.3 Major attractors/ generators

Major attractors/generators are shown in Figure 2.3.

Carlisle Station is a suburban station with limited major attractors or trip generators surrounding. The Station provides access to residents, as well as local destinations such as the Carlisle local activity centre on Archer Street, Church on Memorial Avenue, and Community Centre also on Memorial Avenue. East Victoria Park Primary School is located approximately 250m to the northwest of Carlisle Station at the corner of Mint Street and Beatty Avenue. A childcare centre is

also located to the northwest of the station, at the corner of Archer Street and Rutland Avenue. However, primary schools and childcare centres do not typically generate significant public transport patronage.

Oats Street Station is a bus/rail interchange station, with industrial land uses comprising a significant portion of the walking catchment to the east of the station. The Southern Metropolitan TAFE Carlisle Campus (South Metro TAFE) is located within the 400m radius (5 minute) walking catchment. The Aqualife Aquatic Centre, a local attraction, is also located in the walking catchment.

FIGURE 2.3 MAJOR ATTRACTORS/GENERATORS

Source: Armadale Line Upgrade Alliance, Reference Design Stage – Project Definition Report, 2022

3. Existing situation

3.1 Existing site

The existing site is the Armadale Rail Line, which includes at-grade railway tracks, associated signalling infrastructure, train stations, carparking, shared paths, and general site improvements such as landscaping. There are existing level crossings at Archer Street/ Mint Street, Oats Street and Welshpool Road. The existing station facilities including car parking provision for Carlisle and Oats Street stations are summarised in Table 3.1.

TABLE 3.1 CARLISLE AND OATS STREET EXISTING STATION FACILITIES

	CARLISLE STATION	**OATS STREET STATION**
PLATFORM TYPE	Island platform with four access points	Marginal platform with a total of seven access points
BUS INTERCHANGE	No bus interchange	4 active bus stands
CAR PARKING	57 car bays (inclusive of two ACROD bays and one PTA/Transperth only bay) located on the southern side of the station	75 car bays (inclusive two ACROD bays) and motorcycle parking
KISS 'N' RIDE	No formal kiss 'n' ride	No formal kiss 'n' ride
BICYCLE PARKING	2 bicycle parking spaces within 2 adjoining single-use lockers, located in the car park on the southern side of the station	36 bicycle parking spaces split between 2 bicycle shelters, with 1 shelter each on the northern and southern sides of the station

FIGURE 3.1 EXISTING CARISLE STATION LAYOUT

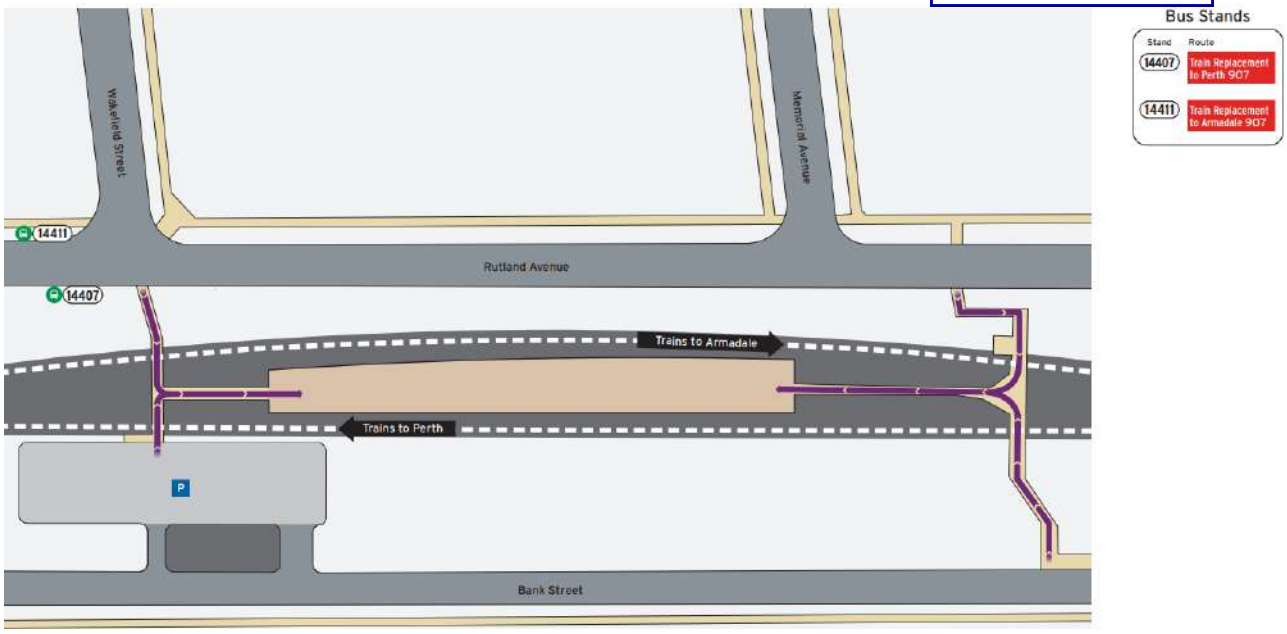
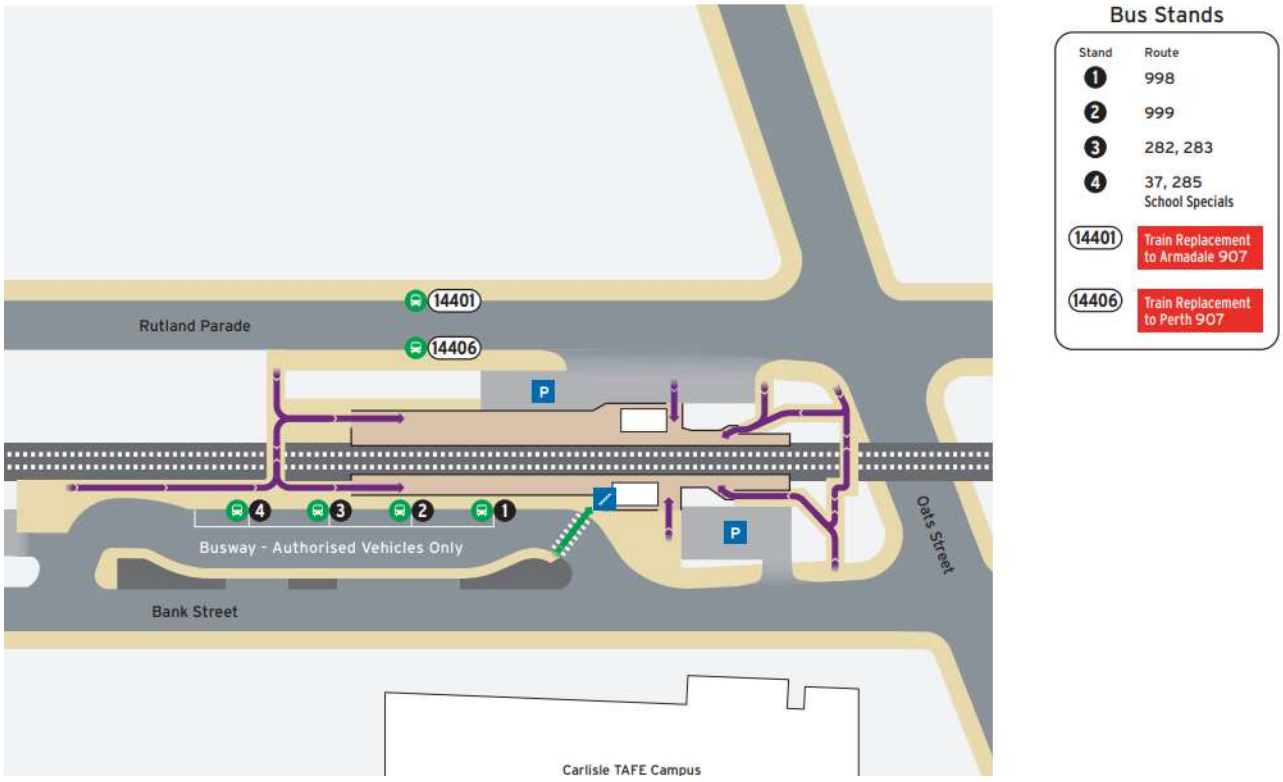


FIGURE 3.2 EXISTING OATS STREET STATION LAYOUT



Car parking demand at stations

Existing car parking facilities and access is discussed in Section 4.1, presented in a discussion of existing station facilities.

Existing car parking occupancy for each station is shown in Table 3.2. Note, occupancy data was collected in different years but is considered suitably similar for this purpose. For Carlisle Station, the data indicates that the facility provides for present demand as well as being capable of providing for some additional activity at the Station. For Oats Street Station, occupancy data indicates turnover and multiple uses of individual bays during an average weekday, rather than sole daily occupancy by an individual vehicle.

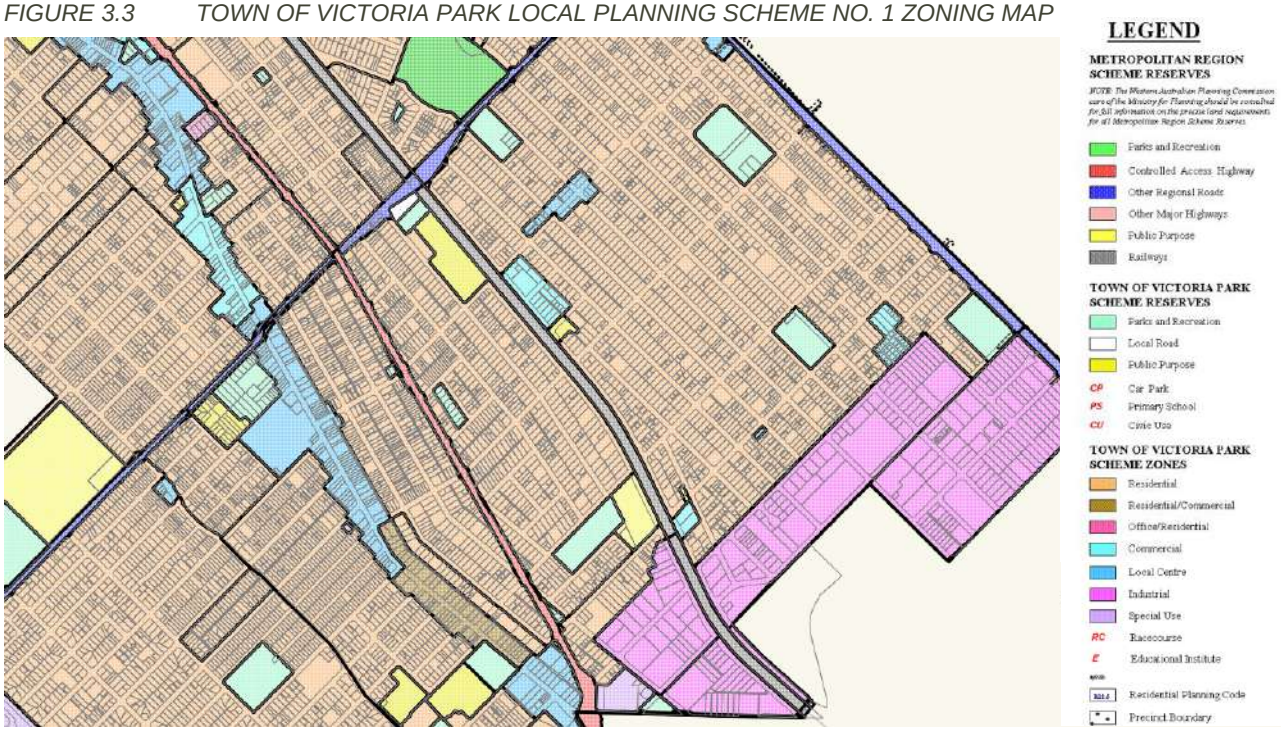
TABLE 3.2 PARK N RIDE EXISTING UTILISATION (AVERAGE WEEKDAY USEAGE 13-17 MARCH)

STATION	OCCUPANCY	PAY & DISPLAY	SMARTPARKER	TOTAL	%SMARTPARKER	YEAR
Carlisle	93%	17	38	56	69%	2017
Oats Street	110%	15	65	81	81%	2019

3.2 Existing land use

The Town's Local Planning Scheme No. 1 is shown in Figure 3.3. The site is shown as railway between Miller Street and Welshpool Road.

FIGURE 3.3 TOWN OF VICTORIA PARK LOCAL PLANNING SCHEME NO. 1 ZONING MAP



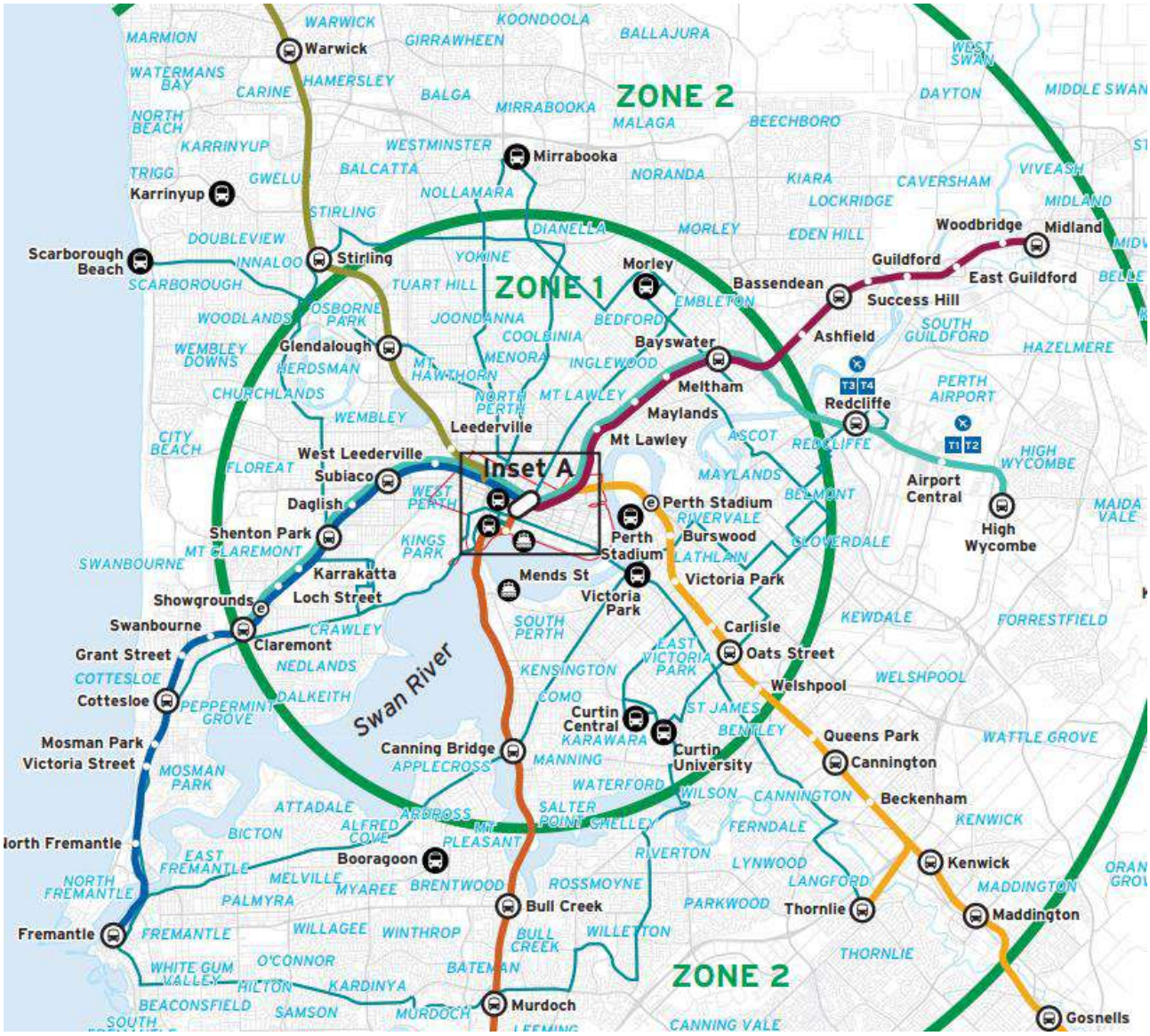
Source: Town of Victoria Park Intramaps, Accessed November 2022

3.3 Existing public transport

The existing public transport network within the plan area includes the Armadale Rail Line, Carlisle Station, Oats Street Station and its bus interchange. The Stations are located within Zone 1 of the Transperth fare system, as shown in Figure 3.4. The bus routes for the plan area and surrounds

are shown in Figure 3.5 (note: bus route network maps are currently being updated by PTA, hence this figure may contain outdated information).

FIGURE 3.4 PERTH FARE ZONE MAP



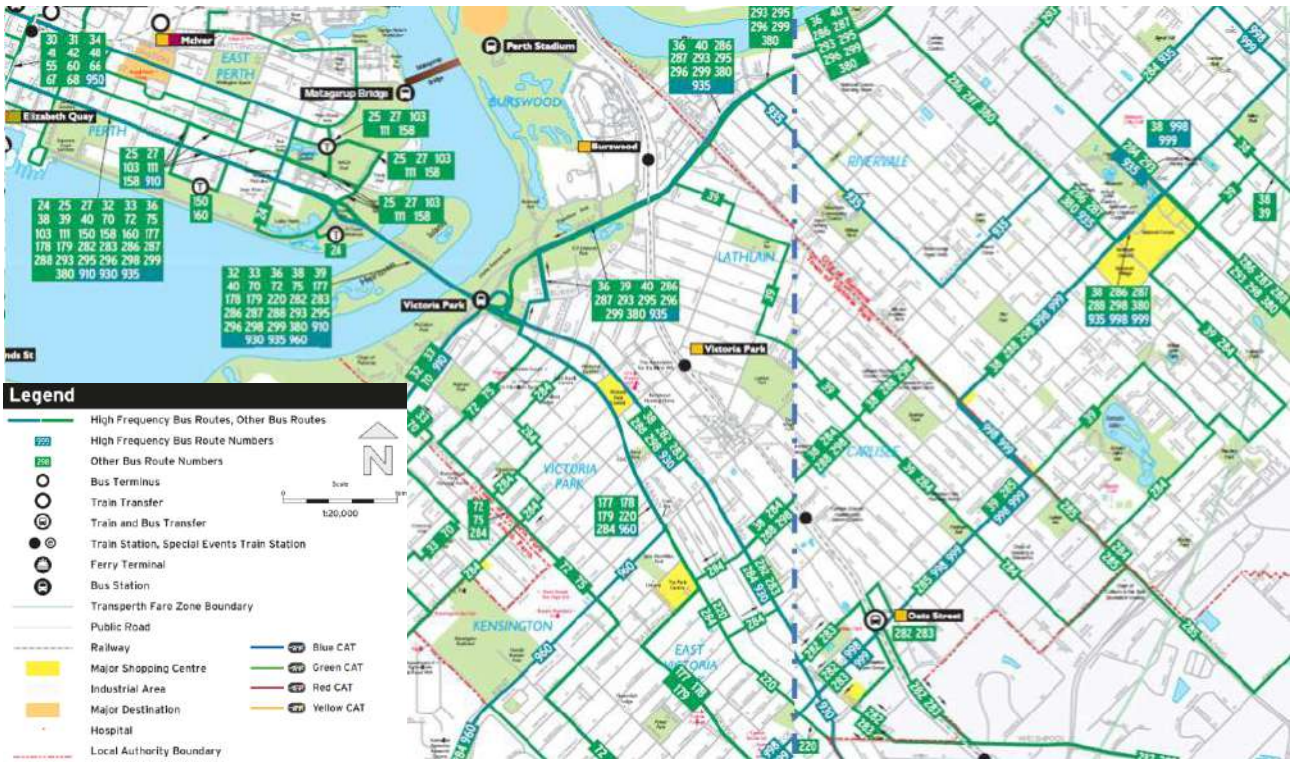
Source: PTA, 2022 (accessed December 2022)

There is no direct bus access to Carlisle Station other than rail replacement buses. Bus stops on Archer Street can be used to access the Station, with evidence showing that most typically these transfer trips are from patrons using suburban bus routes 38, 288 and 298. Total mode share for bus access to Carlisle Station is 5% (PTA, Carlisle Station Access Strategy Update, 2021), with the total volume being 21 trips. Bus route 288 and 289 have been discontinued following the introduction of the Airport rail service.

Bus routes servicing Oats Street Station Bus Interchange support a substantial volume of bus transfers to Oats Street Station, primarily the high-frequency Circle Route services, the 998 and 999. Total mode share for bus access to Oats Street Station is 36%, or an approximate total

volume of 607 trips. Many buses that serve Oats Street Bus Interchange also provide an opportunity for bus-to-bus trips.

FIGURE 3.5 EXISTING SURROUNDING PUBLIC TRANSPORT ENVIRONMENT



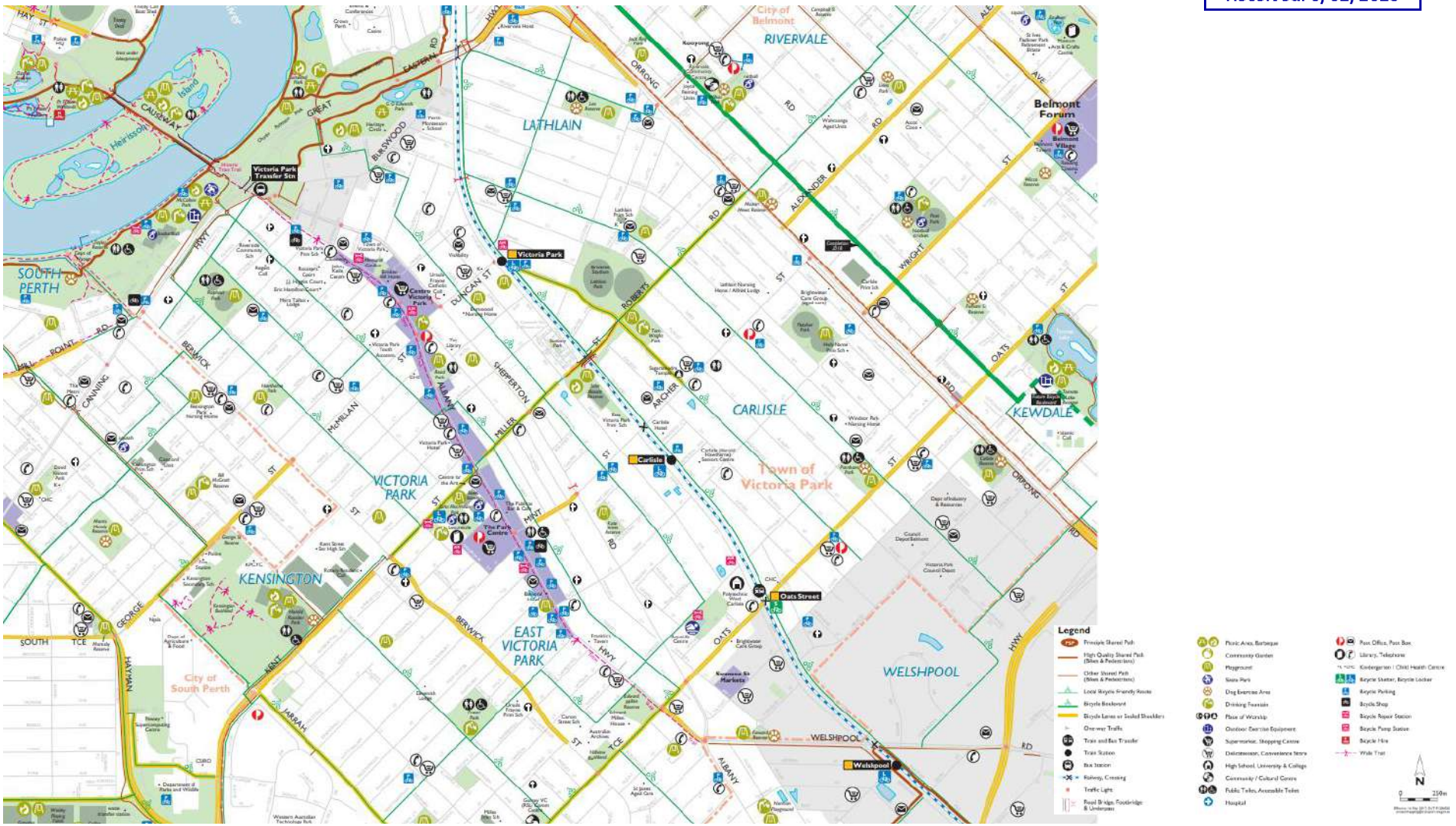
Source: PTA Network Map 5 and 6, accessed November 2022.

3.4 Existing walking and cycling network

The Town's walking and cycling network is shown in Figure 3.6. Since publication of the map in 2017, construction has been completed on the Principal Shared Path (PSP) between Miller Street/ Roberts northeast of Carlisle Station, linking to Oats Street and Welshpool Stations. The PSP is permeable, with many access points for people riding and walking. Kerb ramp entries to the path are generally provided at intersections to connect the PSP to the surrounding path network. Vehicle crossovers for maintenance vehicle access are also likely used for wheeled access to the PSP.

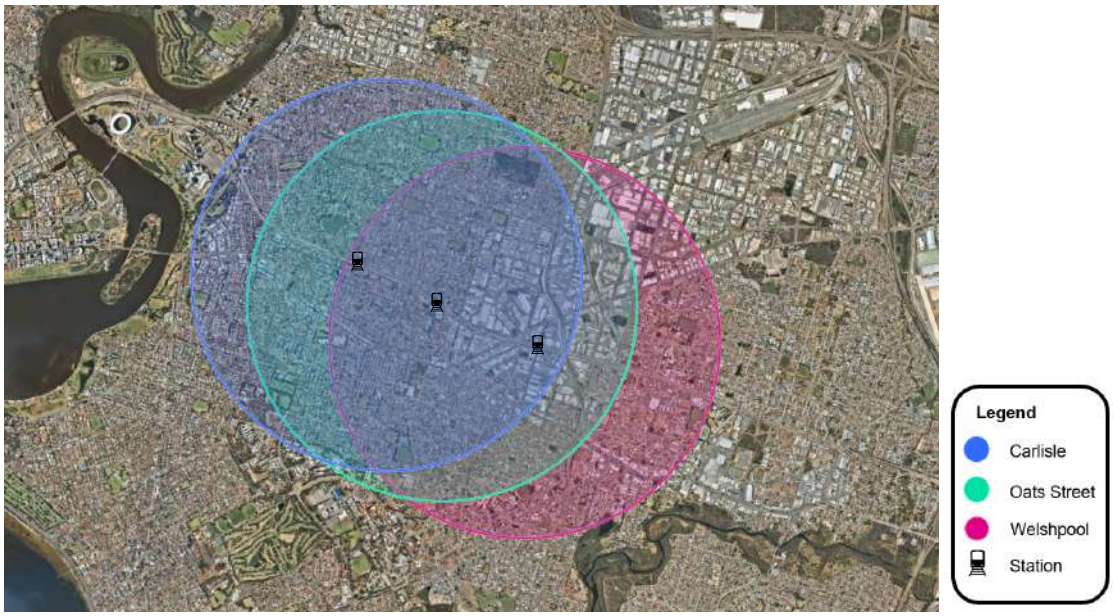
In addition to the PSP, the plan area and surrounds are served by networks of local paths on at least one side of most local streets. A 10-minute cycling catchment translates to an approximate 2.5km radius from a station. The 10- minute cycling catchment for each station is shown in Figure 3.7. Currently, people using the path network cross the rail line at-grade via mazes. Mazes require people on bikes to dismount and are difficult to manoeuvre through for people with prams and mobility devices.

FIGURE 3.6 TOWN OF VICTORIA PARK WALKING AND CYCLING MAP (2017)



Source: Town of Victoria Park and Department of Transport, TravelSmart Map (accessed November 2022)

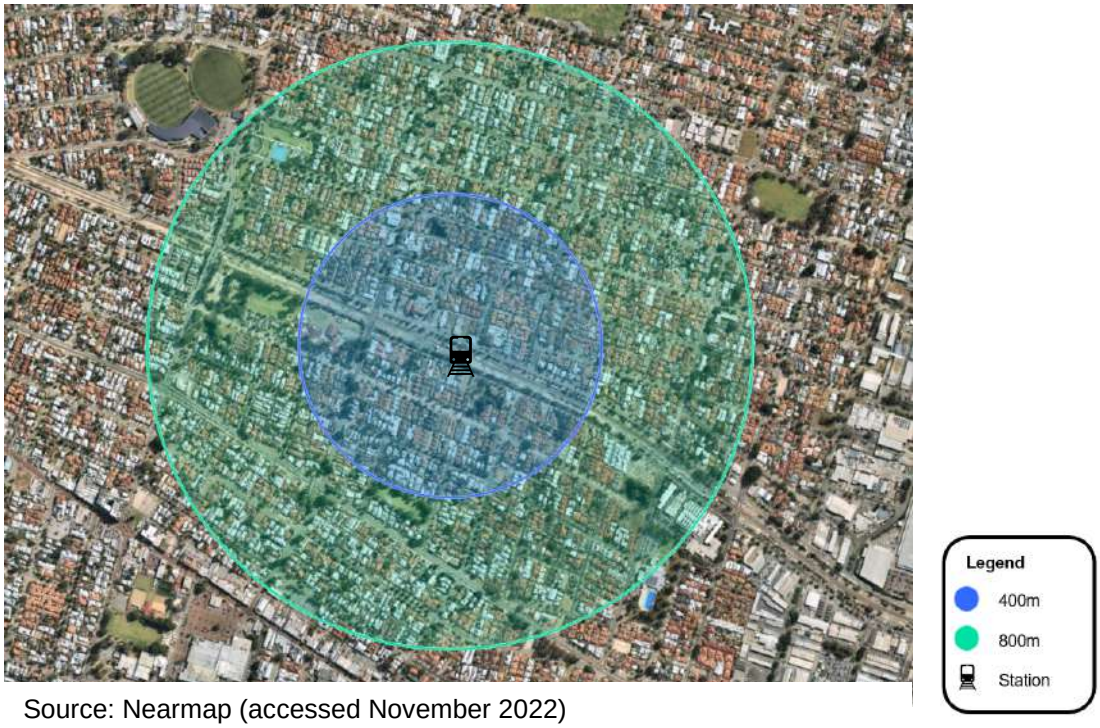
FIGURE 3.7 10-MINUTE CYCLING CATCHMENT FOR CARLISLE, OATS STREET AND WELSHPOOL STATIONS



Source: Nearmap (accessed November 2022)

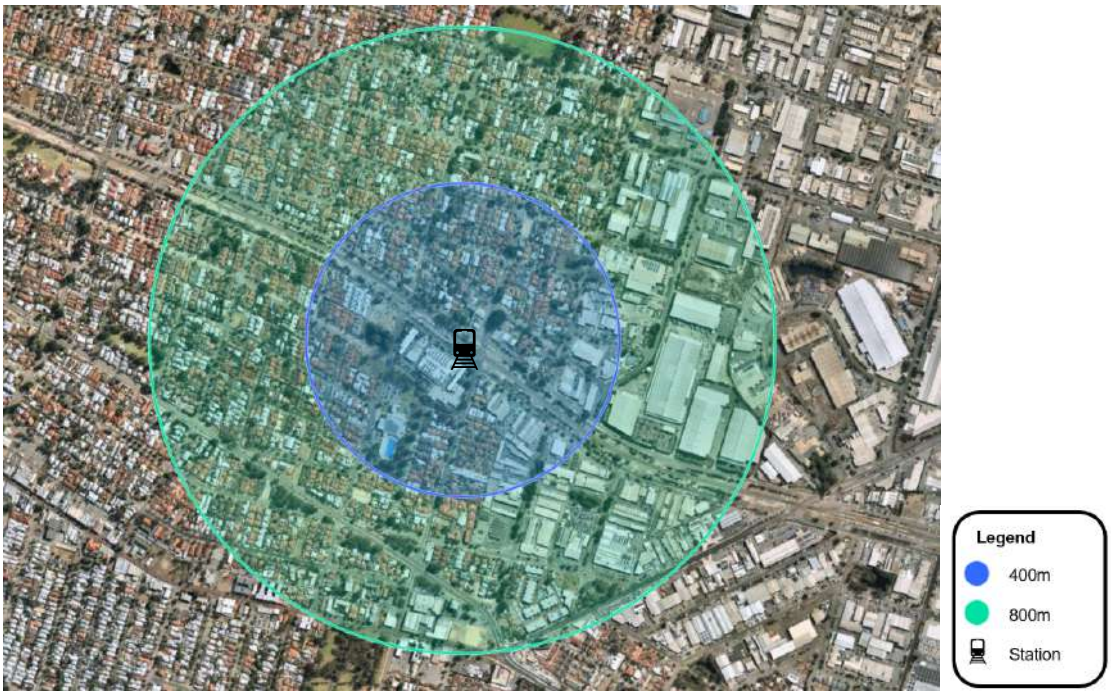
The walking catchments for the Carlisle Station, Oats Street Station and Welshpool Station are shown in Figure 3.8, Figure 3.9 and Figure 3.10 below. The figures show a 400m radius around each station for an approximate 5-minute walking time and an 800m radius around each station for an approximate 10-minute walking time.

FIGURE 3.8 CARLISLE STATION WALKING CATCHMENT 400M AND 800M RADIUS



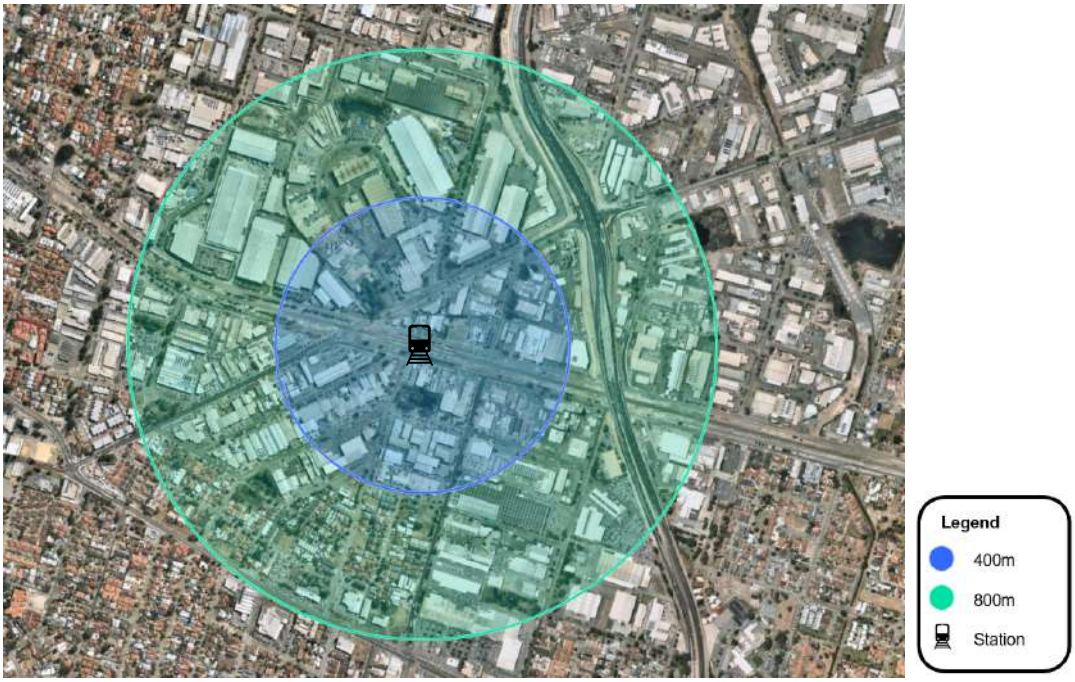
Source: Nearmap (accessed November 2022)

FIGURE 3.9 OATS ST STATION WALKING CATCHMENT 400M RADIUS AND 800M RADIUS



Source: Nearmap (accessed November 2022)

FIGURE 3.10 WELSHPOOL STATION WALKING CATCHMENT 400M AND 800M RADIUS

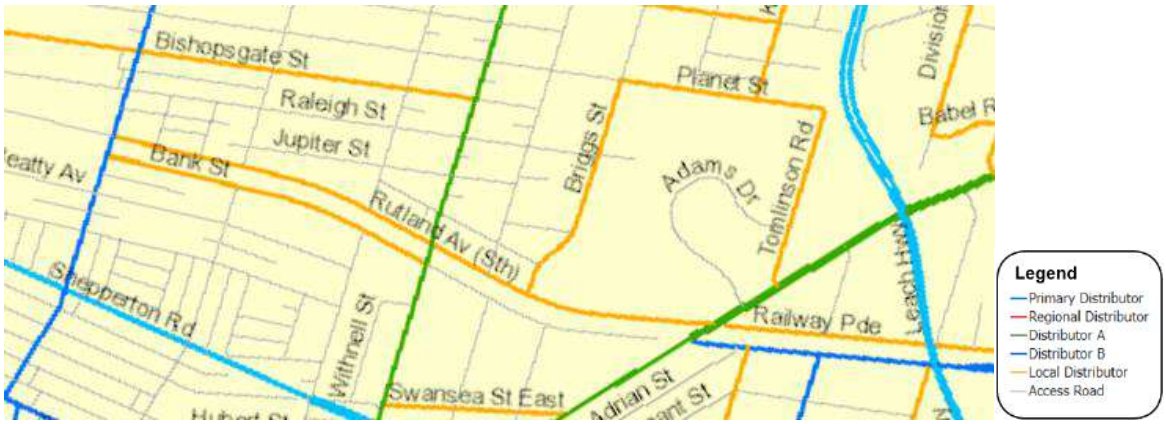


Source: Nearmap (accessed November 2022)

3.5 Existing road network

The road network hierarchy for the site is shown in Figure 3.11.

FIGURE 3.11 ROAD NETWORK HIERARCHY



Source: Main Roads WA Road Information Mapping System (accessed November 2022)

Level crossings are to be replaced with elevated rail over Archer-Mint Street (Distributor B), Oats Street (Distributor A) and Welshpool Road (Distributor A).

The existing speed limits on the road network surrounding the site area is shown in Figure 3.12. The road network surrounding the site is typically 50km/hr, the default speed for built up areas. Welshpool Road has a speed limit of 60km/hr.

FIGURE 3.12 EXISTING SPEED LIMITS

Source: Main Roads WA Road Information Mapping System (accessed November 2022)

3.6 Existing traffic volumes

The existing traffic volumes surrounding the site are detailed in Table 3.3 to Table 3.6.

TABLE 3.3 EXISTING TRAFFIC VOLUMES FOR ARCHER STREET/ RUTLAND AVENUE

Road	Direction	Location	Daily (VPD)	HV content	AM peak (VPH)	PM peak (VPH)
Archer Street	Westbound	West of Rutland Ave	4958	2.44%	421	484
Archer Street	Eastbound	West of Rutland Ave	5228	2.62%	391	504
Archer Street	Westbound	East of Rutland Ave	4857	2.45%	401	464
Archer Street	Eastbound	East of Rutland Ave	5032	2.7%	392	485
Rutland Avenue	Northbound	North of Archer St	145	0.6%	12	18
Rutland Avenue	Southbound	North of Archer St	142	1.40%	26	10
Rutland Avenue	Northbound	South of Archer St	701	2.28%	61	87
Rutland Avenue	Southbound	South of Archer St	793	2.14%	54	87

TABLE 3.4 EXISTING TRAFFIC VOLUMES FOR MINT STREET/ BANK STREET

Road	Direction	Location	Daily (VPD)	HV content	AM peak (VPH)	PM peak (VPH)
Mint Street	Westbound	West of Bank St	4775	2.53%	393	474
Mint Street	Eastbound	West of Bank St	4975	2.55%	395	454
Mint Street	Westbound	East of Bank St	4958	2.33%	421	484
Mint Street	Eastbound	East of Bank St	5228	2.62%	391	504
Bank Street	Northbound	South of Mint St	960	1.66%	93	112
Bank Street	Southbound	South of Mint St	890	1.23%	125	72

TABLE 3.5 EXISTING TRAFFIC VOLUMES FOR OATS STREET/ RUTLAND AVENUE

Road	Direction	Location	Daily (VPD)	HV content	AM peak (VPH)	PM peak (VPH)
Oats Street	Westbound	West of Rutland Ave	6297	4.36%	667	567
Oats Street	Eastbound	West of Rutland Ave	5428	4.99%	415	521
Oats Street	Westbound	East of Rutland Ave	5842	3.93%	629	537
Oats Street	Eastbound	East of Rutland Ave	5102	4.03%	383	477
Rutland Avenue	Northbound	North of Oats St	723	2.62%	52	90
Rutland Avenue	Southbound	North of Oats St	939	2.55%	76	92
Rutland Avenue	Northbound	South of Oats St	1128	5.76%	88	95
Rutland Avenue	Southbound	South of Oats St	1215	7.40%	106	111

TABLE 3.6 EXISTING TRAFFIC VOLUMES FOR OATS STREET/ BANK STREET

Road	Direction	Location	Daily (VPD)	HV content	AM peak (VPH)	PM peak (VPH)
Oats Street	Westbound	West of Bank St	5052	4.94%	498	489
Oats Street	Eastbound	West of Bank St	4456	4.64%	378	408
Oats Street	Westbound	East of Bank St	6297	4.36%	667	567
Oats Street	Eastbound	East of Bank St	5428	4.99%	415	521
Bank Street	Northbound	North of Oats St	1525	11.01%	165	140
Bank Street	Southbound	North of Oats St	1304	15.1%	107	150
Bank Street	Northbound	South of Oats St	1489	5.23%	104	166
Bank Street	Southbound	South of Oats St	1541	4.47%	178	141

Existing intersection performance

The existing network operational results summaries for Mint-Archer Street and Oats Street are provided in Table 3.7 and Table 3.8 below. These tables indicate an acceptable level of performance; however the accompanying reports notes that extensive queueing is observed. This queuing typically results when boomgates are lowered for an extended period. The report also notes that boomgates were commonly lowered in excess of 80 seconds, particularly during the AM peak. This would be classified as a **level of service F** by SIDRA.

TABLE 3.7 MINT-ARCHER NETWORK OPERATIONAL RESULTS SUMMARY

Scenario	Demand Flows	Degree of Saturation	Total Travel Time (veh-h)	Total Control Delay	Level of Service
AM Peak	2,737	.315	26.4	3.48	A
PM Peak	3,276	.382	28.5	3.33	B

Source: PTA, Mint-Archer Street Level Crossing Removal Base Case SIDRA Traffic Modelling Report, 2022

TABLE 3.8 OATS STREET NETWORK OPERATIONAL RESULTS SUMMARY

Scenario	Demand Flows	Degree of Saturation	Total Travel Time (veh-h)	Total Control Delay	Level of Service
AM Peak	3,733	.655	42.4	11.98	C
PM Peak	3,815	.991	45.3	13.55	C

Source: PTA, Oats Street Level Crossing Removal Base Case SIDRA Traffic Modelling Report, 2022

3.7 Crash data

The crash data surrounding the site is shown in Figure 3.13. The crash data for Rutland Avenue and Bank Street including type of crash, crash severity and frequency between 2017-2021 is summarised in Table 3.9. No fatalities have been recorded. Approximately 27 crashes of varying severity were recorded at the intersections of Oats Street and Rutland Avenue and Oats Street and Bank Street, indicating that the current at-grade crossing situation can be improved.

FIGURE 3.13 CRASH DATA MAP

Source: Main Roads WA Crash Map (accessed November 2022)

TABLE 3.9 RUTLAND AVENUE, BANK STREET AND INTERSECTIONS WITH OATS STREET AND ARCHER STREET / MINT STREET CRASH DATA 2017-2021

CRASH TYPE	CRASH SEVERITY				
	PROPERTY DAMAGE (MINOR)	PROPERTY DAMAGE (MAJOR)	MEDICAL ATTENTION	HOSPITAL	FATAL
HIT PEDESTRIAN	0	0	0	1	0
HIT OBJECT	1	1	0	1	0
REAR END	4	7	0	2	0
RIGHT ANGLE	9	20	3	0	0
RIGHT TURN THROUGH	0	2	0	0	0
SIDESWIPE (SAME DIRECTION)	2	3	0	0	0
OTHER	1	3	0	0	0
TOTAL	17	36	3	4	0

4. Proposed internal transport networks

This section focuses on direct access to the stations via walking and riding, public transport, and from park 'n' ride facilities. Each upgraded station will have a concourse level providing access to elevated platforms.

4.1 Public transport

Station facilities

The upgraded station facilities for each station are summarised in Table 4.1 and Table 4.2 below.

TABLE 4.1 CARLISLE STATION FUTURE FACILITIES

	CARLISLE STATION - EXISTING	CARLISLE STATION - FUTURE
PLATFORM TYPE	Island platform with four access points	Marginal platform with three access points from the concourse for each platform (two lifts and one stairs each)
BUS INTERCHANGE	No bus interchange	No change
CAR PARKING	57 car bays (inclusive of two ACROD bays and one PTA/Transperth only bay) located on the southern side of the station	No change
KISS 'N' RIDE	No formal kiss 'n' ride	Two kiss 'n' ride bays
BICYCLE PARKING	Two bicycle parking spaces individually lockable bicycle lockers, located in the car park on the southern side of the station	18 bicycle parking spaces in bike storage room at the northern side of the station

TABLE 4.2 OATS STREET STATION FUTURE FACILITIES

	OATS STREET STATION - EXISTING	OATS STREET STATION - FUTURE
PLATFORM TYPE	Marginal platform with a total of seven access points	Marginal platform with a total of four access points each per platform (two lifts and two stairs each)
BUS INTERCHANGE	Four active bus stands	Eight active bus stands and four layover bays
CAR PARKING	75 car bays (inclusive two ACROD bays) and motorcycle parking	100 car parking bays (inclusive of ACROD bays)
KISS 'N' RIDE	No formal kiss 'n' ride	5 kiss 'n' ride bays

BICYCLE PARKING	36 bicycle parking spaces in two bicycle shelters, with one each on the northern and southern side of the station	108 bicycle parking spaces in two bike shelters and twelve u-rails

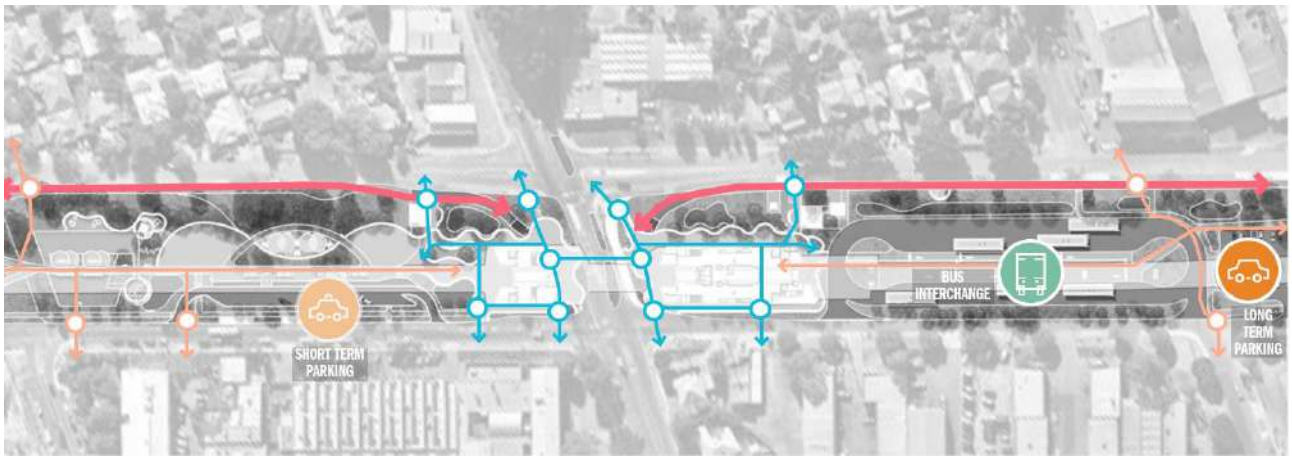
Welshpool Station (within the City of Canning) is being removed due to poor patronage. A proposed bus route between Oats Street Station and Cannington Station would connect the existing station catchment to rail services.

Bus interchange

The bus interchange at Oats Street will provide for eight active bus stands and four layover bays.

The key desire line between the bus transfer and station is shown in Figure 4.2 in the following section. The key desire lines for local direct access to the bus station are shown in Figure 4.1.

FIGURE 4.1 LOCAL ACCESS TO OATS STREET BUS STATION



The current and future bus routes using the interchange are summarised in Table 4.3 below. Note all frequencies are estimates.

TABLE 4.3 OATS STREET BUS INTERCHANGE BUS ROUTE FREQUENCIES

Route number	Peak/Interpeak	Current (2022) frequencies	Future frequencies (2036)
ROUTE 37	Peak	~20 min	~10 min
	Interpeak	~60 min	~30 min
ROUTE 282	Peak	~30 min	~20 min
	Interpeak	~60 min	~60 min
ROUTE 282	Peak	~30 min	~20 min
	Interpeak	~60 min	~60 min

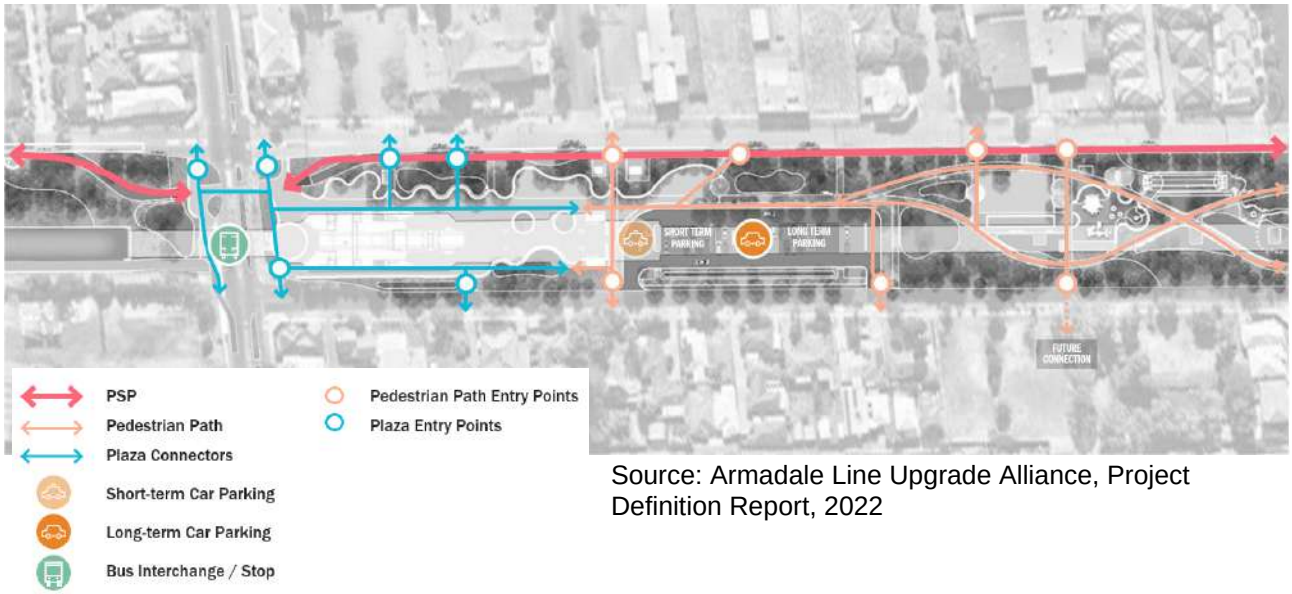
Route number	Peak/Interpeak	Current (2022) frequencies	Future frequencies (2036)
ROUTE 283	Peak	~30 min	~20 min
	Interpeak	~60 min	~60 min
ROUTE 285	Peak	Limited	~20 min
	Interpeak	Limited	~60 min
ROUTE 286 (note: this service is currently unfunded)	Peak	No service	~10 min
	Interpeak	No service	~30 min
ROUTE 998	Peak	~10 min	~ 5min
	Interpeak	~15 min	~ 10 min
ROUTE 999	Peak	~10 min	~ 5min
	Interpeak	~15 min	~ 10 min

Source: Information provided by PTA (November 2022)

4.2 Walking and cycling

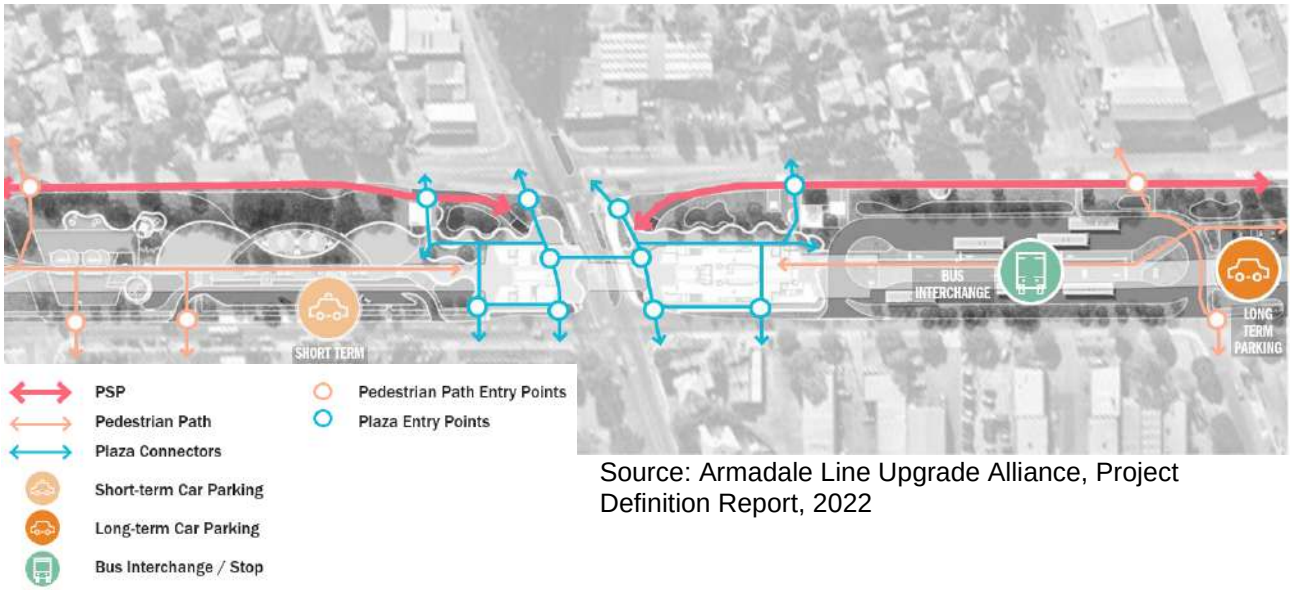
The key pedestrian desire line access points to Carlisle and Oats Street Stations are shown in Figure 4.2 and Figure 4.3. These show the connection of paths to the wider pedestrian network which is used to access local destinations.

FIGURE 4.2 CARLISLE STATION PEDESTRIAN DESIRE LINES



Source: Armadale Line Upgrade Alliance, Project Definition Report, 2022

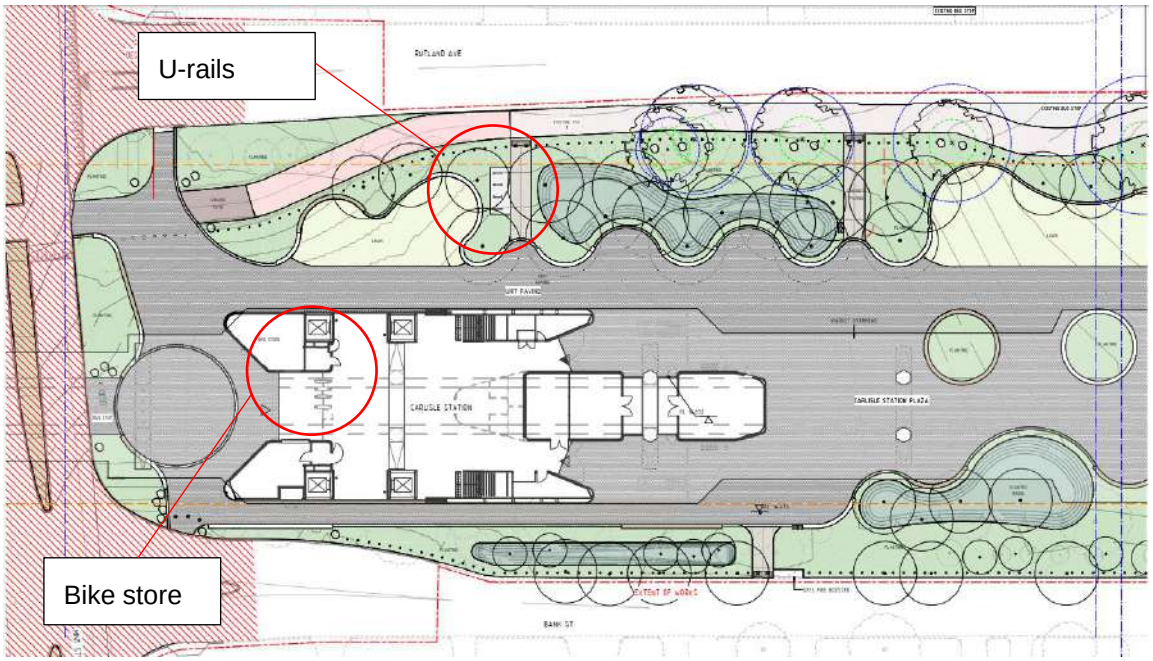
FIGURE 4.3 OATS STREET STATION PEDESTRIAN DESIRE LINES



Source: Armadale Line Upgrade Alliance, Project Definition Report, 2022

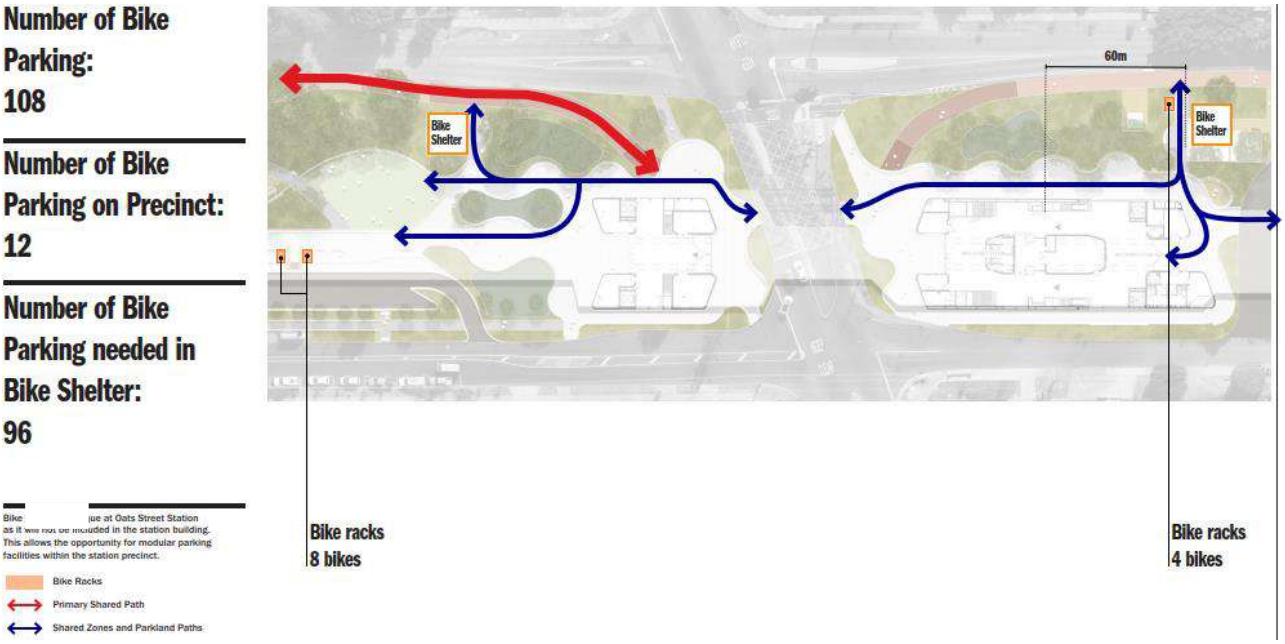
Bicycle storage locations are in visible areas and close to key cycling routes (particularly the PSP) as well as station entry points. Bicycle parking locations for Carlisle Station and Oats Street Station are shown in Figure 4.4 and Figure 4.5.

FIGURE 4.4 CARLISLE STATION BICYCLE PARKING



Source: Armadale Line Upgrade Alliance, Urban Design and Landscape General Arrangement, 2022

FIGURE 4.5 OATS STREET STATION BICYCLE PARKING



Source: Armadale Line Upgrade Alliance, Design Report – Oats Street Package 2022

U-rails for bicycle parking are also provided throughout the linear park close to key community facilities, such as Mungyte Place and Puggle Playground.

4.3 Parking

The development will not change the park 'n' ride parking for Carlisle Station. Park 'n' ride availability at Oats Street Station will be increased. The proposed development will also formalise kiss 'n' ride for both stations. The existing quantum of parking and proposed quantum of parking for each station is summarised in Table 4.4 and Table 4.5 below. Car parking locations and layouts for each station are shown in Figure 4.6 to Figure 4.10. Layout images are extracted from the location view. Car parks are designed to be compliant with requirements for the provision of ACROD parking spaces. Path access between parking areas and stations are provided for all parking areas.

TABLE 4.4 CARLISLE EXISTING AND PROPOSED PARKING

	EXISTING	**PROPOSED**
PARK 'N' RIDE	57 bays	57 bays (no change)
ACROD	2 ACROD bays	2 ACROD bays (no change)
KISS 'N' RIDE	No formalised kiss 'n' ride bays	2 kiss 'n' ride bays
VEHICLE ACCESS	2 access points on Bank Street	2 access points on Bank Street

TABLE 4.5 OATS STREET EXISTING AND PROPOSED PARKING

	EXISTING	**PROPOSED**
PARK 'N' RIDE	73 bays	100 bays
ACROD	2 ACROD bays	2 ACROD bays (no change)
KISS 'N' RIDE	No formalised kiss 'n' ride bays	6 kiss 'n' ride bays
VEHICLE ACCESS	2 parking lots West: entry and exit via Bank Street. One access point, unidirectional, with separate exit point East: Access from Rutland Avenue. Poorly defined entry/exit points, many bays likely accessed directly from the street	2 parking lots, both with entry/exit points on Bank Street

FIGURE 4.6 CARLISLE STATION PARKING LOCATION

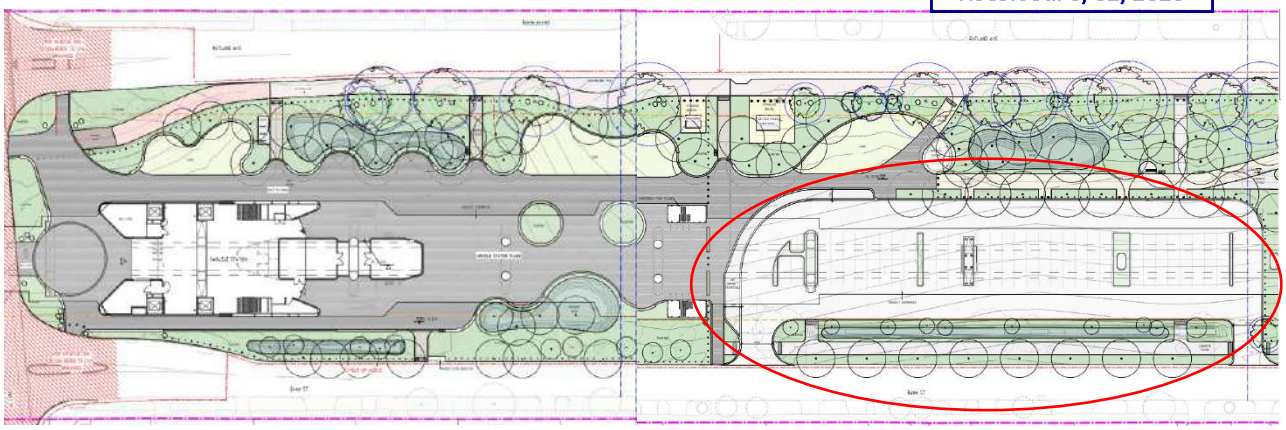


FIGURE 4.7 CARLISLE STATION CAR PARKING LAYOUT

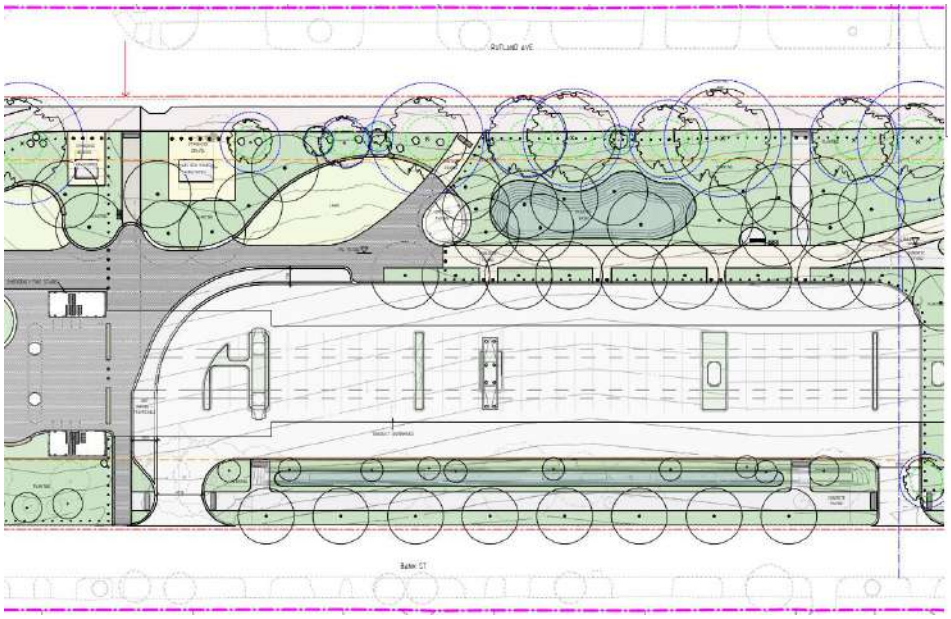


FIGURE 4.8 OATS STREET STATION CAR PARKING LOCATION AND LAYOUT 1

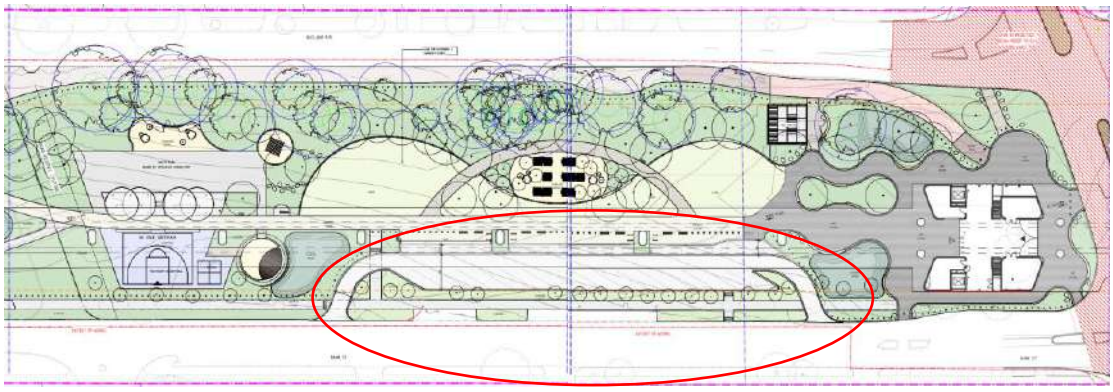


FIGURE 4.9 OATS STREET STATION CAR PARKING LOCATION 2

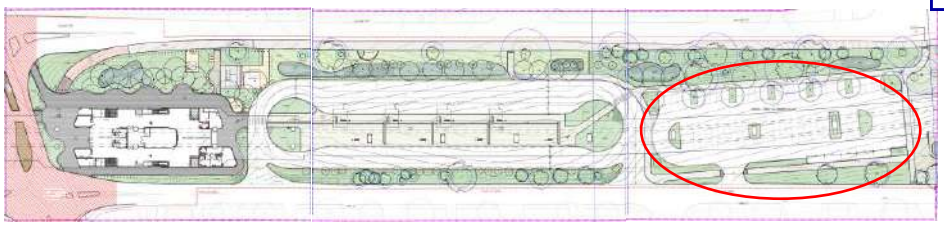
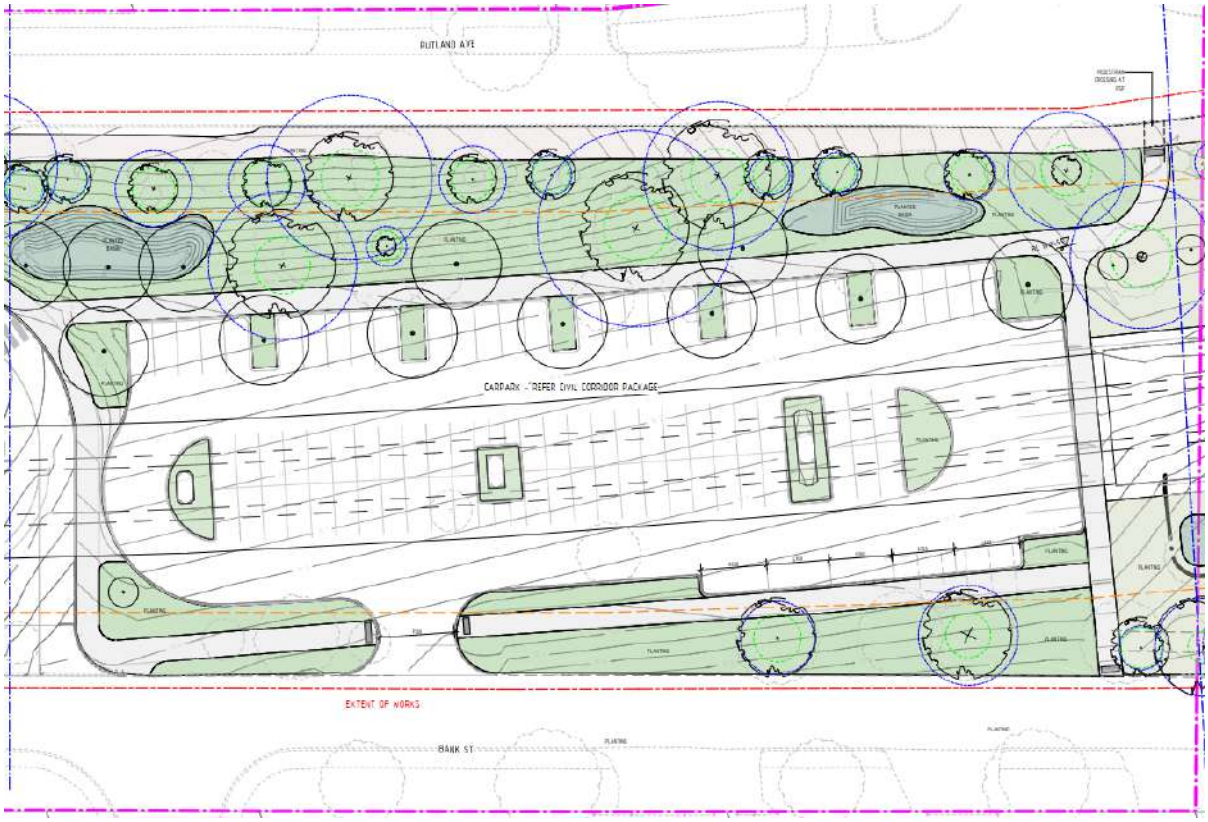


FIGURE 4.10 OATS STREET STATION CAR PARKING LAYOUT 2



Parking demand

Parking at stations is provided to support a limited degree of Park n Ride in line with the relevant Station Access Strategy. The Access Strategies determine that the number of bays will support car parking demand as shown in Table 4.6.

TABLE 4.6 2031 PARKING DEMAND AND PROPOSED SUPPLY

STATION	2031 DEMAND	PARKING PROVISION
Carlisle	59	57
Oats Street	195	100

Travel demand management

The latent demand for parking is likely higher than the existing and proposed supply of parking. Parking at both stations is provided as a fixed constraint, which will help to induce mode shift away from driving and parking. To support access by riding, walking and bus, a Movement Strategy has been developed for the project, as well as updated Station Access Strategies for each Station.

The Movement Strategy is provided in Appendix F (Design Report – Oats Street Package) of this Development Application. The Movement Strategy deals with circulation and access around the site for active modes, including aligning the PSP on the eastern corridor and vehicle movements (car park entries and bus access) on the western side of the corridor, as well as the development of a recreational path network throughout the site. The PSP Crossing Strategy seeks to reduce pedestrian and cyclist conflicts by allowing faster cyclists a safe, direct path along the edge of the transport corridor and slower, recreational cyclists and pedestrians using the path network within the corridor centre.

PTA's Station Access Strategies are developed for each station. These strategies consider how passengers currently travel to stations and suggest key improvements to station access infrastructure that can improve journeys by riding, walking and bus. In line with this project, updated Station Access Strategies are being produced.

4.4 Provision for service vehicles

A maintenance track is provided to the rail line when this runs at ground level between Victoria Park Station and Carlisle Station. Service vehicle access to the maintenance track is over the PSP on Rutland Avenue (See Figure 4.11).

Service vehicle access is also available to Station forecourts via concrete paths and hardstand areas with general access restricted via retractable bollards. It may also be appropriate for service vehicles to park in short stay parking/designated loading zones.

FIGURE 4.11 SERVICE VEHICLE ACCESS TO MAINTENANCE TRACK

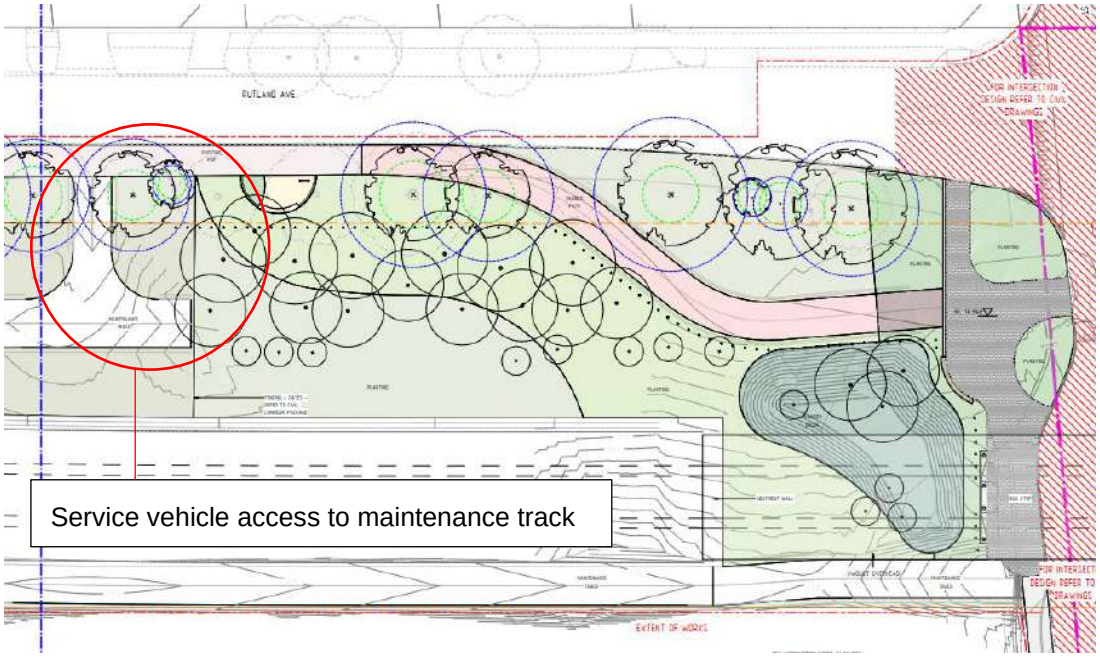
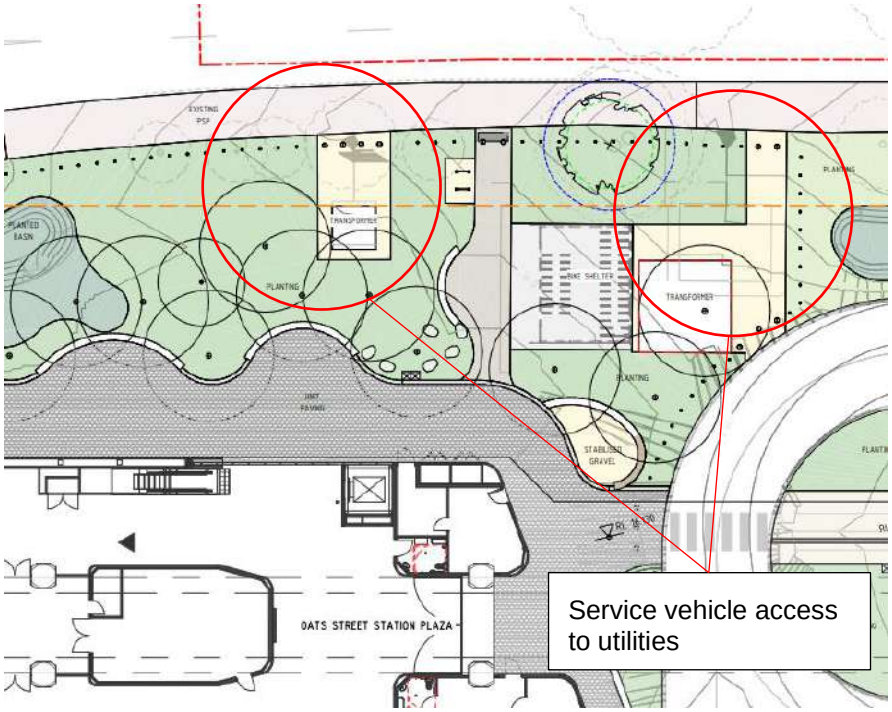


FIGURE 4.12 SERVICE VEHICLE ACCESS TO UTILITIES, OATS STREET STATION



5. Changes to external transport network

This section focuses on changes affecting access to the site, as well as a brief overview of related projects in the external realm that are likely to affect the development area.

5.1 Public transport

A proposed (unfunded) bus route operating between Oats Street Station and Cannington Station (City of Canning) would serve the walkable catchment of Welshpool Station within the Welshpool Industrial Area. The route is proposed to operate on weekdays with a 15-minute peak frequency and 60-minute off-peak frequency.

Additionally, the Oats Street Station Access Strategy Update (PTA, 2021) outlines that there is potential for a range of different connections if there is capacity available for improved operations, including:

- Alterations to services that presently provide suburban connections through Belmont with the potential for connection to Redcliffe Station on the Forrestfield Airport Line.

This change is expected to have minimal overall impact on the public transport catchment to the plan area. Increased bus services will support the increase in rail patronage numbers.

5.2 Walking and cycling network

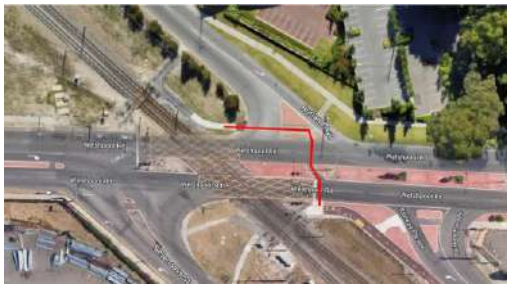
The quality of the cycling corridor provided by the Principal Shared Path (PSP) will be significantly improved as part of the development, which will also improve the amenity and safety of the route.

The PSP is maintained on the eastern side of the rail corridor and disruptions by vehicle and bus movements are minimised by the designs, with these movements typically occurring on the western side of the corridor.

In addition to the elevated rail removing trains from the at-grade context, the relationship between vehicles and people walking and riding at key intersections will be improved. The existing intersection layouts and proposed improvements are summarised in Table 5.1 below.

TABLE 5.1 INTERSECTION IMPROVEMENTS FOR WALKING AND CYCLING

INTERSECTION	EXISTING	PROPOSED
ARCHER STREET/ MINT STREET/ RUTLAND AVENUE/ BANK STREET	Archer Street and Rutland Intersection (facing south)  Pedestrian maze requiring cyclists to dismount	Raised Wombat Crossing at Principal Shared Path crossing of Archer Street, example:

	 Mint and Bank Street (facing north) 	 Existing median traffic islands with cut throughs retained, for example Mint Street south of Bank Street 
OATS STREET/ RUTLAND AVENUE /BANK STREET	Median crossing islands with pedestrian cut throughs, with no pedestrian priority. These are located on each side of current intersections, example below at Oats Street/ Bank Street (facing south) 	Signalise intersection at Oats Street/ Bank Street with signalised crossing for people using the PSP, example: 
WELSHPOOL ROAD/ RUTLAND AVENUE/ SEVENOAKS STREET	The existing PSP crossing of Welshpool Road at Rutland Avenue does not provide priority for people walking and riding. The alignment of the crossing is indirect (see red line on below image)  There are two existing signalised pedestrian crossings at Welshpool Road and Sevenoaks Street intersections (south and west sides)	The PSP crossing of Welshpool Road will be grade separated from the road, elevated alongside the rail line allowing people using the path to cross Welshpool Road in a direct and uninterrupted fashion The existing pedestrian crossing of Welshpool Road crossing Rutland Avenue will be closed, and the median will be reinstated The existing signalised pedestrian crossings at the Welshpool Road and Sevenoaks Street intersection will be retained with improved pedestrian crossing facilities

	Southern pedestrian crossing of Welshpool Road/ Sevenoaks intersection:  Western pedestrian crossing of Welshpool Road/ Sevenoaks intersection: 	

Crossing treatments are shown in the figures below.

FIGURE 5.1 ARCHER-MINT PSP CROSSING

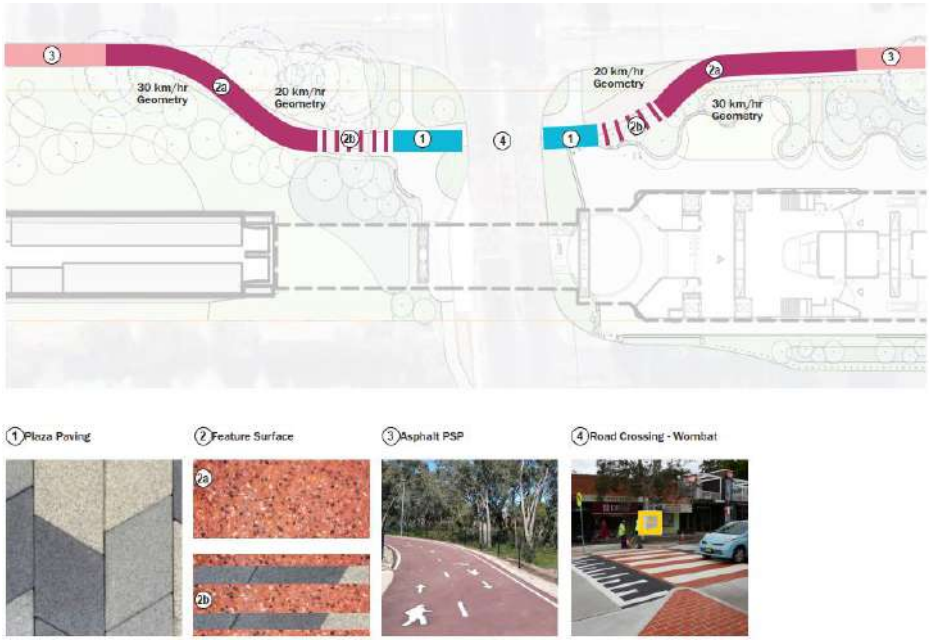
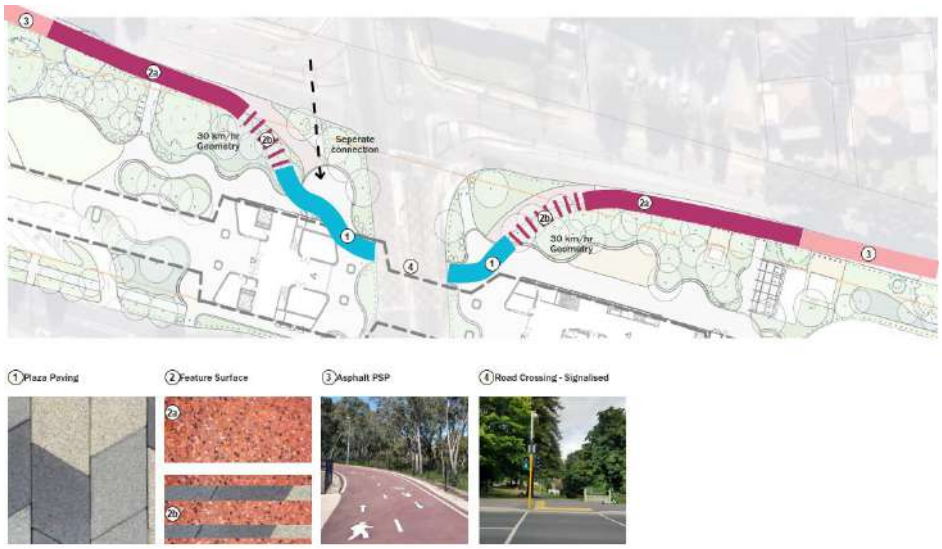


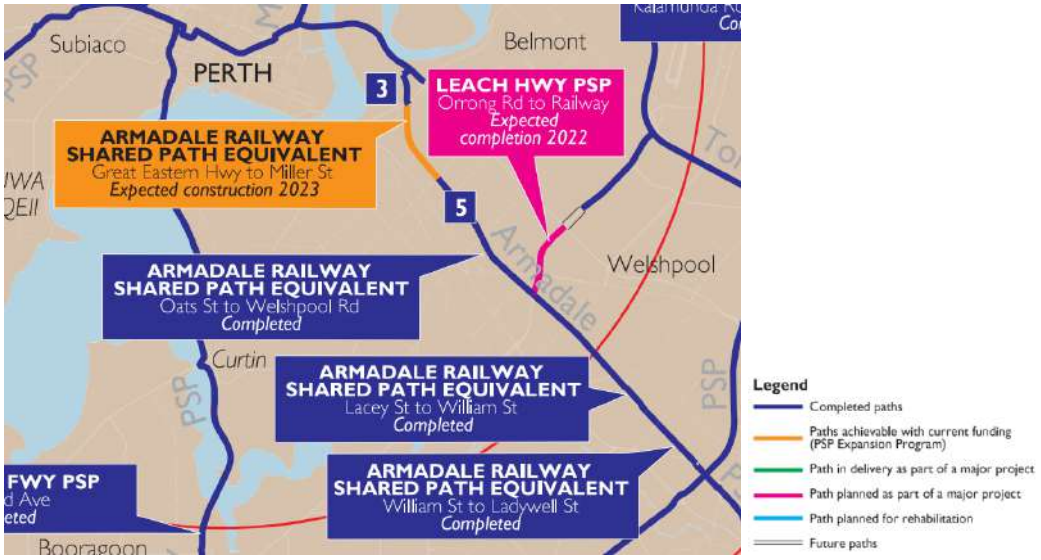
FIGURE 5.2 OATS STREET PSP CROSSING



Within the scope of this project, a path providing a north-south crossing of the linear park between Carlisle and Oats Street Stations will help provide local connection between Dane Street and Lion Street. This is circled in purple on Figure 5.4 below. Crossings of this route at Bank Street and Rutland Avenue remain be uncontrolled.

Externally to the scope of this level crossing removal project, the Principal Shared Path Expansion program will support additional regional walking and cycling access to and from stations on the line. The PSP provides for commuter cyclists making longer trips while also playing a key role as part of shorter trips to stations. In particular, the continuation of the PSP from Miller Street/ Roberts Road to Great Eastern Highway, which is anticipated to complete construction in 2023. The relevant segment is shown in Figure 5.3 below.

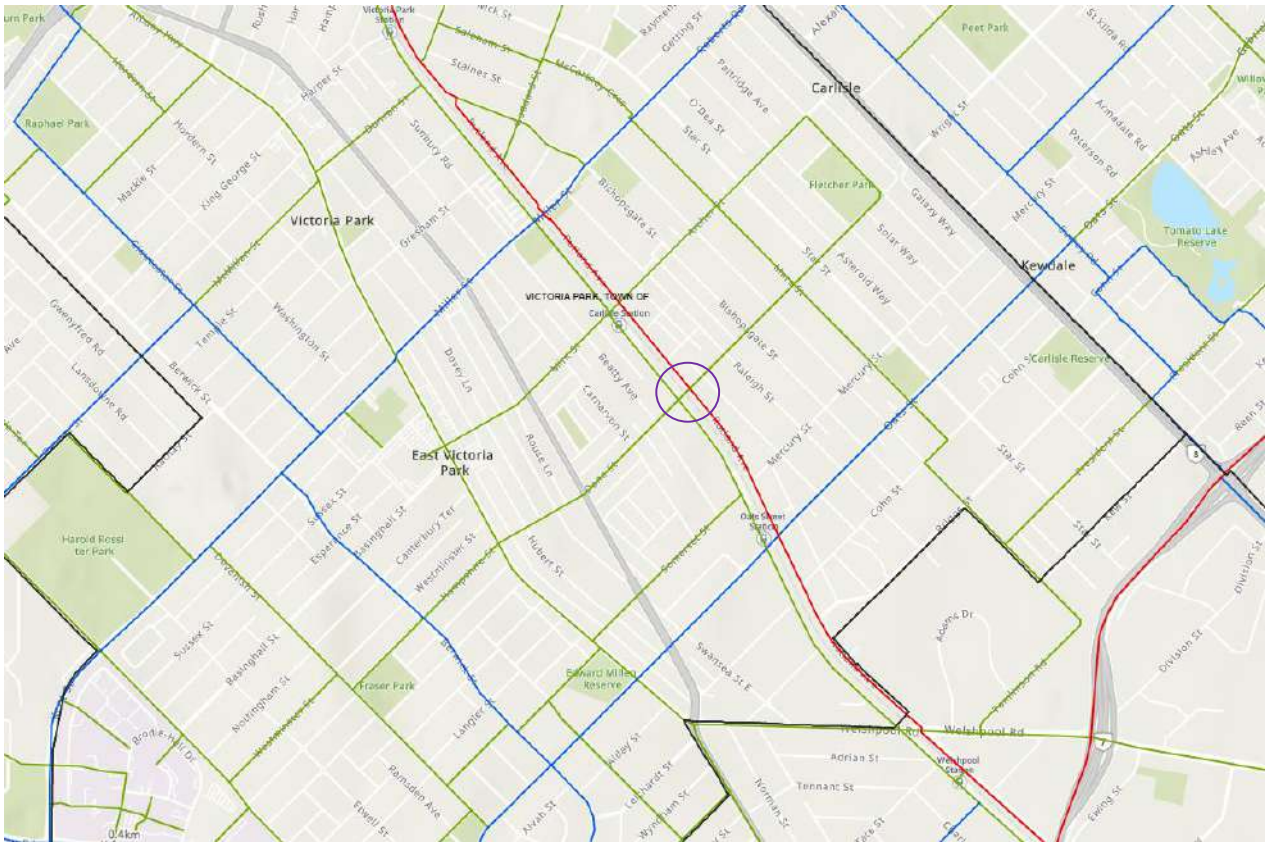
FIGURE 5.3 PRIMARY SHARED PATH EXPANSION PROGRAM – COMPLETED AND CURRENT PROJECTS



Source: Department of Transport, Major Cycle and Pedestrian Paths, 2022 (accessed November 2022)

Department of Transport has partnered with 32 local governments in the Perth and Peel regions to establish the Long-Term Cycle Network (LTCN) for Perth and Peel. The LTCN classifies routes according to their function rather than their built form. The network surrounding the stations is shown in Figure 5.4 below. The completion of the LTCN (outside the scope of this level crossing removal project) will create a dense, permeable network to the stations and support local and regional connections to the stations and surrounding destinations. Local governments and DoT have committed to delivering this network in the long term.

FIGURE 5.4 LONG-TERM CYCLE NETWORK FOR PERTH AND PEEL



Source: Department of Transport, Long-Term Cycle Network for Perth and Peel, 2022 (accessed December 2022)

5.3 Roads/ intersections

The proposed changes to roads and intersections are summarised in Table 5.2.

TABLE 5.2 SUMMARY OF CHANGES TO INTERSECTIONS

INTERSECTION	PROPOSED CHANGES
ARCHER STREET/ RUTLAND AVENUE	Northern corner of intersection: Increase size of median traffic island with pedestrian cut through Eastern corner of intersection: Increase size of median traffic island with pedestrian cut through

	Southern corner of intersection: Combine two existing median traffic islands into one larger, with WOMBAT crossing in the pedestrian cut through at the Principal Shared Path crossing point Western corner of intersection: Retain existing median traffic island with pedestrian cut through
MINT STREET/ BANK STREET	On Mint Street just south of Bank Street, increase size and slight shift of location of raised median traffic island with pedestrian cut through Additional median traffic island with pedestrian cut through at Bank Street terminus with Mint Street
OATS STREET/ RUTLAND AVENUE	Median traffic island restricting movement to left in/ out for Rutland Avenue onto Oats Street (both directions) At Oats Street/ Tuckett Street a small roundabout will provide access to the existing childcare centre on Rutland Avenue
OATS STREET/ BANK STREET	Signalised intersection with median traffic island featuring pedestrian cut throughs on all sides Right turn lane from Oats Street into Bank Street provided, commencing at Oats Street/ Rutland Street intersection An alternative bus route from Oats Street station connecting south to Welshpool Road is currently being investigated
WELSHPOOL ROAD/ RUTLAND AVENUE/ SEVENOAKS STREET	PSP elevated above road Existing pedestrian cut through within raised traffic median island crossing Welshpool Road on Rutland Avenue to be closed Retain existing signalised pedestrian crossings at Welshpool Road/ Sevenoaks Street

Road safety

None of the relevant intersections are identified as black spots, however level crossings have an implicit degree of safety risk due to interaction between the trains and people travelling in cars, by bike or walking. The project removes this interaction.

The project further supports safety for people riding and walking by reducing the interaction between active transport and vehicles. This is achieved through maintaining the key bicycle commuter route (Principal Shared Path) on the eastern edge of the corridor and locating vehicle access points to the site (entry to car parking and bus interchanges) on the western edge of the corridor.

6. Integration with surrounding area

6.1 Trip attractors/ generators

The existing and future forecast patronage for each station is shown in Table 6.1 below. Based on the Strategic Transport Evaluation Model (STEM) modelling these figures are forecast to grow.

TABLE 6.1 EXISTING PATRONAGE

STATION	EXISTING PATRONAGE (2019)	FORECAST PATRONAGE (2031)
CARLISLE STATION	482	733
OATS STREET STATION	1766	3916

Source: Victoria Park Canning Level Crossing Removal, Project Definition Plan (accessed January 2023)

6.2 Connections to surrounding areas

The key network links between the stations and the external path network are shown in the desire line figures in section 4. These figures show the integration of the development with the surrounding walking and cycling network. As part of the project, Station Access Strategies for each station are being updated, with a program of works and behavioural interventions aimed at supporting access to stations and surrounding destinations.

The surrounding road network is not expected to have significant modifications other than the removal of the level crossings.

6.3 Committed developments

A search of current Development Assessment Panel (DAP) applications was undertaken. Within the Town of Victoria Park, no current DAP applications were located in proximity to the subject site.

6.4 Land use

The development does not actively involve changes to land uses in the surrounding areas. The Town's Draft Local Planning Scheme No. 2 is currently in development. As of 7 December 2022, the Draft Scheme has not been publicly advertised. The new Scheme proposes to update the Town's local planning framework of zones, densities and planning controls such as heights, plot ratio and land use permissibility in line with the Town's Local Planning Strategy.

METRONET's Station Precincts are the area within a one kilometre walk from the station (approximately a 10 to 15-minute walk from the station. These precincts are ideal locations for future developments of housing, jobs and community services as they make the best use of the State Government's investment in transport infrastructure. Full build-out of station precincts is expected to be achieved in the long term (30+ years). The development of station precincts is not within the scope of the level crossing removal project.

7. Analysis of external transport networks

The Archer Street/ Mint Street – Rutland Avenue intersection has not been assessed. Due to its location in the road network, growth in traffic is considered to be relatively minor. Car parking provision is not significantly altered by the development meaning that vehicle traffic generated by the development will remain largely stable. Additionally, Town of Victoria Park is currently implementing streetscape upgrades to slow vehicle traffic at this intersection and prioritise walking and riding movements, further making Mint-Archer less attractive than alternative routes. In combination with parallel level crossings being removed, traffic redistribution to this intersection is considered unlikely.

7.1 SIDRA Analysis

Analysis of the Oats Street/ Bank Street and Oats Street/ Rutland Avenue intersection was carried out using the computer software SIDRA Intersection 9.0 under the 2026 Opening and 2031 opening + 5 scenario. The area is fully developed and the induced demand of removing the level crossing is covered by the 5 year scenario with minimal opportunity for further growth given the constrained road network surrounding the development.

SIDRA is a commonly used intersection modelling tool in the field of traffic engineering. Outputs for four standard measures of operation performance can be obtained, being Degree of Saturation (DoS), Average Delay, Queue Length, and Level of Service (LoS).

- **Degree of Saturation (DoS)** is a measure of how much physical capacity is being used with reference to the full capability of a particular movement, approach, or overall intersection. A DoS of 1.0 equates to full theoretical capacity although in some instances this level is exceeded in practice. SIDRA uses maximum acceptable DoS of 0.90 for signalised intersections and 0.80 for unsignalised intersections for Design Life analysis. Design engineers typically set a maximum DoS threshold of 0.95 for new intersection layouts or modifications.
- **Average Delay** is a measure of the average delay per vehicle (in seconds) experienced by all vehicles in a particular lane, approach, or for the intersection as a whole. For severely congested intersections the average delay begins to climb exponentially.
- **Queue Length** measures the length of approach queues. In this document we have reported queue length in terms of the length of queue at the 95th percentile (the maximum queue length that will not be exceeded for 95 percent of the time). Queue lengths provide a useful indication of the impact of signals on network performance. It also enables the traffic engineer to consider the likely impact of queues blocking back and impacting on upstream intersections and accesses.
- **Level of Service (LoS)** is a combined appreciation of queuing incidence and delay time incurred, producing an alphanumeric ranking of A through F. LoS A indicates an excellent level of service whereby delay is at a minimum enabling vehicles to clear an intersection at each change of signals or soon after arrival with little if any queuing. Values of B through D are acceptable in normal traffic conditions. Values of E and F are typically considered undesirable, although within central business district areas with significant vehicular and

pedestrian numbers, corresponding delays/queues are unavoidable and hence, are generally accepted by road users.

Assumptions

The following assumptions have been applied to the SIDRA modelling:

- Vehicle parameters for cars and trucks (Class 2-5, Class 6-9, Class 10, 11 and 12 types) have been adopted from *Main Roads WA Operational Modelling Guidelines.*
- The SIDRA analysis has assumed that the vehicle classification for the intersections obtained from traffic data will remain constant in the future.
- This analysis assumes the existing peak hour will remain consistent in the future.
- Traffic growth is based on ROM data which have been further calibrated using existing traffic data with the Main Roads WA Urban Road Planning (URP) Method.

Oats Street/ Bank Street intersection

The intersection performance for the Development Access is outlined in Table 7.1 for the AM peak and Table 7.2 for the PM peak.

TABLE 7.1 AM PEAK INTERSECTION PERFORMANCE FOR OATS STREET/ BANK STREET

year	2026 -Opening	2031 – 5 years after opening
Worst LoS	LOS E	LOS E
Intersection LoS	LOS C	LOS D
Intersection DoS	0.811	0.914
Average delay (secs)	30.1	41.0
Average back of queue (m)	77.0	84.6

TABLE 7.2 PM PEAK INTERSECTION PERFORMANCE FOR OATS STREET/ BANK STREET

Year	2026 -Opening	2031 – 5 years after opening
Worst LoS	LOS E	LOS E
Intersection LoS	LOS C	LOS D
Intersection DoS	0.792	0.878
Average delay (secs)	35.0	40.7
Average back of queue (m)	93.7	98.9

The results indicate the intersection will perform within capacity during both AM and PM peaks at opening and 5 years after opening.

Though the other parameters indicate that the intersection is operating satisfactorily, the average back of queue results indicate extensive queueing on the northeast approach of Oats Street. This is due to the queues extending from the northeast approach of the downstream intersection of Oats Street/ Bank Street.

Oats Street/ Rutland Avenue intersection

The intersection performance for the Development Access is outlined in Table 7.3 for the AM peak and Table 7.4 for the PM peak.

TABLE 7.3 AM PEAK INTERSECTION PERFORMANCE FOR OATS STREET/ RUTLAND AVENUE

year	2026 -Opening	2031 – 5 years after opening
Worst LoS	LOS A	LOS E
Intersection LoS	LOS A	LOS D
Intersection DoS	0.451	0.295
Average delay (secs)	0.8	0.6
Average back of queue (m)	155.3	212.1

TABLE 7.4 PM PEAK INTERSECTION PERFORMANCE FOR OATS STREET/ RUTLAND AVENUE

Year	2026 -Opening	2031 – 5 years after opening
Worst LoS	LOS A	LOS E
Intersection LoS	LOS A	LOS D
Intersection DoS	0.337	0.393
Average delay (secs)	0.7	0.8
Average back of queue (m)	122.7	165.7

The results indicate the intersection will perform within capacity during both AM and PM peaks at opening and 5 years after opening.

Though the other parameters indicate that the intersection is operating satisfactorily, the average back of queue results indicate extensive queueing on the northeast approach of Oats Street. This is due to the queues extending from the northeast approach of the downstream intersection of Oats Street/ Bank Street.

8. Conclusions

A detailed Transport Impact Assessment of the proposed level crossing removal project concluded the following:

- The proposed development provides increased permeability for people accessing the station by walking, riding, bus or by vehicle
- The development will create a high-quality, direct, safe and high amenity cycling route with limited interruptions by vehicles and buses. This is done by maintaining the PSP on the eastern side of the rail corridor and providing traffic access on the western side of the corridor
- The proposed development enhances the public realm for people walking and cycling to the stations as well as people riding and walking in their local neighbourhoods. The path network is based on connection to existing and proposed paths as well as connection to local destinations
- Removing the level crossing of rail at key intersections provides an opportunity to build a public realm supporting people walking and riding to have a more comfortable journey
- Elevating the PSP above Welshpool Road will create a direct and easy crossing, particularly for commuter cyclists
- Providing increased quantities of secure bicycle parking at each station will support additional trips to stations to be made by bicycle, which increases the catchment area of each station
- The proposed development provides an increased number of access points to each station platform, with Carlisle Station having three access points to each platform (total of six access points), and Oats Street Station having four access points to each platform (total of eight access points)
- The proposed development supports increased bus movement as well as bus-train transfers with increased capacity provided at Oats Street Station bus interchange, in addition to improved amenity at the bus interchange
- Proposed bus route 286 would support access to rail for the catchment surrounding Welshpool Station.
- Intersections with existing level crossings (Mint-Archer and Oats Street) provide a poor level of service to people travelling via these streets, which will be improved by the removal of level crossings.
- Traffic modelling indicates that intersections will perform within capacity during both AM and PM peaks at opening and 5 years after opening. Given the current performance of intersections, this is considered to be appropriate.