



# Croydon Station Easy Access Upgrade Traffic, Transport and Access Impact Assessment

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# Croydon Station

## Easy Access Upgrade

### Traffic, Transport and Access Impact Assessment

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## Glossary of Terms

Term	Meaning
AADT	Annual Average Daily Traffic
ABS	Australian Bureau of Statistics
AS	Australian Standards
ASA	Asset Standards Authority
BTS	Bureau of Transport Statistics, a division of Transport for NSW
CBD	Central Business District
CEMP	Construction Environmental Management Plan
CPTED	Crime Prevention Through Environmental Design
CTMP	Construction Traffic Management Plan
DCP	Development Control Plan
DDA	<i>Disability Discrimination Act 1992</i>
DP&E	New South Wales – Department of Planning and Environment
DSAPT	Disability Standards for Accessible Public Transport
Fruin	John J Fruin, who pioneered studies on pedestrian flows and crowding levels. Fruin defined six levels of crowding for queueing areas, walkways and stairways, and given in terms of Levels of Service (LOS).
HV	Heavy vehicles
I & S	Infrastructure and Services, a division of Transport for NSW (formerly Transport Projects Division)
JTW	Journey to Work
km	Kilometres
LEP	Local Environmental Plan
LGA	Local Government Area
LOS	Level of Service – a qualitative measure of flow and crowding, with LOS A as the ‘most pleasant’ and F the ‘least pleasant’ in terms of pedestrian flow and crowding.
m	metres
mm	millimetres
NSW	State of New South Wales
OOHW	Out of Hours Works
PLC	Presbyterian Ladies College
pmm	pedestrians per metre per minute, a measure of pedestrian flow rate
Rail Possession	Possession 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.
RailCorp	Rail Corporation New South Wales (now Sydney Trains)
REF	Review of Environmental Factors
RMS	Roads and Maritime Services (formerly Roads and Traffic Authority)
Roads Act	<i>Roads Act 1993</i>

Continued

Term	Meaning
TAP	Transport Access Program – an initiative of Transport for NSW to provide a better experience for transport customers by delivering accessible, modern, secure and integrated transport infrastructure.
TCP	Traffic Control Plan
TfNSW	Transport for New South Wales
TT&AIA	Traffic, Transport and Access Impact Assessment (this report)
TGSi	Tactile Ground Surface Indicator
TVM	Ticket Vending Machine
TZ	Travel zone – a geographical unit used as a basis for travel data analysis and statistics.

# Executive Summary

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## Background and Upgrade Works

Transport for New South Wales (TfNSW), through the Infrastructure and Services Division, is proposing to upgrade Croydon Station as part of the Transport Access Program (TAP), which is a NSW Government initiative involving many transport facility upgrades throughout NSW.

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

Croydon Station, located in Sydney, has been earmarked as an Easy Access Upgrade Project to improve customer experience and accessibility, including modal interchange facilities. The following key elements of work are associated with the Croydon Station Easy Access Upgrade:

Croydon Station, located in Sydney, has been earmarked as an Easy Access Upgrade Project to improve the customer experience and accessibility, modal interchange facilities. The following key elements of work are associated with the Croydon Station Easy Access Upgrade:

- demolition and upgrade of the existing footbridge and stairs including provision of new canopies and extension to connect with Hennessy Street
- installation of three new lifts, with associated landings and support structures
- construction of new station operations building at concourse level with staff facilities, customer information window and a family accessible toilet
- provision of improved pedestrian access to the station including upgraded accessible footpaths
- provision of improved interchange facilities including:
  - up to three kiss and ride spaces area near the station access on Paisley Road
  - additional bicycle racks
  - new accessible parking spaces near the station access on Paisley Road.

## Existing Conditions

Croydon Station is currently the 107<sup>th</sup> busiest station within the Sydney Trains network, with 4,750 passengers recorded entering or exiting the station during an average weekday in 2014. Existing station facilities include the following:

- i bicycle parking with capacity for 9 bicycles
- ii footbridge linking the station entry on the southern side with the platforms
- iii footpaths linking to the surrounding network
- iv formal kiss and ride facility on the northern side of the station, with capacity for approximately 2 vehicles.

The station is accessed by more than 1,430 rail users during the weekday AM peak period. Site observations indicate that the demand for unrestricted parking is high, particularly along Paisley Road and the surrounding residential areas, with low to moderate demand for other short-term parking (generally used for school set-down/ pick-up activity). Informal kiss and ride activity was also observed on the both sides of the station.



The station is serviced by the Inner West & South Line, with the closest bus services located approximately 500m from the station on Liverpool Road to the south and Frederick Street to the east. No formal taxi zone is provided in the immediate vicinity of the station.

## Operational and Construction Impacts

TfNSW predicts that daily rail patronage at Croydon Station is expected to increase by 27% between 2011-2016 and 2031-2036. The pedestrian improvements (including new footbridge and new lift access) would provide adequate capacity to accommodate this expected growth, while also enabling direct and safe travel routes, with an overall improved user experience and connectivity.

Pedestrian capacity assessment using Fruin Theory concludes that peak pedestrian activity would continue to operate at a good level of service (LOS A) on account of existing and forecast patronage and improved walkway capacity within the station.

The opportunity to establish formal kiss and ride facilities on the southern side of the station would improve passenger transfer via private vehicles, with potential for improvement to local traffic operations in Paisley Road. The Proposal includes capacity for at least one vehicle on the southern side, noting that there is capacity for additional vehicles, subject to the loss of existing on-street parking spaces. Such provision would complement the two kiss and ride spaces located on the northern side.

Additional bicycle parking in the northern and southern station forecourts would encourage cycling as a viable mode choice for local residents accessing the station, while also accommodating the existing informal bicycle parking demand. Appropriate weather protection should be provided for the proposed bicycle parking, where practicable.

Changes to on-street car parking supply would result from the provision of kiss and ride and accessible commuter parking, with an anticipated minor impact to the station precinct. Provision of two new accessible spaces on the southern side would ensure equitable access at the station.

Construction vehicles would use designated approach and departure routes with appropriate measures to maintain safety for all users at all times, especially at the site accesses, within the site and through local areas. Construction traffic generation is expected to be minimal and have a negligible impact on existing traffic conditions. It is anticipated that the primary construction activity would occur via Paisley Road, with access to the railway corridor available via an existing access point.

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

- longer walk distances as a result of the location of the temporary footbridge and access stairs during construction
- potential higher levels of platform congestion arising from narrower spaces with portions of the platform temporarily fenced off as construction areas (e.g. under existing footbridge)
- higher road safety risk levels associated with construction vehicle-pedestrian interaction, particularly on Paisley Road and Hennessy Street.

These impacts are considered to be manageable, with the Construction Environmental Management Plan to be prepared by the contractor outlining how the potential hazards relating to pedestrian access would be addressed.

Notwithstanding the likely limited impacts of construction on the operation of the surrounding transport network, a Construction Traffic Management Plan and Traffic Control Plans (TCPs) would likely need to be prepared and submitted to the RMS (TMC) and/or Council's Traffic Committee to appropriately manage the use of the designated construction routes and site interfaces. On-street parking impacts as a result of construction workers or localised construction activities would need to be appropriately managed given the high demand for existing parking by rail users accessing Croydon Station.

# 1. Introduction

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## 1.1 Background

Transport for New South Wales (TfNSW), through the Infrastructure and Services Division, is proposing to upgrade Croydon Station as part of the Transport Access Program (TAP), which is a NSW Government initiative involving many transport facility upgrades throughout NSW.

The main objective of the program is to provide better access to, within and around public transport interchanges, railway stations and surrounding station precincts, along with improvements in station amenities and general customer facilities. This would assist in ensuring an enhanced experience for public transport customers by delivering accessible, modern, secure and integrated transport infrastructure.

The planning and delivery of transport infrastructure as part of TAP would focus on the following:

- upgrading existing railway stations to improve access, particularly for those with a disability, the elderly and parents with prams
- providing modern buildings and facilities for all modes that meet the needs of a growing population
- providing transport interchanges that support an integrated network and allow seamless transfers between all modes for all customers
- improving safety and security measures, such as extra lighting, help points, fences and other security features
- improving signage and wayfinding.

The TAP has funding to deliver a series of projects ranging from small works such as ramp and access upgrades, through to larger projects including new stations, whole of station upgrades, transport interchanges and multi-deck commuter car parks.

Transport for NSW engaged GTA Consultants to prepare a Traffic, Transport and Access Impact Assessment (TT&AIA) for the proposed Croydon Station Easy Access Upgrade, to inform the preparation of a Review of Environmental Factors (REF) for the Proposal.

## 1.2 Project Objectives

The overall objectives of the Easy Access Upgrade projects include:

- improving the customer experience (specifically by provision of canopies, improved interchange facilities and a high standard of urban design)
- improving accessibility and compliance with the Disability Discrimination Act (DDA) and the Disability Standards for Accessible Public Transport (DSAPT)
- improving modal access facilities and integration with surrounding precinct
- where possible, increasing station capacity to address identified congestion issues (if any) and to accommodate patronage growth to 2036
- upgrading transport modal interchange facilities and equipment to current standards
- improving amenity for customers, including general access to the station and precinct facilities
- facilitating future unmanned station operation through rationalisation of all station systems, including security, ticketing and passenger information display

- reviewing precinct facilities for life expired elements and recommending appropriate action
- balancing the cost of ownership and maintenance with capital cost
- minimising construction stage impacts on passengers and station operations.

Specific design objectives include:

- verifying compliance with functional and operational requirements
- promoting efficient and effective wayfinding
- minimising pedestrian conflict, congestion and crowding points
- minimising queuing at station and interchange facilities
- increasing accessibility for commuters with mobility impairment
- accommodating growth of patronage and changing travel and working patterns
- improving station functionality, covering improved access to ticketing, platform clearance rates and station control (including congestion and pinch points).

### 1.3 Croydon Station Easy Access Upgrade

The proposed Croydon Station Easy Access Upgrade is designed to provide access for people with a disability, improve pedestrian access to and from the station, increase Croydon Station's ability to cope with the predicted future patronage demands, as well as improve pedestrian flow, passenger information services and wayfinding between transport modes.

The proposed Croydon Station Easy Access Upgrade (the "Proposal") includes the following features:

- demolition and replacement of the existing footbridge and stairs including provision of new canopies and extension to connect with Hennessy Street
- installation of three new lifts, with associated landings and support structures
- construction of new station operations building at concourse level with staff facilities, customer information window and a family accessible toilet
- provision of improved pedestrian access to the station including upgraded accessible footpaths
- provision of improved interchange facilities including:
  - up to three kiss and ride spaces near the station access on Paisley Road
  - additional bicycle racks
  - new accessible parking spaces near the station access on Paisley Road.

### 1.4 Study Area

Croydon Station is located in the inner western suburbs of Sydney. The station precinct straddles the boundary between the Ashfield Council Local Government Area (LGA) and the Municipality of Burwood LGA.

The local and regional context is shown in Figure 1.1.

Figure 1.1: Croydon and its Surrounding Environs



Basemap source: Sydway

## 1.5 Study Scope

This TT&AIA report sets out an assessment of the anticipated traffic, transport and access impacts of the proposed Croydon Station Easy Access Upgrade for inclusion in the REF, including consideration of the following:

- existing traffic and transport conditions and facilities in the vicinity
- operational traffic impacts associated with the proposed facilities
- construction impacts associated with the Proposal
- potential mitigation measures required as a result of any impacts.

This assessment has been prepared noting the following:

- Stakeholder consultation was not conducted as part of this study.
- Assumptions were made in regard to the proposed construction activities.
- Pedestrian, traffic and parking surveys were conducted during the weekday AM and PM peak periods with the primary aim of capturing commuter and rail customer behaviour.
- No modelling was completed as part of this project, noting that the proposed station upgrade is expected to generate only minor additional traffic.

## 1.6 References

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

- an inspection of the site and its surrounds
- Ashfield Council Local Environmental Plan (LEP) 2013
- Municipality of Burwood Local Environmental Plan (LEP) 2012
- Australian Standard, Parking Facilities, Part 1: Off-Street Car Parking AS 2890.1:2004
- Australian Standard, Parking Facilities, Part 5: On-Street Parking AS 2890.5:1993
- Australian Standard, Parking Facilities, Part 6: Off-Street Parking for People with Disabilities AS 2890.6:2009
- traffic and car parking surveys as referenced in the context of this report
- the Study Brief prepared by TfNSW
- *Croydon Station Precinct Accessibility Upgrade – Concept Design Report* (Cardno, February 2014)
- plans for the proposed development prepared for TfNSW
- other documents and data as referenced in this report.

## 2. Existing Conditions

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### 2.1 Station Context

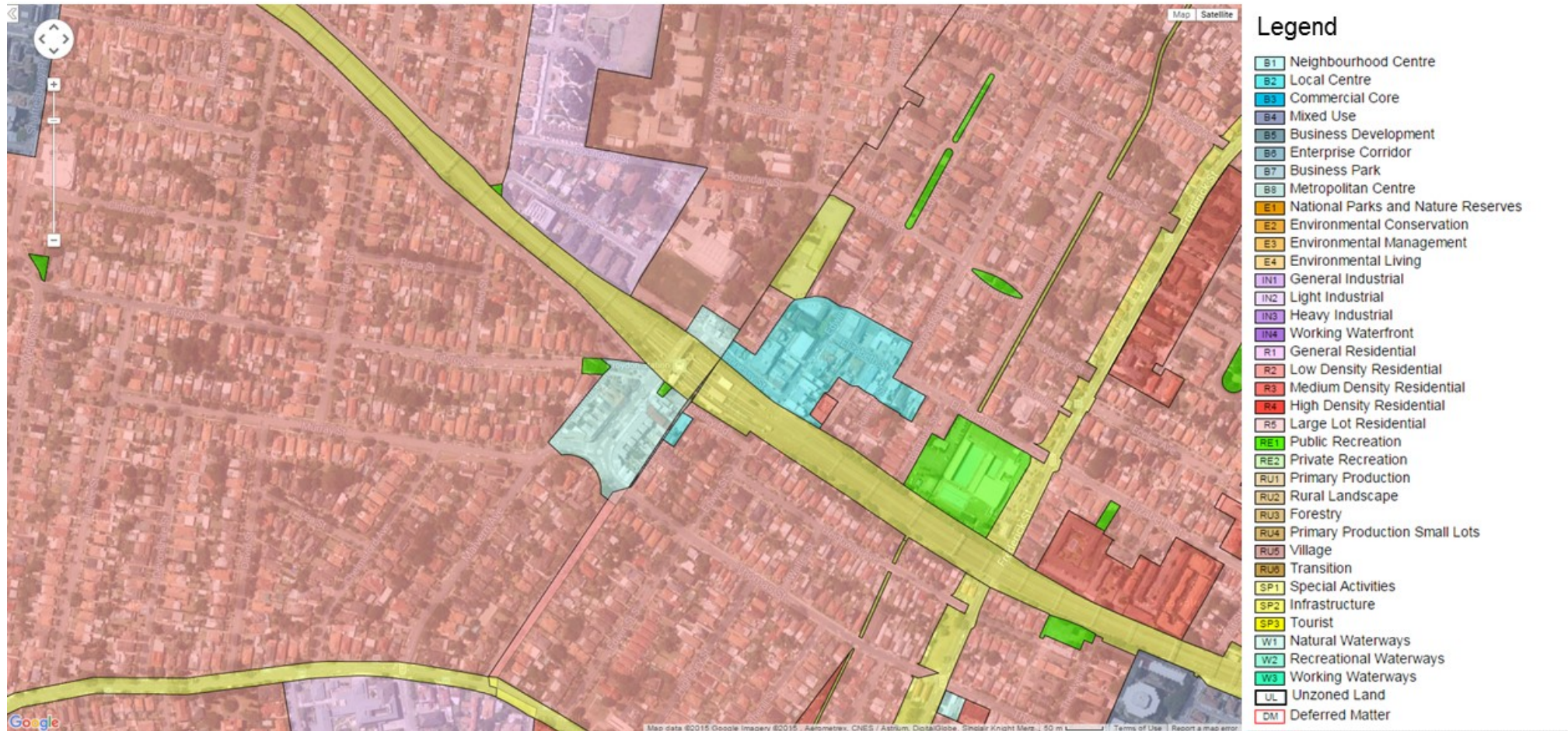
#### 2.1.1 Surrounding Land Uses

Croydon Station is located approximately 11km west of the Sydney CBD between Ashfield and Burwood Railway Stations and on the Sydney Trains T2 Inner West and South Line. It is currently the 107<sup>th</sup> busiest station within the Sydney Trains network, with 4,750 passengers recorded entering or exiting the station during an average weekday in 2014.

Croydon Station divides the Croydon Town Centre into the northern and southern precincts, where land is generally zoned as Local Centre. The precinct straddles the boundary between Ashfield Council and Burwood Municipal Council.

Figure 2.1 shows the land zoning surrounding Croydon Station, including low density residential, with commercial and retail properties forming the Town Centre on either side of the station. Presbyterian Ladies College (PLC) is located to the north of the station, with Croydon Public School located further north and beyond Boundary Street, and the Montessori Academy located at the eastern most end of Paisley Road.

Figure 2.1: Land Zoning Surrounding Croydon Station



Source: NSW Government Planning Viewer, accessed via <https://maps.planningportal.nsw.gov.au/Map> on 16 September 2015.



## 2.1.2 Road Network

Croydon Station is bounded by Hennessy Street and Young Street to the north, and Paisley Road to the south.

The location of Croydon Station and the local area context is shown in Figure 2.2.

Table 2.1 provides a summary of the characteristics of the surrounding key roads.

Figure 2.2: Croydon Station Precinct



Basemap source: Sydney

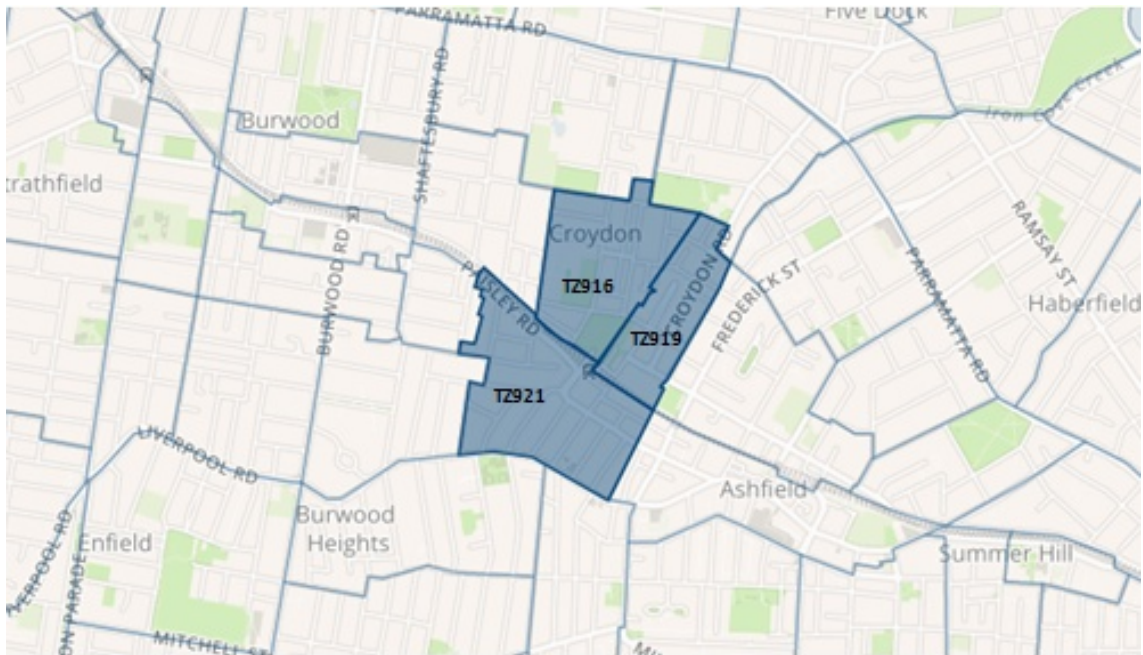
Table 2.1: Surrounding Road Network

Road	Classification	Speed Limit	School Zone	Configuration
The Strand	Regional Road	50km/h	No	One lane in each direction, with additional turn lanes
Meta Street (overbridge)	Regional Road	50km/h	Yes	One lane northbound, two lanes southbound (one through and one right turn to Paisley Road West)
Paisley Road (east of The Strand)	Local Road	50km/h	No	One unmarked lane in each direction, with a cul-de-sac at its western end and a mixture of parallel and angled parking
Paisley Road (west of The Strand)	Regional Road	50km/h	No	One lane in each direction, with additional turn lanes and parallel parking along both sides
Hennessy Street	Local Road	50km/h	Yes	One lane in each direction, with parallel parking on both sides
Young Street	Local Road	50km/h	Yes	One lane in each direction, with parallel parking on both sides

## 2.2 Travel Modes

The *Journey to Work (JTW)* data published by the Bureau of Transport Statistics (BTS) from 2011 Census data by the Australia Bureau of Statistics provides the most robust picture of travel patterns to/ from Croydon. The smallest geographical area for which JTW data is available is a Travel Zone (TZ). JTW data was analysed for the immediate Croydon Station catchment (see Figure 2.3), to better understand the current travel patterns for people who live and work in the area.

Figure 2.3: 2011 Census Data Journey to Work Data (TZ 916, TZ 919 and TZ 921)



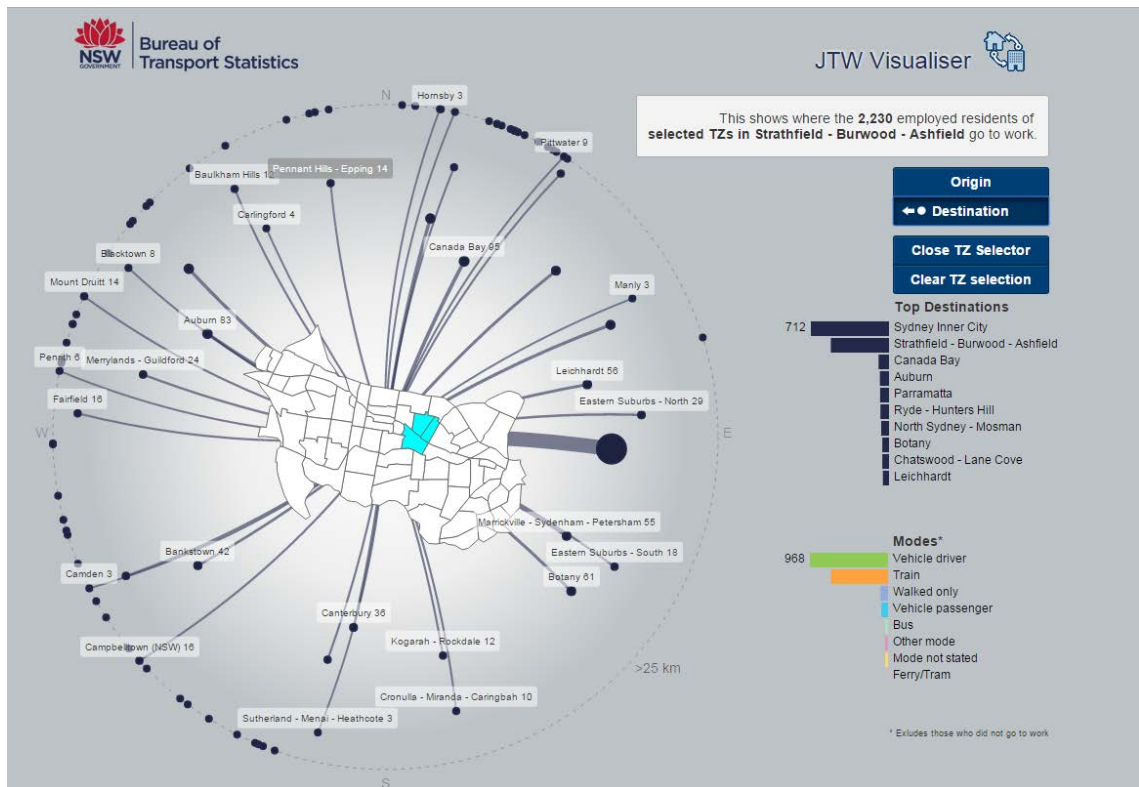
Basemap source: Bureau of Transport Statistics, <http://visual.bts.nsw.gov.au/jtwbasic/>, visited on 13 August 2015

The 2011 JTW data indicates that a total of 2,230 employed residents were living in the selected Travel Zones. The most common locations of work places for these residents are shown in Figure 2.4 and include:

- Sydney Inner City (32%)
- Strathfield, Burwood and Ashfield (24%)
- Canada Bay (4%)
- Auburn (4%)
- Parramatta (4%).

The key travel modes used by employed residents in the analysed Travel Zones include vehicle as a driver or passenger (1,051, or 47%), train (706, or 32%), walking (93, or 4%) and bus (39, or 2%).

Figure 2.4: Place of Work for Employed Residents in selected Travel Zones, 2011



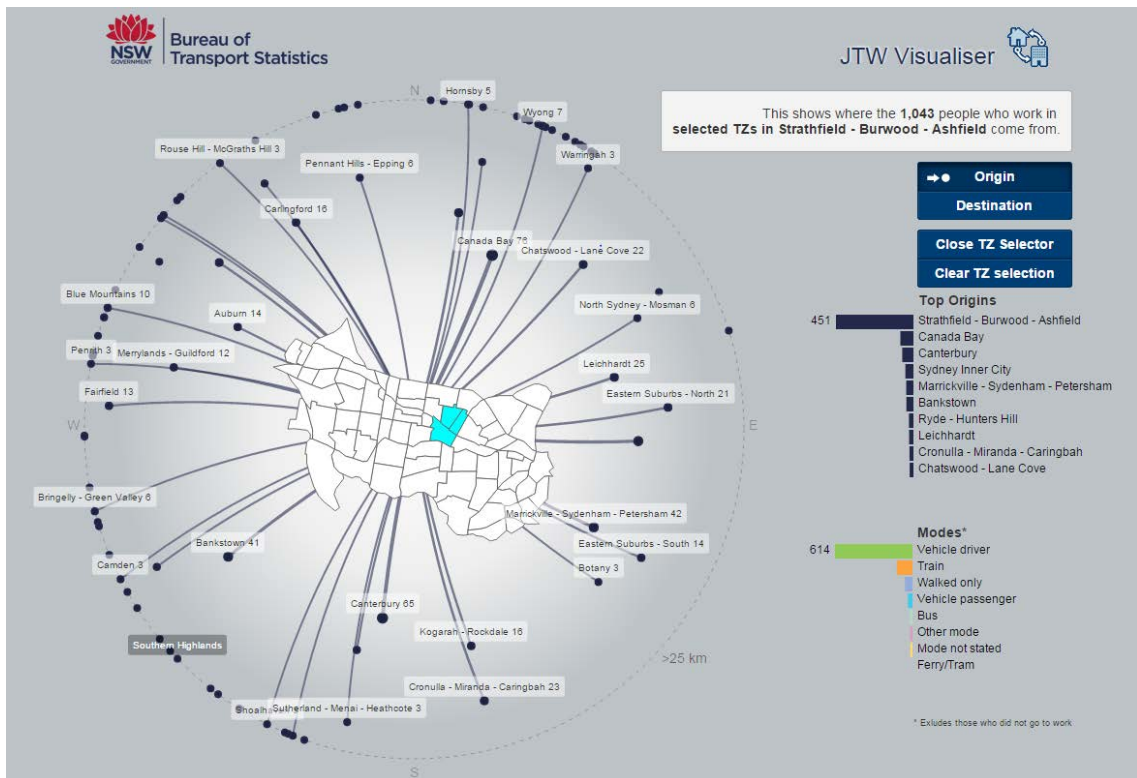
Basemap source: Bureau of Transport Statistics, <http://visual.bts.nsw.gov.au/jtwdynamic/>, visited on 13 August 2015

The 2011 JTW data also indicates that a total of 1,043 people work in the selected Travel Zones. The most common locations of residence of these workers are shown in Figure 2.5 and include:

- Strathfield, Burwood and Ashfield (11%)
- Canada Bay (7%)
- Canterbury (6%)
- Sydney Inner City (5%)
- Marrickville, Sydenham, Petersham (4%)
- Bankstown (4%).

The key travel modes used by employees of the analysed Travel Zones include vehicle as a driver or passenger (650, or 62%), train (124, or 12%), walking (59, or 6%) and bus (20, or 2%).

Figure 2.5: Place of Residence for Employed Workers in selected Travel Zones, 2011

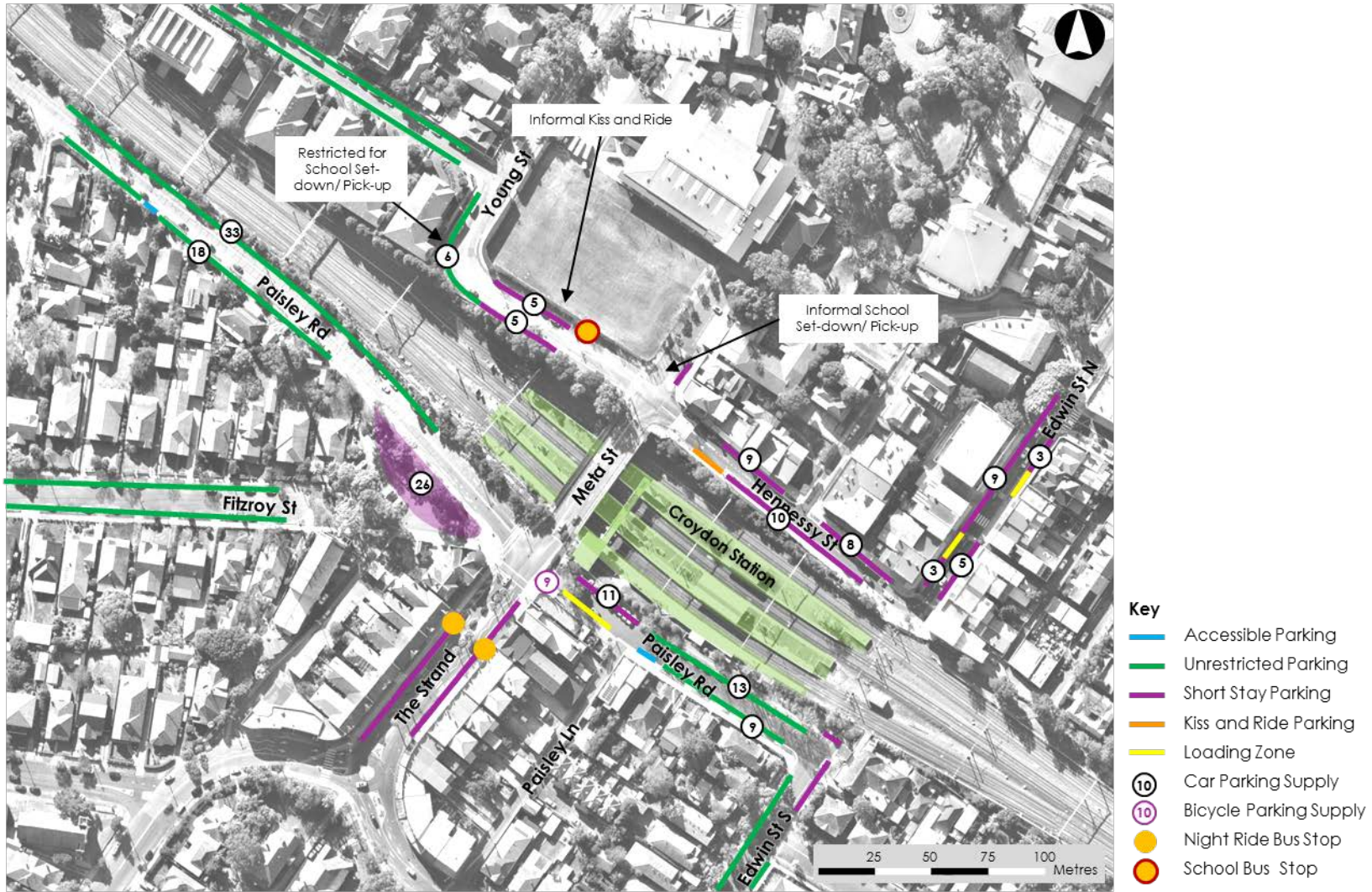


Basemap source: Bureau of Transport Statistics, <http://visual.bts.nsw.gov.au/jtwdynamic/>, visited on 13 August 2015

### 2.3 Existing Station Interchange Facilities

Croydon Station and the surrounding precinct provides a number of transport facilities, including kiss and ride, unrestricted parking (generally used by commuters) and bicycle parking. The existing facilities are indicatively shown in Figure 2.6.

Figure 2.6: Existing Transport Facilities



## 2.4 Public Transport Services

### 2.4.1 Passenger Rail Services

Croydon Station is serviced by the T2 Inner West & South Line. The train journey between Croydon Station and Central Station takes approximately 20 minutes during peak periods.



















Train frequencies during the weekday AM, weekday PM and Saturday peak hours are shown in Table 2.2.

Table 2.2: Train Service Peak Period Frequencies

Direction	AM Peak (8:00am-9:00am)	PM Peak (5:00pm-6:00pm)	Saturday Peak (12:00pm-1:00pm)
Eastbound (Central)	15 minutes	5-10 minutes	10-15 minutes
Westbound (Campbelltown/Granville)	15 minutes	5-15 minutes	15 minutes

A summary of the facilities provided at Croydon Station is detailed in Figure 2.7.

Figure 2.7: Croydon Station Facilities

Getting around the station			Accessibility		
	Stairs	✓		Hearing loop	✓
	Escalator	✗		Platform tactile tiles	✓
	Lift	✗		Portable boarding ramp	✓
	Ramp	✗		Wheelchair accessible toilet	✓
	Level crossing	✗		Wheelchair accessible payphone	✗
				Wheelchair accessible carspace/s	✗
General facilities			Transport interchanges		
	Ticket vending machine	✓		Bus stop close by	✗
	Eftpos	✓		Ferry wharf close by	✗
	Toilet	✓		Taxi rank close by	✗
	Payphone	✓		Bike racks or bike lockers	✗
	Passenger display screens	✓		Kiss and ride	✓
	Help point	✓		Car park close by	✗

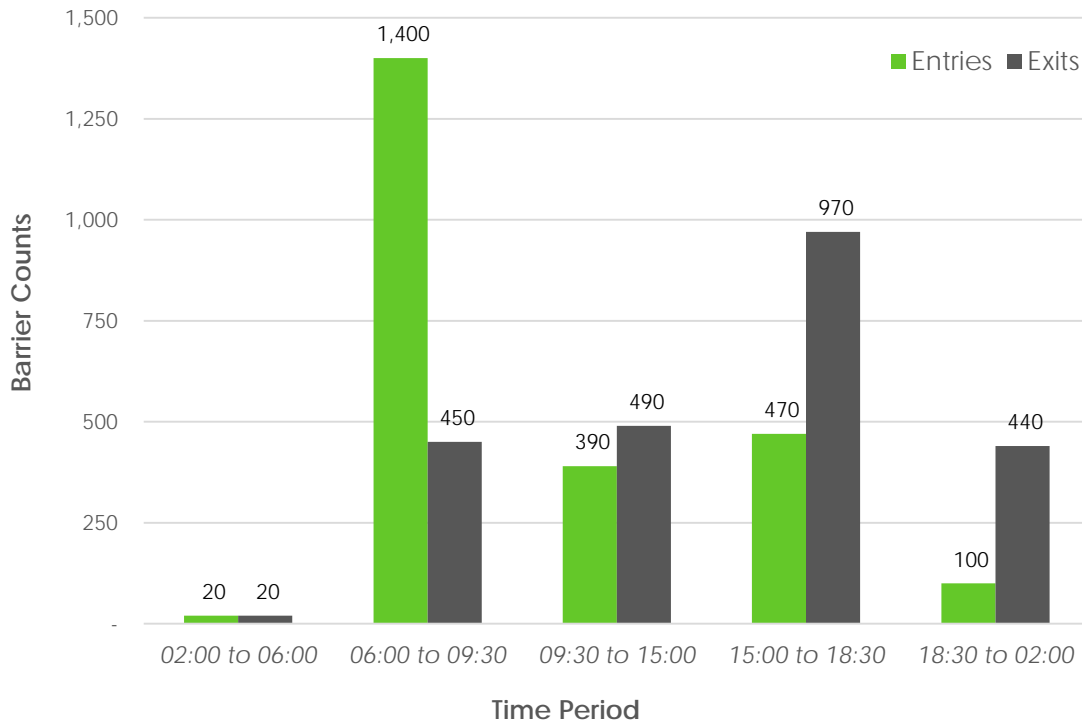
Source: Sydney Trains, [http://www.sydneytrains.info/stations/station\\_details.htm](http://www.sydneytrains.info/stations/station_details.htm), visited on 13 August 2015.

Note that there are non-standard bicycle racks outside the station, although these are not provided by Sydney Trains.

## 2.4.2 Rail Patronage

Rail patronage data for Croydon Station for 2014 is detailed in Figure 2.8. Across the 24 hour period, the station has a total of about 4,750 entries and exits<sup>1</sup>.

Figure 2.8: Croydon Station Patronage, 2014



Source: Bureau of Transport Statistics, <http://www.bts.nsw.gov.au/ArticleDocuments/223/Train%20Station%20Barrier%20Counts%202004-2014.zip.aspx>, visited on 11 August 2015

From Figure 2.8, it is evident that Croydon Station is busiest during the morning (6:00–9:30 AM) and afternoon (3:00–6:30PM) commuter peak periods, which reflects its primary use as both a commuter station to/ from Sydney CBD/ Parramatta and key employment zones, together with school student activity and off-peak use as a local station.

Historical barrier count data for Croydon Station has also been gathered from information published by the Bureau of Transport Statistics, covering the years 2004 to 2014, and given in terms of key time periods during the day<sup>1</sup>. The barrier counts for the 3.5-hour morning peak between 6:00am and 9:30am, as well as the totals for the day (24 hours), are shown in Table 2.3.

<sup>1</sup> <http://www.bts.nsw.gov.au/ArticleDocuments/223/Train%20Station%20Barrier%20Counts%202004-2014.zip.aspx>

Table 2.3: Croydon Station Barrier Counts 2004-2014

Year	6:00am – 9:30am			24 hours		
	In	Out	In + Out	In	Out	In + Out
2004	1,000	520	1,520	2,030	2,020	4,050
2005	1,180	530	1,710	2,070	2,050	4,120
2006	1,240	540	1,780	2,140	2,150	4,290
2007	1,260	540	1,800	2,180	2,180	4,360
2008	1,150	470	1,620	2,140	2,150	4,290
2009	1,170	470	1,640	2,170	2,190	4,360
2010	1,180	470	1,650	2,200	2,200	4,400
2011	1,190	470	1,660	2,210	2,200	4,410
2012	1,390	450	1,840	2,370	2,360	4,730
2013	1,440	460	1,900	2,440	2,450	4,890
2014	1,400	450	1,850	2,380	2,370	4,750

Source: Bureau of Transport Statistics, <http://www.bts.nsw.gov.au/ArticleDocuments/223/Train%20Station%20Barrier%20Counts%202004-2014.zip.aspx>, visited on 11 August 2015

The data indicates that rail patronage has significantly increased (approximately 20%) across the 10 year period to 2014.

### 2.4.3 Bus Services

There are no local bus services accessible from Croydon Station. The closest bus stops are located approximately 500m away on Liverpool Road to the south and Frederick Street to the east, with the exception of the Night Ride bus stops located on The Strand and school bus stops located in the vicinity of the station.

## 2.5 Pedestrian Access and Facilities

### 2.5.1 Pedestrian Facilities

Access to the station platforms is provided via stairs from Meta Street and the primary access from the southern side of the station via the Paisley Road pedestrian plaza. There is no existing access to the station from the north on Hennessy Street.

The key pedestrian desire lines for the station are presented in Figure 2.11, with the majority being via established footpaths along The Strand, Hennessy Street and Paisley Road. The majority of pedestrian activity at the station and in the surrounding precinct is associated with commuter activity and school set-down/ pick-up activity associated with the local schools, located north of the station.

The key pedestrian facilities at Croydon Station are summarised as follows:

- Footpaths are provided along both sides of The Strand including the Meta Street railway overbridge, linking the station to the Town Centre (southern precinct).
- Pedestrian fencing is provided along both sides of the railway overbridge, restricting mid-block pedestrian crossing.
- Footpaths are provided along both sides of Paisley Road east of The Strand, although the narrow footpath along the northern side of Paisley Road (adjacent to the railway corridor) does not typically meet the peak period pedestrian demand. The effective width is further restricted by angle parked vehicles overhanging the kerb.



- A footpath is provided along both sides of Paisley Road west of The Strand. However, the footpath along the northern side of Paisley Road does not continue beyond approximately 50m west of the intersection, therefore encouraging pedestrians to cross mid-block along Paisley Road.
- Footpaths are provided along both sides of Hennessy Street, connecting the station to the Town Centre (northern precinct).
- Footpaths are provided along both sides of Young Street.
- Marked pedestrian crossings are provided on the southern and western legs of the signalised intersection of The Strand and Paisley Road, utilised by pedestrians to/ from the south, including those using the unrestricted parking spaces along Paisley Road.
- The pedestrian (zebra) crossing located on the eastern leg of the intersection of Hennessy Street, Young Street and Meta Street is controlled by a school crossing supervisor during the school peak periods, improving road user safety during these busy times.
- Pedestrian (zebra) crossings are provided on the eastern (raised) and western legs of the priority controlled intersection of Hennessy Street, Young Street and Meta Street, accommodating pedestrian activity from the north, particularly related to school activity.
- A marked pedestrian crossing is provided on The Strand, approximately 80m south of the station and servicing the Town Centre.

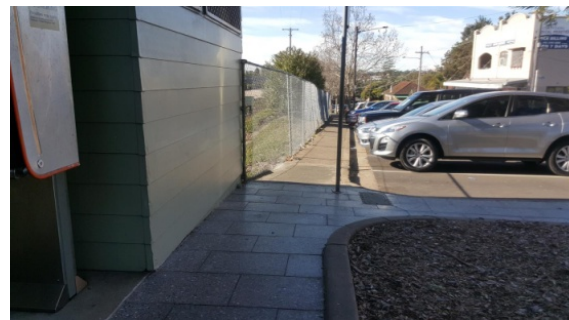
Images of a number of these facilities are shown in Figure 2.9.

Recent improvement works have been completed to sections of the Hennessy Street footpaths and the southern footpath of Paisley Road. These works have improved footpath quality in the vicinity of the station and therefore improving the overall accessibility of the station. However, given that access to the station platforms is via stairs only, Croydon Station does not currently comply with DDA requirements.

Figure 2.9: Pedestrian Facilities and Station Access



Stairs providing station access from The Strand/Meta Street



Narrow footpath along Paisley Road, adjacent to the station



Pedestrian footpath along The Strand providing access to the station and the railway overbridge.



Pedestrian crossing on Hennessy Street



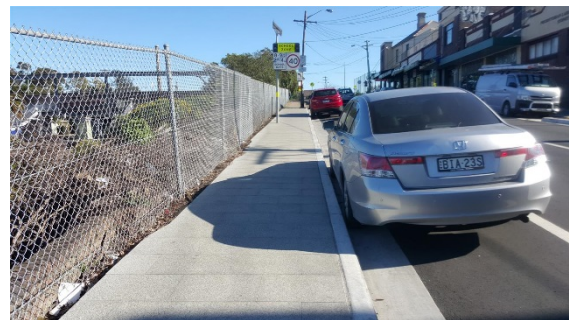
Poor pedestrian connection along northern side of Paisley Road



Pedestrian crossing on Young Street



Signalised pedestrian crossings at the intersection of The Strand and Paisley Road



Recently upgraded footpath along Hennessy Street

## 2.5.2 Pedestrian Activity

GTA Consultants completed pedestrian demand surveys around the station in early August 2015 during the weekday AM and PM peak periods. The survey results indicate that up to 1,430 people access Croydon Station during the AM peak hour (8:00-9:00am), with an 80:20 split between those entering and those exiting. A significant component of the total pedestrian volumes during this period was school children and students, particularly those leaving the station before 8:30am. The peak pedestrian flows were between the station and Croydon Public School on Boundary Street and PLC on Meta Street to the north. During the AM peak, an equal split was observed across the two station entries.

The PM peak pedestrian activity was approximately 60% of that observed during the AM peak period, with a 60:40 split between the Paisley Road entry and The Strand entry. This is likely to be attributed to the high volume of school children using the station during the AM peak period, with their corresponding PM activity generally occurring prior to the typical peak period (that is, earlier than 4:00pm).

Approximately 20% of pedestrians accessing the station travel via Paisley Road (south of The Strand). This results in a high number of mid-block crossings relating to the most direct pedestrian desire line.

The eastern side of The Strand accommodates approximately 80% of the north-south pedestrian volumes along the railway overbridge during the peak periods. The western side is considered less desirable given that there is no direct pedestrian crossing opportunity at either end of the bridge and the pedestrian fencing restricts mid-block crossings. As a result, the pedestrian crossing located on the eastern leg of the intersection of The Strand/ Hennessy Street/ Young Street and Meta Street experiences significantly higher utilisation than the pedestrian crossing located on the western leg, with a 90:10 split observed during the AM peak hour.

## 2.6 Cyclist Facilities

Cyclist facilities at Croydon Station include bicycle parking in the Paisley Road pedestrian plaza (southern station precinct), with capacity for 9 bicycles. No bicycle parking is provided on the northern side of the railway line. At the time of the site visits, the bicycle parking was underutilised, with less than 50% occupied.

Hennessy Street, Fitzroy Street and Young Street are recognised as on-road cycle routes by Ashfield Council and the Municipality of Burwood, with bicycle logos regularly positioned on the road pavement. Additional wayfinding signage is also provided to promote the cycling connections.

Images of the bicycle facilities and recognised cycle routes in the station precinct are shown in Figure 2.10 and Figure 2.11, respectively.

Figure 2.10: Bicycle Facilities



Bicycle racks located on Paisley Road to the south of the station

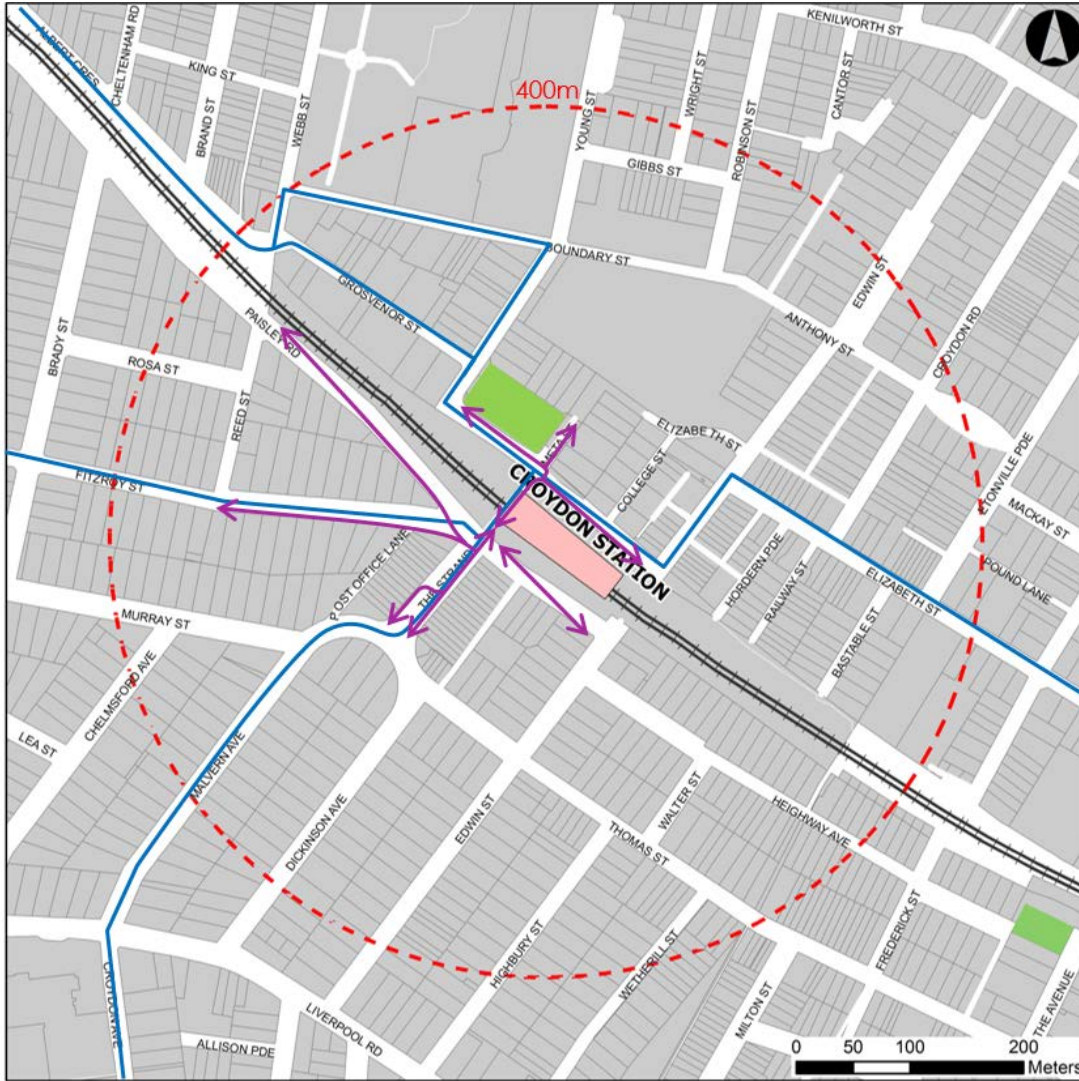


Cycling wayfinding on Hennessy Street



Bicycle pavement logos on Young Street

Figure 2.11: Pedestrian Desire Lines and Cycling Facilities



- Key**
- Cycling Route (On-Road)
  - Walking Route
  - Bicycle Storage
  - Station
  - Walking Catchment

## 2.7 Taxi and Kiss & Ride Facilities

A formal kiss and ride facility is provided on the southern side of Hennessy Street. In addition to kiss and ride activity on Hennessy Street, on-site observations confirmed that a significant amount of kiss and ride activity also occurs along Paisley Road, east of The Strand, and to a lesser extent on The Strand itself. It is noted that there are no formal kiss and ride facilities to the south of the station.

There are no formal taxi ranks in the station precinct, and no taxi activity was observed at the time of the site visits.

The formal kiss and ride facility and informal kiss and ride locations are shown in Figure 2.12.

Figure 2.12: Kiss and Ride



Informal kiss and ride activity on Paisley Road



Formal Kiss and Ride on Hennessy Street

## 2.8 Traffic Volumes

GTA Consultants completed traffic movement counts in the immediate vicinity of the station on Thursday 6 August 2015 during the AM and PM peak periods.

Two-way traffic volumes along The Strand (south of Hennessy Street) totals up to 1,400 vehicles per hour. These traffic volumes reflect Hennessy Street primarily serving as a through traffic route, connecting Parramatta Road and Liverpool Road, combined with activity associated with the station, Croydon Town Centre and school set-down/ pick-up activity.

As discussed, Paisley Road (east of The Strand) accommodates a high number of kiss and ride vehicle movements. This, combined with commuter parking, service vehicles, school set-down/ pick-up activity, as well as the geometrical constraints of Paisley Road, results in a congested local road environment during the peak periods. In particular, the following observations were made in relation to the Paisley Road interactions:

- Although Paisley Road and Paisley Lane are generally configured to accommodate a one-way loop, a high number of U-turn movements were observed on Paisley Road, particularly when kerbside parking reached capacity and congestion started to build up.
- Unrestricted parking is generally utilised by commuters.
- Kiss and ride and school set-down/pick-up activity occurs along the whole section of Paisley Road between The Strand and Edwin Street (south).

With consideration for the above and noting that there is a high proportion of mid-block pedestrian crossing activity, pedestrian and vehicle conflicts were observed.

Further to the above, peak period traffic congestion typically occurs along The Strand, with the Hennessy Street pedestrian crossing identified as a key contributor, particularly outside of the school peak periods (i.e. outside when the crossing is supervised).

## 2.9 Parking Demand

No designated commuter car parking is provided for Croydon Station. However, on-site observations confirm that unrestricted parking surrounding the station is often used by commuters. These include 22 spaces located along Paisley Road east of The Strand and 50 spaces located along Paisley Road between The Strand and Reed Street to the west, noting that unrestricted parking along Paisley Road (west) generally extends to Burwood Railway Station (about 1km to the west). All day commuter parking was generally observed along this stretch of Paisley Road, particularly on the northern side adjacent to the railway corridor.

At the time of the site visit, the 72 parking spaces specified above reached capacity by around 8:00am, which is indicative of the strong commuter parking activity surrounding Croydon Station. Furthermore, commuter activity was observed on the surrounding residential streets, presenting a challenge in balancing the commuter and residential parking demand, and any associated changeover.

## 2.10 Road Safety

Recorded crash data (sourced from RMS) in the vicinity of Croydon Station is presented in Figure 2.13. The data includes the most recent 5 year period from July 2009 to July 2014 and indicates that a total of 13 crashes have occurred in the immediate surrounds of Croydon Station. The breakdown of these crashes is as follows:

- 5 crashes occurred on The Strand
- 4 crashes occurred on Hennessy Street
- 4 crashes occurred on Edwin Street (north).

These crash results are consistent with the role and function of these roads, given the high peak period traffic volumes and high pedestrian activity, as well as peak period congestion.

The crash statistics are summarised in Table 2.4.

**Table 2.4: Crash Statistics Summary**

Location	Type of Crash	Number of Crashes
The Strand	Off-path	2
	Pedestrian	1
	U-turn	1
	Off-path	1
Hennessy Street	Vehicle door	2
	Entering traffic from footpath	2
Edwin Street (North)	Head-on	1
	Off-path	1
	Rear-end	1
	Off-path	1

Further to the above and as discussed within this report, the following safety concerns in the immediate vicinity of the station were identified:

- pedestrian/ vehicle conflicts along Paisley Road (south of The Strand) and geometrical constraints at the western end
- pedestrian/ vehicle conflicts at the intersection of The Strand/ Hennessy Street/ Young Street/ Meta Street
- There are two approach lanes to the pedestrian (zebra) crossing on the western leg of the intersection of The Strand/ Hennessy Street/ Young Street/ Meta Street, which represents a road safety issue and does not comply with relevant standards and guidelines.
- landscaping on the boundary of PLC restricts sight lines around the Young Street bend, representing a safety risk for pedestrians crossing Young Street and noting that pedestrian kerb ramps are located less than 20m north of the bend.

Figure 2.13: Recorded Crash Data (2009-2013)





## 3. Proposed Station Upgrade

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### 3.1 Overview

The access layout for the Croydon Station Easy Access Upgrade has been based on the concept design developed by Cardno and Caldis Cook, and is subject to detailed design. As outlined in Section 1.3, the proposed Croydon Station Easy Access Upgrade is designed to provide access for people with a disability, improve pedestrian access to and from the station, increase Croydon Station's ability to cope with the predicted future patronage demands, as well as improve pedestrian flow, passenger information services and wayfinding between transport modes.

The proposed Croydon Station Easy Access Upgrade includes the following features:

- demolition and replacement of the existing footbridge and stairs including provision of new canopies and extension to connect with Hennessy Street
- installation of three new lifts, with associated landings and support structures
- construction of new station operations building at concourse level with staff facilities, customer information window and a family accessible toilet
- provision of improved pedestrian access to the station including upgraded accessible footpaths
- provision of improved interchange facilities including:
  - up to three kiss and ride spaces near the station access on Paisley Road
  - additional bicycle racks
  - new accessible parking spaces near the station access on Paisley Road.

The proposed Croydon Station Easy Access Upgrade layout is shown in Figure 3.1.

Figure 3.1: Indicative Proposed Layout – Croydon Station

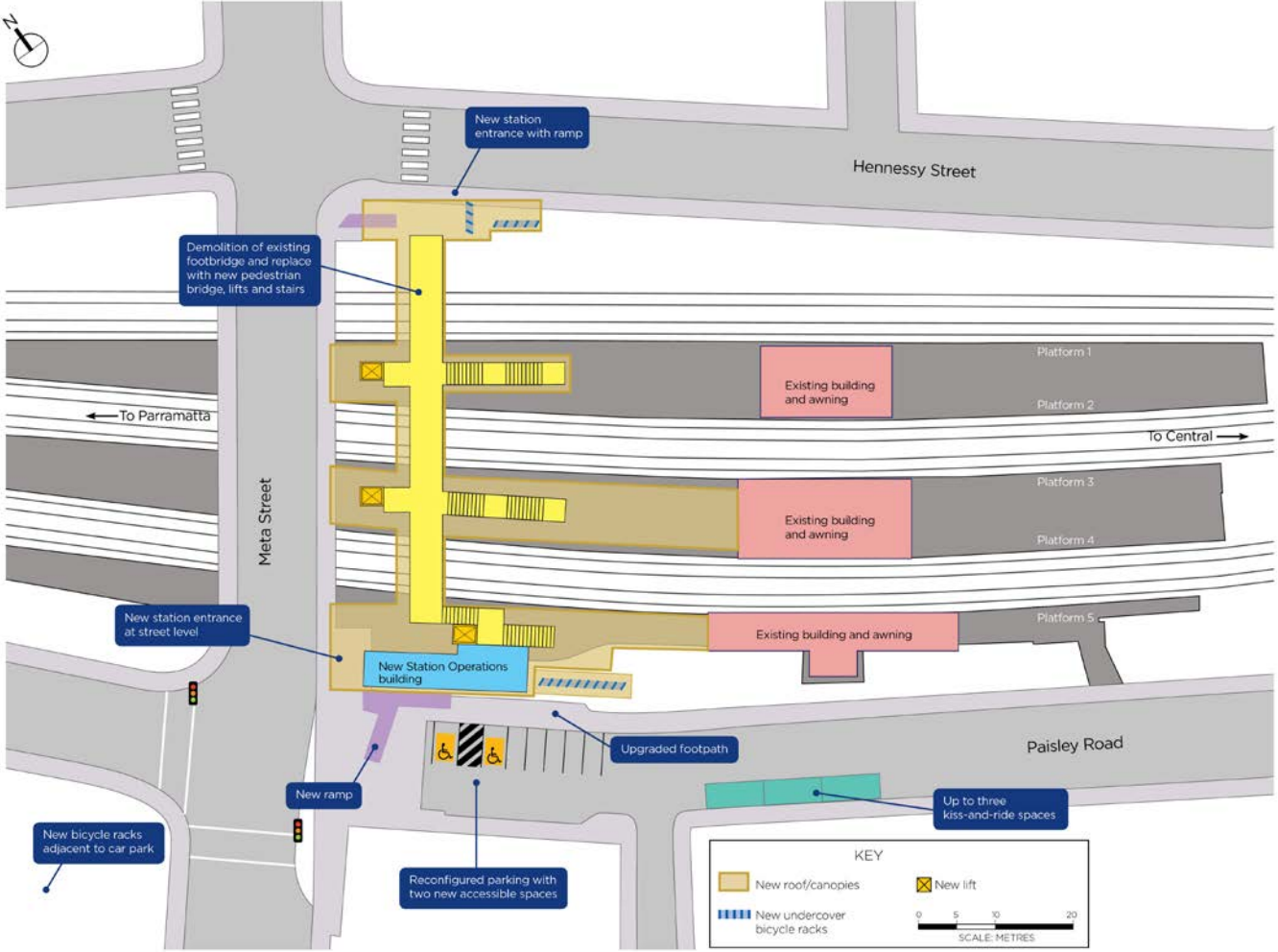


Image source: Transport for NSW I&S

### 3.1.1 Station Access

The Proposal includes new lifts and stair access to all platforms, as well as new stairs and accessible ramps at the new northern and the southern station entry points. A new pedestrian footbridge is also proposed to link Hennessy Street and Paisley Road with all of the platforms and station facilities, replacing the existing footbridge which currently provides access via Meta Street and Paisley Road only.

In addition, footpath improvements are proposed along both Hennessy Street and Paisley Road.

### 3.1.2 Transport Interchange Facilities

#### Kiss and Ride

The project scope incorporates establishing up to three formalised kiss and ride spaces on the southern side of Paisley Road. The provision of the kiss and ride facility would need to consider the location of the existing accessible parking space in front of 8–10 Paisley Road, Croydon (Croydon Medical Practice and Croydon Dental), which is preferred to be retained as an accessible car parking space.

It is noted that formal accessibility provisions (i.e. linemarking, signage and logo, etc.) are not required as part of a designated kiss and ride area. As such, the number of kiss and ride spaces could be extended further east along Paisley Road, but would result in a loss of unrestricted car parking spaces.

#### Bicycle Parking

New bicycle parking racks would be provided within the northern and southern station forecourts (north on Hennessy Street and south on Paisley Road), with a combined minimum capacity for 40 bicycles, as follows:

- minimum five (5) undercover racks for 10 bicycles on Hennessy Street
- minimum ten (10) racks for 20 bicycles with associated canopy on Paisley Road East
- minimum five (5) racks for 10 bicycles on Paisley Road West adjacent to the existing accessible car parking space.

These would be in addition to the existing bicycle parking racks (9 racks) located outside the southern station entry on the corner of The Strand and Paisley Road.

The bicycle parking racks are proposed to be provided on the north side Paisley Road East, close to the station entry. This will facilitate cycle access to Croydon Station.

### 3.1.3 Parking

Two new accessible spaces would be provided on Paisley Road, near the station entry. This would likely result in a loss of about three existing short-stay parking spaces.

The accessible spaces would be oriented at a 90-degree angle to the kerb.

## 4. Operational Impacts

### 4.1 Future Station Patronage

Forecast station patronage data provided by TfNSW is presented in Table 4.1. This data indicates that rail patronage at Croydon Station is expected to increase to 6,055 persons per day and 2,349 in an average weekday AM peak period by 2036. This equates to a 27% overall increase in passengers per day.

Typically, 15% additional patronage is factored in for design purposes. In this regard, the design patronage for 2036 would be 6,963 for a 24-hour period. This would equate to approximately 47% increase from 2014 patronage levels.

Table 4.1: Forecast Station Patronage for various Five Year Periods

	2011-2016	2016-2021	2021-2026	2026-2031	2031-2036
Growth	8%	7%	6%	6%	6%
Daily Patronage (at the end of period)	4,752	5,085	5,390	5,715	6,055
AM peak (6:00-9:30 AM)	1,844	1,973	2,091	2,217	2,349
24-hour design patronage including additional 15%					6,963
3.5-hour AM peak design patronage including additional 15%					2,701

Source: Transport for NSW, Easy Access / Station Upgrade Projects 2014 (Project 1) Portion 2 (Croydon), Deed Exhibit B, Works Brief Appendix A.

### 4.2 Public Transport

The Proposal would not have any significant impacts on bus or rail operations. It would likely bring about positive impacts in terms of contributing towards making rail transport more accessible to the community.

### 4.3 Pedestrians

The proposed pedestrian facilities, including the new footbridge, lifts and upgraded stairs and canopies would present pedestrian benefits, particularly in improving the user experience and amenity by providing new and improved facilities.

Provision of lifts to the station platforms, with accessible paths of travel linking Hennessy Street and Paisley Road would accommodate mobility impaired persons accessing the station platforms (noting that mobility impaired access is not currently available at Croydon Station). These would also provide improved access for the elderly and people with prams or luggage, etc.

The provision of a direct pedestrian connection linking the station with Hennessy Street (to the north) would accommodate a major pedestrian desire line, particularly during the school peak periods. The direct connection would be particularly beneficial during the peak periods, where pedestrian conflicts associated with school children and commuters regularly occur at the existing station access via The Strand. It is noted that access to the new footbridge is proposed to be open to the general community and not restricted to railway customers only (thereby facilitating a broader pedestrian link away from traffic).

This new footbridge would also contribute towards further reducing safety risks and improve overall experience for pedestrians, particularly railway station customers, with the provision of additional pedestrian movement capacity between Hennessy Street and Paisley Road.

Formalising interchange facilities on Paisley Road would also positively contribute towards the overall pedestrian and cycling environment, at least to the south of the station precinct.

The projected increase in station patronage is likely to increase the number of people crossing Paisley Road (south of The Strand), as well as kiss and ride activity occurring at the same location. Noting that the Paisley Road footpaths (particularly on the northern side) are unable to cater for the current pedestrian demand and there is a high occurrence of mid-block pedestrian crossing activity, it is recommended that access and circulation improvements for Paisley Road be further investigated, including the potential for a Shared Zone and/ or a one way flow (forming a loop with Paisley Lane, i.e. access via Paisley Road and egress via Paisley Lane only).

The placement of the Paisley Road Loading Zone and its necessity should be further considered, noting that the location is undesirable from a pedestrian safety perspective, as well as geometrically unsuitable with insufficient manoeuvring area for a loading vehicle to complete the required turning movements.

#### 4.3.1 Pedestrian Capacity Assessment

To understand whether there is adequate capacity in the station surrounds to cater for future pedestrian demands while ensuring the safety and convenience for pedestrians, GTA Consultants followed guidance from RailCorp's *Engineering Standard: Stations and Buildings – Station Design Standard Requirements: ESB 003 – Station Functional Spaces*<sup>2</sup>, which requires pedestrian access, queuing and circulation to satisfy "Fruin Level of Service C".

In addressing this, GTA Consultants used Fruin Theory<sup>3</sup> as reproduced in the '*Transit Capacity and Quality of Service Manual – 3<sup>rd</sup> Edition – Part 10*'<sup>4</sup> which involves evaluating the pedestrian capacity and level of service (LOS) of an area.

To assess pedestrian Level of Service (LOS), GTA Consultants chose to use the criteria of 'Pedestrian Flow Rate'. Pedestrian flow rate, measured in pedestrians per metre per minute (pmm), is the number of pedestrians that pass a point during a specific period of time for a given level of service, which is a qualitative measure of pedestrian comfort and crowding tolerance level.

Table 4.2 presents the LOS criteria based on 'Pedestrian Flow Rate' and Figure 4.1 presents a graphical representation of the walkway LOS.

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<sup>2</sup> As amended under Asset Standards Authority Technical Note – TN 044: 2015 dated 28 July 2015.

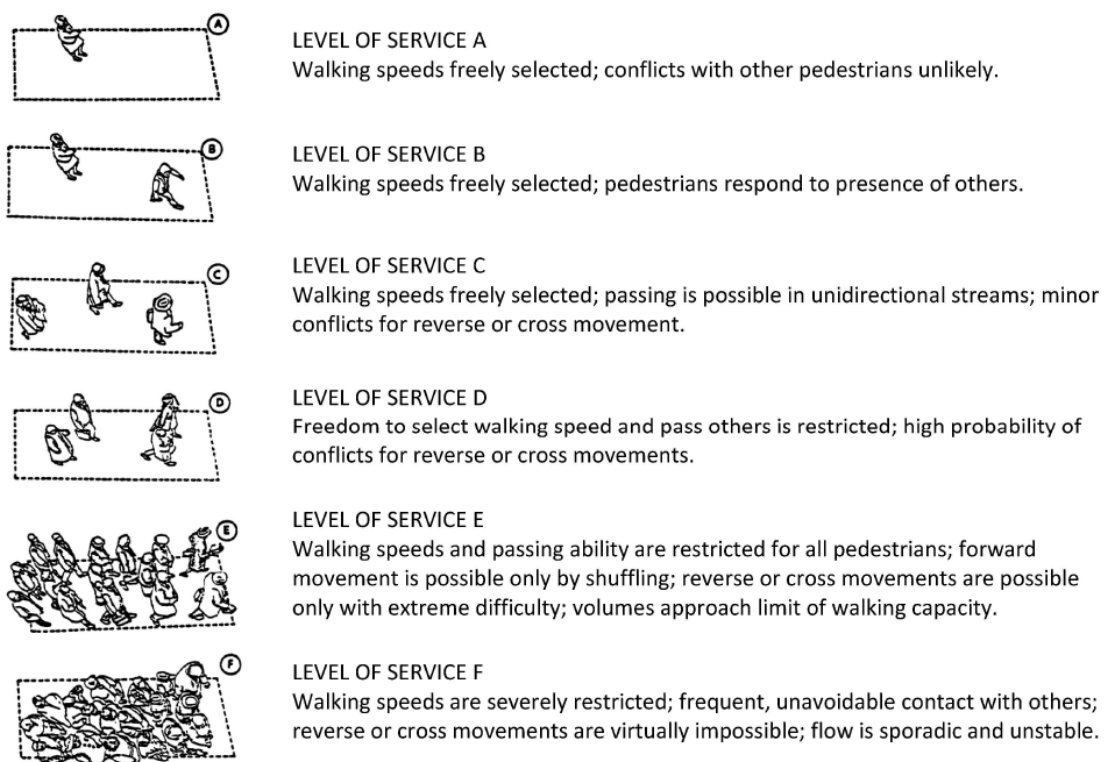
<sup>3</sup> Fruin, John J. 1987 *Pedestrian Planning and Design – Revised Edition*

<sup>4</sup> Transportation Research Board 2013 *Transit Capacity and Quality of Service Manual – 3<sup>rd</sup> Edition – Part 10*

Table 4.2: Pedestrian Level of Service on Walkways

Level of Service (LOS)	Flow per Unit Width (pmm)
A	0–23
B	23–33
C	33–49
D	49–66
E	66–82
F	Variable

Figure 4.1: Illustration of Fruin Theory Walkway Levels of Service<sup>5</sup>



Source: Transportation Research Board 2013 Transit Capacity and Quality of Service Manual – 3<sup>rd</sup> Edition – Part 10.

Table 4.3 presents the results of the pedestrian LOS assessment for the new footbridge. The assessment was undertaken for the peak 15 minute intervals during the study hour. The walkway widths used are based on the estimated path width along the new footbridge at the station access points.

<sup>5</sup> Fruin, John J. 1987 *Pedestrian Planning and Design – Revised Edition*

Table 4.3: Pedestrian LOS Assessment

Period	Peak Pedestrian Volume (p/ 15min)	Peak Pedestrian Volume (p/ min)	Walkway Width (m)	Flow Rate (pmm)	LOS
Existing	531	36	4.0	8-9	A
Design patronage 2036+15%	781	52	4.0	13	A

[1] Based on a forecast 47% increase in design station patronage for 2036 including 15%, as detailed Table 4.1.

Table 4.3 indicates that based on existing pedestrian volumes, the pedestrian LOS for the study location is 'A' and operates well over a 15 or 1 minute peak. Therefore the proposed 4m wide footbridge would be adequate to accommodate the expected growth in passenger demand, with no anticipated queuing or delay at any time. This would significantly improve pedestrian flows and interaction in and around the station.

## 4.4 Cyclists

As previously noted, additional bicycle parking would be provided on Paisley Road East (minimum 10 racks), Paisley Road West (minimum 5 racks) and Hennessy Street (minimum 5 racks). The Proposal increases the available bicycle parking capacity by 40 bicycles, which would be adequate to cater for the current and likely future demands. It is anticipated that provision of new facilities at the station access points is likely to increase awareness of such facilities, potentially with an associated increase in the cycling mode share to and from the station precinct.

## 4.5 Taxis

There are currently no taxi facilities in the Croydon Station Precinct, and the Proposal does not include the provision of any formal taxi facilities.

The Proposal would not have any significant impacts on taxis. However, the direct link to Hennessy Street would improve accessibility to the station from any taxi activity which occurs in the northern station precinct.

## 4.6 Kiss & Ride

The Proposal includes establishing up to three formalised kiss and ride spaces on Paisley Road, where a high level of peak period informal kiss and ride activity is currently occurring. The kiss and ride area would need to be located with consideration for the existing accessible parking space located outside Croydon Medical Practice (8-10 Paisley Road, Croydon).

On-site observations indicated that the existing accessible parking space is generally unoccupied during the AM and PM peak periods and as a result is also used for informal kiss and ride. However, it is understood that the accessible space is well utilised by patients of the Medical Practice across the day, when kiss and ride may also be required. As such, it is recommended that kiss and ride be provided immediately east of the accessible space, which would result in a loss of on-street parking spaces (two of which have only recently been provided).

Provision of the kiss and ride spaces to the east of Paisley Lane would encourage vehicles to use Paisley Road and Paisley Lane as a one-way loop (i.e. egress via Paisley Lane only for all vehicles entering Paisley Road, including customers using commuter parking spaces). This would potentially offer benefits for the overall operation of Paisley Road and in particular pedestrian-

vehicle interactions, resulting from a reduction in the number of mid-block U-turn manoeuvres currently occurring on Paisley Road, particularly during periods of high pedestrian activity. This could be further supported by implementation of formal restrictions including one-way signage and traffic calming measures, with the potential to reduce the carriageway width and widen footpaths.

Alternatively, a reversed one-way loop could be implemented, with vehicles using Paisley Lane northbound to access Paisley Road from Thomas Street. This could improve the conflict point observed at the intersection of Paisley Road with Edwin Street (south), where vehicles need to make three-point turns to access the set-down/ pick-up areas adjacent to the Montessori Academy. With such an arrangement, a kiss and ride facility could be provided along the northern side of Paisley Road adjacent to the railway corridor, reducing the need for pedestrians to cross Paisley Road. However, the local and regional road network impacts for this potential reversal of Paisley Lane one-way flow direction would need to be further assessed.

## 4.7 Traffic Generation

Given that the proposed station upgrade provides a higher level of station accessibility and usability at Croydon Station, the improved commuter experience and upgraded facilities are likely to attract greater commuter use. As a result, traffic activity is anticipated to marginally increase, albeit with a negligible impact on the surrounding road network. It is anticipated that the most critical impact would be along Paisley Road, with kiss and ride activity anticipated to increase in-line with growth in future patronage demand.

As discussed, it is recommended that further consideration be given to vehicle circulation and access to Paisley Road, as well as the pedestrian interactions and connections.

## 4.8 Car Parking Demand

The Proposal is not expected to increase the level of car parking demand. However, it is noted that the proposed improvements would reduce the amount of kerbside parking along Paisley Road.

Overall, the positive impacts arising from improved accessibility and upgraded facilities at Croydon Station would outweigh the potential negative impacts of a slight reduction in the number of time-restricted car parking spaces in the precinct.

The Proposal includes minor changes to car parking, including provision of two 90-degree angled accessible spaces on Paisley Road, resulting in the loss of three existing short stay spaces. It is noted that these existing spaces are used heavily during the AM and PM peak periods, particularly for school set-down/ pick-up. However, it is anticipated that any school set-down/ pick-up activity could be replaced outside the associated schools, with potential safety benefits.

As discussed, establishing a formal kiss and ride facility on Paisley Road would also result in a loss of on-street parking. Notwithstanding this, it is anticipated that any loss of unrestricted parking could be supported by the broader road network, with commuters observed to park within the surrounding residential streets.

The proposed car parking modifications would be designed in accordance with Australian Standard 2890.1:2004 (Parking Facilities, Part 1: Off-Street Parking), Australian Standard 2890.5:1993 (Parking Facilities, Part 5: On-Street Parking) and Australian Standard AS 2890.6:2009, (Parking Facilities, Part 6: Off-Street Parking for People with Disabilities) and Council Standards, as applicable.



## 4.9 Property Access

The Proposal is not expected to have any impact on existing access to properties in the vicinity of the station. Provision of any formalised kiss and ride on Paisley Road should be signposted and should not include any driveways.

It is anticipated that the provision of a formalised kiss and ride facility would minimise the number of people using existing property accesses along Paisley Road to set-down/ pick-up passengers and turn around.

## 4.10 Road Safety

The Proposal includes upgrades and improvements to the existing pedestrian access to Croydon Station (generating safety benefits as a result of additional pedestrian capacity and separation), with minor improvements anticipated for the interaction between vehicles and pedestrians in Paisley Road. However, as discussed above, it is recommended that further consideration be given to improvements in Paisley Road, to improve road user interactions and road safety.

In addition, safety improvements at the intersection of The Strand, Hennessy Street, Young Street and Meta Street should be considered (noting the existing Young Street pedestrian crossing safety issue), including the potential for traffic signals to improve traffic flows and road user safety.

## 5. Impacts during Construction

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### 5.1 Construction Activities

#### 5.1.1 Construction Works

The key construction activities for the Croydon Station Easy Access Upgrade can be summarised as follows:

- construction of a temporary footbridge towards the east end of the station platforms, accessed via temporary stairs from Paisley Road
- construction of a temporary booking office on Paisley Road
- demolition of existing footbridge and construction of new footbridge at the same location, including a new link to Hennessy Street and provision of lifts to all platforms
- construction of new transport interchange facilities on Paisley Road, including new layout of car parking spaces, bicycle parking and kiss and ride facilities
- demolition of the temporary facilities, including the footbridge, booking office and access stairs.

#### 5.1.2 Construction Hours

Construction works at Croydon Station are likely to be restricted to the standard hours of construction as follows (with the exception of works required to be undertaken during weekend track possessions):

- Monday-Friday 7:00am-6:00pm
- Saturday 8:00am-1:00pm.

No work would generally be undertaken on Sundays and/ or public holidays without prior approval from TfNSW. Should construction activities need to be undertaken outside these hours, advanced notification would typically need to be given to surrounding residents and businesses using standard TfNSW communications procedures. It is anticipated that there would be up to 7 or 8 weekend track possessions per year, with an anticipated construction period of 2 years commencing late 2015.

On this basis, there is expected to be negligible impacts associated with works undertaken outside these standard hours, including weekend works.

### 5.2 Construction Vehicle Routes

The surrounding road network is well established and would provide direct access to/ from the site. Figure 5.1 illustrates the likely access routes to be used by construction vehicles to access the Croydon Station construction site, as well as to the existing railway corridor access points on Paisley Road and on Hennessy Street. These link to the wider regional approved Restricted Access Vehicle Routes as identified by Roads and Maritime Services (RMS), including:

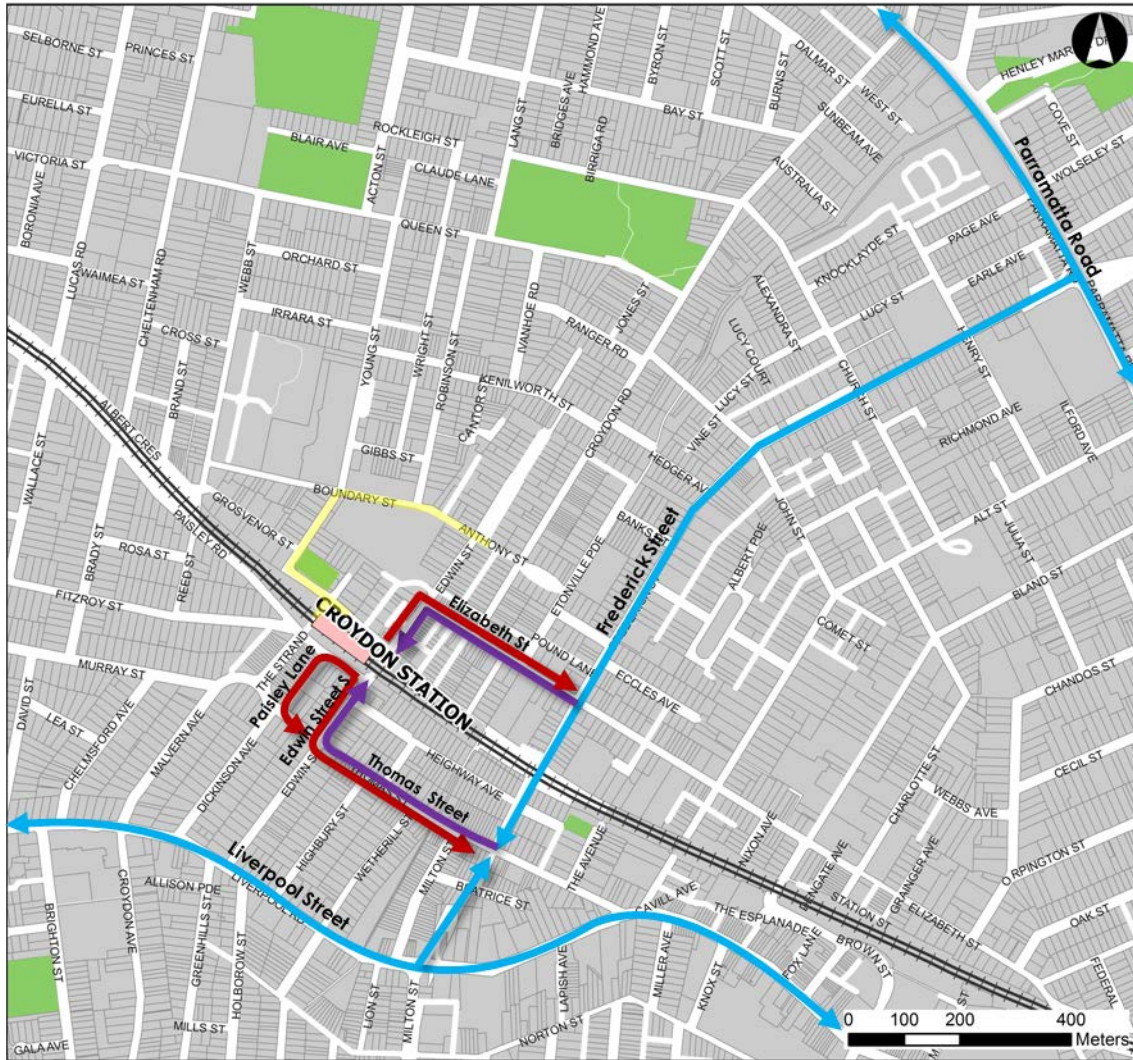
- Parramatta Road
- Liverpool Road/Hume Highway
- Frederick Street.

Locally, the main construction access route for the project would be via Thomas Street and Edwin Street (south) to link with Paisley Road, and via Edwin Street (north) and Elizabeth Street to link

with Frederick Street. Smaller construction vehicles could egress the site via Paisley Lane, to access Thomas Street and onto Frederick Street.

The affected routes surrounding the station precinct may include traffic closures from time to time, including during some weekend possessions for activities such as lifting materials/ delivery of components and placement of concrete.

Figure 5.1: Construction Vehicle Routes



- Key**
- RMS Approved B-Double Routes (approach/ departure)
  - Approach Route
  - Departure Route
  - School Zone
  - Station

## 5.3 Pedestrian Impacts

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

- longer walk distances as a result of the location of the temporary footbridge and access stairs during construction
- potential higher levels of platform congestion arising from narrower spaces with portions of the platform temporarily fenced off as construction areas (e.g. under existing footbridge)
- higher road safety risk levels associated with construction vehicle-pedestrian interaction, particularly on Paisley Road and Hennessy Street.

These impacts are considered to be manageable, with the Construction Environmental Management Plan to be prepared by the contractor outlining how the safety issues would be addressed.

## 5.4 Traffic Impacts

Traffic generated by construction activities includes construction worker light vehicles (including utility vans), as well as heavy vehicles for periodic delivery and removal of materials (including conduits, utility poles, and extraction of spoil material) and construction plant and equipment. Vehicle types and sizes would vary depending on the required use, but typically include medium and large rigid vehicles and articulated vehicles for import of bulk materials or spoil removal, as well as concrete trucks. The amount of fill material or spoil would be minor due to the limited extent of excavation required for the Proposal.

Specific oversize vehicles may be required for precast elements such as pedestrian footbridge spans and pre-fabricated sections/ structures. Specific permits would be required for such vehicles and therefore addressed separately.

The traffic generated by construction activities is unknown at this stage. However, while the overall traffic impacts arising from the Proposal during construction are expected to be manageable and have minimal impacts on existing traffic conditions, construction site access via Paisley Road would have the potential for moderate impacts to two sensitive land uses at the southern side of the station precinct, in particular:

- Montessori Academy at 57 Edwin Street (south), Croydon
- Croydon Medical Practice and Croydon Dental (8–10 Paisley Road, Croydon).

The impacts would be more pronounced during the busy peak school drop-off and pick-up times for the Montessori Academy. More detailed Construction Traffic Management Plans (CTMPs), as part of a broader Construction Environmental Management Plan, would need to be prepared by the contractor to identify alternative drop-off, pick-up and parking areas and spaces for Montessori Academy when existing spaces are fenced off during construction. Where possible, construction vehicle activity in the vicinity of the Montessori Academy would preferably be undertaken outside School Zone hours.

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.

While no known specific restrictions would limit access and/ or the work hours as specified, the CTMPs also need to outline how construction traffic, including traffic associated with works on weekends, would be managed. In particular, potential weekend road closures relating to track possessions need to be identified in the CTMPs and suitable alternative access routes provided, in consultation with RMS and the relevant Councils.

## 5.5 Parking Impacts

Given that parking is generally in high demand in the local area, construction workers would be encouraged to car pool and/or make use of the available public transport for travel to and from the station and the work sites.

Prior notice should be provided if a temporary loss to existing public car parking is required during the construction activity.

The construction stage would have moderate localised impacts to parking, but likely limited to the Paisley Road car parking spaces only. The construction activities are anticipated to have only minor or negligible impacts beyond this section of Paisley Road.

## 5.6 Other Transport Impacts

Construction activities would not typically present significant impacts on the surrounding area and users. This includes rail operations and general traffic. Construction works in the vicinity of any pedestrian and cyclist desire lines would need to be managed and controlled at all times to ensure that there is no impact to public safety.

A temporary footbridge and stairs, including lighting and CCTV and other station facilities would be provided to ensure pedestrian access to all of the platforms is accommodated via Paisley Road. The existing pedestrian level of service would be maintained throughout construction under this scenario.

Access to all properties surrounding the stations would be maintained, with negligible traffic impact on surrounding properties expected during construction.

## 5.7 Worker Induction

All workers and subcontractors engaged on-site would be required to undergo a site induction. The induction should include permitted access routes to and from the construction site for all vehicles, as well as standard environmental, WHS, driver protocols and emergency procedures.

Any workers required to undertake works or traffic control within the public domain would be suitably trained and covered by adequate and appropriate insurances. All traffic control personnel would be required to hold RMS accreditation in accordance with Section 8 of Traffic Control at Work Sites.

## 5.8 Recommended Mitigation Measures

Notwithstanding the limited impacts of construction on traffic operation of the surrounding network, a Traffic Control Plan (TCP) would likely need to be prepared and submitted to the RMS and/ or Council to appropriately manage the use of the designated construction routes and site interfaces.

As part of implementation of the TCP, standard signage warning approaching vehicles of the construction activity and heavy vehicle movements should be installed. This should include static signage to be in-place in advance of the works. Other possible mitigation measures to minimise traffic impacts during construction of the station upgrade 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.
- Use of traffic controllers to negotiate pedestrian and construction vehicle priority and access, if required.

The TCP should also outline how potential construction vehicle manoeuvres could be accommodated in and out of the construction sites. In addition, swept path analysis should be conducted to ensure that the largest required vehicle can turn in and out of the work sites.

## 5.9 Construction Traffic Management

Construction Traffic Management Plans for each construction stage would be need to be prepared and submitted as required to RMS and the relevant Councils. The plan should include a description of:

- final construction traffic approach and departure routes
- locations of access to and from the local road network
- road closures and alternative routes
- details of construction signage and traffic controllers.

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