NSW GOVERNMENT

Transport Access Program

Petersham Station Upgrade

Supporting Studies

Artist's impression of the proposed Petersham Station Upgrade, subject to change during detailed design.

October 2019

TRANSPORT ACCESS PROGRAM

Petersham Station Upgrade
Traffic, Transport and Access Impact Assessment

Prepared for:

Transport for NSW
Level 5, Tower A, Zenith Centre,
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BASIS OF REPORT

This report has been prepared by SLR Consulting Australia Pty Ltd (SLR) with all reasonable skill, care and diligence, and taking account of the timescale and resources allocated to it by agreement with Transport for NSW (the Client). Information reported herein is based on the interpretation of data collected, which has been accepted in good faith as being accurate and valid.

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DOCUMENT CONTROL

Reference	Date	Prepared	Checked	Authorised
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EXECUTIVE SUMMARY

Background and upgrade works

Transport for NSW (TfNSW) has proposed the Petersham Station Upgrade (the 'Proposal'). The Proposal is part of the Transport Access Program, a NSW Government Initiative to provide a better experience for public transport customers by delivering accessible, modern secure and integrated transport infrastructure. The Proposal would aim to provide a station precinct that is accessible to those with a disability, limited mobility, parents/carers with prams, and customers with luggage**.**

The Proposal would include the following key elements:

- two new lifts connecting the existing footbridge to the Terminus Street station entrance and the station platform
- a new access ramp and stairs from the Trafalgar Street station entrance to the existing footbridge
- upgrade works to the existing footbridge and stairs
- improved amenities such as a new family accessible toilet and a male and a female ambulant toilet in the platform building
- an additional external canopy to the family accessible toilet
- new Station Services Equipment Room (SSER) within the existing platform building
- a new accessible parking space adjacent to the Terminus Street lift
- a formalised kiss and ride area on Terminus Street
- new bicycle parking
- platform resurfacing, CCTV and wayfinding signage
- electrical upgrades for new infrastructure.

Existing conditions

With an average weekday total of 7,071 journeys recorded in 2017, Petersham Station is the 67th busiest station on the Sydney Trains network. The station provides daily passenger rail connections between Sydney Central and Campbelltown at average frequencies of approximately one service every 15 minutes in each direction during both on and off-peak periods.

Petersham Station currently consists of one island platform, with a pedestrian footbridge connecting Trafalgar Street to Terminus Street which provides access to the station platforms. A pedestrian underpass is also located to the west of the station, which provides an additional pedestrian connection between Trafalgar Street and Terminus Street but does not access the station platforms. Petersham Station is currently not accessible as per the Commonwealth *Disability Discrimination Act 1992* (DDA) and *Disability Standards for Accessible Public Transport* (DSAPT) and elements of the station are below current standards.

A station access mode survey was conducted in 2015 by GHD at Petersham Station indicating that 'walk only' movements were the dominant form of station access during both the AM and PM survey periods. In the AM peak 'walk only' movements accounted for 89.9 percent of all station arrivals and in the PM peak 'walk only' movements accounted for 92.3 percent of station arrivals. Pedestrians were identified as the dominant mode of access to and from the station and confirmed by site visits.

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Petersham Station currently has no formal 'park and ride' or 'kiss and ride' facilities and is generally not considered a significant 'park and ride' station.

Operational impacts

Average weekday patronage at Petersham Station is forecast to increase at a rate of approximately one percent per annum between 2017 and 2036, with patronage projected to increase from 7,180 persons to 8,409 persons during the same period.

It is assumed that 'walk only' will continue to be the dominant mode of access to/from the station in future due to the existing dense urban environment and the limited opportunities for off-street park and ride facilities surrounding the station.

The proposed station access improvements, including the enlarged forecourts at both station entrances, upgrade to footpaths on Trafalgar Street and Terminus Street, new accessible ramp to the southern access and provision of two new lifts to access the island platform from street level would offer considerable pedestrian benefits and improve the customer experience at the station.

The proposed new bike path along the station access on Trafalgar Street, to be delivered by Inner West Council, will provide the necessary infrastructure for both existing and potential new bike riders to access the station efficiently and safely. The general improvements to the footpath network and removal of existing impediments to movement such as fencing as part of the Proposal would also create a better user experience for cyclists, as cycling demand increases and becomes a more viable transport mode.

Given the relatively minor nature and scale of the improvements delivered as part of the Proposal, it is not expected that there would be any significant impacts on road capacity or performance. Whilst there would be some increase in station utilisation as a result of improvements to accessibility and amenity, it is expected that these incremental increases would not result in a material increase in traffic demand.

Construction impacts

The following key construction-stage impacts are likely to be generated:

- Increased construction vehicle traffic including light and heavy vehicles within the station precinct and along local streets, most likely in Trafalgar Street and nearby intersections during an approximate 12-month period.
- Loss of approximately 72 car parking spaces in the Transport for NSW Training Facility car park during an approximate 12-month period.
- Increased demand for all-day parking for construction staff
- Potential confusion and loss of amenity to customers accessing the station via temporary and changed facilities during construction, particularly during the busy commuter AM and PM peak periods.
- Minor travel delays on account of likely Traffic Control Plan (TCP) implementation requiring some users to stop for construction traffic.
- Reduced access to Trafalgar Street and Terminus Street.

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Mapping prepared by the National Heavy Vehicle Regulator (NHVR) illustrates that Parramatta Road and a section of Old Canterbury Road can accommodate larger vehicles including High Mass Limit 19 metre, 23 metre and 25/26 metre B-Doubles.

Heavy vehicle construction access would be available to both the northern and southern sides of the station via Terminus Street and Trafalgar Street respectively. Broadly, construction routes are likely to include the following roads, subject to additional analysis during the detailed design phase:

- New Canterbury Road
- Stanmore Road
- Crystal Street
- Parramatta Road.

Based on the scale of the Proposal and projected intensity of construction activities (i.e. concentrated over weekend rail shutdowns over the period of around 18 months, these impacts are considered to be manageable subject to the preparation and implementation of a Construction Environmental Management Plan inclusive of a Construction Traffic Management Plan which also include Traffic Control Plans which when combined would review issues and risks and identify solutions and arrangement to avoid, mitigate, and manage risk involving construction activities, users of the transport system and local residents.

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DOCUMENT REFERENCES

TABLES

FIGURES

Glossary of terms

Term Meaning	Term Meaning
CEMP	Construction Environmental Management Plan
CML	Concessional Mass Limit
CTMP	Construction Traffic Management Plan
DDA	*Disability Discrimination Act 1992* (Commonwealth)
DSAPT	*Disability Standards for Accessible Public Transport 2002*
GML	General Mass Limit
LOS	Level of Service
NSW	State of New South Wales
NVHR	National Heavy Vehicle Regulator
PEA	Preliminary Environmental Assessment
Rail shutdown	Rail shutdown is the term used by railway building/maintenance contractors to indicate that they have taken possession of the track (usually a block of track) for a specified period, so that no trains operate for a specified time. This is necessary to ensure the safety of workers and rail users.
REF	Review of Environmental Factors
RMS	Former New South Wales Roads and Maritime Services (now part of TfNSW)
TAP	Transport Access Program
TCP	Traffic Control Plan
TfNSW	Transport for New South Wales
TT&AIA	Traffic, Transport and Access Impact Assessment

1 Introduction

1.1 Background

Transport for NSW (TfNSW) has proposed the Petersham Station Upgrade (the 'Proposal'). The Proposal is part of the Transport Access Program, a NSW Government Initiative to provide a better experience for public transport customers by delivering accessible, modern secure and integrated transport infrastructure. The Proposal would aim to provide a station precinct that is accessible to those with a disability, limited mobility, parents/carers with prams, and customers with luggage

1.2 Proposal overview

The Proposal involves an upgrade of Petersham Station which would improve accessibility and connectivity between modes. The Proposal includes the following key elements:

- two new lifts connecting the existing footbridge to Terminus Street station entrance and the station platform
- a new access ramp and stairs from the Trafalgar Street station entrance to the existing footbridge
- upgrade works to the existing footbridge and stairs
- improved amenities such as a new family accessible toilet and a male and a female ambulant toilet in the platform building
- an addition of an external canopy to the family accessible toilet
- new Station Services Equipment Room (SSER) within the existing platform building
- new accessible parking space adjacent to the Terminus Street lift
- formalised kiss and ride area on Terminus Street
- new bicycle parking
- platform resurfacing, CCTV and wayfinding signage
- electrical upgrades for new infrastructure.

The key features of the Proposal are shown in Figure 13.

1.3 Scope and methodology

GHD completed a *Traffic, Transport and Access Impact Assessment* (TT&AIA) (March 2018) which formed part of the Preliminary Environmental Assessment (PEA) project phase and was based on a previous version of the concept design.

The concept design has since progressed with amendments; however, the majority of the GHD's findings remain valid in consideration for the Review of Environmental Factors (REF). Accordingly, this report references and builds upon the prior GHD assessment. SLR has been commissioned to undertake a gap analysis of these previously reported findings and prepare a specialist report including elements that require additional assessment suitable for inclusion as part of the REF.

Based on a review of the GHD reporting, SLR has not included any new data collection or analysis. The only new analysis required was a review of crash data in the vicinity of the site. No intersection modelling has been undertaken.

Figure 2 illustrates the study area and surrounding road network context.

1.4 References

The following documents were used as reference as a part of this assessment:

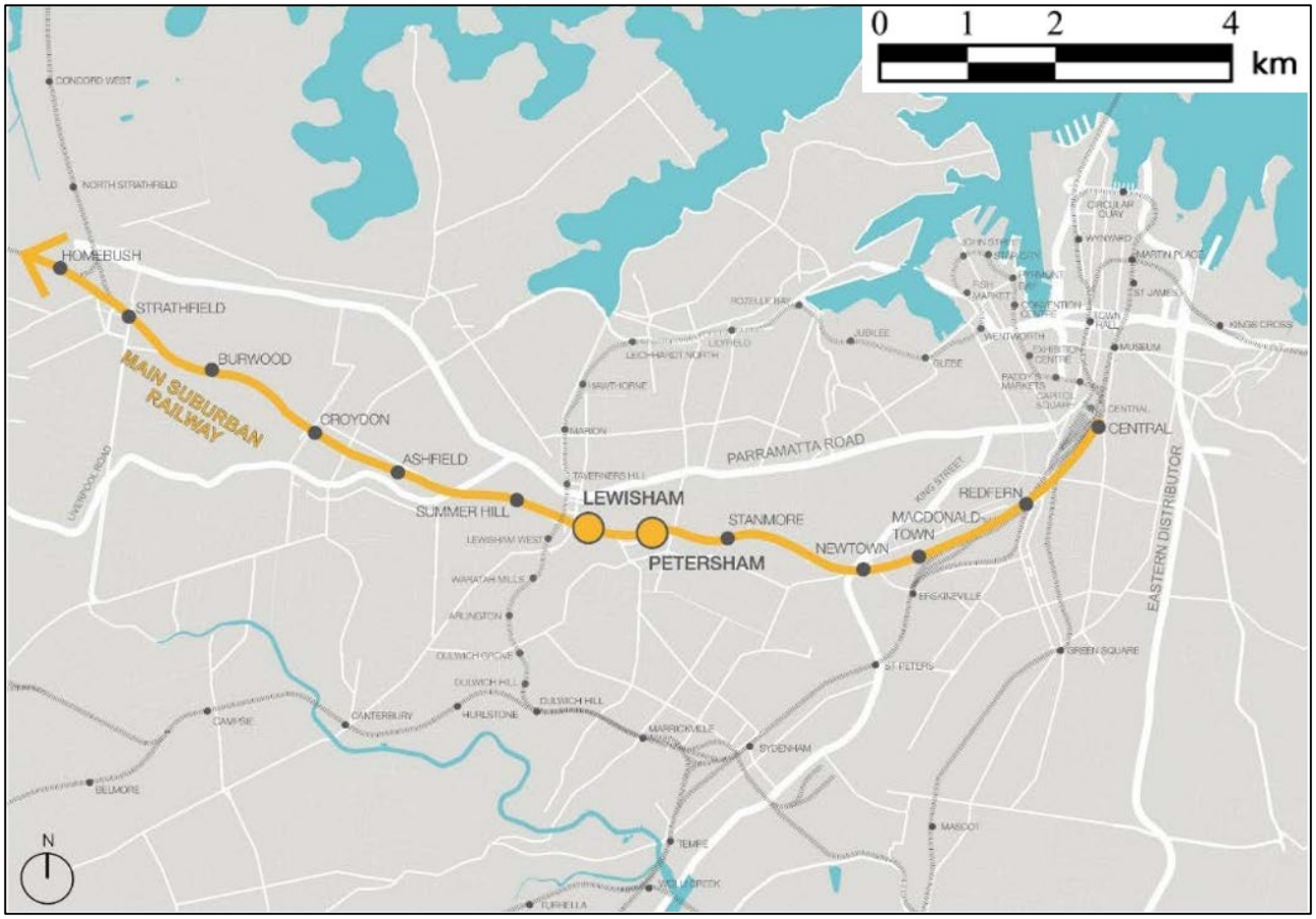
- DesignInc (25 July 2019). Petersham Station Easy Access Upgrade Transport Access Program – Package 2A
- GHD (March 2018). Petersham Station Precinct Accessibility Upgrade Traffic Transport and Access Impact Assessment
- GHD (July 2019). Transport Access Plan 3: Five Stations Upgrade Petersham Station Concept Design Road Safety Audit.

2 Existing conditions

2.1 Site context

Petersham Station is located approximately 5.5 kilometres west of Central Station and is situated along the T2 Inner West Line between Stanmore and Lewisham Stations (refer to Figure 1).

Figure 1 Site context (GHD, 2018)



With an average weekday total of 7,071 journeys recorded in 2017, Petersham Station is the 67th busiest station in the Sydney Trains network. The station provides daily passenger rail connections between Sydney Central and Parramatta or south to Leppington at average frequencies of approximately one service every 15 minutes in each direction during both on and off-peak periods. In the morning (AM) peak period, this frequency increases with approximately one service every six minutes from Parramatta / Leppington. In the evening (PM) peak period, this frequency also increases with approximately one service every seven minutes from Sydney CBD.

2.2 Surrounding road network

Key roads within the Petersham Station precinct include: Trafalgar Street, Terminus Street, Regent Street and Audley Street which are discussed below. The location of Petersham Station in the local area and road network context is illustrated in Figure 2.

2.2.1 Trafalgar Street

Trafalgar Street functions as a collector road which runs parallel and to the south of the rail line and which provides one traffic lane in each direction. The speed limit is 50 km/h.

Trafalgar Street forms a signalised intersection with Crystal Street at its eastern end, approximately 150 metres (m) from the southern station access. A signal controlled pedestrian crossing is currently located directly adjacent to the southern station access in order to facilitate pedestrian movements across Trafalgar Street. Trafalgar Street forms the eastern and western approaches of a roundabout with Audley Street to the west of the station footbridge. At its western end, Trafalgar Street forms a signal controlled intersection with Gordon Street, which is a no right turn into Trafalgar Street, buses excepted.

On-street parking is available along Trafalgar Street except for select areas east of the station access. A range of 'No Stopping', 'Bus Zone' and time restricted 'No Parking' areas are located at this location on both sides of the street. Some driveways directly intersect with Trafalgar Street, largely on the southern side of the street, and footpaths are provided on both sides of the street.

2.2.2 Terminus Street

Terminus Street functions as a local road which runs parallel and to the north of the rail line, which provides one traffic lane in each direction and which allows restricted parallel to kerb on-street parking on both sides of the street. The speed limit is 50 km/h. Terminus Street provides a vehicular and non-vehicular connection between the northern side of the station and Crystal Street to the east and Palace Street to the west. Trafalgar Street forms a left out only intersection with Crystal Street.

2.2.3 Regent Street

Regent Street functions as a local road with one traffic lane provided in each direction. The speed limit is 50km/h. At its northern end, Regent Street intersects with Trafalgar Street as a 'left-in, left-out' priority-controlled intersection. An existing central median with a pedestrian barrier along Trafalgar Street restricts right turns into Regent Street for northbound traffic on Trafalgar Street. Restricted parallel to kerb on-street parking is provided on both sides of the road. Driveways (including an access point to the Petersham RSL car park) frequently intersect with the street and footpaths are provided on both sides of the street.

2.2.4 Audley Street

Audley Street functions as a collector road with a speed limit of 50 km/h, which provides one traffic lane in each direction. Footpaths and kerbside parking are provided along both sides of the street. At its northern end, Audley Street forms a roundabout intersection with Trafalgar Street. To the south, Audley Street forms a signal controlled intersection with New Canterbury Road.

Figure 2 Surrounding road network

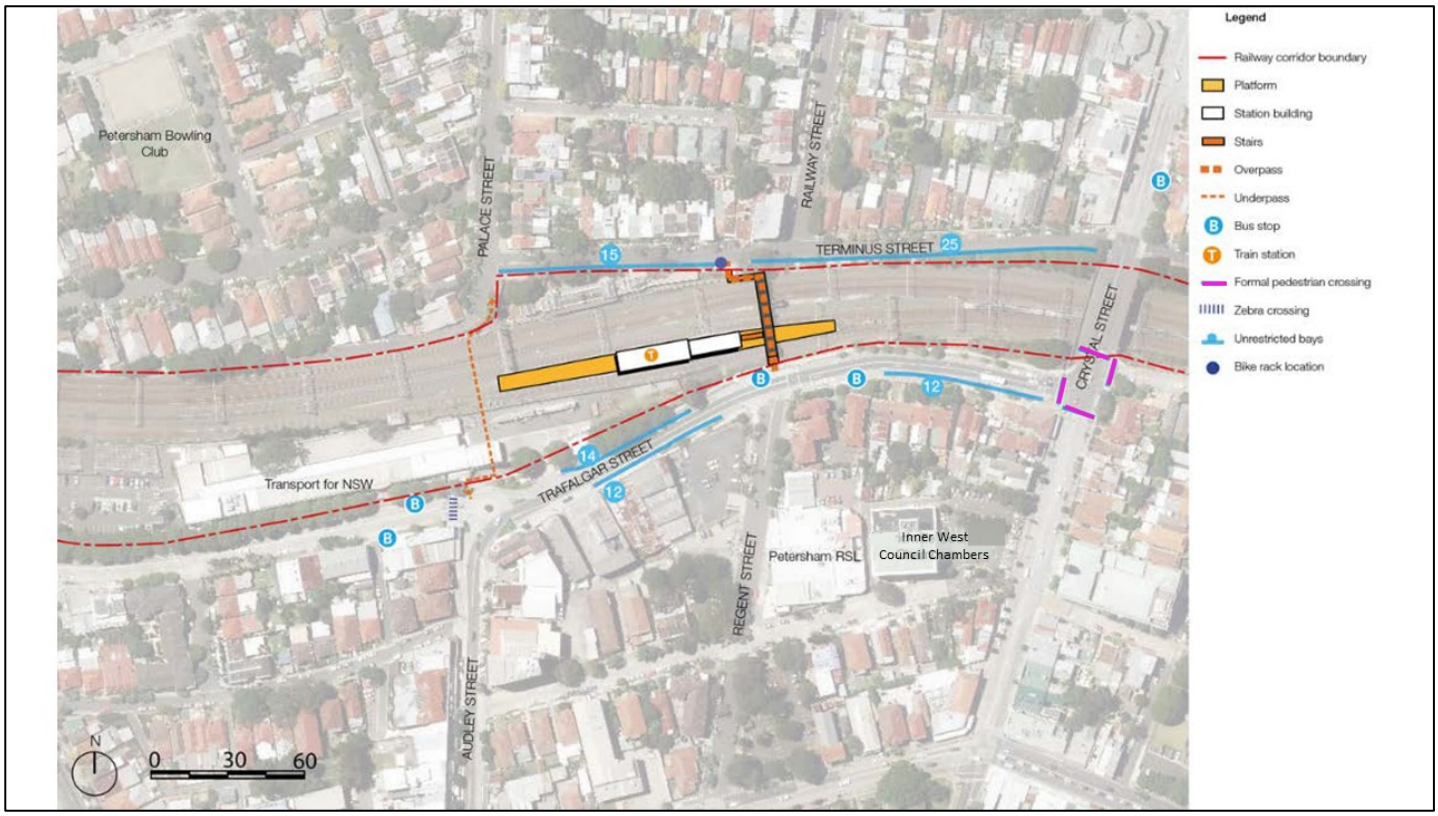
2.3 Station access and facilities

2.3.1 Pedestrians

2.3.1.1 Station access

As shown in Figure 3, Petersham Station currently consists of one island platform, with a pedestrian footbridge connecting Trafalgar Street to Terminus Street which provides access to the platform. A pedestrian underpass is also located to the west of the station, which provides an additional pedestrian connection between Trafalgar Street and Terminus Street but does not access the station platforms. Petersham Station is currently not accessible as per the Commonwealth *Disability Discrimination Act 1992* (DDA) and *Disability Standards for Accessible Public Transport 2002* (DSAPT) and elements of the station are below current standards.

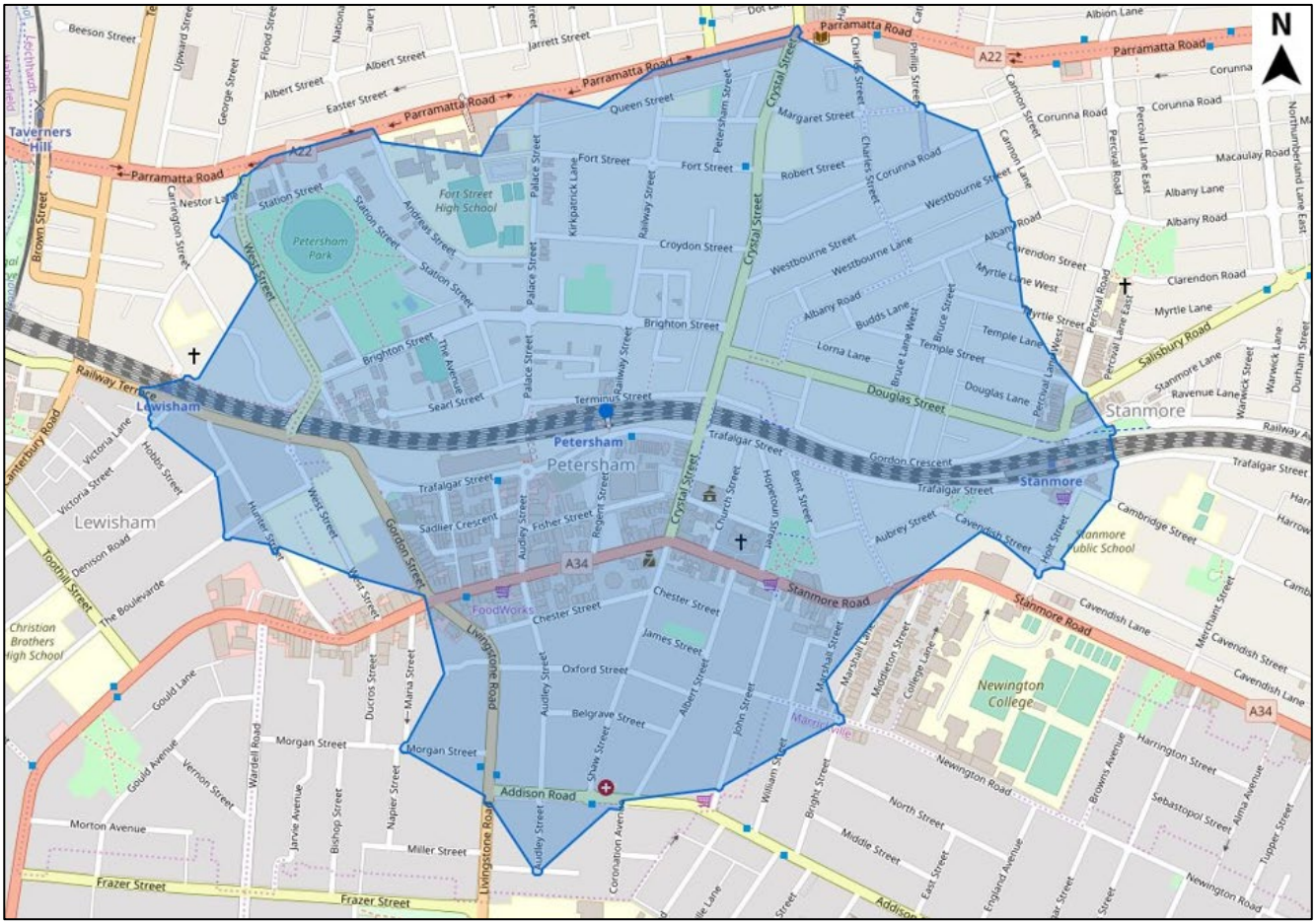
Figure 3 Existing transport interchange facilities (GHD, 2018)



2.3.1.2 External movement network

The 10-minute walkable catchment is illustrated in Figure 4.

Figure 4 10 minute walking catchment (source: iso4app.net)

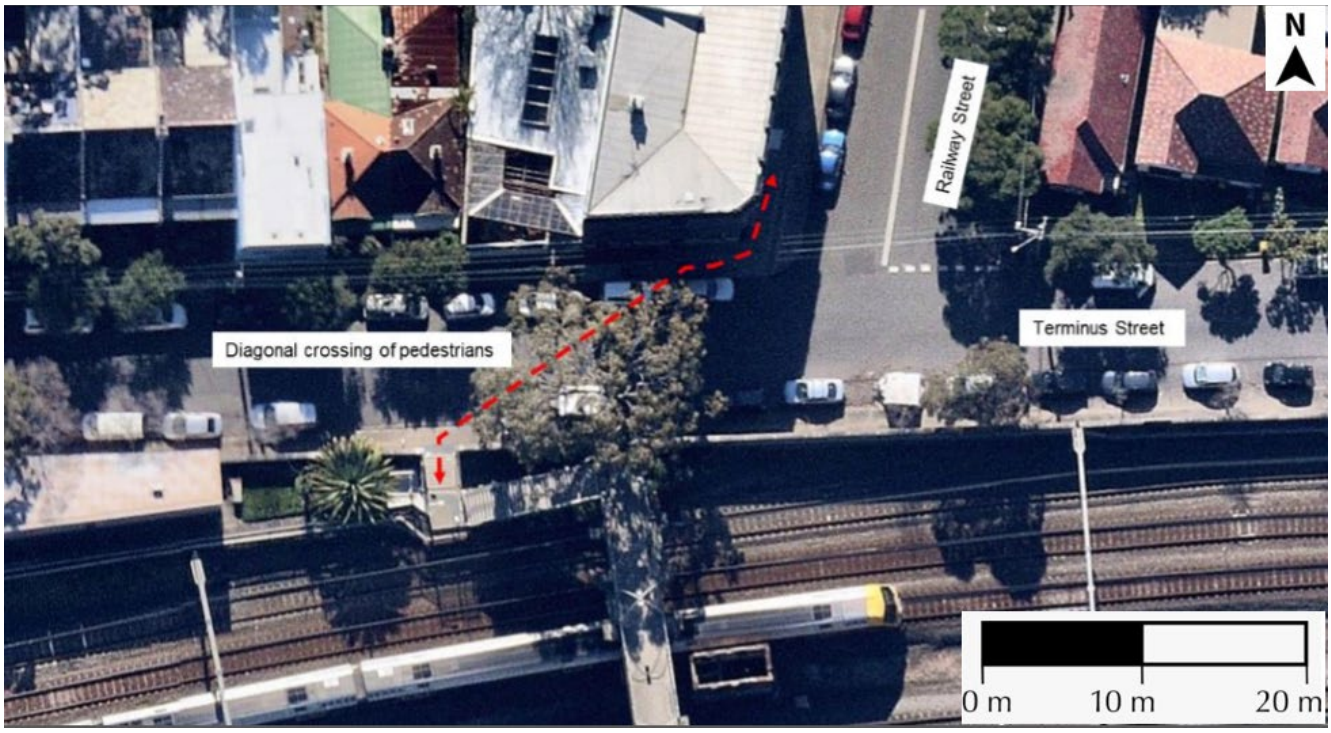


Pedestrian access to/from the station is available via the existing footpath network which runs parallel to the majority of the surrounding roads. Parts of the existing footpath network have narrow, worn or uneven footpaths. A pinch point for pedestrians was identified along Trafalgar Street near the outbound bus stop, adjacent to the pedestrian footbridge on the southern side of the street.

The pedestrian network in the vicinity of Petersham Station provides connections to Petersham Town Hall, Petersham RSL, commercial developments along Audley Street, New Canterbury Road and Crystal Street, Petersham Park, Fort Street High School, Petersham College and a large number of residential properties which surround the station. The existing pedestrian footbridge and pedestrian underpass also provide pedestrian connections between developments on either side of the rail line. A signal controlled pedestrian crossing is currently located directly adjacent to the southern station access in order to facilitate pedestrian movements across Trafalgar Street.

There is currently no pedestrian barrier/fence provided at the footpath at the bottom of the stairs from the footbridge at Terminus Street. During site inspections undertaken at the time of the station access mode surveys, there were a number of school children walking directly onto the road from the stairs at this location, crossing Terminus Street at an informal midblock crossing point. Based on the site observations, there is currently a conflict point between pedestrians and vehicles at this location which is a safety issue. Furthermore, pedestrians were observed to walk diagonally across the intersection at Terminus Street / Railway Street, as shown in Figure 5.

Figure 5 Terminus Street pedestrian desire line (GHD, July 2019)



2.3.1.3 Mode share assessment

On 9 April 2015 a station access mode survey was conducted at Petersham Station by GHD indicating that 'walk only' movements were the dominant form of station access during both the AM and PM survey periods. In the AM peak 'walk only' movements accounted for 89.9 percent of all station arrivals and in the PM peak 'walk only' movements accounted for 92.3 percent of station arrivals. Pedestrians were identified as the dominant mode of access to and from the station and confirmed by site visits. A limitation of this survey was the ability to accurately differentiate between station users walking to the station from surrounding properties and those parking in surrounding streets and walking to the station. This mode share assessment is still considered relevant as the surrounding road network and lack of dedicated commuter parking suggests that Petersham Station is not a significant park and ride station.

2.3.2 Cyclists

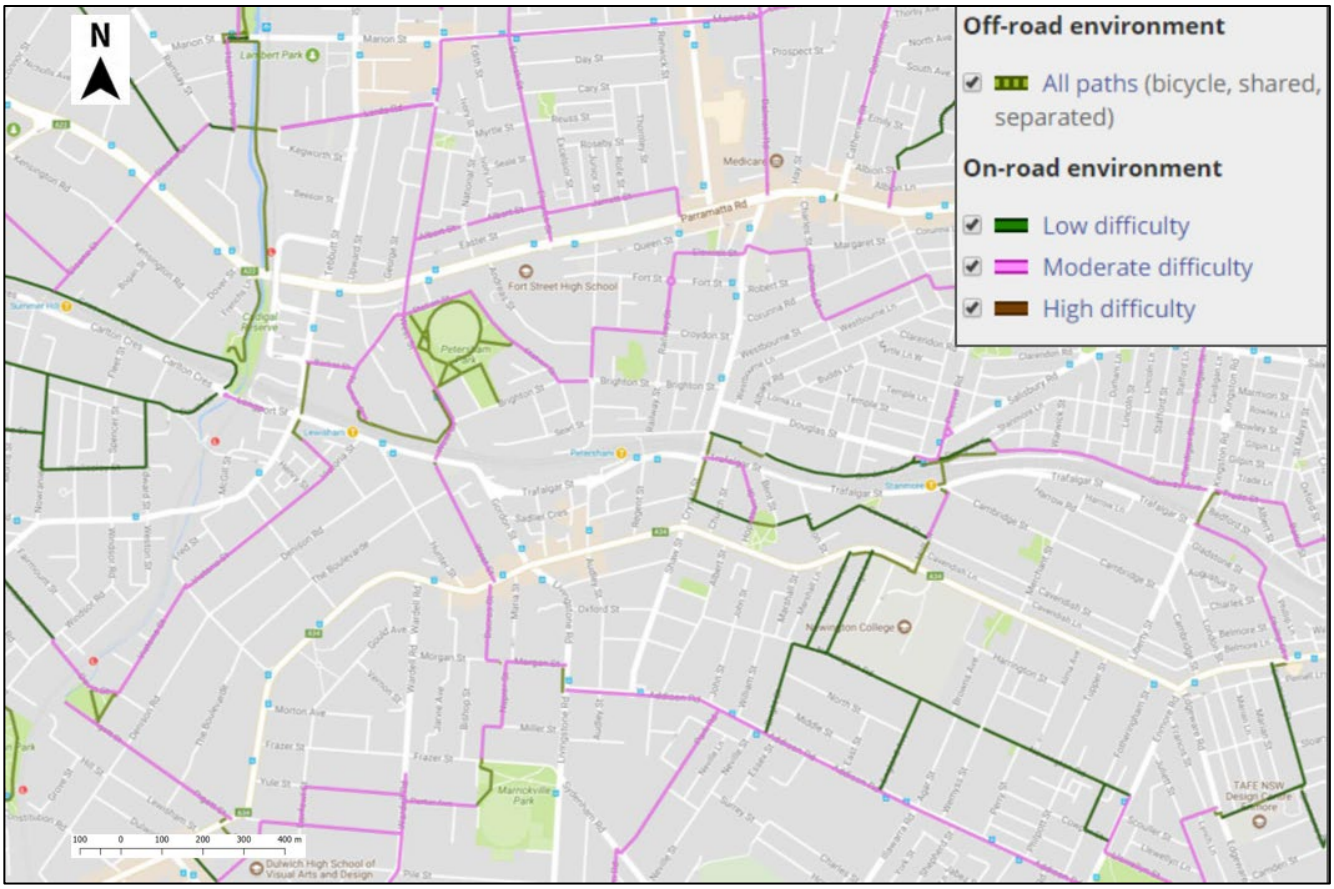
2.3.2.1 Station access

Bike parking for six bikes is currently provided on the northern side of the station. However, these bike racks must be accessed via stairs from Terminus Street, which lead to the pedestrian footbridge. This is not convenient for cyclists, as cyclists must carry their bikes up/down these stairs in order to access the cycle parking facilities. No formal cycle parking facilities are currently provided at the southern access to the station at Trafalgar Street, though it is noted that Inner West Council propose to implement a new bike path here in future. During site inspections at the time of the station access mode surveys in April 2015, there were a number of bikes chained to a fence near the station entrance at Trafalgar Street.

2.3.2.2 External movement network

As shown in Figure 6, dedicated cycle infrastructure (bike lanes, separated paths) is limited in the vicinity of Petersham Station. While some of the roads surrounding the station have either been identified as bike friendly roads or, due to their design and low traffic volumes, the formal cycle network currently lacks sufficient continuity to encourage increased use of this mode for travel to/from Petersham Station.

Figure 6 Existing bike route network (GHD, 2018)



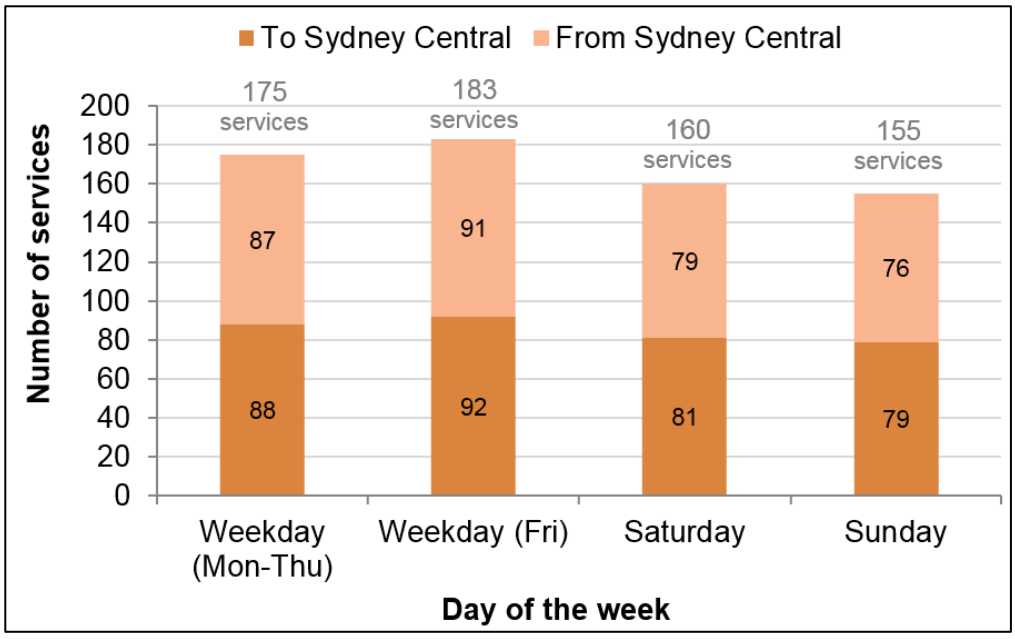
2.4 Public transport

2.4.1 Train

2.4.1.1 Services

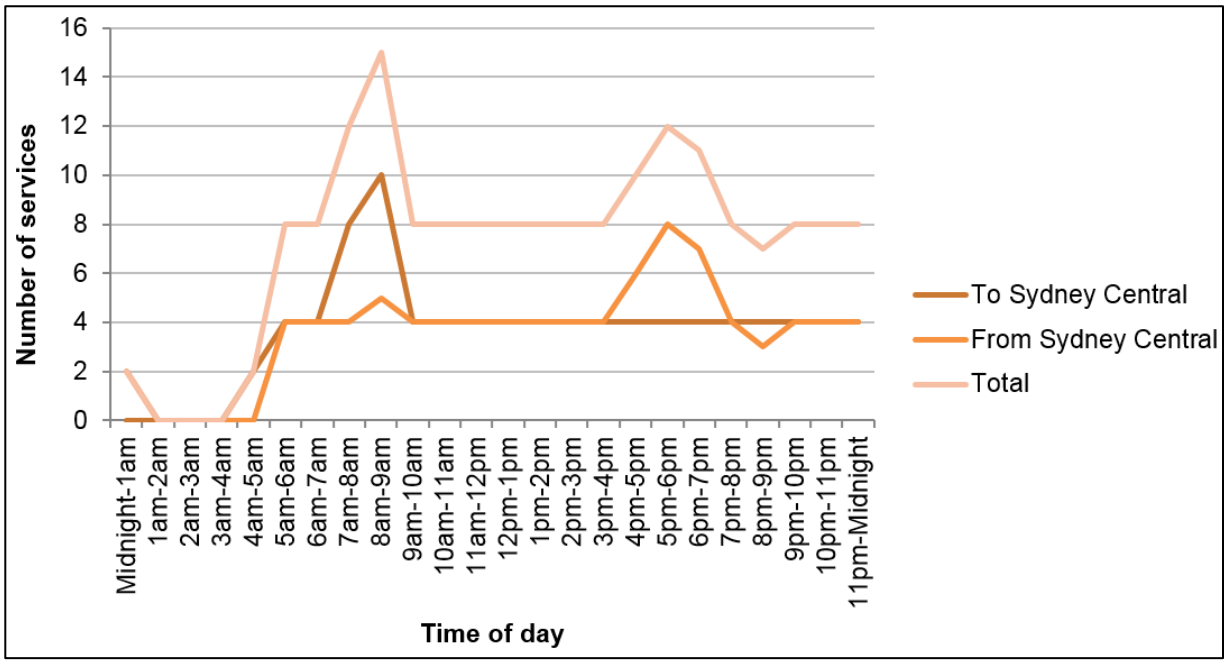
The number of train services at Petersham Station varies depending on the day of the week. As shown in Figure 7, a total of 175 daily services operate between Monday and Thursday, 183 trains on a Friday, 160 trains on a Saturday and 155 trains on a Sunday. The directional composition of these weekday and weekend services is also shown in Figure 9.

Figure 7 Current daily rail services at Petersham Station (GHD, 2018)



According to current train timetabling, the number of train services is generally consistent throughout the day (i.e. between 6:00 am and midnight) with the exception of the AM and PM peak periods. As can be seen in Figure 8, ten additional outbound services are provided between 7:00 am and 9:00 am (four additional outbound services between 7:00 am and 8:00 am and six between 8:00 am and 9:00 am). Also shown in Figure 9 are the nine additional inbound services between 4:00 pm and 7:00 pm (two additional inbound services between 4:00 pm and 5:00 pm, four between 5:00 am and 6:00 am and three between 6:00 am and 7:00 am) that are currently provided to specifically accommodate additional patronage during the evening (PM) peak period. Figure 8 outlines the current weekday (i.e. Monday to Thursday) train service profile over a 24-hour period.

Figure 8 Current weekday train service profile at Petersham Station (GHD, 2018)



Further analysis of current timetabling suggests that inbound (i.e. to Sydney Central) and outbound (i.e. from Sydney Central) trains typically operate at average frequencies of one service every 13 minutes between the hours of 6:00 am and 10:00 pm. The exception to these average frequencies, however, is for outbound services during the AM peak period and inbound services during the PM peak period. During these times, timetabled services operate at intervals as low as three minutes in both the inbound and outbound direction. In addition to metropolitan services, longer distance regional rail services travel in the vicinity of, but do not stop at, Petersham Station. These rail services are operated by TrainLink and connect Sydney to regional centres including Lithgow, Bathurst, Orange, Parkes, Condobolin, and Broken Hill.

2.4.1.2 Patronage

Average weekday patronage at Petersham Station has generally remained consistent between 2004 and 2017 with weekday patronage marginally increasing from 6,740 in 2004 to 7,071 in 2017. This represents an average increase of approximately 0.4 percent per annum (p.a.).

This average rate of increase was not consistent from one year to the next as average daily patronage varied between years. This is especially evident between 2008 and 2011, at which time average weekday patronage was below 2004 levels.

Average weekday patronage at Petersham Station is forecast to increase at a growth rate of nineteen percent between 2017 and 2036 to an average weekday patronage of 8,409.

2.4.2 Bus

2.4.2.1 Services and stops

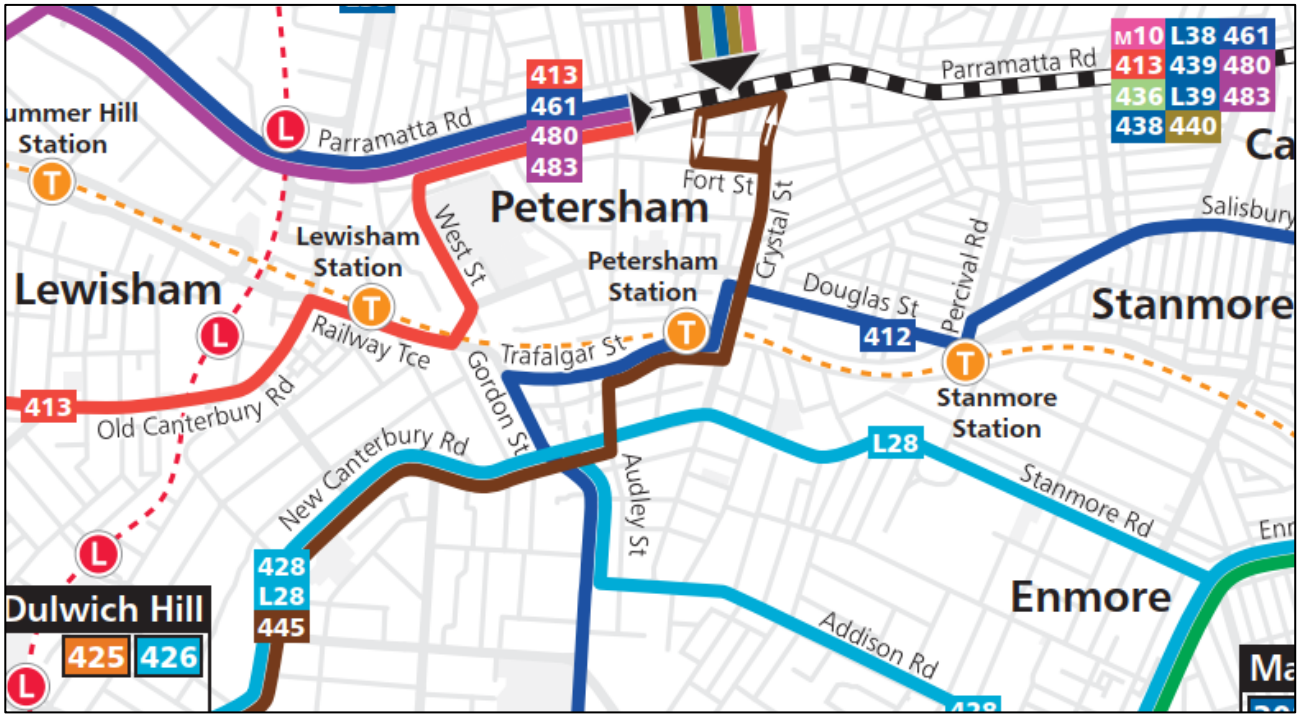
Two bus stops are currently located along Trafalgar Street close to the station access. These bus stops are positioned on the northern and southern sides of Trafalgar Street and provide inbound (i.e. towards Sydney) and outbound (i.e. from Sydney) connections respectively.

The existing environment also creates a pinch point for pedestrian movements along Trafalgar Street. Bus facilities are not provided on the northern side of the station at Terminus Street and there are no bus services currently operating from this side of the station.

Four bus services operate at the nearby inbound and outbound stops along Trafalgar Street. These services and routes are shown in Figure 9 and include:

- Route 412, Campsie-City Martin Place
- Route 444, Campsie-Balmain East Wharf
- Route 445, Campsie-Balmain East Wharf
- Route N50, Liverpool-City Town Hall.

Figure 9 Bus route network (TfNSW, 2019)



Route 412 is the dominant bus service in the vicinity of the station, providing a total of 95 weekday services (inbound and outbound) over a 24 hour period. Route 444 and 445 provide a total of 76 and 40 weekday services over a 24 hour period respectively.

Route N50 is a late night, rail replacement service which provides a total of 12 services (inbound and outbound) between midnight and 4:30 am on Sunday to Wednesday. Six inbound (i.e. Liverpool-City) and six outbound (i.e. City-Liverpool) N50 services are provided between midnight and 6 am.

Daily profiles of the weekday bus services by route and direction are provided in Figure 10 and Figure 11 respectively.

Figure 10 Weekday bus services at Petersham Station by route (GHD, 2018)

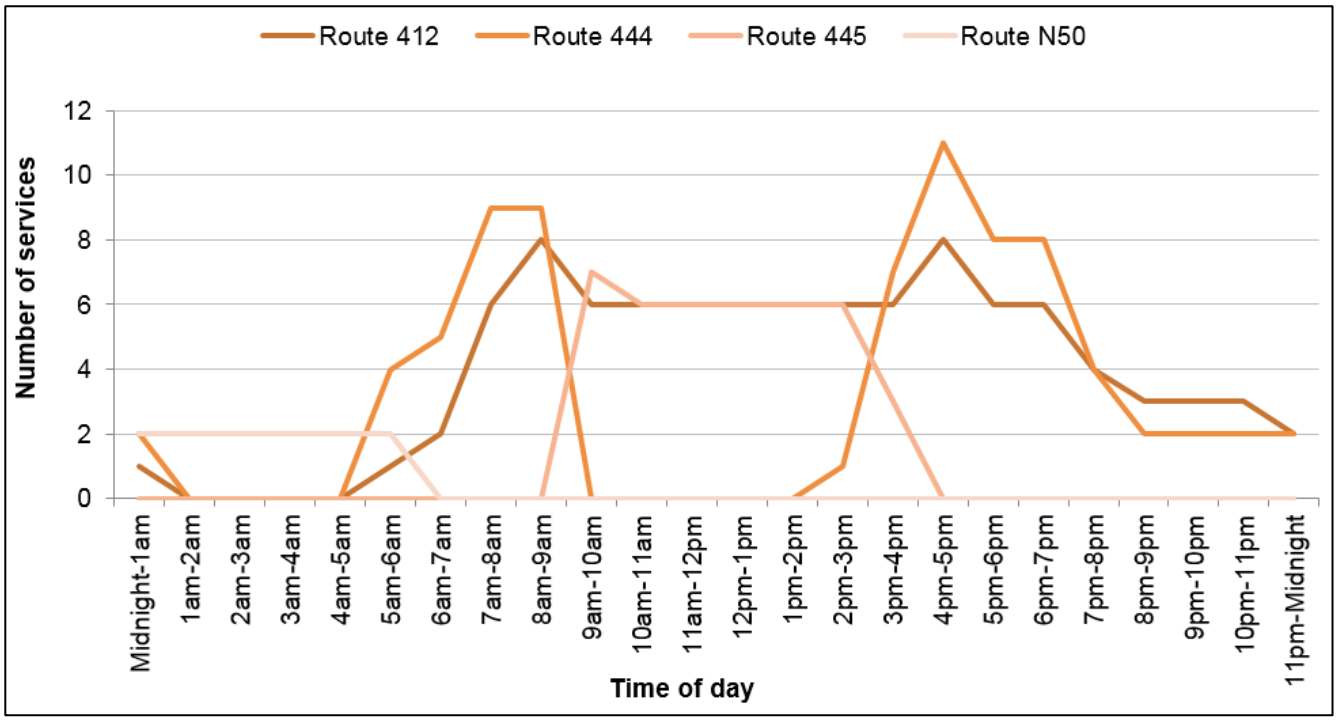
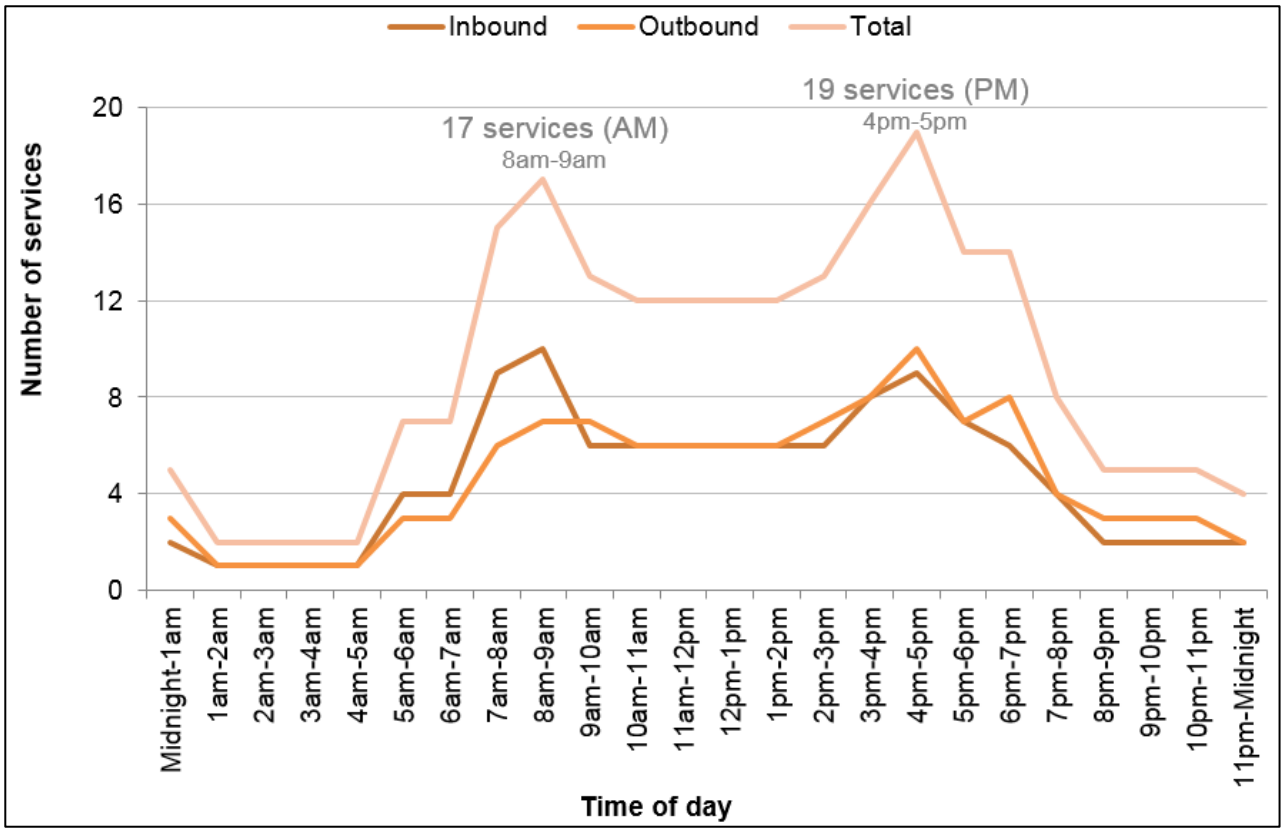


Figure 11 Weekday bus services at Petersham Station by direction (GHD, 2018)



As can be seen in Figure 11, the peak periods for bus activity at the inbound and outbound stops was between 8:00 am and 9:00 am (17 services) and 4:00 pm and 5:00 pm (19 services). The current timing of the bus service peak hours and the passenger peak hours identified at the station from the access mode survey (8:00 am – 9:00 am and 4:40 pm – 5:40 pm), suggests some correlation between bus timetabling and key rail passenger demand.

The findings of the station access mode survey identified some bus and rail interchange at Petersham Station, with seven percent of access mode to the station via bus during the AM peak, with 5.4 percent access mode via bus during the PM peak.

2.5 Taxis

No dedicated taxi bays are currently provided at Petersham Station. The findings from the station access mode survey indicates that the mode share for taxis is low, accounting for 0.1 percent of all access modes to the station during the PM survey period. No passengers were observed to access the station via taxi during the AM survey period.

2.6 Kiss and ride

No formal kiss and ride facilities are currently provided at Petersham Station. However, there is informal kiss and ride at the 'no parking' zones adjacent to the station entrances at Terminus Street and Trafalgar Street.

The findings from the station access mode survey indicates that kiss and ride mode share at Petersham Station is low, accounting for 1.6 percent and 0.8 percent of all access modes to the station during the weekday AM and PM survey periods respectively. These are shown in Table 1.

Table 1 Private vehicle mode share

Classification	Peak Period	
	AM (7:00 am – 9:00 am)	PM (4:00 pm – 6:00 pm)
Car driver	1.0%	0.5%
Car passenger	0.3%	0.3%
Kiss and Ride	1.6%	0.8%
Total	**2.9%**	**1.6%**

2.7 Park and ride

No dedicated commuter parking is provided at or surrounding Petersham Station. Unrestricted on-street parking is available on the surrounding road network within around a 100 metre walk from the southern station entrance. On-street parking along the northern side of Terminus Street is restricted to a maximum of two hours for non-parking permit holders. The length of stay currently permitted by on-street parking restrictions on the surrounding road network and the lack of dedicated commuter parking areas, suggest that Petersham Station is not a significant Park and Ride station. This is confirmed by the findings of the station access mode survey.

There is currently no formalised accessible parking close to Petersham Station. As such, the only option for people with a disability is to park in regular parking spaces, which would often result in travelling further distances to both station entrances.

2.8 Traffic, car parking, pedestrian and cyclist demands

No demand surveys, except for the mode share station access survey, were completed by GHD during the prior investigations and none were deemed to be warranted to inform the REF.

2.9 Transport safety

Crash information has been sourced from the former NSW Roads and Maritime Services for the period 2013-2017 (inclusive) for an area within the immediate vicinity of the station. The data indicates 13 crashes were reported for the region shown in Figure 12, including one serious injury crash in 2013 at the intersection of Terminus Street / Crystal Street. An initial review of crash data suggests that there may be a road safety issue at the intersection of Trafalgar Street / Crystal Street (shown in Figure 12) given the prevalence of crashes in this location. The majority of these crashes are crash types involving vehicles travelling in the same direction i.e. lane changing and rear-end crashes. Due to the proximity of this intersection to Petersham Station increased construction traffic may potentially exacerbate existing safety issues associated with congestion or intersection geometry. The summary results are illustrated in Table 2.

Figure 12 NSW RMS Crash Data (2013 - 2017 inclusive)

Source: roadsafety.transport.nsw.gov.au/statistics/interactivecrashstats (accessed 22 August 2019)

Table 2 NSW RMS Crash Data (2013 - 2017 inclusive)

Crash year	Crash location	Crash ID	Crash severity	Crash description (Road User Movement (RUM) code)
2017	2-way undivided on Terminus St	1143515	Minor / Other Injury	RUM 74 – On road out of control
2017	Roundabout at Trafalgar St / Audley St	1148460	Minor / Other injury	RUM 9 – Ped other
2016	2-way undivided on Terminus St	1101439	Non casualty / towaway	RUM 71 – Off rd. left into object
2016	Intersection at Trafalgar St / Crystal St	1102607	Minor / Other injury	RUM 30 – Rear end
2015	2-way undivided on Trafalgar St	1069676	Non casualty / towaway	RUM 73 – Off rd. right into object
2015	Intersection at Trafalgar St / Crystal St	1077264	Minor / Other injury	RUM 37 – Left turn sideswipe
2014	Intersection at Trafalgar St / Crystal St	1006852	Non casualty / towaway	RUM 21 – Right through
2014	Intersection at Trafalgar St / Crystal St	1009336	Non casualty / towaway	RUM 30 – Rear end
2014	Intersection at Trafalgar St / Crystal St	1021704	Moderate Injury	RUM 34 – Lane change right
2014	Roundabout at Trafalgar St / Audley St	1048976	Moderate Injury	RUM 30 – Rear end
2014	Intersection at Trafalgar St / Crystal St	1055207	Minor / Other Injury	RUM 39 – Other same direction
2013	2-way undivided on Regent St	824065	Non casualty / towaway	RUM 49 – Other manoeuvring

Crash year	Crash location	Crash ID	Crash severity	Crash description (Road User Movement (RUM) code)
2013	Intersection at Terminus St / Crystal St	857334	Serious Injury	RUM 34 – Lane change right

2.10 Existing situation summary

The existing traffic, transport and access observation issues can be summarised as follows based on the combined investigations undertaken by GHD (March 2018) and SLR.

A station access mode survey was conducted in April 2015 at Petersham Station indicating that 'walk only' movements were the dominant form of station access during both the AM and PM survey periods.

Petersham Station currently consists of one island platform, with a pedestrian footbridge connecting Trafalgar Street to Terminus Street which provides access to the platforms, however, Petersham Station is currently not accessible as per the Commonwealth *Disability Discrimination Act 1992* (DDA) and *Disability Standards for Accessible Public Transport 2002* (DSAPT) and elements of the station are below current standards.

There is currently no pedestrian barrier/fence provided at the footpath at the bottom of the stairs from the footbridge at Terminus Street. During site inspections undertaken at the time of the station access mode surveys, there were a number of school children walking directly onto the road from the stairs at this location, crossing Terminus Street at an informal midblock crossing point.

Bike parking for six bikes is currently provided on the northern side of the station. However, these bike racks must be accessed via stairs from Terminus Street, which lead to the pedestrian footbridge. This is not convenient for cyclists.

No formal kiss and ride or park and ride facilities are currently provided at Petersham Station.

An initial review of crash data suggests that there may be a road safety issue at the intersection of Trafalgar Street / Crystal Street. The majority of crashes that have occurred at this intersection involve vehicles travelling in the same direction and in non-daylight hours.

3 Proposal description

3.1 Proposal overview

The Proposal involves an upgrade of Petersham Station which will improve accessibility and connectivity between modes. The Proposal includes the following key elements:

3.1.1 New lifts to existing footbridge

Construction and installation of two lifts connecting to the existing footbridge. This would include:

- installation of a narrow through-lift at the northern entrance (Terminus Street)
- installation of a narrow through lift on the station platform
- lift landings with canopies for weather protection at the waiting areas
- drainage, electrical and communications services installation for the lifts.

Retention of the existing footbridge with minor modifications which would include:

- minor extension of the footbridge toward the southern entrance (Trafalgar Street) requiring demolition of the existing stairway and brick pillars to accommodate the new stairs and ramp
- upgrade works including removal of a portion of the existing footbridge balustrade to allow for landings to the lifts and replacement of stair treads and handrails etc.

3.1.2 Station entrances and interchange facilities

Modifications to the northern entrance (Terminus Street) which would include:

- a new accessible station entrance at the lift area which would include demolition of a portion of the existing brick wall and widening of the existing footpath to create a forecourt area
- replacement of the existing lower stairs, balustrade and handrail that provides access from street level to the existing footbridge stairs
- one new accessible parking space on Terminus Street including line marking, signage, new kerb ramp and kerb adjustments
- a formalised kiss and ride area with capacity for two cars on Terminus Street including line marking, signage new kerb ramp and kerb adjustments
- provision of eight new bike hoops (i.e. bike racks)
- new landscaping, feature lighting, seating and decorative paving at the station entrance.

Modifications to the southern entrance (Trafalgar Street) would include:

- a new compliant ramp and stairs from the southern entrance on Trafalgar Street to the existing footbridge with a balustrade and handrail
- widening of the station entrance forecourt to the existing retaining wall for a new paved landing
- new feature lighting and decorative paving at the station entrance.

3.1.3 Platform and platform building works

Reconfiguration of the platform building (Figure 10) would include:

- provision of a new family accessible toilet through the construction of a new internal wall within the existing male toilets and removal of one male cubicle
- conversion of one female cubicle and one male cubicle into female and male ambulant toilets
- provision of a new door and lowering of the floor to provide level access for the family accessible toilet
- new canopy for the family accessible toilet entrance
- construction of a new switchboard room which would require existing internal wall modifications, and works to provide the required fire resistance
- creating a dedicated Station Services Equipment Room (SSER) through relocation of station communications and electrical equipment to the existing store room
- repositioning of one basin from the store room to the staff room with a new partition wall and ceiling.

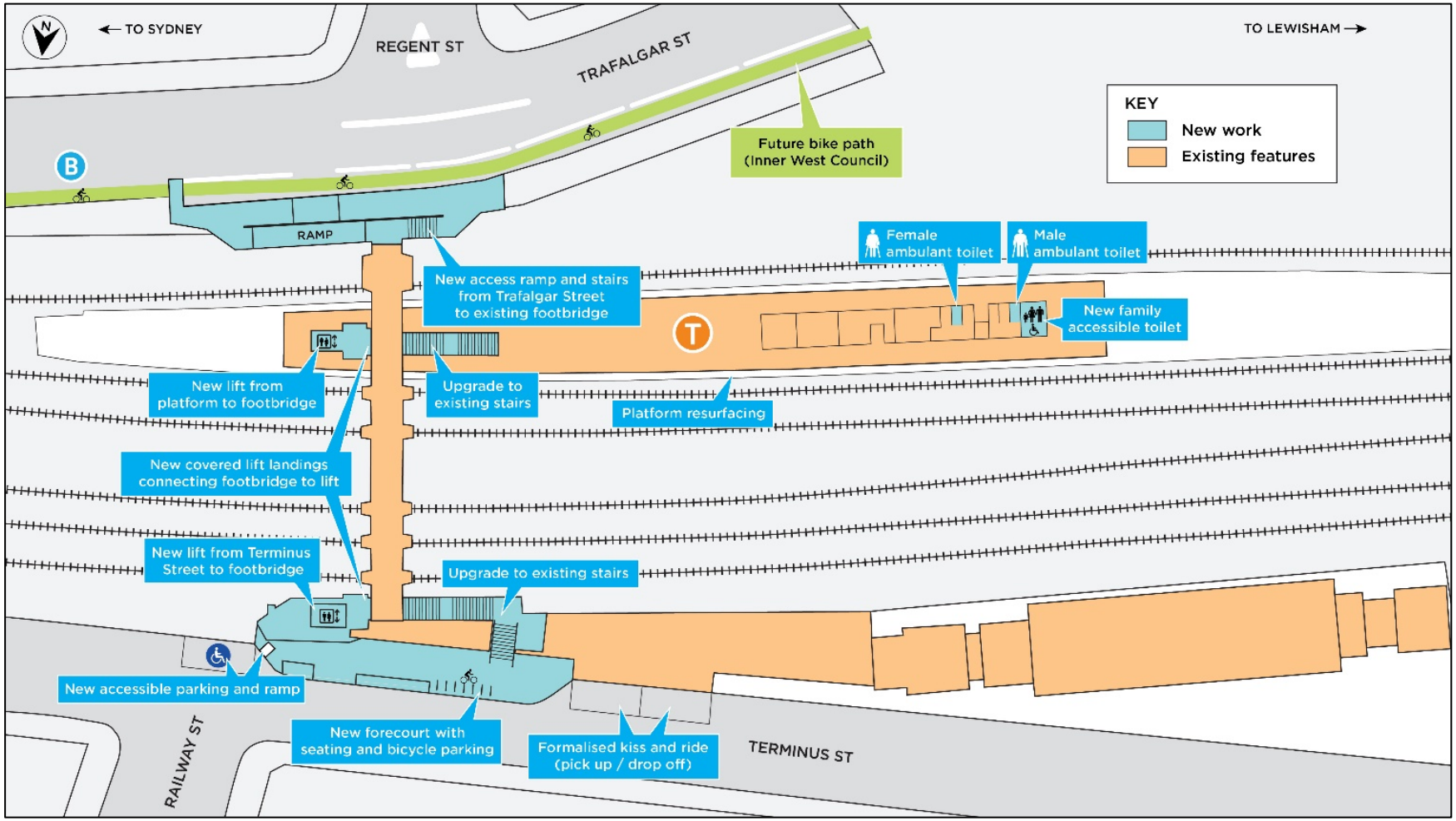
Platform works would include:

- provision of a canopy at the base of the platform lift to provide weather protection for customers
- localised platform regrading to allow for accessible paths of travel
- linemarking for the boarding assistance zone.

3.1.4 Ancillary works

- replacement or adjustments to existing fencing and safety screens
- installation of wayfinding signage and other signage to identify accessible features
- adjustment to seating, rubbish bins, lighting and other facilities
- improvement to station security and communication systems, including CCTV upgrade, PA system upgrades, additional opal card readers and new hearing induction loop
- new or reinstatement of Tactile Ground Surface Indicators (TGSIs) for the platform, stairways and ramp
- protection or relocation of services and utilities
- electrical upgrades for new infrastructure.

Figure 13 Key features of the Proposal



4 Operational impacts

4.1 Future station patronage

Average weekday patronage at Petersham Station is forecast to increase at a rate of approximately one percent per annum between 2017 and 2036. It is assumed that 'walk only' will continue to be the dominant mode of access to/from the station in future due to the existing dense urban environment and the limited opportunities for off-street Park and Ride facilities surrounding the station. As such, a minor increase in traffic is expected to be generated as a result of the proposed station upgrade.

4.2 Public transport

The relatively minor scope of works that form part of the Proposal are not anticipated to be significant enough that they would induce a material change to the existing public transport utilisation and/or capacity. Accordingly, the Proposal impacts to public transport, if any, would be minor but broadly positive given they would contribute to making travel by rail more accessible for the local community.

4.3 Pedestrians

The proposed station access improvements, including the enlarged forecourts at both station entrances, upgrade to footpaths on Trafalgar Street and Terminus Street, new accessible ramp to southern access and provision of two new lifts to access the island platform from street level would offer considerable pedestrian benefits and improve the customer experience at the station.

There is currently no pedestrian barrier/fence provided at the footpath at the bottom of the stairs from the footbridge at Terminus Street. During site inspections at the time of the station access mode surveys, there were a number of school children walking directly onto the road from the stairs at this location, crossing Terminus Street at an informal midblock crossing point. The proposed enlarged forecourt, landscaping and infrastructure would create a more pedestrian friendly environment and a safer road environment for all road users. The placement of bike hoops and plantings at the outer edges of the forecourt would likely encourage pedestrians to cross Terminus Street at a safer location further away from the intersection at Terminus Street / Railway Street. It was noted previously that a pedestrian desire line was observed diagonally across this intersection.

The reduction in length of the pedestrian crossing distance at the existing pedestrian crossing at Trafalgar Street and new ramps at this crossing would provide enhanced pedestrian safety at this location and improved accessibility, particularly for customers using prams or in wheelchairs.

A pedestrian Level of Service (capacity) analysis was undertaken with respect to the both station entrances, including the stairway and accessible ramp on Trafalgar Street and the stairway on Terminus Street. The assessment was undertaken in accordance with RailCorp's *Engineering Standard: Stations and Buildings – Station Design Standard Requirements: ESB 003 – Station Functional Spaces*, which specifies [pedestrian] *"circulation during the peak (am or pm) to be designed for Fruin Level of Service C".* (RailCorp, 2010 page 34)

The assessment used Fruin Theory which relies on the Pedestrian Flow Rate measured in pedestrians per-metre-per-minute (pmm) as shown in Table 3.

Table 3 Pedestrian level of service on walkways

Level of Service (LOS)	Pedestrian Flow Rate (pmm)
A	0–23
B	23–33
C	33–49
D	49–66
E	66–82

The results of the pedestrian LOS assessment are summarised in Table 4 for the stairway and accessible ramp on Trafalgar Street and the stairway on Terminus Street. The pathway widths are based on the concept design and the peak demands are estimated from a conservative future station patronage in a 2036 scenario where the estimated patronage for the AM peak hour (8am – 9am) is 1300 persons and the patronage for the PM peak (3pm – 7pm) is 2900 persons. To ensure a conservative assessment, a peak demand of 2000 persons per hour was used for the assessment peak hour period. A 50/50 split was assumed for both station entrances and for the accessible ramp and stairway on Trafalgar Street. A flow conversion factor of 0.5 was used to convert 15 minute demands into one minute demands instead of 0.0666.

Table 4 Petersham Station - pedestrian level of service assessment

Path Location	Peak Demand (p/60 min)	Design Demand (p/15 min)	Design Demand (p/ min)	Pathway Width	Pedestrian Flow Rate (pmm)	Level of Service
Stairway (Trafalgar Street)	500	125	62.5	2.2	28-29	B
Accessible ramp (Trafalgar Street)	500	125	62.5	2.2	28-29	B
Stairway (Terminus Street)	1000	250	125	2.465	50-51	D

Table 4 indicates that the stairway and new accessible pathway on Trafalgar Street would operate well within typically adopted performance thresholds. A possible exception is the stairway at Terminus Street, however the enlarged forecourt area would provide sufficient space for pedestrians in a peak event.

4.4 Cyclists

The proposed new protected bike path along the station access on Trafalgar Street, to be delivered by Inner West Council, will provide the necessary infrastructure for both existing and potential new bike riders to access the station efficiently and safely. The general improvements to the footpath network and removal of existing infrastructure such as fencing as part of the Proposal would also create a better user experience for cyclists. As cycling demand increases it would be expected that this greater mode share would benefit the safety of all road users through creating a general awareness of a more integrated multi-modal environment.

Six bike hoops are currently provided on the northern side of the station however these can only be accessed via the stairs on Terminus Street, which is not convenient for cyclists. As part of the Proposal, these would be removed and eight new bike hoops installed on Terminus Street on the outer edge of the enlarged forecourt area. This is considered an appropriate number for this location given the current demand for bike users. The relocation of bike racks to the new Terminus Street station entrance forecourt would also improve accessibility for cyclists as these bike racks are currently accessed via stairs from Terminus Street.

No bike hoops are currently planned to be installed on Trafalgar Street however given that this entrance is adjacent to the planned bike lane to be delivered by Inner West Council, it is recommended that TfNSW investigate opportunities to install bike facilities on this side of the station. In the AM peak approximately 49 bike users access the station and in the PM peak approximately 73 access the station. While all these users may not necessarily use bike hoops, it is indicative of the potential demand to be considered in the future within these peak periods.

4.5 Taxis

No new or improved taxi facilities are provided as part of the Proposal. Whilst the Proposal is not anticipated to generate any direct impact with respect to taxis, except that there may be a minor increase in demand arising from an increase in station utilisation by less mobile pedestrians whom are more likely to rely on travel by taxi, the impact of the current general lack of taxi facilities is projected to worsen as the station patronage increases into the future.

4.6 Kiss and ride

A formalised kiss and ride area is proposed on Terminus Street west of the station access. The two kiss and ride spaces is considered a reasonable amount given the relatively low private vehicle mode share.

Due to the proposed bike path on Trafalgar Street, there is no space for any kiss and ride facilities at this station access. This may inconvenience a relatively small number of users who currently drop off passengers on this side of the station, however, this number represents only 0.3 percent of mode share in both the AM and PM peak periods. This is equivalent to around seven users in the AM peak period and four users in the PM peak period. It would be expected that the new kiss and ride spaces on Terminus Street would become a viable option for some of these users.

4.7 Road network

The Proposal would increase accessibility to Petersham Station and improve the customer experience and amenity, likely leading to a minor increase in utilisation and patronage. This would manifest in customers either travelling by train where they did not before, or by changing from another nearby station.

Accordingly, there may be some minor increase in traffic generation; however, it is projected to be minor and would have a negligible impact on the surrounding road network or the amenity of local residents. Importantly, the Proposal features infrastructure improvements that reflect the current mode share of users and important function of the station for commuters and school children.

The reduced road widths on both station accesses, whilst slowing vehicles speeds, would increase the interaction of opposing vehicle movements with the risk of head-on or side-impact crashes with parked vehicles, however, it is expected that these infrastructure improvements will result in an overall net safety benefit where the potential for more serious crashes, in particular pedestrian crashes, will be reduced.

4.8 Car parking

One new accessible parking space would be created east of the station access. The location of the DDA parking spaces close to the lift access is appropriate for more efficient access.

The Proposal would result in the loss of approximately six parking spaces on the northern side and seven spaces on the southern side of Terminus Street, due to the enlarged forecourt area, proposed pedestrian crossing and proposed kiss and ride and accessible parking.

The proposed amendments along Terminus Street would:

- provide two new kiss and ride spaces and one accessible parking space on the southern side of Terminus Street; and
- result in a net loss of approximately seven on-street parking spaces compared to the current situation (excluding the proposed kiss and ride and accessible spaces).

It is assumed that on the northern side of Terminus St the existing parking arrangements will remain. The Proposal would result in a reduction of road width on Terminus Street potentially requiring the need to create a no-parking zone, resulting in a further loss of 6 spaces.

Along Trafalgar Street there would be no available on-street parking on the northern side of Trafalgar Street due to the proposed bike path (which is to be delivered separately by Inner West Council).

Overall, the Proposal has the potential to increase parking demand by a minor amount given the accessibility improvements which may lead to a small increase in station utilisation and patronage, however due to the current mode share distribution it is not expected that the loss of on-street parking would have any major impact to existing users.

4.9 Property access

The Proposal is not expected to have any impact on existing access to properties in the vicinity of the Petersham Station.

4.10 Transport safety

The Proposal should improve pedestrian safety given that the enlarged forecourts provide for increased space and manoeuvrability for pedestrians. On both Trafalgar Street and Terminus Street, the forecourt and surrounding infrastructure also facilitates shorter crossing distances and safer desire lines for pedestrians.

The station access upgrade coupled with the proposed bike path on Trafalgar Street would provide a safe and efficient option for cyclists and reduce conflict with vehicles.

It was noted in Section 2.9 that the intersection at Trafalgar Street / Crystal Street has a history of crashes, the majority of which involved vehicles travelling in the same direction. It is not expected that the Proposal would have any significant bearing on the road safety at this intersection although minor increases in traffic on Trafalgar Street and reduction in lane capacity could result in longer queuing on the western approach, impacting intersection operation.

5 Construction impacts

5.1 Construction works

The construction methodology would be further developed during the detailed design of the Proposal by the nominated Contractor in consultation with TfNSW. The construction staging outlined in this assessment 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.

The key staged construction activities for the Proposal, can be summarised as follows:

- enabling works – Terminus Street side
- enabling works – platform
- services and piling for platform lift
- services and piling for Terminus Street lift
- install lift shaft and prefabricated concourse for Terminus Street lift
- install platform lift shaft and prefabricated concourse. Commence works on Trafalgar Street
- Terminus Street stairs and landing modifications
- platform lift works including glazing, regrading of platform. Continue works on Trafalgar Street
- continue Terminus Street works
- platform resurfacing, services and platform building works
- Terminus Street finishing works including lift, stairs and forecourt
- platform finishing, signage and defects rectification.

5.2 Construction hours

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

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

Certain works may need to occur outside recommended standard hours and would include night works and works 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 for ongoing maintenance when trains are not operating.

Out of hours works are 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 12 rail shutdowns would be utilised during the construction period. Six of these shutdowns would require the closure of the station to the public to facilitate the following activities:

- services, piling and lift shaft installation on the platform
- Terminus Street station entrance works including stairs and lift installation and landing modifications
- Trafalgar Street station entrance works including demolition and excavation works for the ramp and stairs
- platform regrading, resurfacing and TGSI installation
- interchange upgrades including modifications to bike racks and parking.

Out of hours works may also be scheduled outside rail shutdown periods. Approval from TfNSW (and roads authority if required for any road closures) would be required for any out of hours work and the affected community would be notified as outlined in TfNSW's *Construction Noise and Vibration Strategy* (TfNSW, 2018).

5.3 Construction period

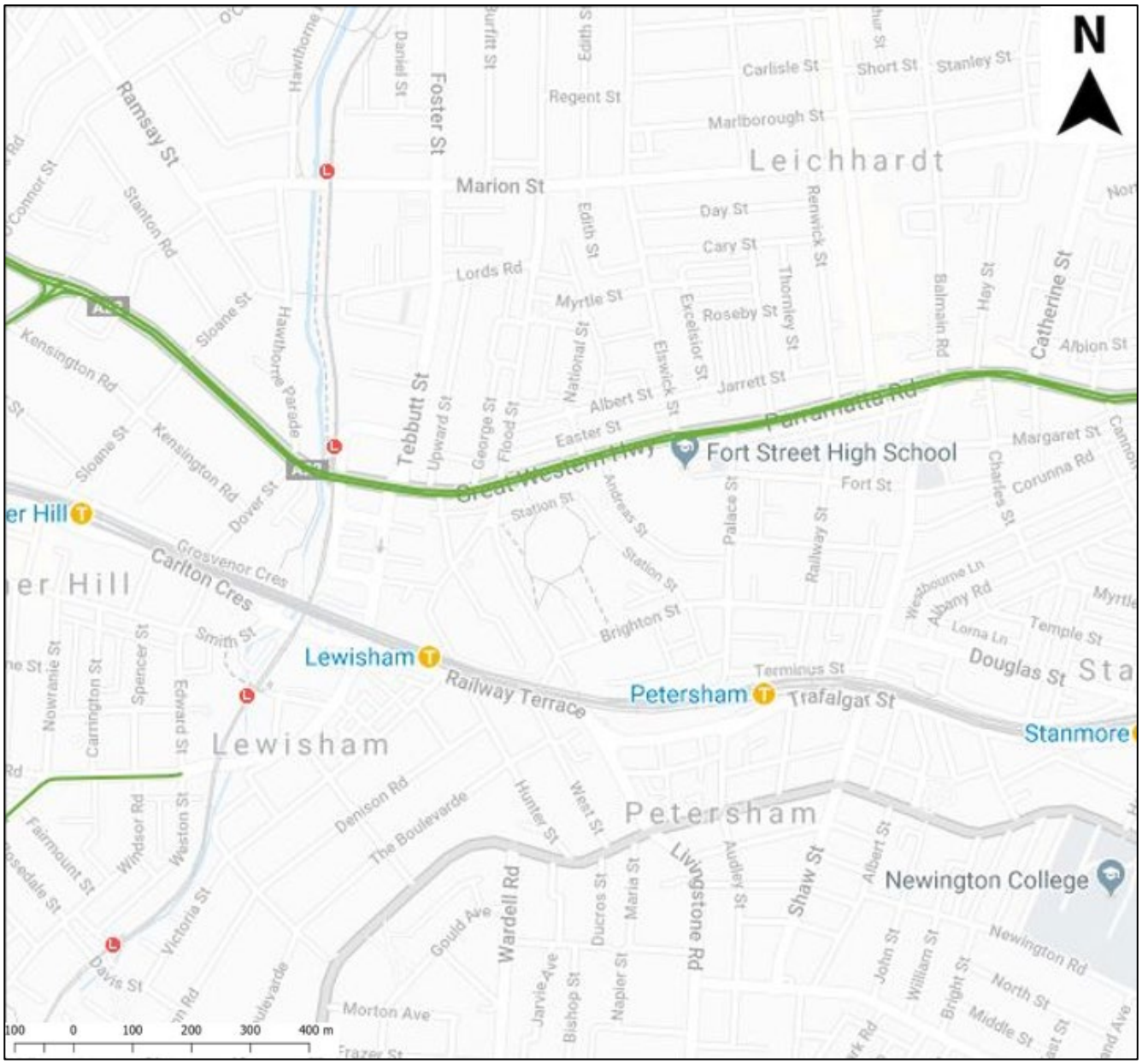
Subject to approval, construction is expected to commence in early 2020 and take around 18 months to complete.

5.4 Haulage routes

Petersham Station is situated between the two arterial roads of Parramatta Road and New Canterbury Road.

Mapping prepared by the National Heavy Vehicle Regulator (NHVR) illustrates that Parramatta Road and a section of Old Canterbury Road can accommodate larger vehicles including High Mass Limit 19 metre, 23 metre and 25/26 metre B-Doubles. This is illustrated in Figure 14.

Figure 14 NSW RMS Approved 19, 23m, 25/26m B-Double GML/CML network



Source: http://www.rms.nsw.gov.au/business-industry/heavy-vehicles/maps/restricted-access-vehicles-map/map/index.html (accessed 23 August 2019)

Heavy vehicle construction access would be available to both the northern and southern sides of the station via Terminus Street and Trafalgar Street respectively. It is assumed that heavy vehicle routes would be on the state road network, with possible local traffic control and parking restrictions on local roads to provide access to the site.

Detailed assessments (e.g. swept paths, bridge rating analysis) to determine the suitability of these proposed routes for heavy vehicle use would be undertaken and the proposed access routes would be identified in the Construction Traffic Management Plan (CTMP). Broadly these construction routes are likely to include the following roads, subject to additional analysis during the detailed design phase:

- New Canterbury Road
- Stanmore Road
- Crystal Street
- Parramatta Road.

5.5 Work induction

All workers and subcontractors involved in the construction works would be required to undertake a site induction before commencing work. It is recommended that work induction include the permitted access routes, driver and worker protocols, emergency procedures, WHS requirements and environmental measures. All workers, including construction and traffic controllers, are to hold all appropriate licences.

5.6 Pedestrian impacts

The following impacts to pedestrians / rail customers are anticipated to arise from construction activities:

Longer temporary walking distances during the demolition of the existing stairways and construction of new stairs and access path.

Potential higher levels of platform congestion arising from localised restrictions/narrowing of portions of the platform temporarily fenced off during construction of the lifts and internal station building modifications.

Elevated frequency of pedestrian and truck interactions on Trafalgar Street, Terminus Street and the surrounding road network.

Potential confusion and loss of amenity for customers during the temporary relocation of station entrances; and, potential footpath closures and/or diversions where strictly necessary.

Delays to customers arising during construction including management of traffic and work activities.

Higher road safety risk levels associated with construction vehicle-pedestrian interaction, particularly on Trafalgar Street and Terminus Street.

These impacts are considered to be manageable subject to a detailed Construction Environmental Management Plan (CEMP) to be prepared by a suitably qualified person or agency, either directly or in partnership with the nominated Contractor. The CEMP would be prepared in the next phase of the Proposal as construction activities and works programs are resolved and should identify strategies, work practices, and traffic control plans that avoid, reduce and mitigate safety risks for all users of the transport system including customers of Petersham Station.

It is also recommended to coordinate the construction of the protected bike path infrastructure within the same construction period of the station upgrade, where possible, to both minimise delay and the potential negative impacts on pedestrians.

5.7 Traffic impacts

The following is a summary of vehicular-based construction, plant, and equipment that is likely to be used:

- jack hammer
- franna/mobile cranes

- demolition saw
- coring machine
- rail mounted flat-bed truck
- elevated work platform
- hand tools
- torque wrenches and impact wrenches
- chainsaw
- bobcat
- concrete pump and truck
- water cart
- grinders and bar
- benders
- skip trucks
- hi-rail plant including elevated work platform, flatbed and hiab
- piling rig
- excavator
- lighting tower
- suction truck
- forklift
- road rail excavator
- hammer drills
- vibrating roller/compaction plate.

The types, sizes, duration of stay, and demand for each of these envisaged vehicle types will vary depending on the required use and can only be confirmed once the nominated Contractor has been confirmed and resolved their construction approach and programme.

Typically, construction trucks travelling on the external road network would consist of medium and large rigid vehicles and articulated vehicles. Specific oversize vehicles may be required for specialist construction activities; however, specific permits would be required for such movements.

The traffic generated during construction activities is likely to vary during the construction period and would increase during weekend shutdowns which would occur throughout the construction period. The exact number and type of construction vehicle movements is not known at this time. The traffic generated as a part of the construction works is not expected to exceed 20 light vehicles and 10 heavy vehicles per day during peak construction periods.

The proposed construction activities are expected to lead to short-term increases in traffic volumes on the road network surrounding Petersham Station. A summary of the 'with construction' traffic volumes on roads expected to be used by construction and worker vehicles is provided in Table 6, which also provides the expected Level of Service (LoS) based on the criteria provided in Table 5. As shown, all roads would operate at a satisfactory LoS, assumed as LoS D or better for this assessment. The LoS analysis does not include the impacts of construction vehicles, particularly heavy vehicles stopping, loading and unloading near to the proposed construction site. It is recommended that these activities be avoided during weekday peak periods and where possible be limited to evenings and weekends. The impacts of stopping, loading and unloading vehicles would be further investigated as part of the detailed design stage.

Table 5 Austroads Midblock Level of Service Criteria

Level of service	One Lane (veh/hr)	Two Lanes (veh/hr)
A	200	900
B	380	1,400
C	600	1,800
D	900	2,200
E	1,400	2,800

Table 6 Construction traffic and Midblock Level of Service

Street Name	Direction	Capacity	2019 (without construction traffic)		2019 (with construction traffic)		Difference		Midblock LoS (with construction traffic)	
			AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak	AM Peak	PM Peak
Terminus Street	Eastbound	600	15	16	17	18	2	2	A	A
	Westbound	600	11	12	13	14	2	2	A	A
Railway Street	Northbound	600	97	103	132	137	35	35	A	A
	Southbound	600	66	70	100	105	35	35	A	A
Trafalgar Street	Eastbound	600	535	566	569	600	35	35	C	C
	Westbound	600	550	581	584	616	35	35	C	C
Audley Street	Northbound	600	141	149	176	184	35	35	A	A
	Southbound	600	242	256	276	291	35	35	B	B

Construction Traffic Management Plans (CTMPs) under a broader Construction Environmental Management Plan (CEMP) would be prepared by a suitably qualified practitioner and consider special or at-elevated risk land uses including schools and lower order residential routes. Consideration should be made to limit or avoid construction vehicle activity during School Zone periods.

The CTMPs would need to detail how the interaction between the work sites and street frontages (including traffic and pedestrians) would be managed. Typically, accredited personnel would need to be deployed to ensure safety for all users at all times.

The CTMPs would need to detail how construction associated with works on weekends would be managed. In particular, potential weekend road closures relating to rail shutdowns need to be identified in the CTMPs and suitable alternative access routes provided in consultation with the relevant roads authority.

5.8 Parking impacts

A temporary construction compound would be required to accommodate a site office, amenities, laydown and storage area for materials. An area for a construction compound has been proposed within the car park of Transport for NSW Training Facility, shown in Figure 15. Crane set-up locations are also shown (in yellow) where cranes would be required at both sides of the station during rail shutdown/construction activities.

Figure 15 Location of proposed temporary compound and laydown areas (indicative only)

The proposed use of the Transport for NSW car park as a site compound would result in a temporary reduction of approximately 72 parking spaces. As these spaces are not generally used by station users (only staff) this parking supply reduction would have an insignificant impact on the surrounding street network. During the construction period it would be recommended that drivers who currently park in this car park be advised to avoid parking in nearby streets available to commuters.

It is also recommended that construction workers be encouraged to travel via non-private vehicle modes or to travel with workmates/carpool where possible. Construction workers should be discouraged from parking in nearby streets that would be most convenient for station customers.

Prior notice should be given if additional material temporary losses in existing public car parking is planned during the construction period.

Construction of the Proposal is likely to impact on on-street parking at Terminus Street, Railway Street, Trafalgar Street and Regent Street. It is expected that some workers would also park at on-street parking locations in the vicinity of the construction compound outside the formal car park facility. This may reduce the available for on-street parking, currently used by commuters and visitors to Petersham.

The crane setup locations may impact access to a number of properties on the southern side of Trafalgar Street. It would be recommended to retain resident access to these properties where possible through detailed Traffic Control Plans (TCPs).

5.9 Transport safety

During the construction period there would be an elevated frequency of pedestrian and truck interaction and higher road safety risk levels associated with construction vehicle - pedestrian interaction, particularly on Trafalgar Street, and to a lesser extent Terminus Street. As construction would occur in several stages, this may result in potential confusion and loss of amenity for customers during temporary locations of station entrances and potential footpath closures and/or diversions. Due to the altered conditions, particularly during peak periods, some users may take unnecessary risks to avoid delay. It is therefore essential that clear signage and infrastructure be put in place in accordance with CTMPs to mitigate these impacts.

6 Conclusion and recommendations

6.1 Conclusion

The scope of the Proposal is not anticipated to result in any significant adverse operational impacts. The Proposal would aim to provide a station precinct that is accessible to those with a disability, limited mobility, parents/carers with prams, and customers with luggage.

The proposed station access improvements, including the enlarged forecourts at both station entrances, upgrade to footpaths on Trafalgar Street and Terminus Street, new accessible ramp to southern access and provision of two new lifts to access the island platform from street level would offer considerable pedestrian benefits and improve the customer experience at the station.

6.2 Operational mitigation measures

Recommendations to mitigate operational impacts include:

- Investigate opportunities to install bike facilities on Trafalgar Street, prior to the completion of the bike path by Inner West Council, considering potential future demand.

6.3 Construction mitigation measures

As Petersham is a station that is not considered a significant park and ride station, there is an increased mode share of pedestrians walking to the station from their destinations and a need to ensure that any potential risks and/or confusion to pedestrians during the construction period is minimised. A CTMP inclusive of detailed TCPs would need to be prepared and submitted to the relevant roads authority.

The Contractor should prepare CTMP for each phase of construction. The CTMP should specify the following:

- construction approach and staging
- construction traffic demands
- construction parking strategy
- construction vehicle travel routes
- road closures and alternative routes
- compound access and egress locations
- pedestrian management strategy.

TCPs incorporate standard signage informing users of the transport system of temporary changes implemented to accommodate construction activity including heavy vehicle movements, lane/path closures and/or diversions, changes in speed limits, and the possible need to stop if directed, etc. This should include static signage installed in advance of, and throughout the works precinct.

Other possible mitigation measures to minimise traffic impacts during construction of the station upgrade should generally include:

- Appropriate traffic management, including static signs, manual traffic control and provision of temporary barriers to control the proposed work areas and minimise delays.

- Establishment of safe access points to work areas from the adjacent road network including safety measures such as barriers and warnings to pedestrians, maintaining sight distance requirements and signage and the provision of traffic management measures such as those identified above.
- Establishment of temporarily realigned vehicle and/or pedestrian facilities.
- Use of traffic controllers to negotiate pedestrian and construction vehicle priority and access, if required.
- Coordination of the construction of the proposed bike lane infrastructure on Trafalgar Street to be delivered within the same construction period
- Coordinate the construction of the protected bike path infrastructure within the same construction period of the station upgrade, where possible, to both minimise delay and the potential negative impacts on pedestrians.
- Drivers who currently park in the Transport for NSW Training Facility car park be advised to avoid parking in nearby streets available to commuters, during the construction period.
- Construction workers encouraged to travel via non-private vehicle modes or to travel with workmates/carpool where possible.
- Work inductions include the permitted access routes, driver and worker protocols, emergency procedures, WHS requirements and environmental measures.
- Construction Traffic Management Plans (CTMPs) consider special or at-elevated risk land uses including schools and lower order residential routes, with consideration given to limit or avoid construction vehicle activity during School Zone periods.
- As crane setup locations may impact access to a number of properties on the southern side of Trafalgar Street, it is recommended to retain resident access to these properties where possible through detailed Traffic Control Plans (TCP).

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