



# **TfNSW TAP Towradgi Station Upgrade**

## **Transport Access Program Traffic Impact Assessment**

Transport for New South Wales

25 June 2020

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**Document Issue History**

Report File Name	Prepared	Reviewed	Issued	Date	Issued to
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# EXECUTIVE SUMMARY

## Background and Upgrade Works

Transport for New South Wales (TfNSW) is proposing to upgrade Towradgi Railway Station as part of the Transport Access Program (TAP) which is a NSW Government initiative to provide a better experience for public transport customers by delivering accessible, modern, secure and integrated transport infrastructure.

The main objective of the program is to provide better access to, within and around public transport interchanges, railway stations and surrounding station precincts, along with improvements in station amenities and general customer facilities.

Towradgi Railway Station, located 5km north of Wollongong, has been included in the third tranche of the Transport Access Program upgrades to improve the customer experience, accessibility, modal interchange facilities and general station precinct. The upgrade includes the following key elements:

- construction of a new footbridge over the rail corridor connecting the platforms of the station including two lifts and two sets of stairs
- construction of a new Station Systems Equipment Room (SSER) building
- construction of new footpaths to connect Towradgi Road and Weber Crescent to the station and the new footbridge
- provision of two accessible parking spaces and a kiss and ride zone on Weber Crescent
- removal of existing platform shelters and the provision of new platform shelters
- minor regrading and widening of the station platforms
- reconfiguration of the existing toilet within the station building with a new family accessible toilet.

## Existing Conditions

Towradgi Railway Station is a suburban stop on the South Coast Line, with approximately 230 passengers recorded entering and exiting the station during an average weekday in 2013. Existing station facilities include:

- Bicycle lockers with a capacity for two bicycles and a bicycle rack with capacity for five bicycles
- Station entrances on Towradgi Road linking to the surrounding network
- Existing bus stops a fair distance from the station
- Unmarked school bus stops on Towradgi Road outside the station entrance
- Unrestricted on-street parking with approximately 100 available spaces

No formal car park, kiss and ride or taxi rank facilities are currently provided at the station. The demand for parking is currently low compared to the available supply of on-street unrestricted parking.

## Operational and Construction Impacts

Population growth data from Transport for New South Wales indicates that demand is expected to increase by 13% between 2017 and 2036. The proposed pedestrian footbridge and new station entrance would provide adequate capacity to accommodate this expected growth, while also enabling direct and safe travel routes, with an overall improved user experience and connectivity.

The capacity of the proposed footbridge is not expected to be an issue for pedestrians because the peak pedestrian activity is very low.

No new cycling facilities have been proposed, but existing capacity is not expected to be exceeded.

The proposed kiss and ride facilities along with the new entrance on Weber Crescent would improve modal interchange between the train and vehicle network. However, it is likely to generate more traffic and increase U-turn activity in the small suburban roads near the new entrance. Increases in traffic and parking demand are not expected to cause congestion issues, but line marking and signage for parking spaces are recommended to maintain sight lines and manoeuvring space near corners and intersections.

It is unlikely that vehicle trips generated by the station would have a significant impact on the greater road network.

The new station entrance on Weber Crescent may increase pedestrian traffic in the direction of Carters Lane, so a new pedestrian crossing should be considered at the intersection of Weber Crescent and Carters Lane, or directional signage should be used to direct pedestrians to existing crossings.

The safety of pedestrians on Towradgi Road should be considered further in the design, as there have been recorded incidents of vehicles hitting pedestrians trying to cross the road. This may be due to the lack of a crossing directly outside the station, and pedestrians choosing to take the shortest route rather than walking to Memorial Drive or Carters Lane and crossing at a marked crossing.

A Construction Traffic Management Plan (CTMP) and accompanying Traffic Control Plans (TCP) would need to be prepared and submitted to Wollongong Council and the relevant roads authority prior to the commencement of works.

All construction vehicles must follow the CTMP and use the designated approach and departure routes to access the site to ensure safety for all road users. Construction vehicles may have issues making the right turn from Towradgi Road to Ocean Street, and the impacts and mitigation measures should be considered in the CTMP. Construction traffic generation is not expected to have a significant impact on the greater road network.

Parking restrictions may be required on Weber Crescent and Ocean Street to allow heavy vehicles to safely access the construction site because the roads are relatively narrow. Parking of delivery vehicles and plant should be considered in the CTMP, as there may not be enough manoeuvring space on the narrow local roads, along with the design of manoeuvring spaces and site entrances. Parking demand generated by construction workers and contractors is not expected to exceed the available supply.

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# 1. INTRODUCTION

## 1.1 Background

Transport for New South Wales (TfNSW) is proposing to upgrade Towradgi Railway Station as part of the Transport Access Program (TAP) which is a NSW Government initiative to provide a better experience for public transport customers by delivering accessible, modern, secure and integrated transport infrastructure.

## 1.2 Project Objectives

The Transport Access Program aims to provide:

- Stations that are accessible to people with a disability, limited mobility and parents with prams
- Modern buildings and facilities for all modes that meet the needs of a growing population
- Modern interchanges that support an integrated network and allow seamless transfers between all modes for all customers
- Safety improvements including extra lighting, lift alarm, fences and security measures for car parks and interchanges, including stations, bus stops and wharves
- Signage improvements so customers can more easily use public transport and transfer between modes at interchanges

## 1.3 Towradgi Station Upgrade

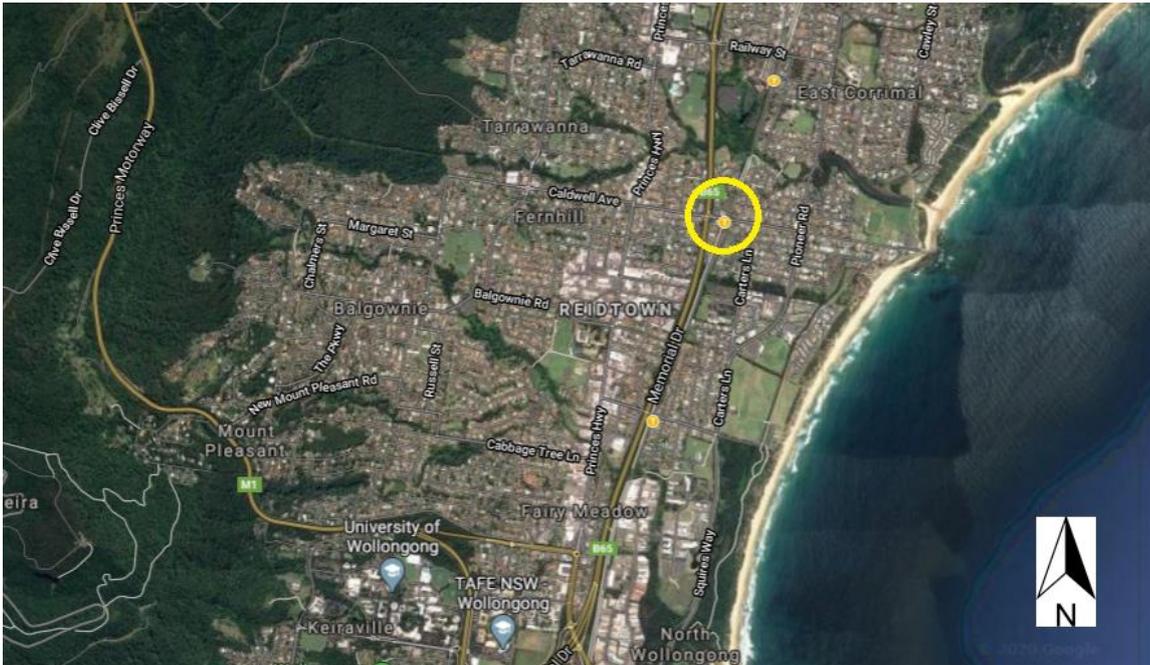
The Proposal involves an upgrade of Towradgi Station as part of the Transport Access Program which would improve accessibility and amenities for customers. The Proposal would include the following key elements:

- construction of a new footbridge over the rail corridor connecting the platforms of the station including two lifts and two sets of stairs
- construction of a new Station Systems Equipment Room (SSER) building
- construction of new footpaths to connect Towradgi Road and Weber Crescent to the station and the new footbridge
- provision of two accessible parking spaces and a kiss and ride zone on Weber Crescent
- removal of existing platform shelters and the provision of new platform shelters
- minor regrading and widening of the station platforms
- reconfiguration of the existing toilet within the station building with a new family accessible toilet.

## 1.4 Study Area

Towradgi Railway Station is located within the Wollongong Local Government Area (LGA), near the intersection of Towradgi Road and Memorial Drive. The station is located within a low-density residential area, with a small neighbourhood centre at the entrance of the station.

The local and regional context is shown in Figure 1-1



Source: Google Maps

**Figure 1-1: Towradgi and Surrounding Environs**

## 1.5 Study Scope

This TIA report details the expected traffic and transport impacts of the proposed Towradgi Station TAP upgrade. The report covers the following:

- The existing traffic and transport facilities and usage in the area.
- Proposed station facility upgrades and additions.
- Anticipated operation traffic impacts resulting from proposed upgrades.
- Traffic impacts anticipated during construction of upgrades.
- Potential mitigation measures required as a result of the impacts.

This report has been prepared noting the following:

- Stakeholder consultation was not conducted as part of this study
- A site visit was conducted, but no traffic or pedestrian behaviour was recorded due to the COVID-19 restrictions
- Traffic modelling was not undertaken as a part of this study

## 1.6 References

In preparing this report, the following references have been used.

- An inspection of the station and its surrounds
- Wollongong Council Local Environmental Plan (LEP) 2009
- Roads and Maritime Service (RMS) Interactive Crash Statistics website
- TfNSW Travel Zone Explorer website
- TfNSW Train Station Entries and Exits Data
- 2016 Census Data from the Australian Bureau of Statistics website
- Relevant Council codes and Australian Standards

## 2. EXISTING CONDITIONS

Towradgi Railway Station is located in the Wollongong City Council LGA, approximately 60km south of the Sydney CBD and about 5km north of Wollongong.

Towradgi Railway Station is located three stations north of Wollongong Station, between Fairy Meadow and Corrimal Railway Stations. Data from 2013 indicates that Towradgi Station had an estimated 110 passengers recorded entering and exiting the station during an average weekday.

Towradgi Railway Station is located south of the Towradgi Road overpass bridge and is surrounded by low-density residential housing. The Wollongong Council zoning map is shown in Figure 2-1, with the station location outlined in blue. Memorial Road and Ocean Street run parallel to the railway on the western side and Weber Crescent on the eastern side.

The entrances to the station are located on Towradgi Road, where there is a small neighbourhood centre (B1). Corrimal Town Centre (B6) is located about 600m to the west along Towradgi Road. The suburb of Towradgi is mostly zoned as low-density residential housing (R2), with scattered zones of recreational parks (RE1). A light industrial zone (IN2) is located to the southwest and a tourist zone including hotels and conference centre (SP3) is located to the southeast.



Source: Wollongong City Council LEP 2009

**Figure 2-1: Towradgi Land Use Zoning**

## 2.1 Existing Station Operation

Towradgi Railway Station currently provides limited access to other transport facilities. Bicycle storage options are available near the station, but there are no commuter car parks or kiss and ride facilities. Parking is available on local roads. Bus stops that are located near the station are accessible by pedestrians via the existing footpath network. Unmarked school bus stops are located on both sides of Towradgi Road just outside the station.

A summary of transport facilities currently available at Towradgi Railway Station is detailed in Figure 2-2.



Basemap Source: SixMaps, NSW Department of Finance and Services

**Figure 2-2: Existing Transport Facilities**

## 2.2 Public Transport

### 2.2.1 Passenger Rail Services

Towradgi Railway Station is serviced by the South Coast Line. The South Coast Line has northbound services departing from Kiama, Port Kembla, Dapto and Wollongong, and southbound services departing from Central, Waterfall and Thirroul. The only trains that stop at Towradgi Station are all stops services travelling between Port Kembla and Waterfall or Thirroul, where passengers need to change services to travel to Sydney. Journeys between Central Station and Towradgi Station during peak periods take approximately 90-100 minutes including a change of service. The station is classified as non-wheelchair accessible by TfNSW.

Frequencies of timetabled services during weekday AM, PM and weekend peak hours are shown in Table 2-1.

**Table 2-1: Train Services Frequencies**

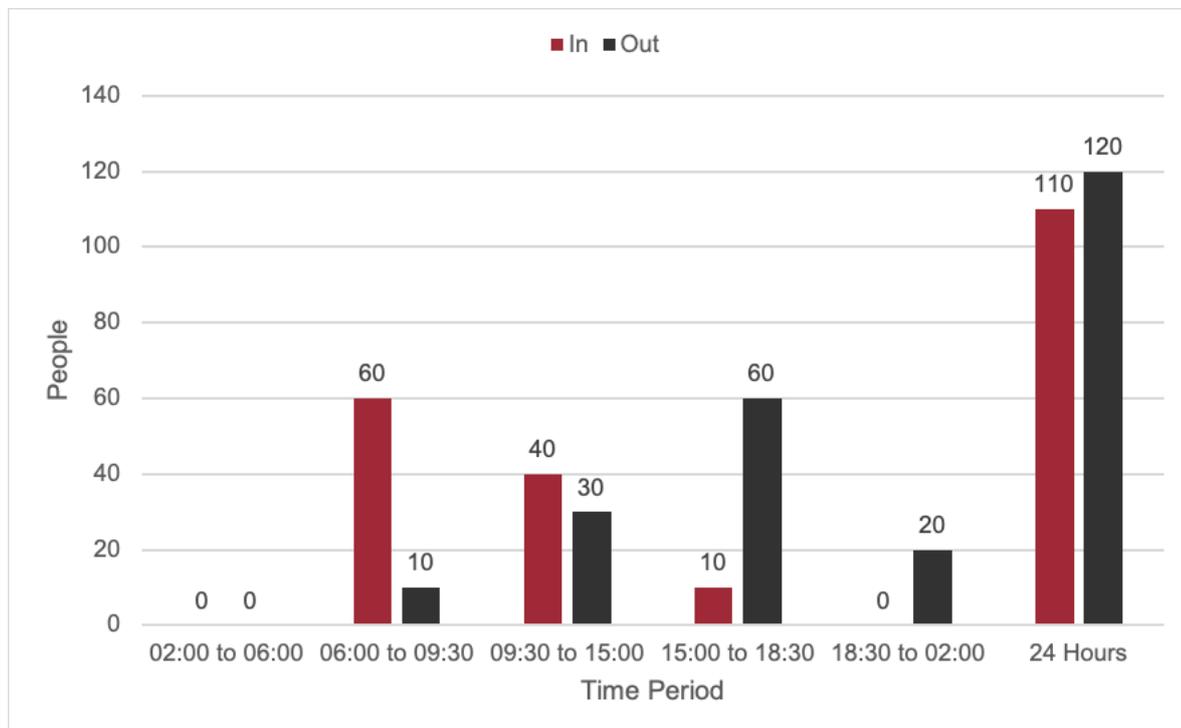
Direction	Peak Period Frequency		
	AM Peak (6:00am to 8:00am)	PM Peak (4:00pm to 6:30pm)	Weekend Peak (10:00am to 11:00am)
Northbound (to Sydney)	20 minutes	60 minutes	60 minutes
Southbound (to Wollongong)	20-35 minutes	20-35 minutes	60 minutes

A summary of facilities provided at Towradgi Station according to TfNSW is listed below:

- Toilets
- Payphone
- Emergency Help Point
- Wheelchair accessible toilet
- Bike Racks
- Bike Lockers
- PA for announcements

### 2.2.2 Rail Patronage

Rail patronage data collected from a typical weekday in 2013 is detailed in Figure 2-3 below.



Source: Train Statistics 2014 (v1.1, Bureau of Transport Statistics, May 2015)

**Figure 2-3: Towradgi Railway Station Patronage**

It is evident from the above figures that Towradgi Railway Station is not a busy station, and most patrons using the station during peak periods are travelling from the suburb to their place of work.

Details of station entries and exits from Opal card data for 2016 to 2018 are detailed below in Table 2-2.

**Table 2-2: Towradgi Railway Opal Entries and Exits 2016 to 2018**

Year	Average Daily Entries	Average Daily Exits	Total
2016	90	80	170
2017	80	80	160
2018	90	100	190

### 2.2.3 Bus Services

Bus stops are located on Murrannar Road 300m east of the station, and the Princes Highway west of the station. The buses that service the area are operated by Premier Charter Buses (Routes 2, 3 and 8) and Dion’s Bus Service (Routes 90, 91, 92 and 93). Routes 3 and 8 depart from Murrannar Road and links to the suburbs surrounding Towradgi, and the routes departing from Princes Highway link to Stanwell Park to the north and Wollongong to the south.

The bus stop locations and routes in the vicinity of Towradgi Railway Station are presented in Figure 2-4 and the frequency of buses in Table 2-3.

**Table 2-3: Daily Bus Service Frequencies**

Route	Bus Stop Location	Peak Frequency	Off-peak Frequency
3/8	Murrannar Road	60 minutes	60 minutes
2	Princes Highway	15-20 minutes	60 minutes
90	Princes Highway	15 minutes	20-30 minutes
91	Princes Highway	7 services per day	
92	Princes Highway	60 minutes	120 minutes
93	Princes Highway	60 minutes	120 minutes



Basemap Source: Wollongong City Council LEP 2009

**Figure 2-4: Bus Stop and Bus Routes**

## 2.2.4 School Bus Services

There are three school bus services that run along Towradgi Road and may stop at unmarked locations outside Towradgi Station. School bus stop locations are shown in Figure 2-2, and Table 2-4 presents the frequency of school bus services.

**Table 2-4: School Bus Timetable**

Route	Eastbound Stop (opp. station)	Westbound Stop (near station)
S107	8:32 and 15:32	8:28 and 15:18
S188	15:10	-
S119	16:10	8:12

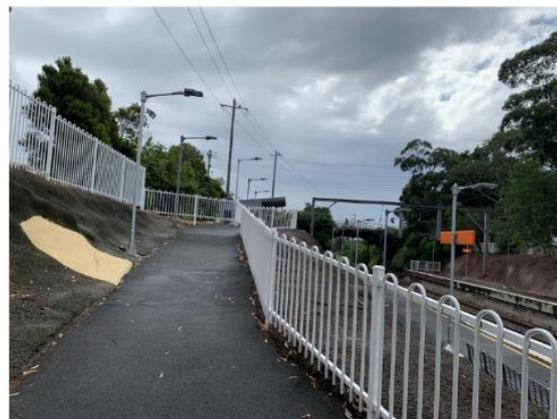
## 2.3 Walking and Cycling

### 2.3.1 Pedestrian Infrastructure

Pedestrian access to the station platforms is provided by footpaths from the entrances on Towradgi Road. The only pedestrian route crossing the railway is via the Towradgi Road overbridge, as there is no footbridge provided. There are footpaths on both sides of Towradgi Road, but the nearest crossings are at Memorial Drive and Carters Lane and are both about 100m away from the station entrances. A footpath also leads through the park east of the station to the footpath on Weber Crescent. There are no footpaths on the north-south aligned section of Weber Crescent. Pedestrian facilities and station access are detailed in Figure 2-5.



Anticlockwise from top left:  
 Entrance on eastern side of station  
 Looking up ramp from eastern platform  
 Looking up ramp from western platform



**Figure 2-5: Pedestrian Facilities and Station Access**

### 2.3.2 Pedestrian Activity

A site visit was conducted by Bitzios Consulting in April 2020 during the morning peak period. During the site visit, no pedestrians were encountered, but this may be due to the COVID-19 restrictions in place at the time.

### 2.3.3 Cycling Infrastructure

There are two bicycle storage options provided at Towradgi Railway Station. A bicycle rack with space for six bicycles is located in front of the station building near the entrance to the western platform. Bicycle lockers are available in a park on the eastern side of the station and there is capacity for two bicycles.

Towradgi Road is recognised by Wollongong Council as an on-road unmarked bicycle route that connects to the shared path on the coast, and Memorial Drive is recognised as a having marked facilities in the shoulder lane, and suitable only for experienced riders.

Bicycle facilities are pictured in Figure 2-6, and bicycle routes are detailed in Figure 2-7.



**Figure 2-6: Bicycle Facilities (Bicycle Rack and Lockers)**



Basemap Source: SixMaps, NSW Department of Finance and Services

**Figure 2-7: Pedestrian Desire Lines and Cycling Facilities**

## 2.4 Road Network

### 2.4.1 Towradgi Road

Towradgi Road is a two-way, two-lane road that is part of unclassified regional route 7642. It is aligned in an east-west direction perpendicular to Towradgi Railway Station and extends from Corrimal town centre at the Princes Highway to Towradgi Point on the coastline. The signposted speed limit is 50km/h. Short-term and unrestricted parallel parking is available on both sides of the road east of the station (shown in Figure 2-9), and a small short-term parking area is available in front of the neighbourhood centre across from the western side of the station. The railway overpass bridge is significantly higher than the average level of the road, and the changes in elevation limit the sight distance for vehicles approaching the bridge. The lack of vision over the crest of the bridge is demonstrated in Figure 2-8.



**Figure 2-8 Towradgi Road (looking east from Memorial Drive and towards station entrance)**



**Figure 2-9: Towradgi Road (looking east from station)**

## 2.4.2 Memorial Drive

Memorial Drive is a two-way, four-lane highway that forms part of State Road HW1. It is aligned in a north-south direction parallel to Towradgi Railway Station on the western side, and extends from the Princes Highway at Bulli to the Princes Motorway at Gwynneville. The signposted speed limit is 80km/h north of the intersection at Towradgi Road and increases to 90 km/h south of the intersection. Figure 2-10 shows the pedestrian crossing at the intersection of Memorial Drive and Towradgi Road.



**Figure 2-10: Intersection of Memorial Drive and Towradgi Road (looking north)**

## 2.4.3 Weber Crescent

Weber Crescent is a two-way unmarked local road that runs parallel to Towradgi Railway Station on the eastern side and curves away from the station to run parallel to Towradgi Road. It is a no through road from Carters Lane and forms a loop with Carnell Crescent. There is no access to the station available from Weber Crescent, there are no footpaths on the side of the road parallel to the station and there is no raised kerb on the station side of the road. The signposted speed limit is 50 km/h.



**Figure 2-11: Weber Crescent (viewed from intersection with Cannell Crescent)**

#### 2.4.4 Ocean Street

Ocean Street is a two-way unmarked local road that is aligned in a north-south direction parallel to Towradgi Railway Station on the western side. It is a no through road that is accessible from Towradgi Road, and access to the railway corridor is located at the end of the road.

### 2.5 Parking Demand

No commuter car parks have been allocated at Towradgi Railway Station. On-street parking is available on the surrounding roads, including Towradgi Road and Weber Crescent. Parking on Towradgi Road is generally short-stay, with unmarked parallel spaces only. Unrestricted parking is also available on the various side streets near the station. Typical parking demand has been estimated using satellite imagery from various dates, and summarised in Table 2-5.

**Table 2-5: Towradgi Station Typical Parking Demand**

Parking Area	Type	Supply (Spaces)	Demand (Spaces)	Demand (%)
Towradgi Road	Short-Stay	9	4	44
	Unrestricted	10	4	40
Weber Crescent	Unrestricted	50	12	24
Cannell Crescent	Unrestricted	30	7	23
Ocean Street	Unrestricted	15	4	27

The estimates suggest that there is sufficient parking in the area, including near the proposed entrance at Weber Crescent. Note that these areas are residential parking areas, so the parking demand is not entirely train commuters.

## 2.6 Traffic Volumes

Traffic volumes generated from trips to and from the station were calculated based on Opal Card data and historical trip distributions. Comparing the typical parking, journey to work and Opal Card data, we estimate that about 38% of train passengers drive to the station. Table 2-6 outlines the estimated number of vehicle trips generated assuming 38% of train passengers drive.

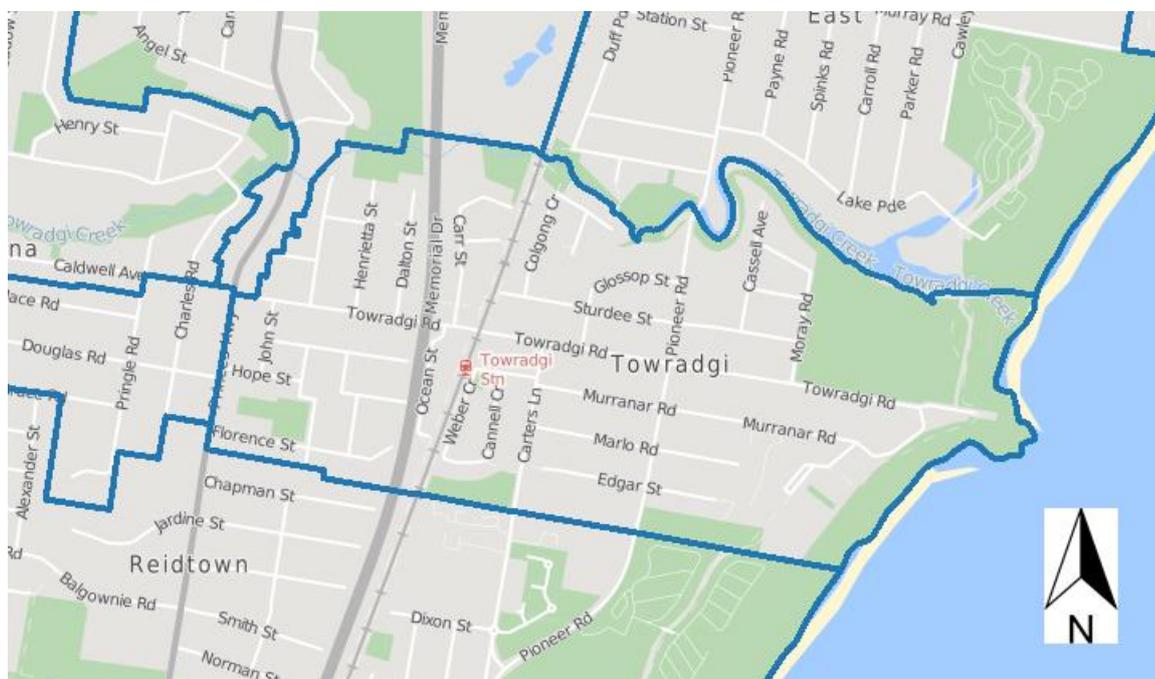
**Table 2-6: Typical Commuter Traffic Generation**

Time	Vehicles In	Vehicles Out	Total
2:00 – 6:00	0	0	0
6:00 – 9:30	23	4	27
9:30 – 15:00	16	12	28
15:00 – 18:30	4	23	27
18:30 – 2:00	0	8	8

As the above figures suggest, traffic to and from the station does not have a significant impact on the surrounding road network.

## 2.7 Travel Mode Choice

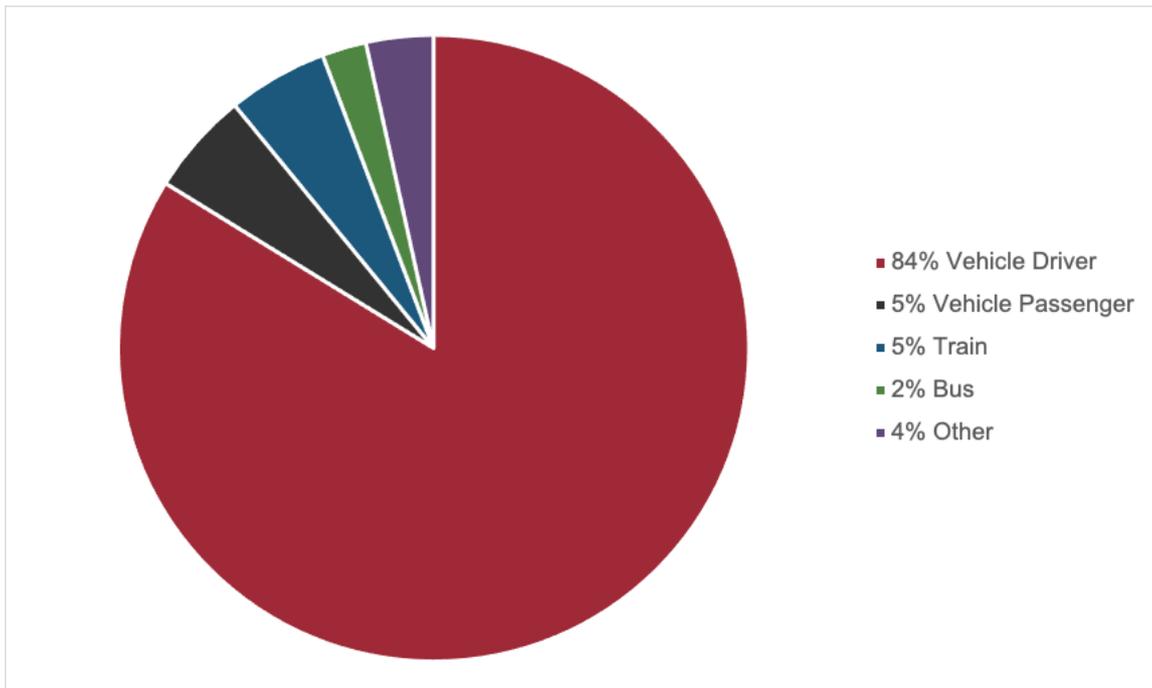
Bitzios Consulting has used 2016 Census data to determine patterns of travel to and from Towradgi Railway Station. Since Towradgi is a small station, we expect that only people from the suburb would be using the station. The neighbouring suburbs are serviced with their own railway stations. The Census boundary of the suburb is detailed in Figure 2-12.



Source: Australian Bureau of Statistics

**Figure 2-12: Census statistics boundary for the suburb of Towradgi**

Census data estimates the population of Towradgi to be 3,126 people. The data suggests that 89% of people in Towradgi that travel to work on a daily basis drive to work, and 5% of people use the train. The number of people estimated to use the train is 61 people per day, and this is fairly consistent with the rail patronage data outlined in Section 2.2.2. This data is summarised in Figure 2-13.



**Figure 2-13: 2016 Census Data – Employed Residents Commuting from Towradgi**

Census data also suggests that while the majority of people that travel to work daily have workplaces south of the suburb, the majority of train commuters work north of Towradgi. 76% of workplaces are south Towradgi, and 24% are north. Of those that use the train to get to work, 82% have to travel north and 18% have to travel south. It should be noted that the sample size for train commuters is small, so may have significant fluctuations.

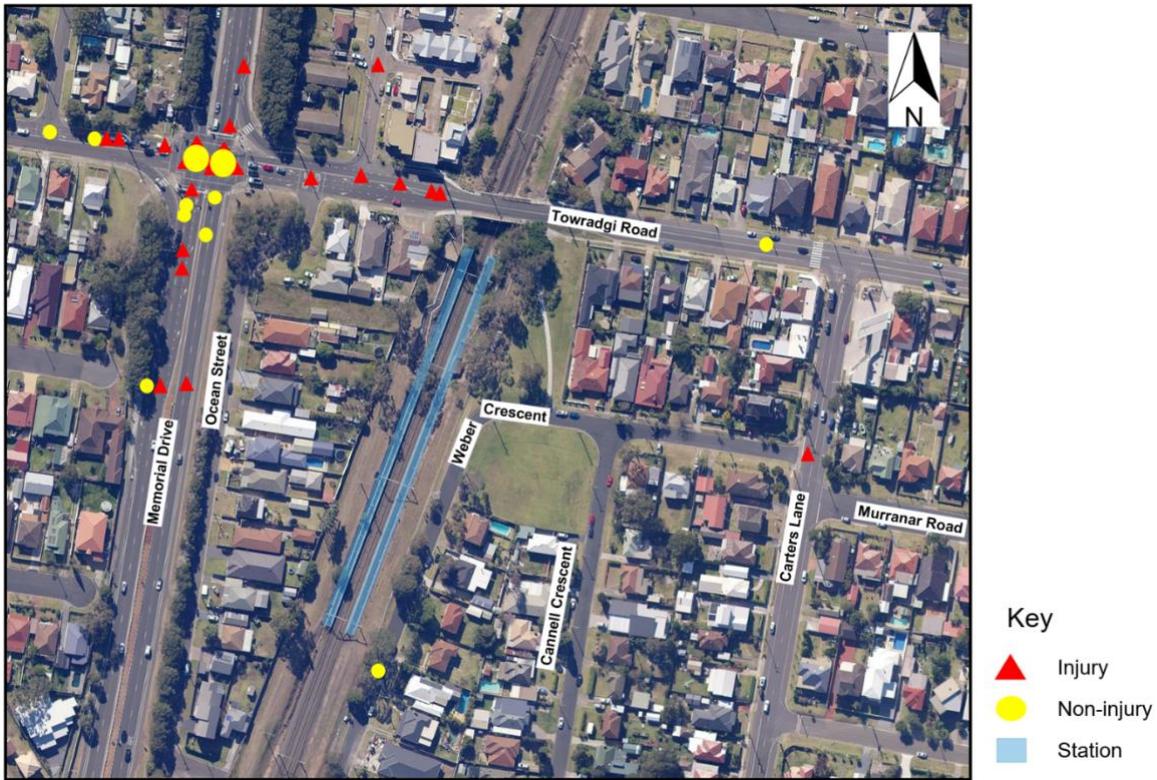
## 2.8 Road Safety

Historical crash data from the RMS Interactive Crash Statistics website indicates that a significant number of incidents have occurred in the vicinity of Towradgi Railway Station from 2014-2019, mostly near the intersection of Memorial Drive and Towradgi Road. It should be noted that these crash statistics are based on incidents reported to Police, and do not contain near misses, especially those involving pedestrians. A summary of the crash statistics are listed in Table 2-7, and mapped in Figure 2-14.

**Table 2-7: Crash Statistics Summary (2014 – 2019)**

Location	Type of Crash	Number of Crashes
Towradgi Road	Pedestrian Collision	1
	Turning Vehicles	3
	Rear-end	4
	Reversing	1
	Into breakdown/accident	1
	Out of control on road	1
Memorial Drive	Cyclist Collision	1
	Turning Vehicles	8
	Rear-end	20
	From footpath	1

Location	Type of Crash	Number of Crashes
	Off path	3
Weber Crescent	Off path	1
	Vehicle door	1
Carr Street	U-Turn	1



Basemap Source: SixMaps, NSW Department of Finance and Services

**Figure 2-14: Recorded Crash History (2014-2019)**

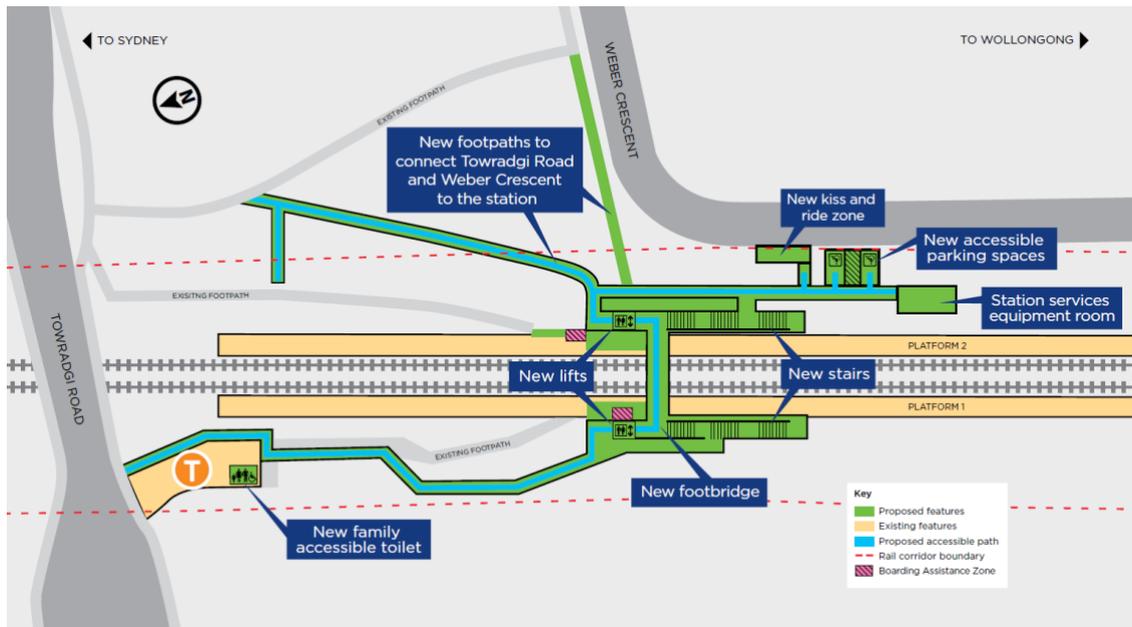
# 3. PROPOSED STATION PRECINCT IMPROVEMENTS

## 3.1 Overview

The Proposal involves an upgrade of Towradgi Station as part of the Transport Access Program which would improve accessibility and amenities for customers. The Proposal would include the following key elements:

- construction of a new footbridge over the rail corridor connecting the platforms of the station including two lifts and two sets of stairs
- construction of a new Station Systems Equipment Room (SSER) building
- construction of new footpaths to connect Towradgi Road and Weber Crescent to the station and the new footbridge
- provision of two accessible parking spaces and a kiss and ride zone on Weber Crescent
- removal of existing platform shelters and the provision of new platform shelters
- minor regrading and widening of the station platforms
- reconfiguration of the existing toilet within the station building with a new family accessible toilet.

The general layout of the proposed works is shown in Figure 3-1.



Source: Transport for New South Wales

**Figure 3-1: Towradgi Railway Station Proposed Layout (indicative only, subject to detailed design)**

### **3.1.1 Station Access**

The proposed design includes the construction of a new station entrance on the east side of the station, and new footpaths that connect to the existing network on Towradgi Road and Weber Crescent. The footpath leading from the western platform to Towradgi Road is to be realigned and upgraded to comply with DDA and Australian Standards.

A new footbridge would connect the two platforms and provide accessible lift access to and between both platforms.

### **3.1.2 Integrated Transport facilities**

#### *Kiss and Ride*

A formal kiss and ride facility would be provided on Weber Crescent on the eastern side of the station. The kiss and ride area must be tapered to provide a safe place for cars to stop and drop passengers off.

#### *Bicycle Parking*

No extra bicycle parking has been proposed for Towradgi Railway Station

#### *Car parking*

Two accessible parking spaces are proposed on Weber Crescent next to the proposed kiss and ride area. A bollard must be placed between the spaces on the side near the road to prevent vehicles entering the shared space.

# 4. CONSTRUCTION TRAFFIC IMPACTS

## 4.1 Construction Activity

The upgrade of Towradgi Railway Station would include the construction of a new footbridge over the existing railway, so construction during normal business hours would impact the operation of trains on the South Coast Line. Should track possession be required during train operating hours, prior notice would need to be given to affected passengers using standard TfNSW procedures.

Most of the required work would be undertaken during standard (NSW) Environmental Protection Authority (EPA) construction hours, which are as follows:

- 7:00am to 6:00pm Monday to Friday
- 8:00am to 1:00pm Saturdays
- no work on Sundays or public holidays

Out of hours work is required in some cases to minimise disruptions to customers, pedestrians, motorists, and nearby sensitive receivers; and to ensure the safety of railway workers and operational assets. It is estimated that approximately four rail shutdowns would be utilised to facilitate the following:

- construction of lift shafts
- installation of footbridge structure
- platform works including demolition of shelters, construction of new platform shelters and platform widening and regrading

The construction would also include the installation and repair of footpaths used to access both sides of the station. The construction may temporarily limit access to the platform, so pedestrian access to the platform should be considered when planning construction.

### 4.1.1 Worker Induction

A site induction would be required for all on-site workers and subcontractors. The induction should include WHS, environmental protocols and emergency procedures, as well as protocols for vehicles accessing the site.

Any workers responsible for road works and traffic control must be suitably trained and covered by the appropriate insurances. All traffic controllers must hold RMS accreditation in accordance with Section 8 of *Traffic Control at Work Sites Version 5*.

## 4.2 Construction Stage Impacts

### 4.2.1 Construction Vehicles

Construction vehicles are expected to approach the construction site from the nearest arterial road, which is Memorial Drive. The main construction compounds are located on Weber Crescent, so vehicles must approach the site via Towradgi Road and Carters Lane. For longer vehicles to access Weber Crescent, a detour along Pioneer Road is required as the turn onto Carters Lane from Towradgi Road would be blocked by a pedestrian island.

Access to railway property via the Ocean Street gate would be required to allow the installation of a crane pad on the western side of the station. Ocean Street is the only road that could be used to access the Ocean Street gate. Construction vehicles may have issues making the right turn into

Ocean Street from Towradgi Road if the 'Keep Clear' zone at the intersection of the roads is blocked. Heavy vehicles approaching from Memorial Drive north would have to weave across a lane to turn from the right lane of Towradgi Road into Ocean Street, and there will be sufficient gaps created by the signal phasing at the intersection of Memorial Drive and Towradgi Road. Measures to reduce the risk associated with these movements should be considered during construction planning.

Expected construction vehicle routes are detailed in Figure 4-1.



Basemap Source: Wollongong City Council LEP 2009

**Figure 4-1: Construction Vehicle Routes**

Construction vehicle turnaround areas must be designed for the construction sites on both sides of the railway corridor to ensure forward entry and egress from the frontage roadways. Swept path analysis must be undertaken to ensure that construction vehicles can safely manoeuvre within the site and access the locations of the crane pads and site compounds. The paved turnaround area next to the Ocean Street rail corridor access gate may be designated as the turnaround area for construction vehicles since expected traffic volumes would be low and vehicles would have ample sight lines across the turnaround area.

#### 4.2.2 Traffic Impacts

The construction of the proposed upgrades would add extra vehicles to the local roads. Vehicles that would need access to the site include heavy vehicles for material and equipment delivery and removal, light work vehicles for construction workers and subcontractors.

Since a significant amount of material is required for the construction of the new footbridge, it is expected that medium and large rigid vehicles, articulated vehicles, and concrete trucks would need access to the site.

Construction traffic is not expected to exceed 20 light vehicles and 10 heavy vehicles per day during peak construction periods (including scheduled Sydney Trains rail possessions) and would be less

when work is undertaken during standard construction hours. This volume is low and would not have a significant impact on the greater road network.

If the construction site encroaches onto Weber Crescent, residents south of the construction site would have to use Cannell Crescent as a detour. This would not be a significant detour, and the additional traffic generated is not expected to be significant.

### 4.2.3 Parking Impacts

The demand for parking in the area is very low, so parking demand generated by construction works should not be a significant issue. Parking restrictions may be needed on Weber Crescent between Carters Lane and the rail corridor access gate to allow safe access for large vehicles because the road is particularly narrow. For similar reasons, parking restrictions may also be required on Ocean Street between Towradgi Road and the rail corridor access gate.

Existing parking space on Weber Crescent would be affected by construction works because the construction site will impede pedestrians and vehicles from accessing that area. However, there is enough parking capacity on Cannell Crescent to accommodate expected parking volumes.

Parking of delivery vehicles and plant should also be considered, as the local roads are relatively narrow.

### 4.2.4 Other Impacts

The construction works are not expected to have any significant impact on other modes of transport. It is not expected that construction would encroach onto Towradgi Road, so cycle routes are unlikely to be affected. Bus routes and stops would not be affected by the construction, but the construction vehicle route may overlap with bus routes.

## 4.3 Recommended Mitigation Measures

In order to manage potential issues caused by construction works, a traffic control plan (TCP) that covers the various stages of construction would need to be prepared and submitted to the relevant roads authority and Wollongong City Council before work commences.

The TCP should include all required traffic control measures such as signs and line marking as per the *RMS Traffic Control at Work Sites Manual – Version 5*.

A Construction Traffic Management Plan (CTMP) that further details construction traffic impacts on the road network and mitigation procedures would need to be prepared and submitted to Wollongong Council before the commencement of construction works.

The CTMP should be based on the staging and timing of the construction, and include:

- The proposed construction activities, including hours of operation
- Identification of haulage routes and truck frequency
- Pedestrian and traffic route closures and management methods including local parking restrictions
- Construction zone access gates and ingress and egress of vehicles to the site including swept path analysis to demonstrate suitability
- Loading and unloading of materials, including identification of works zones on frontage roadways
- On-site parking requirements for construction traffic
- Construction traffic impacts on the surrounding road network, including recommendation of mitigation measures if necessary.

## 5. OPERATIONAL TRAFFIC IMPACTS

### 5.1 Future Demand

TfNSW has provided the patronage data for 2017, predicted rates for 2036 and associated growth rate. This is outlined in Table 5-1 **Error! Reference source not found.**

**Table 5-1: Forecast Station Patronage**

Year	2017	2036
Growth (%)	-	13
Average Weekday Patronage	161	182
1-hour Weekday Peak	10	11

### 5.2 Public Transport

It is unlikely that the proposed upgrade would have any significant impacts on bus and rail operations. As the future patron demand suggests, the proposed station upgrade is unlikely to cause congestion issues on the South Coast Line.

The proposal is also unlikely to have any significant impact on the surrounding bus network because of the low expected growth in rail patronage. The addition of the new station entrance on Weber Crescent means that transfers to the Route 3/8 bus stops on Murrarar Road may be more convenient for passengers. A pedestrian crossing on Carters Lane would provide better connectivity between the station and the bus stops.

### 5.3 Pedestrians

The proposed station upgrades include a number of pedestrian facilities including a new entrance, footbridge and lifts which would greatly improve accessibility and safety.

The new station entrance on Weber Crescent would provide easier access for pedestrians travelling towards the southeast of the station, and provide easier access to street parking in the vicinity. This may increase pedestrian activity on Weber Crescent, and a new footpath has been included in the proposal to accommodate this increase.

The provision of a footbridge and lifts would improve access for people with mobility issues, as the existing station ramps are not DDA compliant. The proposed footbridge would provide an alternative pedestrian railway crossing that is safer than the footpath on Towradgi Road. The footbridge would also provide a more direct route between the western platform and street parking on Weber Crescent.

It is unlikely that there would be an issue with pedestrian capacity on the footbridge, lifts and stairs because the patronage numbers are very low.

### 5.4 Cyclists

Cycling facilities have been provided at Towradgi Railway Station with a total capacity of eight bicycles. Given the forecast station patronage growth and the lack of dedicated cycling routes to the station, it is unlikely that the capacity of bicycle parking would be exceeded.

## 5.5 Kiss and Ride

A formal kiss and ride area is to be provided at the new Weber Crescent entrance, with space for at least one vehicle. This is likely to generate more traffic for the nearby streets that are currently a no-through area and given the location of the kiss and ride area, there may be increased U-turn activity on Weber Crescent because that would be the fastest way to get to the kiss and ride area. It is possible to drive to the kiss and ride area without performing a U-turn, but it involves a detour through Cannell Crescent.

## 5.6 Traffic Generation and Parking Demand

The new station entrance on Weber Crescent along with the proposed kiss and ride facility and accessible parking spaces means that traffic and parking demand would increase on Weber Crescent and the surrounding roads. This would have a moderate impact on the smaller roads, and a negligible impact on the larger road network.

The current demand for parking on Weber Crescent is a fraction of the available capacity, but increases in demand may cause issues as there is no indication of where parking is permitted. Line-marking and signage may be necessary to define where parking is restricted, especially near corners and intersections. There would also be a larger number of vehicles using Weber Crescent looking for parking and using the kiss and ride facility. However, congestion issues are not expected because the future demand is low.

It is unlikely that the vehicle trips generated by the proposed upgrades would have a significant impact on the greater road network, and may reduce the number of vehicles using Towradgi Road as the parking on Weber Crescent would become closer to the station.

## 5.7 Property Access

It is not expected that the proposed upgrades would impact vehicle or pedestrian access to neighbouring properties.

## 5.8 Road Safety

The proposed upgrades to Towradgi Railway Station would create a number of changes in pedestrian and vehicle patterns which may introduce safety issues.

The new entrance on Weber Crescent and the addition of the kiss and ride area may cause increased U-turn activity on Weber Crescent, as described in section 4.5. An increase in reversing vehicle movements is a significant safety issue for pedestrians. There are currently no footpaths on the section of Weber Crescent parallel to the station, and passengers parking in that area may need to walk on the road to get to the station.

For pedestrians travelling between the station and the bus stops on Murrarar Road, there is no pedestrian crossing on Carters Lane at the intersection with Weber Crescent, so pedestrians have to walk to the Towradgi Road crossing. Construction works outside the station precinct may be outside the scope of the TAP upgrade, but the position of directional signage should be considered in the design to mitigate this.

The proposed upgrade should leave safety conditions mostly unchanged on Towradgi Road, but there have been incidents reported of vehicles hitting pedestrians trying to cross the road. This may be due to the lack of a crossing directly outside the station, and pedestrians choosing to take the shortest route rather than walking to Memorial Drive or Carters Lane and crossing at a marked crossing. This issue is compounded by the curvature of the overpass bridge, which reduces the sight distances for vehicles. The safety of pedestrians on Towradgi Road should be considered further in the design.