

Transport for NSW

Turrella Station Upgrade

Traffic, Transport and Access Impact Assessment



Artist's impression of the Turrella Station upgrade subject to detailed design.

▲ Turrella Station
Upgrade

Traffic, Transport and Access Impact Assessment



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1. Introduction

1.1. Background

The NSW Government is committed to facilitating and encouraging use of public transport such as trains, by upgrading stations to make them more accessible and improving interchanges around stations with other modes of transport such as buses, bicycles and cars. This is being delivered through the Transport Access Program (TAP), which is a NSW Government initiative to provide a better experience for public transport customers by delivering modern, safe and accessible infrastructure. .

In line with this initiative, Transport for NSW proposes to provide accessibility upgrades at Turrella Station (the Proposal). The Proposal would ensure that Turrella Station would meet legislative requirements under the *Disability Discrimination Act 1992* (DDA) and the *Disability Standards for Accessible Public Transport 2002* (DSAPT).

The Proposal is designed to drive a stronger customer experience outcome, to deliver improved travel to and between modes, encourage greater public transport use and better integrate interchanges with the role and function of town centres. The Proposal would also assist in responding to forecasted growth in the region and as such would support growth in commercial and residential development.

Turnbull Engineering has been engaged to undertake a Traffic, Transport and Access Impact Assessment to support the Review of Environmental Factors (REF) for the Proposal.

1.2. Key Proposal features

The Proposal involves upgrades to Turrella Station and would include the following key elements:

- A new lift providing access from the Reede Street bridge to the station platform
- A new station entrance from the Reede Street bridge. The new station entrance would include:
 - Demolition of the existing station access stair and the section of the eastern platform canopy in order to accommodate the new stairs, lift, landing and canopy
 - Construction of a new station entrance landing area
 - Construction of new stairs between the proposed landing and the station platform
- Internal modifications to the existing station building including:
 - Provision of a new unisex ambulant toilet in the location of the existing female toilets
 - Provision of a new family accessible toilet in the location of the existing male toilets

- Modifications to kerb and line markings to accommodate the expansion of the kiss and ride bay along Turrella Street
- Upgrades along the footpath located on the northern side of Turrella Street to provide an accessible and safe path of travel to the new station entrance including installation of traffic barriers
- Localised platform regrading and the installation of new tactiles along the platforms
- Ancillary work including improvements to station lighting and CCTV to improve safety and security, electrical upgrades for the new infrastructure, landscaping and adjustments to wayfinding signage.

Subject to planning approval, construction is expected to commence in early 2022 and take up to 18 months to complete.

Figure 1-1 shows the general layout of key elements for the Proposal.

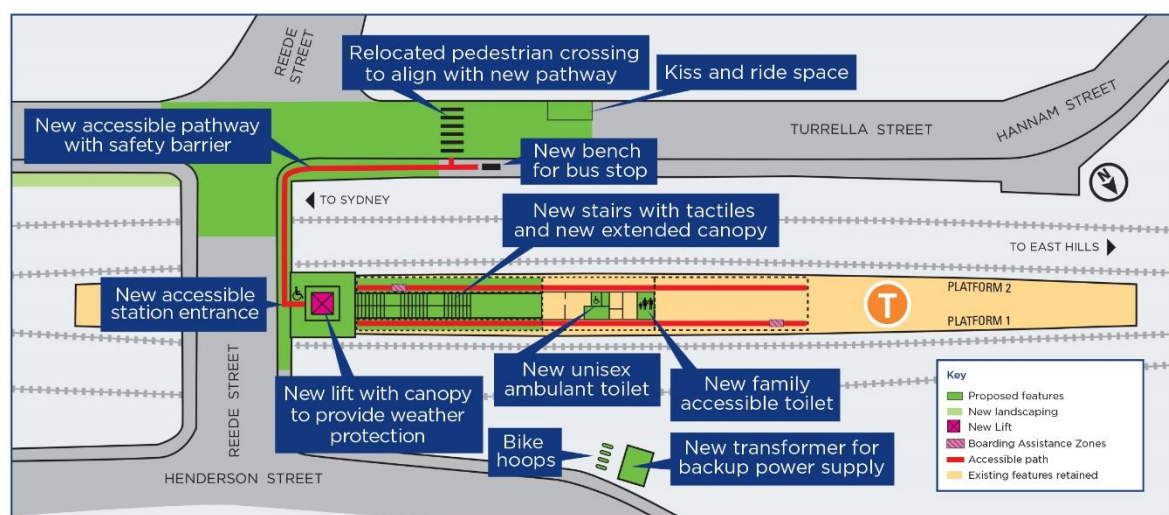


Figure 1-1: Key elements of the Proposal

1.3. Scope and objectives of this report

This report assesses the anticipated traffic, transport and access impacts during construction and operation of the Proposal and identifies where feasible, mitigation measures to reduce the anticipated impacts of the Proposal. More specifically, this report includes the consideration of the following:

- Existing traffic, transport and access conditions within the study area including a review of:
 - The road network
 - Parking arrangements
 - Public transport services and facilities
 - Pedestrians and bicycle users
 - Kiss-and-ride and taxi facilities
 - Road safety
- Operational traffic, transport and access impacts associated with the Proposal
- Construction traffic, transport and access impacts associated with the Proposal
- Potential mitigation measures that may be implemented to minimise traffic, transport and access impacts associated with the Proposal.

1.4. Reference

In preparing this report, reference has been made to the following:

- *Bayside Council Land Use Zoning Map* (Bayside Council, 2021)
- *Centre for Road Safety Interactive crash statistics* (TfNSW, 2021)
- *Turrella Station Upgrade Design Report* (Aurecon, 2021)

1.5. Report structure

This report has the following structure:

- Chapter 1 (this chapter) provides an overview of TAP and the Proposal
- Chapter 2 details the existing traffic and transport environment
- Chapter 3 provides a description of the Proposal
- Chapter 4 provides an assessment of the potential traffic and transport impacts during the construction phase of the Proposal
- Chapter 5 provides an assessment of the potential traffic and transport impacts during the operational phase of the Proposal
- Chapter 6 provides a summary of traffic and transport impacts due to the Proposal identifies mitigation and management measures.

2. Existing Conditions

2.1. Study area

Turrella Station is located in the suburb of Turrella and falls within the jurisdiction of Bayside Council in NSW. The station is located approximately 10 kilometres south of the Sydney CBD and is bordered by the suburbs of Bardwell Park, Earlwood, Wolli Creek and Bardwell Valley.

The Proposal is generally located within the boundaries of the existing station and includes Turrella Street between Hannam Street and Reede Street on the south side of the rail line. North of the rail line, the Proposal includes the vacant land at 27 Henderson Street. The study area extent is shown in Figure 2-1.

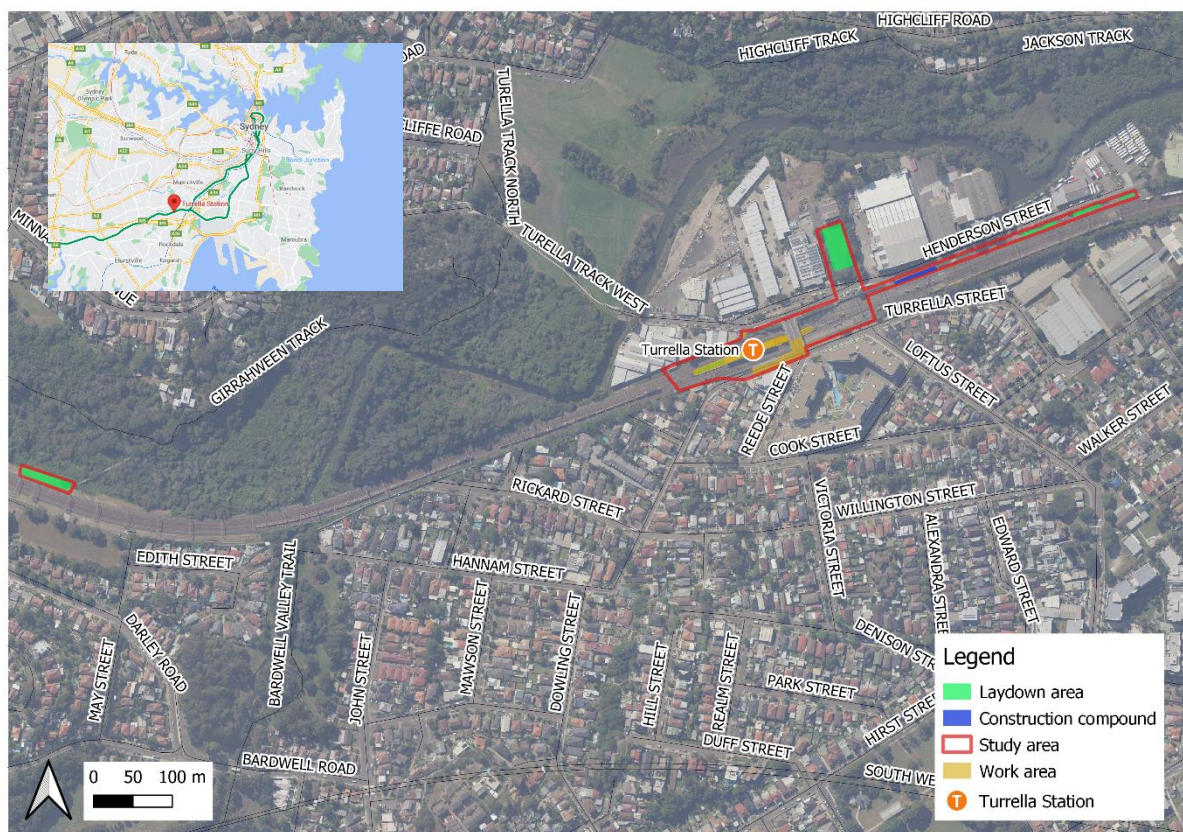
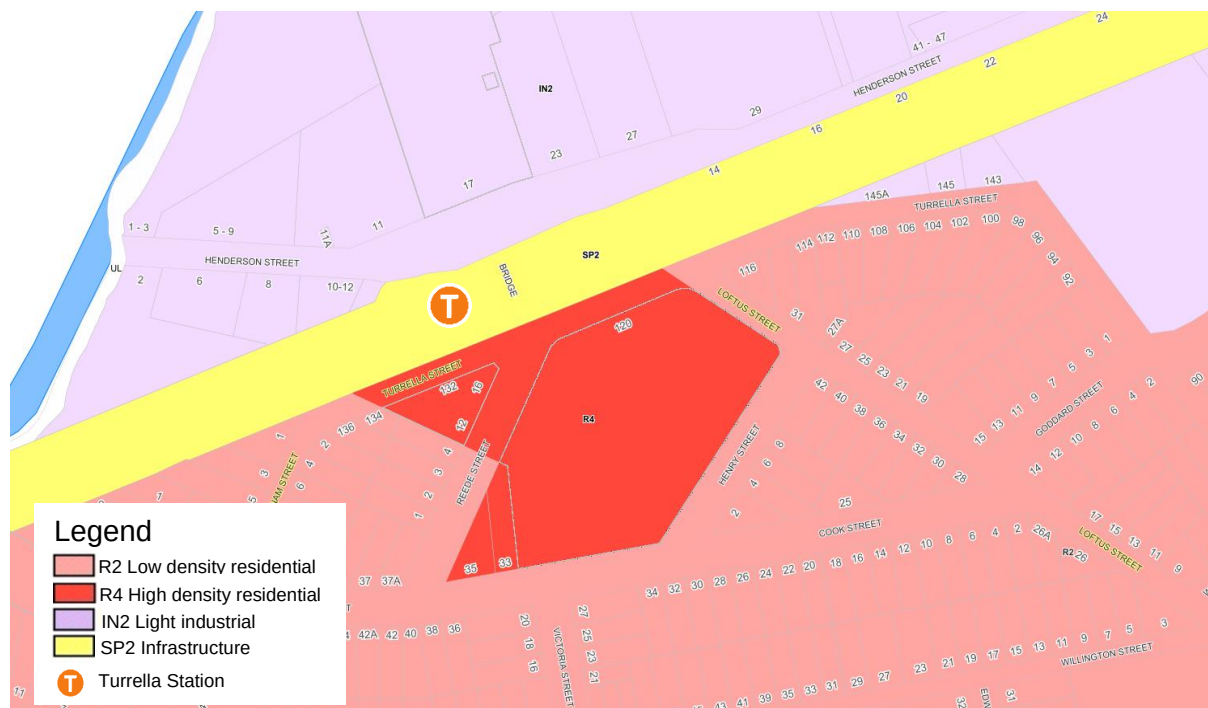


Figure 2-1: Study area at Turrella Station

Land use surrounding the Proposal primarily consists of R2 low-density residential, R4 high-density residential, IN2 light industrial and SP2 infrastructure (rail) areas. Figure 2-2 presents the land use zone plan for the area surrounding Turrella Station.



Source: Bayside Council Land Use Zoning Map - accessed 5 August 2021

Figure 2-2: Lane use surrounding the Proposal

2.2. Road network

Turrella Station is surrounded by local roads including Turrella Street, Henderson Street, Reece Street and Hannam Street. These roads have a sign-posted speed limit of 50 km/hr. The majority of surrounding roads provide a single traffic lane in each direction. Close to the station, unrestricted on-street parking is provided to support retail, commercial and industrial activity, as well as for residents.

Key roads within close proximity to Turrella Station are shown in Figure 2-3.

The station is accessible from Reece Street, which has an overbridge connecting Henderson Street and Turrella Street, providing connectivity to and from the north and south of the rail line, respectively.



Figure 2-3: Road network around Turrella Station

2.3. Car parking

There are approximately 74 unrestricted on-street parking spaces on local roads in close proximity to Turrella Station, with no formal commuter car parks provided.

2.4. Public transport

2.4.1. Station layout and access

Turrella Station has a single island platform with four tracks. The station and platforms are accessible via a stairs on the western side of Reece Street (see Figure 2-4), with footpaths on surrounding roads connecting the station to the wider transport network. The station is not currently wheelchair accessible.



Figure 2-4: Station entrance from Reede Street

2.4.2. Station facilities

The facilities currently provided at Turrella Station include:

- Opal card top-up machine or single trip ticket machine
- Payphone
- Kiss-and-ride zone
- Bicycle lockers
- Emergency help points
- Toilets.

Given the absence of a lift, Turrella Station does not provide adequate access for people with a disability, limited mobility, carers/parents with prams and customers with luggage.

2.4.3. Rail services

Turrella Station is located on the T8 Airport and South Line. Platform 1 serves inbound train services towards Central Station and the City Circle via the Airport and Platform 2 serves outbound train services towards Macarthur. Table 2-1 summarises the existing train services and their frequencies at Turrella Station.

Table 2-1: Train services at Turrella Station

Rail line	Weekday and weekend service frequency	
	AM (5:00am to 12:00pm)	PM (12:00pm to 12:00am)
T8 Airport and South Line	Every 15 minutes	Every 15 minutes

2.4.4. Bus network

One bus route currently operates in the vicinity of Turrella Station as follows:

- Bus route 473 – Rockdale to Campsie, operated by Transit Systems.

Bus route 473 operates every 30 minutes on weekdays during peak periods and every 60 minutes on weekdays during off-peak periods and is accessible at bus stops located on Turrella Street and Loftus Street. The bus stops closest to the station are shown in Figure 2-5.

Pedestrian connectivity between the bus stops and the station is maintained via footpaths and the formal pedestrian crossing on Turrella Street. Both bus stops do not provide seating nor shelter for customers.

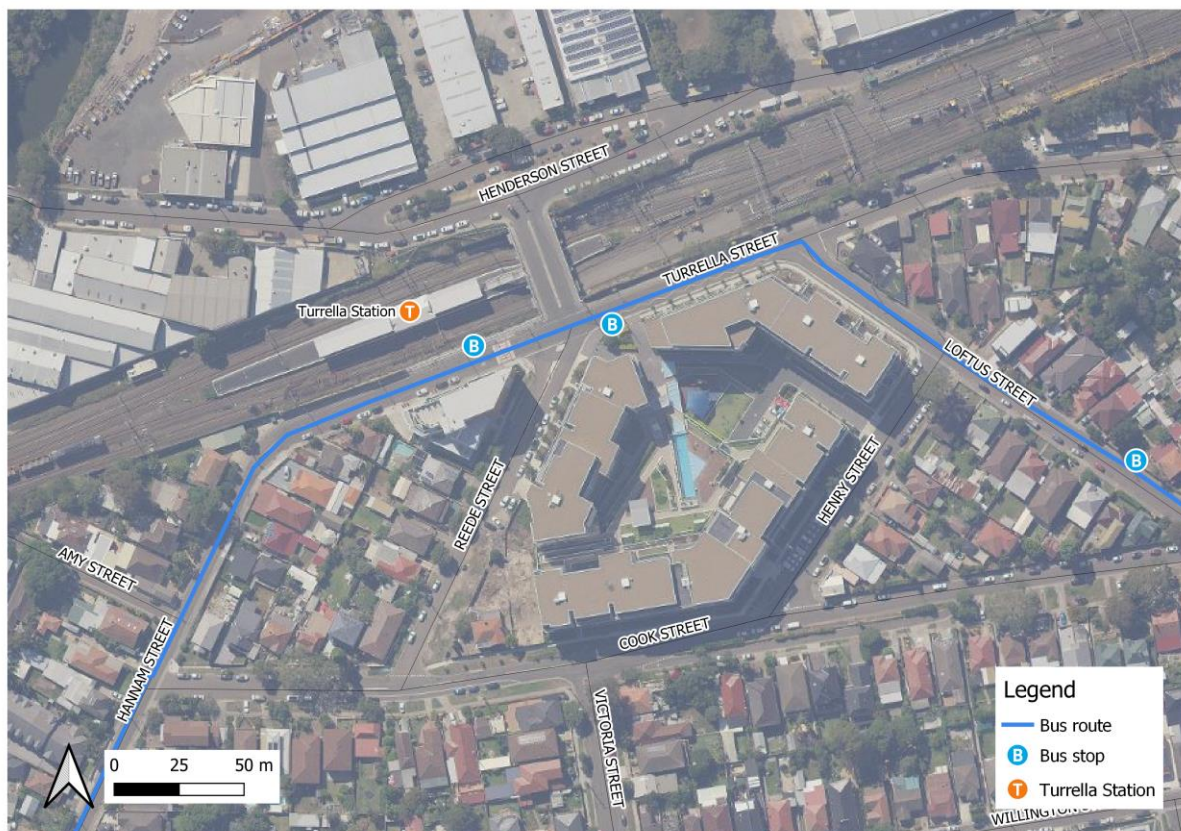


Figure 2-5: Existing bus stop locations surrounding Turrella Station

2.5. Active transport

2.5.1. Pedestrian network

As discussed in Section 2.4.1, pedestrian access to and from Turrella Station is provided via a stairs on the western side of Reece Street. Paved footpaths are provided on both sides of Turrella Street and Reece Street and on one side of the road on Henderson Street.

A marked pedestrian crossing (zebra) is located on Turrella Street west of Reede Street, providing a safe crossing point for customers of the station and connecting the station to the kiss-and-ride zone on the southern side of Turrella Street.

The pedestrian network surrounding Turrella Station is shown in Figure 2-6.



Figure 2-6: Pedestrian infrastructure surrounding Turrella Station

2.5.2. Cycle network

The cycle network in the vicinity of Turrella Station is limited and includes a marked on-road cycle route on Turrella Street, Hannam Street, Reede Street and Henderson Street. At the western end of Henderson Street, the on-road cycle route connects to a short, shared path that continues west along the southern side of Turrella Reserve.

A bicycle locker that can accommodate up to four bicycles is available approximately 60 metres west of the station on the northern side of Turrella Street..

The cycle network surrounding Turrella Station is shown in Figure 2-7.



Figure 2-7: Cycle infrastructure surrounding Turrella Station

2.6. Kiss-and-ride facilities

A kiss-and-ride zone is located on the southern side of Turrella Street between Hannam Street and Reece Street, as shown in Figure 2-8. The kiss-and-ride zone can accommodate one vehicle.



Figure 2-8 Kiss-and-ride facilities surrounding Turrella Station

2.7. Road safety

A summary of the crash data on roads surrounding Turrella Station for the most recent five-year period with available data (2015 to 2019) is shown in Figure 2-9.



Figure 2-9: Turrella Station and surrounds crash map

In the five-year period from 2015 to 2019, a total of 22 crashes were recorded on roads surrounding Turrella Station (TfNSW, 2021). A total of 12 crashes resulted in at least one injury and no fatalities were recorded. Near the station, two crashes were recorded at the Turrella Street / Loftus Street intersection and two other crashes were recorded on Turrella Street between Reede Street and Hannam Street. These crashes resulted in either no casualties or minor injuries. None of these crashes involved a pedestrian.

Crash data by Road User Movement (RUM) code is provided in Appendix A.

3. Proposed station upgrade

3.1. Scope of works

3.1.1. Station upgrade

Details of the proposed work to take place at the station to improve accessibility and customer experience include:

- Upgrades to the existing footpath between Reede Street, Turrella Street and the station entrance on the Reede Street bridge
- Demolition of the existing stairs connecting the station platform to Reede Street and replacement with a new stairs
- Installation of a new lift and associated lift landing between Reede Street and the station platform
- Demolition of the existing platform canopy and replacement with a new canopy extending from the lift to the existing station building.

To maintain existing pedestrian access to the station during construction of the new station entry, temporary stairs would be constructed to continue to provide access to the station platform. The design and staging of the temporary access would be determined during detailed design phase of the Proposal.

3.1.2. Station building modifications

Details of the proposed work to take place within the station building to improve accessibility and customer experience are provided below:

- Refurbishment of existing male toilets located within the station building to create a new family accessible toilet. This work would include the demolition of existing toilets, installation of fittings, finishes, services connections, bathroom fixtures (including toilets, sinks, and a changing table), plumbing and widening of the existing brick opening to allow for a new compliant door
- Designation of a new single staff toilet to be located in the existing female toilets
- Construction of a new unisex ambulant toilet at the location of the existing female toilets. This would include the demolition of existing internal fittings and installation of new fittings, fixtures, finishes, and services connections
- Relocation of the communications room to the existing cleaning room
- Relocation of the cleaning room to the existing men's bathroom. This would include the removal of existing internal partitions, fixtures and fittings and the installation of service connections, fixtures and fittings.

3.1.3. Interchange facilities

Details of the proposed work to take place around the station to improve accessibility and customer experience are provided below:

- Relocation of the road centreline along Turrella Street to provide space for the proposed expansion of the kiss and ride zone
- Modifications to the median strip on Reede Street and provision of new road line markings to allow vehicles to turn left onto Reede Street from Turrella Street more safely and reduce the likelihood of a vehicle mounting the kerb
- Relocation of the pedestrian crossing on Turrella Street approximately 10 metres west to allow easier access from the kiss-and-ride zone
- Construction of a new ramp and path located near the corner of Turrella Street and Reede Street including the installation of new compliant handrails and traffic barriers.

3.1.4. Ancillary work

Details of the proposed ancillary work required to take place at and around the station to facilitate accessibility upgrades are provided below:

- Relocation of services including lighting and communications systems (e.g. CCTV), stormwater drainage, retaining walls, and overhead wiring
- Improvements to station power supply which includes the installation of a padmount substation, and earthing/bonding provisions (specific power requirements to be determined during detailed design)
- Improvements to station security and communication systems, including CCTV modifications, public address system upgrades, modification to station passenger information systems and new hearing induction loops within the station platforms
- New wayfinding signage in relation to the new lift and parking spaces
- Regrading and resurfacing of the station platforms to provide compliant paths of travel between the lift, boarding assistance zones, family accessible toilet and other facilities on the platforms
- Lighting upgrades
- Relocation of station furniture and rubbish bins
- Landscaping along Turrella Street
- Provision of a new bench seat and wheelchair waiting space at the bus waiting area on Turrella Street.
- Temporary site compounds for storage of materials and equipment
- Temporary work (where required) during construction in order to maintain existing pedestrian 'level of service' and access to the station
- Relocation and preservation of existing underground services including sewer, telecommunications, water, power and gas.

3.2. Construction activities

Subject to approval, construction is expected to commence in early 2022 and take around 18 months to complete. The construction methodology would be further developed during the detailed design of the Proposal by the nominated Contractor in consultation with Transport for NSW.

The proposed construction activities for the Proposal are identified in Table 3-1. This staging is indicative and is based on the current concept design and may change once the detailed design methodology is finalised. The staging is also dependent on the Contractor's preferred methodology, program and sequencing of work.

Table 3-1: Indicative construction staging for key activities

Stage	Activities
Site establishment and enabling work	- Establish site compounds (i.e. fencing, site offices, amenities and plant/material storage areas) - Establish temporary facilities as required (temporary toilets, temporary construction lights etc.) - Erect site hoarding on platforms as required - Service location and relocation.
Utilities	- Confirmation of locations of existing underground utilities - Relocate utilities as required - Establish protection zones around utilities not required to be relocated.
Lift installation	- Prepare sites and position cranes and piling rigs for lift - Temporary earthworks and dismantling of fencing and barriers to allow piling rigs to reach desired locations - Excavation of lift pit and lift landing footings (including temporary shoring if required) - Piling work for lift and lift landing - Waterproof (as required) - Install reinforcement, formwork and concrete to form the lift pit and footings - Erect glass and steel shaft structure - Install structural supports for lift landing - Install lift landing - Install lift, including fit-out.
Stairs	- Remove existing stairs from Reede Street to the station platform - Carry out piling work and establish footings for the new stairs - Install the new stairs - Construct street level walk-out to lift with fit-out around lift including new canopy and anti-throw screens.
Canopy work	- Piling work for canopy footings - Concrete pour - Erect steel framework and roof.
Turrella Street and Reede Street footpath	- Demolition/excavation of existing non-compliant footpath - Construction of ramp and regrading of footpath area to tie into existing footpath on Reede and Turrella Streets - Installation of traffic barriers - Partial removal of medium strip on Reede Street - Adjustment of line markings and pedestrian crossing on Turrella Street.
Station building works	Reconfiguration of existing male and female toilets into family accessible toilet, ambulant toilet, staff toilet and cleaning room.
Demobilisation	- Installation of ancillary features - Removal of hoardings - Site demobilisation.
Testing and commissioning	- Testing electrical, communications and signalling components - Commissioning of new lift.

3.2.1. Working hours

The majority of work required for the Proposal would be undertaken during standard (NSW) Environment Protection Authority (EPA) construction hours, which are as follows:

- 7.00 am to 6.00 pm Monday to Friday
- 8.00 am to 1.00 pm Saturdays
- No work on Sundays or public holidays.

Certain work may need to occur outside standard hours such as night work. Additionally, work would occur during routine rail shutdowns. The rail shutdowns are scheduled closures that would occur regardless of the Proposal when part of the rail network is temporarily closed by Sydney Trains for ongoing maintenance when trains are not operating.

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 required to facilitate the following:

- Construction and installation of new stairs
- Service relocation work
- Electrical work
- Piling works for lift
- Lift installation
- Work on the station including regrading, construction of canopies and work involving service routes.

Out of hours work may also be scheduled outside rail shutdown periods. Approval from Transport for NSW would be required for any out of hours work and the community would be notified in advance of the work as outlined in Transport for NSW's *Construction Noise and Vibration Strategy* (TfNSW, 2019).

3.2.2. Workforce

The peak number of construction vehicles and workforce anticipated during construction of the Proposal includes:

- Construction vehicles:
 - Up to 20 light vehicles and three heavy vehicles per day during the typical construction period
 - Up to 30 light vehicles and five heavy vehicles per day during weekend rail possessions.

3.2.3. Plant and equipment

The plant and equipment likely to be used during construction includes:

- | | | |
|-----------------------------|--------------------------|--------------------|
| • Hand tools | • Petrol pressure washer | • Jackhammer |
| • All terrain forklift | • Light towers | • Air compressor |
| • Street sweeper | • Vac truck | • 4t excavator |
| • 12t Crane truck | • Bore rigs | • 2.5t excavator |
| • Hi-rail crane truck | • Chainsaw | • 1.5t excavator |
| • Hi-rail flat bed | • 10t Smooth drum roller | • Hydrema |
| • water cart | • rivet buster | • 250 tonne crane. |
| • Demolition saw | • Oxy-Acetylene burner | |
| • Generator (5kVA – 25 kVA) | | |

3.2.4. Earthworks

Excavations and earthworks would generally be required for the following:

- Lift shaft pit excavation
- Regrading and resealing of Platforms 1 and 2
- Excavation for power supply upgrade work
- Excavation for the construction of the kiss-and-ride bay
- Footpath regrading on Turrella Street
- Partial removal of median strip on Reede Street.

3.2.5. Construction compound and laydown areas

Temporary construction compound and laydown areas would be required to accommodate construction activities associated with the Proposal. The construction compounds would include a site office, amenities, laydown and storage area for materials, parking for workforce and storage of construction plant and equipment.

Six sites have been identified as potential construction compound/laydown areas for the Proposal as follows:

- Laydown area
 - Within the vacant land on 27 Henderson Street (north of Turrella Station)
 - Within the rail corridor on Henderson Street, opposite 57 Henderson Street (north of Turrella Station)
 - Within the rail corridor on Henderson Street, opposite 65 Henderson Street (north of Turrella Station)
 - Within the rail corridor on Henderson Street, opposite 67 Henderson Street (north of Turrella Station)
 - Within the rail corridor adjacent to Wolli Creek Regional Park (north of Turrella Station)

- Construction compound
 - Within the rail corridor on Henderson Street, opposite 29 Henderson Street (north of Turrella Station).

The locations of the construction compound and laydown areas are shown in Figure 3-1. The extent to which the areas would be utilised for the Proposal would be determined during detailed design.

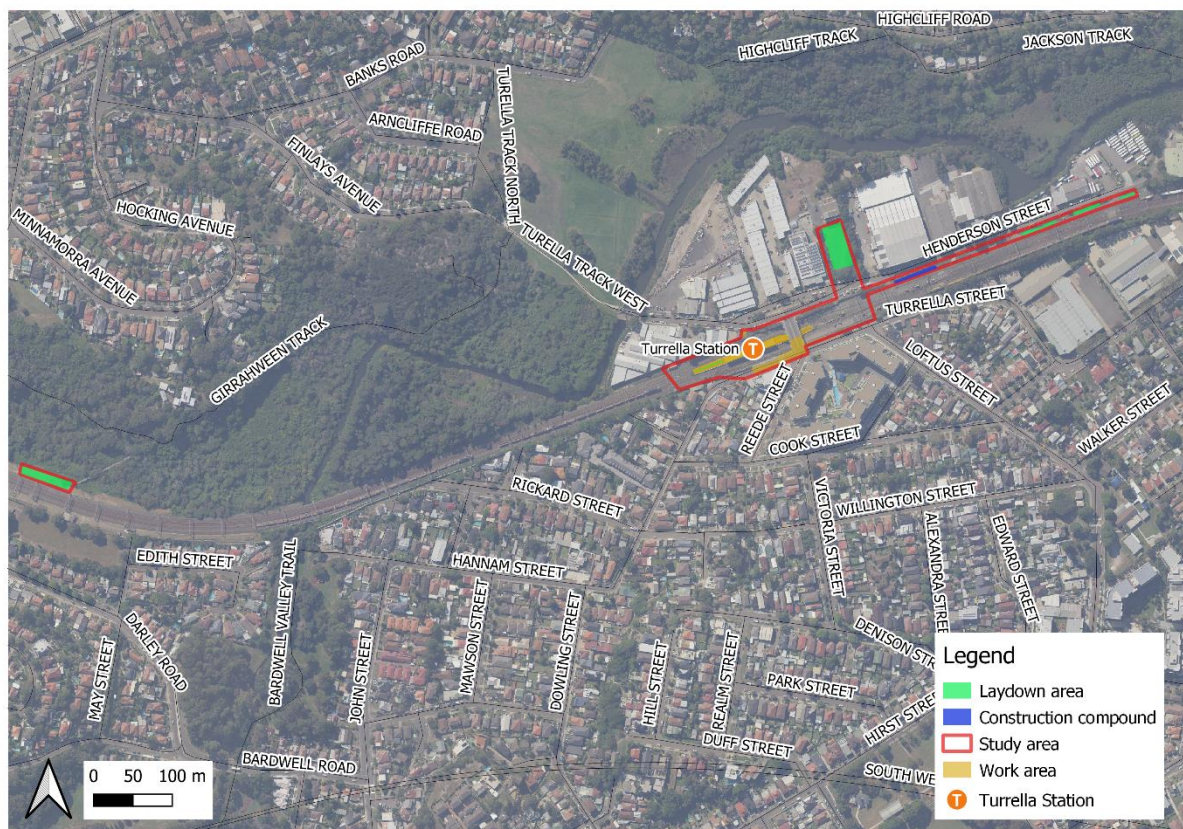


Figure 3-1: Proposed construction compound and laydown areas for the Proposal

3.2.6. Haulage routes

With no definitive haulage routes identified at this stage, Figure 3-2 outlines the potential haulage routes that could be used by construction vehicles travelling to and from the construction compound and laydown areas. The potential haulage routes comprise roads that could accommodate heavy vehicles and would form the shortest route between the construction compound and laydown areas and the arterial road network to minimise impacts on the local road network. Forest Road and Bexley Road are designated as 25/26 metre B-double routes and would be the primary routes to and from the construction compound and laydown areas.

It is recommended that construction vehicles travel via Forest Road, Wollongong Road, Bonar Street, Thompson Street and Turrella Street to access the construction compound and laydown areas. Loftus Street and Kelsey Street have also been nominated as a potential shorter alternative route which should be limited to use outside of the school zone hours to minimise road network and safety impacts when the school zone is in operation on Loftus Street.

Alternatively, construction vehicles could travel via Bexley Road, Slade Road, Darley Road, Bardwell Road, John Street, Hannam Street and Turrella Street to access the construction compound and laydown areas. A signposted weight limit of 4.5 tonnes applies on Slade Road.

The proposed haulage routes are subject to overhead hazard assessments, swept path analyses and the largest vehicle that the construction compound and laydown areas can accommodate. Furthermore, given that all construction compound and laydown areas are not located within close proximity to the arterial road network, the constraints that exist on local roads that limit the types of heavy vehicles that can travel on these roads would need to be considered. The final construction haulage routes would be determined by the nominated construction contractor during detailed design of the Proposal and in consultation with Transport for NSW and Bayside Council. A Construction Traffic Management Plan (CTMP) would also be prepared and used to inform truck drivers of the designated haulage routes to and from the construction compound and laydown areas.



4. Construction impacts

4.1. Impacts on the road network

4.1.1. Road network performance

The majority of construction vehicles generated by the Proposal during construction are expected to be light vehicles (including utilities) for construction workers. Trips generated by heavy vehicles are expected to be minimal and infrequent, and associated with the delivery and removal of materials, plant and equipment.

The traffic generated by the construction work is not expected to exceed 20 light vehicles and three heavy vehicles per day during the peak construction period.. During rail shutdowns, the number of construction vehicles would marginally increase to 30 light vehicles and five heavy vehicles per day. Given that the number of construction vehicles is low and would fall within the range of daily variation in traffic volumes on the road network when compared to background traffic, impacts on the road network are anticipated to be minor.

Temporary full or partial closure of sections of Turrella Street, Reede Street and Henderson Street would be required to facilitate works such as crane lifts, structure deliveries, modifications to aerials, concrete pours and earthworks. Appropriate detour routes and/or other traffic management arrangements would be implemented when these roads are temporarily closed. Roads that could form part of a detour route include Hannam Street, Reede Street south of Turrella Street, Cook Street and Loftus Street. Temporary road closures would result in a minor increase in travel time for vehicles travelling on a detour route. Furthermore, given that the Reede Street overbridge provides the only vehicle access to properties on Henderson Street, north-south connectivity between Turrella Street and Henderson Street via the Reede Street overbridge would be maintained throughout construction, with appropriate arrangements to be determined during construction planning. Therefore, overall road network impacts are anticipated to be minor given the availability of alternative roads that provide similar connectivity, and the temporary short-term nature of the closures.

4.1.2. Emergency vehicle access

Access for emergency vehicles during construction would be maintained in accordance with emergency vehicle requirements. Emergency services would be advised of all planned changes to traffic arrangements prior to applying the changes. This would include information about upcoming lane closures, traffic disruptions, anticipated delays to traffic, extended times of work and locations of any road closures.

4.2. Impacts on parking

Approximately three parking spaces would be temporarily removed on the southern side of Turrella Street between Hannam Street and Reede Street during construction works associated with the Reede Street corner raising, relocation of the pedestrian crossing, modifications to linemarking and the kiss-and-ride zone, and regrading of footpaths and lighting upgrades. Additional parking spaces may be temporarily removed on Turrella Street and Henderson Road to facilitate works such as crane lifts, structure deliveries, modification to arials, concrete pours, earthworks and to accommodate construction vehicle access at the proposed construction compound at 27 Henderson Street.

Minor impacts on parking are anticipated due to the low number of parking spaces that may be removed and the availability of alternative on-street parking spaces nearby. Other alternative parking measures and controls to mitigate the loss of parking during construction of the Proposal would be considered in consultation with Bayside Council, prior to construction commencing.

Construction workers would be required to park away from the station or within the nominated construction compound if feasible, and encouraged to carpool where practicable.

4.3. Impacts on public transport

The bus stop on the northern side of Turrella Street west of Reede Street may be temporarily relocated during construction. If required, the bus stop would be temporarily moved to a location that is in close proximity to its current location. This may result in a minor impact to bus customers due to a potential minor increase in travel distance. Signage would be in place and communicated to bus customers in advance of any changes.

4.4. Impacts on active transport

4.4.1. Pedestrian network

Access to and from Turrella Station would be maintained throughout construction via the construction of temporary stairs from Reede Street, except during scheduled rail shutdowns.

Temporary closure of footpaths on roads surrounding the Proposal may be required during construction. If required, footpaths on the other side of the road would remain open, maintaining connectivity. Also, temporary full or partial closure of Turrella Street between Reede Street and Hannam Street may result in the closure of the pedestrian crossing and would require pedestrians to cross the road at an alternative location. This closure would be undertaken during a scheduled rail shutdown and traffic control would be provided to allow pedestrians to safely cross Turrella Street.

The presence of construction work on the platforms would reduce the amount of space available and temporarily impact pedestrian movements along the platform. This has the potential to result in a higher level of congestion arising from restricted access to certain areas of the platforms such as near the lift construction area.

Impacts on the pedestrian network are anticipated to be minor due to pedestrian connectivity being maintained throughout construction and the lower traffic volumes expected on Turrella Street when the street is closed during construction. Although traffic volumes associated with heavy vehicles and construction workers would increase, increases are expected to be within typical fluctuations of daily traffic movements and therefore not result in an increased road safety risk during construction.

Temporary signage would be provided to direct pedestrians along detour routes and along the platforms.

4.4.2. Cycle network

On-road cycle routes on Henderson Street, Reede Street and Turrella Street would be affected during temporary full or partial closure of these roads. This would result in cyclists being required to travel via alternative roads which could include Cook Street, Reede Street or Loftus Street. Furthermore, minor conflicts are anticipated between cyclists and construction vehicles travelling to and from the construction compound and near the access point. Given the temporary nature of the potential road closures and the low traffic volumes that alternative local roads would carry, and the low number of construction vehicles generated by the Proposal during construction, impacts on cyclists are anticipated to be minor.

4.5. Impacts on kiss-and-ride facilities

Temporary closure of the kiss-and-ride zone on the southern side of Turrella Street may be required during construction. Impacts are anticipated to be minor given that only one parking space would be temporarily removed, with alternative parking spaces available nearby.

5. Operational impacts

5.1. Impacts on the road network

The Proposal would provide a higher level of station accessibility and usability, with an improved customer experience and facility upgrades that would likely attract higher patronage at the station. This could lead to a marginal increase in traffic on roads near the station. However, the potential marginal increase in traffic during operation of the Proposal is anticipated to have a negligible impact on the surrounding road network.

5.2. Impacts on parking

The Proposal would remove three on-street parking spaces on the southern side of Turrella Street due to the realignment of the road centreline and reconfiguration of the kiss-and-ride zone. Due to the low number of permanently removed parking spaces, parking impacts are anticipated to be minor.

5.3. Impacts on public transport

The operation of the Proposal would have no impact on the bus network and train services.

A bench seat would be provided at the bus stop on the northern side of Turrella Street, which would improve customer experience. Customer accessibility to and from Turrella Station and within publicly accessible areas at the station would improve.

5.4. Impacts on active transport

5.4.1. Pedestrian network

The Proposal would enhance pedestrian accessibility given the inclusion of facilities such as a new lift and new canopies for weather protection. Overall station accessibility would improve particularly for customers with mobility constraints parents/carers with prams, and customers with luggage.

Additionally, the proposed modification to the existing footpath along the northern side of Turrella Street with a new DSAPT compliant ramp, and extended guard rails and a widened footpath along the western side of Reede Street would improve pedestrian safety. The relocation of the existing pedestrian crossing would also provide a more direct connection between the kiss-and-ride zone and the station.

5.4.2. Pedestrian capacity assessment

A static pedestrian flow assessment of the Proposal that is documented in *Turrella Station Upgrade Design Report* (Aurecon, 2021), considered the impact of proposed new vertical transportation including lift and stairway on pedestrian flow within the station. The assessment used Fruins Theory to determine capacity in terms of pedestrian throughput, which has been classified into six performance categories, or Level of Service (LoS) as shown in Table 5-1.

Table 5-1: Pedestrian LoS

Fruins Level of Service	Walkways (platforms / footbridges) Pedestrian flow rate (pmm*)	Stairss Pedestrian flow rate (pmm*)	Description
A	0-23	0-16	Normal walking speed can be freely selected and slower pedestrians can be easily overtaken. Cross conflicts can be easily avoided.
B	23-33	16-23	Sufficient space is available to select normal walking speed and to bypass other pedestrians in primarily one-directional flows. Where there is reverse direction or crossing movements, minor conflicts will occur.
C	33-49	23-33	Restricted ability to select normal walking speed or freely pass others. High probability of conflict where crossing movements and counter-flows exist. Conflict avoidance requires frequent adjustment of walking speeds and direction. Flow is reasonably fluid but considerable friction and interaction between pedestrians is likely to occur.
D	49-66	33-43	Restricted walking speed and overtaking is difficult. Counter-flow and crossing movement severely restricted with multiple conflicts. Some probability of reaching critical density causing temporary stoppages.
E	66-82	43-56	Walking speed and passing ability restricted for virtually all pedestrians. Forward movement is possible only by shuffling. Counter-flows and crossing movements extremely difficult. Flow volumes approach limit of walking capacity causing frequent stoppages and interruptions of flow.
F	>82	>56	Severely restricted walking speed with frequent unavoidable contact with other pedestrians. Reverse or crossing movements are virtually impossible. Pedestrian flows are sporadic and unstable and are more representative of a queuing than a flow situation.

* Pedestrians per metre per minute

Using Fruins Theory, a minimum pedestrian LoS C is desirable.

The pedestrian capacity assessment considered the following sections of Doonside Station during the 2036 morning and evening peak hour:

- Stairs between the platform and lift
- The platform.

With assumed 2036 pedestrian forecast demand including a margin of 15 per cent (to accommodate unforeseen growth and extend infrastructure capacity life), results of the assessment indicated that the stairs and platform during the morning and evening peak hour would perform at LoS A and LoS B, respectively.

5.4.3. Cycle network

No impacts on the cycle network are anticipated during operation of the Proposal.

5.5. Impacts on kiss-and-ride facilities

The existing kiss-and-ride zone on the southern side of Turrella Street that currently accommodates one vehicle would be modified with provision of two accessible kiss-and-ride bays. As a result, customer accessibility to the station would be improved. As discussed in Section 5.4.1, connectivity between the kiss-and-ride-zone and the station would also improve due to the relocated pedestrian crossing.

5.6. Safety

Swept paths on Reede Street and Turrella Street documented in *Turrella Station Upgrade Design Report* (Aurecon, 2021) identified that the swept paths for a 12.5 metre bus and 19 metre articulated truck between Reede Street and Turrella Street are currently non-compliant. The proposed widening of the Reede Street footpath would make these swept paths more constrained. However, the proposed partial removal of the existing median on Reede Street and modifications to linemarking on Turrella Street would provide additional space for heavy vehicles to turn left from Turrella Street onto Reede Street. Swept paths would be compliant for an 8.8 metre two axle rigid truck (e.g. waste vehicles). Although improved, swept paths for a 12.5 metre bus and 19 metre articulated truck would remain non-compliant as these vehicles may be required to cross into the opposite traffic lane. Given the non-compliant swept paths, Bayside Council would be consulted, with the final design to be approved by council prior to the commencement of construction.

The Proposal would improve pedestrian safety through the upgrade of existing footpaths and the provision of a lift at the platform. Furthermore, the modification of the existing ramp on the northern side of Turrella Street to a DDA compliant ramp, and extended guard rails and a widened footpath along the western side of Reede Street, would improve safety for people with disabilities and/or less mobility.

6. Summary

6.1. Traffic, transport and access impacts

The following impacts are anticipated during construction of the Proposal:

- A minor increase in traffic volumes associated with heavy vehicles and construction workers. These increases are expected to fall within typical fluctuations of daily traffic movements and therefore not adversely affect the existing operation of the road network in proximity to Turrella Station
- Temporary full or partial closure of Turrella Street, Reede Street and Henderson Street, resulting in a minor increase in travel time for vehicles travelling on a detour route
- Temporary removal of up to three car parking spaces surrounding Turrella Station, resulting in a minor impact due to the availability of alternative on-street parking spaces nearby
- Potential temporary relocation of the bus stop on the northern side of Turrella Street, resulting in a potential minor increase in travel distance for affected bus customers
- Minor impacts on pedestrians due to the temporary full or partial closure of footpaths near Turrella Station
- Minor impacts on cyclists due to the potential full or partial closure of Henderson Street, Reede Street and Turrella Street
- Minor conflicts between the active transport network and construction vehicles travelling to and from the construction compounds and near access points
- Minor impacts due to the potential temporary closure of the kiss-and-ride zone on Turrella Street.

It is expected that operational impacts of the Proposal would be positive, particularly for people with disabilities, less mobility, parents/carers with prams and customers with luggage. Overall station accessibility would improve due to the provision of a new lift to the station platform, modification of the existing pedestrian crossing on Turrella Street, installation of a new DDA compliant ramp, extended guard rails and a widened footpath along Reede Street and Turrella Street, provision of a bench seat at the bus stop on the northern side of Turrella Street and provision of two accessible kiss-and-ride bays.

6.2. Mitigation and management measures

The majority of long-term impacts of the Proposal would have been addressed through the design process. However, residual impacts that arise from engineering constraints or from construction activities, and which cannot be removed through the design could be managed through mitigation measures.

The following mitigation and management measures are recommended to minimise impacts during construction of the Proposal:

- Prior to the commencement of construction, a CTMP would be prepared as part of the Construction Environmental Management Plan (CEMP) and in accordance with relevant guidelines. The CTMP would outline how construction of the Proposal would avoid, mitigate and manage risks involving construction activities, users of the traffic and transport network and local residents
- The community would be notified in advance of proposed transport network changes through appropriate media and other appropriate forms of community liaison
- A drive-through assessment or swept path analysis would be carried out to ensure that sufficient manoeuvring space is provided for the largest design vehicle along the proposed haulage routes
- Traffic Guidance Schemes (TGSs) would be developed for construction works that require lane closures such as on Turrella Street, Reede Street or Henderson Street. TGS implementation would ensure adequate warning and guidance is provided to road users, minimising road related traffic impacts
- Where relevant, Road Occupancy Licenses (ROLs) and crane permits would be submitted and approved prior to the closure of any roads
- Access between Turrella Station and the transport network would be maintained during typical construction periods outside of rail shutdown periods
- Directional signage and/or linemarking would be used to direct and guide drivers, cyclists and pedestrians past the construction compound and on the surrounding road network
- Use of Loftus Street and Kelsey Street as part of an alternative haulage route would be limited to hours outside of the operation of the school zone
- Additional investigation into the proposed local roads used by construction routes given the load limits that currently exist would be carried out in consultation with Transport for NSW and Bayside Council
- Before and after dilapidation surveys of roads used by construction vehicles between the construction compounds and the arterial road network would be carried out by the construction contractor
- Investigation into alternative parking arrangements would be carried out in consultation with Bayside Council prior to the commencement of construction
- Adequate information would be provided to affected bus customers if the bus stop on the Turrella Street is relocated, and would include advanced notification and appropriate signage to the alternative bus stop
- Access between Turrella Street and Henderson Street via Reede Street would be maintained during construction, with appropriate arrangements to be determined by the construction contractor during construction planning
- Construction workers would be encouraged to carpool or use other forms of transport to travel to and from the construction compounds, to minimise parking impacts on commuters, residents and the general public

The Proposal would improve the accessibility for all customers at Turrella Station. The following mitigation and management measures are recommended to minimise impacts during operation of the Proposal.

- Bayside Council would be consulted about non-compliant swept paths on Reede Street and Turrella Street, with approval of the final design to be obtained prior to the commencement of construction.

Appendix A Crash history in proximity to Turrella Station

Severity of crash	Year	RUM code	Description
Serious injury	2017	81	Off left/rt bnd=>obj
Moderate injury	2015	42	Leaving parking
	2016	16	Left near
	2017	49	Other manoeuvring
	2019	5	Ped walk against
Minor/other injury	2015	21	Right through
	2015	10	Cross traffic
	2016	73	Off rd right => obj
	2017	71	Off rd left => obj
	2017	30	Rear end
	2017	16	Left near
	2017	29	Other opposing
Non-casualty (towaway)	2015	20	Head on
	2015	10	Cross traffic
	2015	85	Off rt/lft bnd=>obj
	2016	71	Off rd left => obj
	2016	49	Other manoeuvring
	2016	85	Off rt/lft bnd=>obj
	2016	87	Off lft/lft bnd=>obj
	2016	85	Off rt/lft bnd=>obj
	2019	71	Off rd left => obj
	2019	71	Off rd left => obj