

# Project update

JANUARY 2017





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Cover: Sydney's new metro train

This page: Track laying has started at the Sydney Metro Trains Facility at Rouse Hill, November 2016

## Premier's message



Welcome to Sydney Metro – Australia's largest public transport project.

We're already more than half way through delivering Stage 1 of this world-class infrastructure project

– the 36 kilometre Sydney Metro Northwest, formerly known as the North West Rail Link.

Services will start in the first half of 2019 with a metro train every four minutes in the peak.

And now we're full steam ahead with Stage 2, the 30 kilometre Sydney Metro City & Southwest.

We're extending metro rail from the end of Sydney Metro Northwest at Chatswood, under Sydney Harbour, through new underground stations in the CBD and west to Bankstown.

Services are expected to start in 2024, with the capacity to run a metro train every two minutes each way under the centre of Sydney.

Sydney Metro, together with signalling and infrastructure upgrades across the existing Sydney rail network, will deliver around 200 trains an hour into the Sydney CBD from all across Sydney in the busy morning peak – that's 60 per cent more than now.

This massive capacity growth – enough room for an extra 100,000 customers an hour – can only be achieved by delivering this new metro rail system to work together with the existing suburban rail network.

So welcome aboard Sydney's brand new railway system, delivering a level of customer service and safety never before seen in Australia.

**Mike Baird MP**  
PREMIER OF NEW SOUTH WALES  
AND MINISTER FOR WESTERN SYDNEY

## Minister's message



Fifteen trains an hour. That's one train every four minutes in the peak. And that's just for starters.

The new Sydney Metro railway network is being delivered for Sydney's

future – and will grow with our global city for generations to come.

Sydney Metro is Australia's first fully-automated metro railway and will help deliver more trains and faster services across all of Sydney.

With a new generation of fast, safe and reliable trains, Sydney Metro customers won't need a timetable – they'll just turn up and go.

Australian-first technology like platform screen doors will deliver world-class levels of reliability and customer safety – these doors keep people and objects away from the edge of platforms, allowing trains to get in and out of stations faster.

Sydney Metro trains will run at 98 per cent on-time running – this high level of reliability has been written into the operating contract.

Fares will be set the same as the rest of the Sydney train network and customers will be able to use their Opal card.

As we get closer to the first services starting, this Project Overview outlines the benefits of this world-class railway network.

**Andrew Constance MP**  
MINISTER FOR TRANSPORT  
AND INFRASTRUCTURE

# SYDNEY METRO

Sydney Metro is Australia's biggest public transport project.

This new standalone railway will deliver 31 metro stations and 66 kilometres of new metro rail, revolutionising the way Australia's biggest city travels.

Metro means a new generation of world-class fast, safe and reliable trains easily connecting customers to where they want to go. When services start in the first half of 2019, customers won't need timetables – they'll just turn up and go with a train every four minutes in the peak.

Technology will keep customers connected at all stages of their journey, including:

- ▶ planning at home using smart phone travel apps
- ▶ real time journey information at metro stations and on board trains, and
- ▶ accessing information and other public transport to help get to their final destination after they leave the train.

This approach will help customers achieve their daily tasks, whether it's getting to work, meetings, school or education, sport, a day out or running errands and of course, getting home.

## Connecting Sydney

When Sydney Metro is extended into the central business district (CBD) and beyond in 2024, metro rail will run from Sydney's booming North West region under Sydney Harbour, through new underground stations in the CBD and beyond to the south west.

There will be ultimate capacity for a metro train every two minutes in each direction under the city, a level of service never before seen in Sydney. Sydney's new metro railway will have a target capacity of about 40,000 customers per hour, similar to other metro systems worldwide. Sydney's current suburban system can reliably carry 24,000 people an hour per line.

Sydney Metro, together with signalling and infrastructure upgrades across the existing Sydney rail network, will increase the capacity of train services entering the Sydney CBD – from about 120 an hour today to up to 200 services beyond 2024. That's an increase of up to 60 per cent capacity across the network to meet demand.

### STAGE 1

#### SYDNEY METRO NORTHWEST

Formerly the 36 kilometre North West Rail Link, this \$8.3 billion project opens in the first half of 2019 with a metro train every four minutes in the peak. It includes eight new metro stations, five upgraded stations and 4,000 commuter car spaces.

### STAGE 2

#### SYDNEY METRO CITY & SOUTHWEST

A 30 kilometre extension of metro rail from the end of Sydney Metro Northwest at Chatswood under Sydney Harbour, through new CBD stations and south west to Bankstown. It is due to open in 2024 with seven new metro stations and 11 upgraded stations.



Sydney Metro alignment

## Key benefits

Metro delivers improved connectivity across multiple levels:

- ▶ moving more people faster than ever before
- ▶ fast and easy to change to trains, buses, ferries and light rail
- ▶ making it much easier to move around a growing city
- ▶ making a big city better connected
- ▶ aligning and integrating with other city-building transport projects
- ▶ opening up options for work, education, health care and much more
- ▶ taking the guesswork out of travel – no need to plan, just turn up and go.

# SYDNEY METRO NORTHWEST



Sydney Metro Northwest prototype station

The \$8.3 billion Sydney Metro Northwest project is currently under construction and on track to open to customers in the first half of 2019.









## Sydney Metro Northwest is delivering eight new railway stations at:

- ▶ Cherrybrook
- ▶ Castle Hill
- ▶ Showground
- ▶ Norwest
- ▶ Bella Vista
- ▶ Kellyville
- ▶ Rouse Hill
- ▶ Cudgegong Road.

Five existing stations between Epping and Chatswood will be upgraded to metro standards.

Sydney Metro Northwest will deliver, for the first time, a reliable public transport service to a region which has the highest car ownership levels per household in NSW. Over the coming decades, an extra 200,000 people will move into Sydney's North West, taking its population above 600,000, or twice the size of Canberra.

### Project features

-  A train at least every **4 minutes** in the peak
-  **4000** commuter car parking spaces
-  **8 new** railway stations
-  **5 existing** railway stations **upgraded**
-  **36km** total project length
-  **23km** of new metro line
-  **15km** twin tunnels
-  **4km** elevated skytrain

# SYDNEY METRO CITY & SOUTHWEST



Artist's impression of Martin Place Station

Sydney Metro City & Southwest has two components:

**Chatswood to Sydenham** – new 15 kilometre twin tunnels from Chatswood, under Sydney Harbour through Sydney's CBD to Sydenham.








**Sydenham to Bankstown upgrade** – upgrade and conversion of the existing 13.5 kilometre railway from Sydenham Station to Bankstown Station to metro standards, including 11 existing stations upgraded.

Stage 2 of Sydney Metro will extend metro rail from Sydney's booming North West region, beneath Sydney Harbour, through new underground CBD stations and beyond to Bankstown.

## The project will deliver seven new metro stations, at:

- ▶ Crows Nest
- ▶ Victoria Cross (North Sydney)
- ▶ Barangaroo
- ▶ Martin Place
- ▶ Pitt Street
- ▶ Central Station (new underground platforms)
- ▶ Waterloo.

### Project features

-  **16km** of new metro line between Chatswood and Sydenham
-  **Convenient interchanges** with other forms of transport including Sydney Trains, NSW Trains, light rail, buses and ferries
-  **7 new** railway stations
-  All stations will **meet the needs** of pedestrians, cyclists, customers catching or getting buses and taxis, and people being dropped off and picked up in cars
-  **15km** twin tunnels
-  There will be platform screen doors and all stations will be **fully accessible**
-  New stations are designed for passenger comfort including **environmentally friendly** features like natural ventilation and natural lighting

# TOMORROW'S SYDNEY

Sydney is truly one of the greatest cities in the world and home to Australia's strongest economy.

Our population is set to grow by another million people over the next 10 years. To support this population growth and our booming economy the NSW government is turbocharging infrastructure development across Sydney.

The NSW Government is delivering projects to reduce traffic congestion, improve public

transport networks, provide better health care and create sustainable public spaces.

Visit [mysydney.nsw.gov.au](http://mysydney.nsw.gov.au) regularly to find out more about the projects being delivered and progress being made, as well as useful advice on how to move in and around the CBD.

# SYDNEY'S RAIL FUTURE

## What is Sydney's Rail Future?

*Sydney's Rail Future* is a long-term plan to increase the capacity of Sydney's rail network through investment in new services and upgrading of existing infrastructure. It's a five-stage program to meet the challenges of a growing population and the needs of customers in the future. The plan aims to modernise and transform Sydney's rail network.

The plan was released in 2012 and identified Sydney Metro Northwest (formerly the North West Rail Link) as Stage 1 of Sydney's new metro network.

In 2014, the extension of the project through the city and out to Bankstown was confirmed as Stage 2: Sydney Metro City & Southwest.

*Sydney's Rail Future* forms part of the *NSW Long Term Transport Master Plan*.

For more information about *Sydney's Rail Future* and the metro network go to [www.sydneymetro.info/sydney-rail-future](http://www.sydneymetro.info/sydney-rail-future)



Artist's impression of Bella Vista Station



## A new railway for Western Sydney

The NSW Government has announced a new underground metro railway line will be built between Parramatta and the Sydney CBD to help cater for Sydney's growth.

Sydney Metro West will provide a direct connection between the CBDs of Parramatta and Sydney, linking communities not previously serviced by rail as well as supporting growth between the two major CBDs.

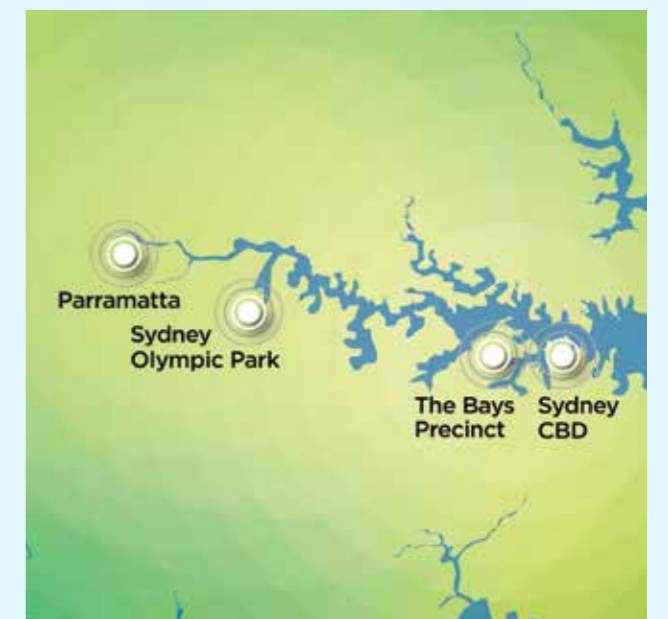
This state-of-the-art railway helps address Sydney's rapid growth, with the city's population set to increase above six million in the next 20 years.

Sydney Metro West will integrate with long-term transport planning for Western Sydney including rail needs currently being investigated around the future Western Sydney Airport.

The new railway is expected to be built largely underground and operational in the second half of the 2020s.

The NSW Government will work with industry, the community, businesses and local stakeholders like councils along the route to get feedback on potential station locations and the best outcomes to serve Sydney for the next century and beyond.

Transport for NSW will begin engaging with community, industry and key stakeholders in early 2017 to get feedback on the project.





Tunnelling finished on 14 January 2016 with TBM2 Florence's break-through at Cherrybrook

# Sydney's new train

## KEY FACTS



**Stage 1 Northwest**  
Opens 2019



**Stage 2 City & Southwest**  
Opens 2024



**66 kilometres**  
New metro rail for Sydney



**31 metro stations**  
State-of-the-art, fully accessible



**98%**  
On-time Running reliability



**In peak**  
Train every four minutes



**Off peak**  
Train every ten minutes



**Connected**  
Continuous mobile phone coverage through network



**No timetable**  
Customers will just turn up and go



**Opal ticketing**

## TRAIN FEATURES

Three double doors per carriage for faster loading and unloading  
Level access between platform and train

170 metres long platforms - longer than most of Sydney

Heating and air conditioning

Customer service assistants at every station and moving through the network during the day and night

Two multi-purpose areas per train for prams, luggage and bicycles

Wheelchair spaces, separate priority seating and emergency intercoms

Real-time travel information and live electronic route maps

Platform screen doors keep people and objects away from the edge and allow trains to get in and out of stations much faster

Inside you can see from one end of the train to the other

## SAFETY

**Sydney Metro is Australia's first fully-automated metro rail network**

Around the world, millions of people use these networks every day in cities like Paris, Singapore, Dubai and Hong Kong

An example of a metro operations control centre

**Constant monitoring**  
Expert train controllers monitor entire metro system

**Operations Control Centre**  
State-of-the-art network controlled from new high-tech facility at Tallawong Road

**Security**  
More than 230 tunnel cameras on Sydney Metro Northwest alone

**Signalling and communications systems**  
Control the trains, tunnels, platforms and skytrain to deliver a safe and reliable journey

**Faster journeys**  
System minimises the time trains are stopped at stations and the time between each train

## STATIONS OVERVIEW

Customers are at the centre of everything we do at Transport for NSW and Sydney Metro's stations are being designed to be an easy part of daily journeys.

State-of-the-art technology will keep customers connected - from planning a journey at home using smart phone travel apps to real-time information at metro stations and on board trains.

The modern stations will be fully accessible for people with a disability, prams and children, including level access between platforms and trains. Metro stations are designed to provide safe and efficient interchange between transport modes, giving priority to pedestrians.

Platform screen doors keep people and objects away from the edge, improving customer safety and allowing trains to get in and out of stations

much faster. These doors run the full length of the platforms and only open at the same time as the train doors.

Customer service assistants will be at every station and will also move through the Sydney Metro network during the day and night.

All stations are designed to reflect the character of local areas they serve, and where possible, include environmentally friendly features such as solar panels, natural light and ventilation.



Sydney Metro Northwest prototype station

## SYDNEY METRO NORTHWEST

### Cudgegong Road Station



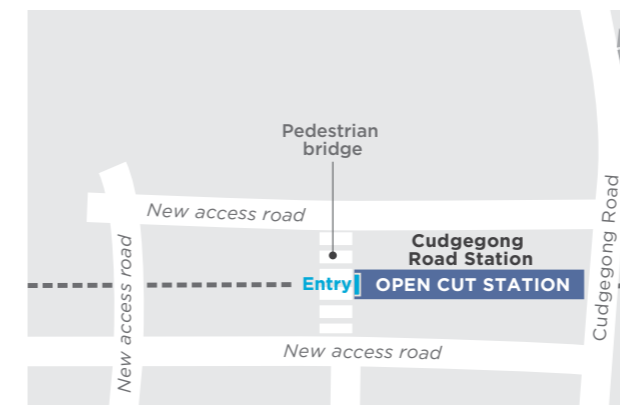
Artist's impression of Cudgegong Road Station

In the heart of the North West Growth Centre, the new Cudgegong Road Station will become the transport hub for booming residential growth at places like The Ponds and western parts of Rouse Hill. This station serves local shops and commercial activities.

It is an open cut station - that is, open to the sky, but about six metres below street level. A canopy will cover part of the platform for shade.

#### The station includes:

- ▶ **two new internal access roads** between Tallawong Road and Cudgegong Road, providing access to the station and car park areas
- ▶ construction of a **road overbridge** midway between Tallawong Road and Cudgegong Road linking the access roads
- ▶ **new traffic lights** off Cudgegong Road and Tallawong Road
- ▶ **pedestrian bridge** across the rail line
- ▶ **weather protected** kiss and ride, bus and taxi areas
- ▶ **station access and entry** via a new access road on the northern side of the station, between Cudgegong Road and Tallawong Road.



Note: All station location maps are indicative only

- P** **Parking**  
1000 commuter spaces
- B** **Buses**  
6 spaces
- K** **Kiss and ride**  
15 spaces
- T** **Taxi**  
9 spaces
- B** **Bicycles**  
Parking and storage for 45 bicycles



# SYDNEY METRO NORTHWEST

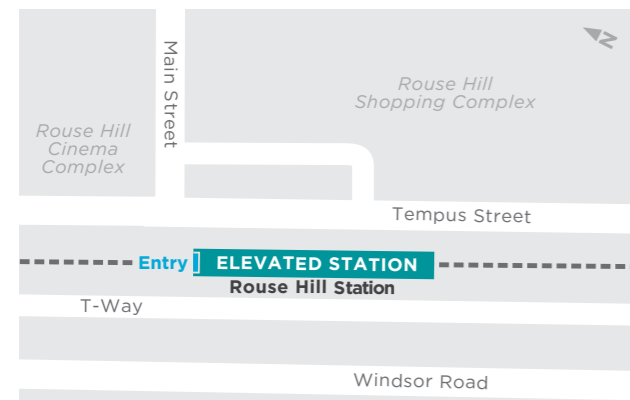
## Rouse Hill Station



Artist's impression of Rouse Hill Station





The new Rouse Hill Station will service the growing retail and entertainment precinct of this area. Rouse Hill has a long-term employment target of 12,000 jobs by 2036. As such, the station will serve as a major public transport interchange and the T-way will be modified to accommodate the station above it. Recent residential development lies to the south of the station.

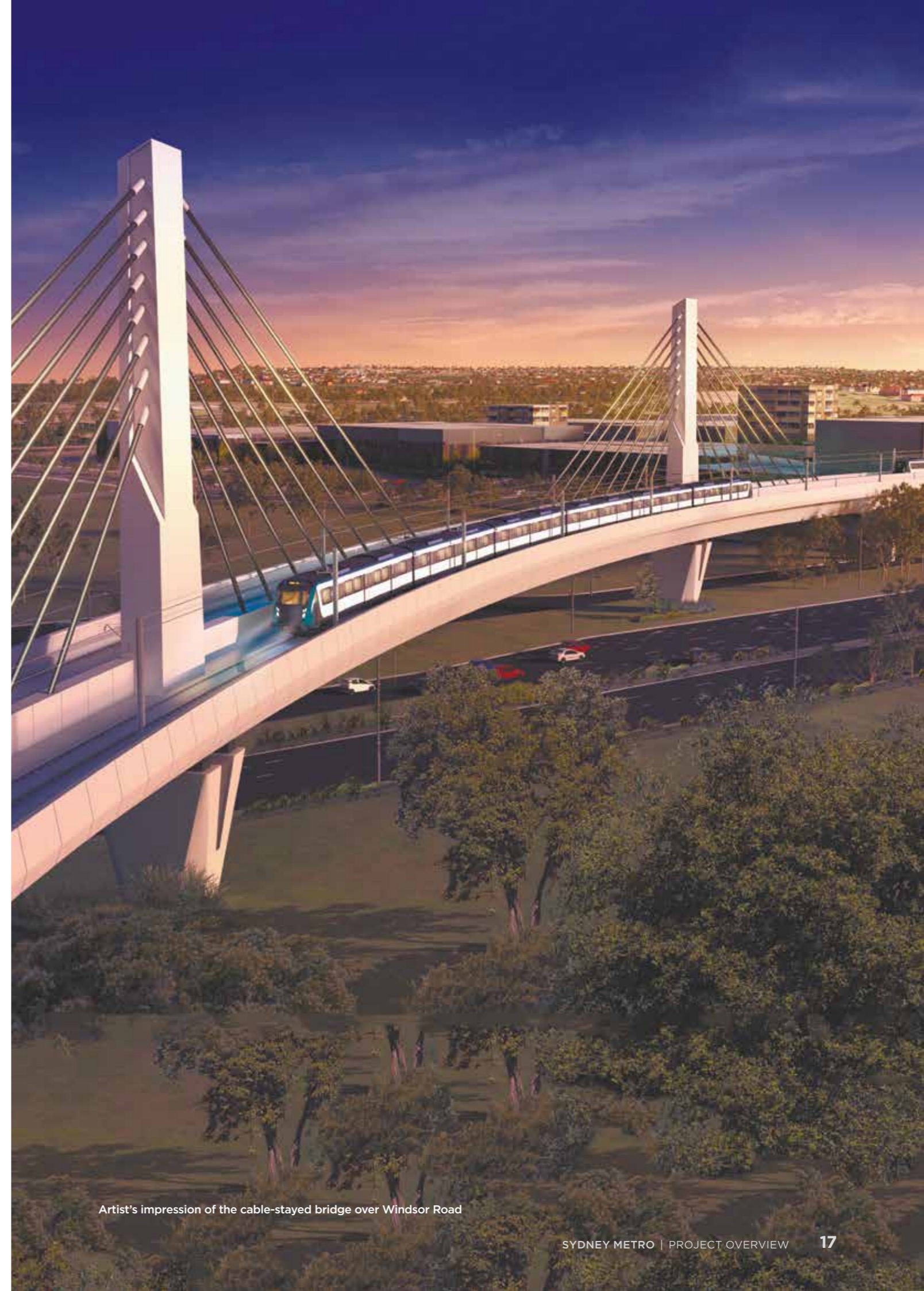
Rouse Hill Station is about 12 metres above ground as one of the two stations on the elevated skytrain route (Kellyville Station is the other).



### The station includes:

- ▶ **upgrade** and modification of the surrounding roads and footpaths
- ▶ **reinstatement of traffic lights** at the corner of Rouse Hill Drive and White Hart Drive
- ▶ **reconfiguration** of the bus interchange
- ▶ **T-way** and road layout reconfiguration
- ▶ **footpath upgrades** along Tempus Street and Windsor Road
- ▶ **pedestrian crossings** on Tempus Street, Main Street and on the T-way
- ▶ **station access and entry** via Tempus Street adjacent to Rouse Hill Town Centre forecourt.

-  **Buses**  
2 spaces
-  **Kiss and ride**  
25 spaces
-  **Taxi**  
6 spaces
-  **Bicycles**  
Parking and storage for 40 bicycles



Artist's impression of the cable-stayed bridge over Windsor Road

# SYDNEY METRO NORTHWEST

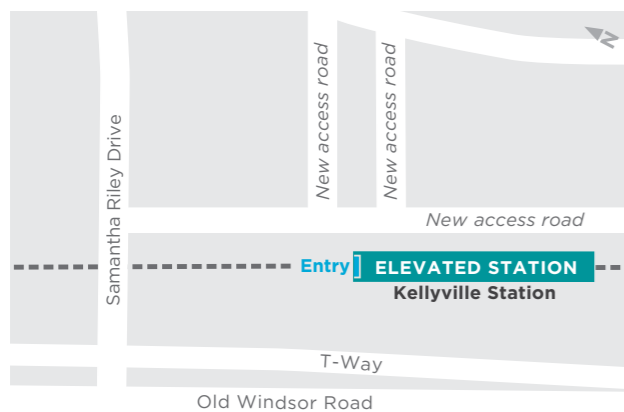
## Kellyville Station



Artist's impression of Kellyville Station

Kellyville Station will work together with the adjacent T-way to service the public transport needs of this growing residential area. The station will provide rail access and a public transport interchange for people living at Kellyville, Beaumont Hills and Stanhope Gardens, and will have the biggest commuter car park of all the metro stations.

Kellyville Station is being built about 13 metres above ground as one of the two stations on the elevated skytrain route (Rouse Hill Station is the other).



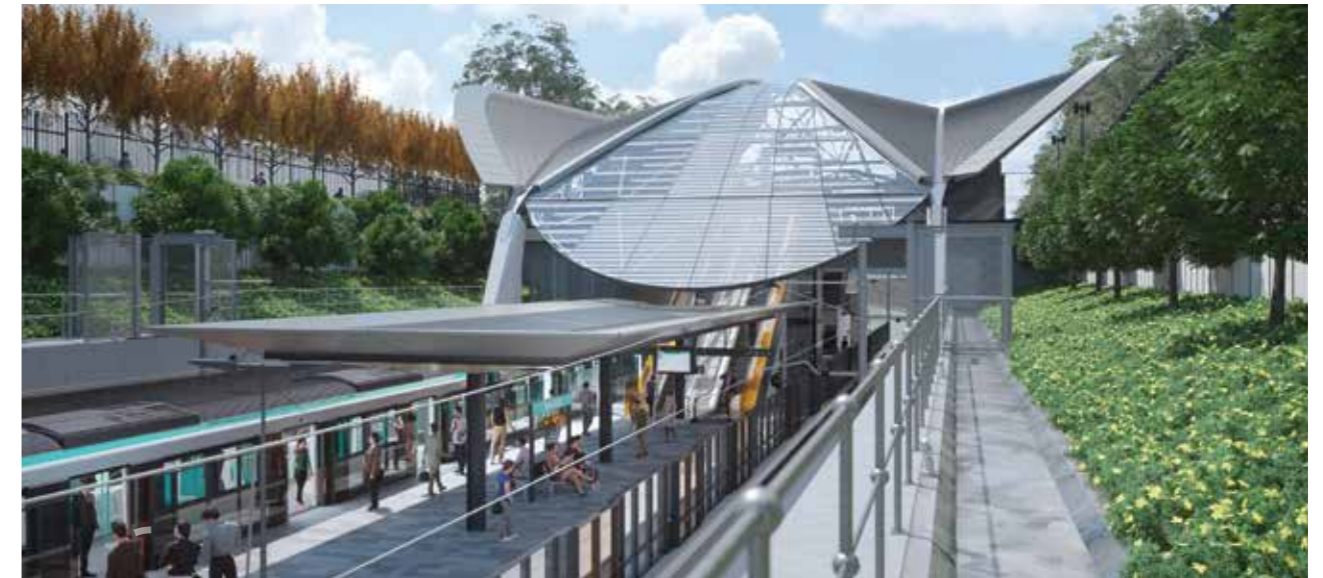
### The station includes:

- ▶ building **new access roads** and modifying and upgrading parts of surrounding roads and footpaths
- ▶ Samantha Riley Drive being **widened** to accommodate additional turning lanes
- ▶ **removal of the roundabout** on Samantha Riley Drive
- ▶ **new traffic lights** at Samantha Riley Drive
- ▶ **a new pedestrian bridge** across Old Windsor Road and the T-way at the intersection with Samantha Riley Drive and Newbury Avenue
- ▶ **station access and entry** via a new access road off Samantha Riley Drive.

- P** **Parking**  
1200 commuter spaces
- T WAY** **T-way parking**  
160 car spaces
- Buses**  
4 spaces
- Kiss and ride**  
10 spaces
- Taxi**  
4 spaces
- Bicycles**  
Parking and storage for 45 bicycles

# SYDNEY METRO NORTHWEST

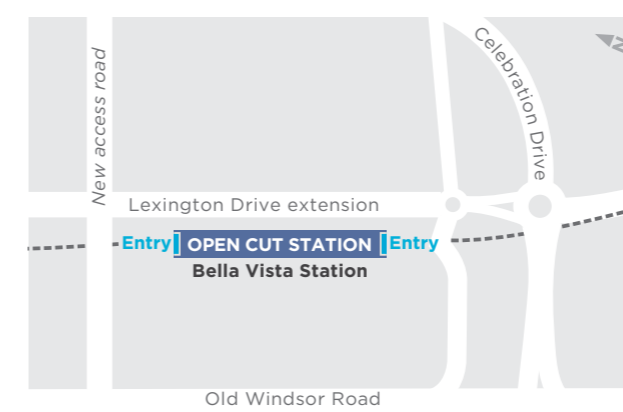
## Bella Vista Station



Artist's impression of Bella Vista Station

Bella Vista Station is one of two stations added to the project in 2011 following detailed community feedback. The station will serve the booming Norwest Business Park – one of Sydney's largest – as well as local residential areas of Bella Vista. A large area of residential development is located to the east of the station, with the business park to the south.

Bella Vista Station is located in a cutting, open to the sky, but six metres below ground level. A canopy will cover part of the platform for shade.



### The station includes:

- ▶ **safe and easy access** for pedestrians
- ▶ **retail space** at station entries
- ▶ local **bus access** from existing T-way
- ▶ **new traffic lights** at Lexington Drive and Celebration Drive
- ▶ a **pedestrian bridge** across Old Windsor Road
- ▶ extension of Celebration Drive to link with **new local access roads**
- ▶ **footpath** upgrades
- ▶ **station access and entry:** The main entrance from Norwest Business Park is via a pedestrian plaza facing the new Lexington Drive extension, off Celebration Drive. A second western entrance is via the future carpark and local shops.

- P** **Parking**  
800 commuter spaces
- Buses**  
6 spaces
- Kiss and ride**  
16 spaces
- Taxi**  
4 spaces
- Bicycles**  
Parking and storage for 30 bicycles



Bella Vista Station construction, November 2016

# SYDNEY METRO NORTHWEST

## Norwest Station



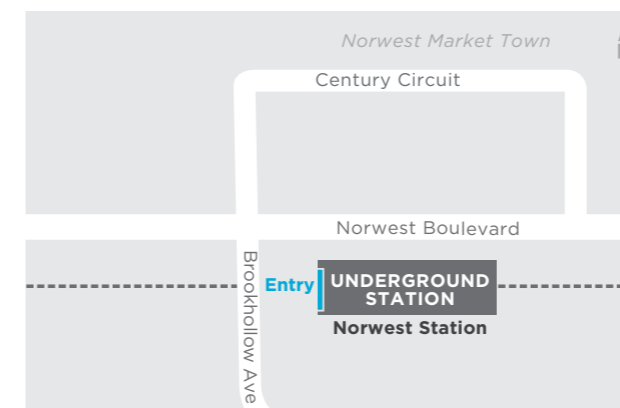
Artist's impression of Norwest Station





Located in the heart of the Norwest Business Park, this station will serve one of Sydney's biggest employment precincts. In addition to this major employment centre, it will also serve a large area of recent residential development to the south of the station.

Norwest Station is an underground station, about 22 metres below street level.

### The station includes:

- ▶ construction of **retail space** at station entry
- ▶ **new traffic lights** at the intersection of Norwest Boulevard and Brookhollow Avenue
- ▶ **pedestrian and bicycle upgrades** along Norwest Boulevard and Brookhollow Avenue
- ▶ the area of land to the north east of the station entrance will be **landscaped**, including planting along Norwest Boulevard
- ▶ provision for an **underground connection** to the north-eastern side of Norwest Boulevard
- ▶ **station access and entry** via the corner of Norwest Boulevard and Brookhollow Avenue.



-  **Buses**  
4 spaces
-  **Kiss and ride**  
9 spaces
-  **Taxi**  
9 spaces
-  **Bicycles**  
Parking and storage for 30 bicycles

# SYDNEY METRO NORTHWEST

## Showground Station



Artist's impression of Showground Station

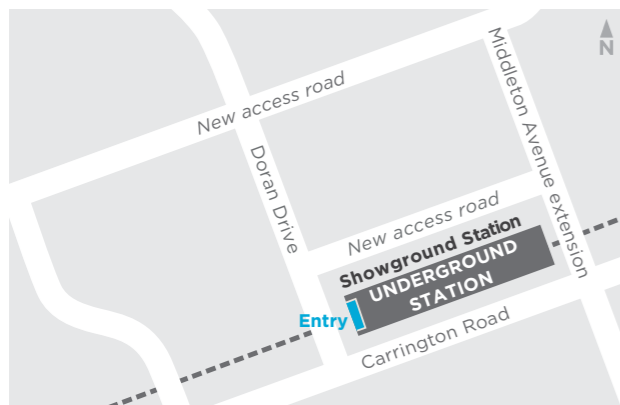
Showground will service the heart of the Castle Hill Showground entertainment and community precinct.

Showground Station will service its namesake as well as providing direct rail access to existing residential development to the north and east and employment areas to the south and west.

This suburban village station is being constructed underground, at a depth of about 20 to 25 metres below street level. Skylights bring daylight to the platform and concourse areas.

### The station includes:

- ▶ construction of **new public plaza** and retail space
- ▶ **new traffic lights** at the intersection of Carrington Road and Doran Drive
- ▶ **new access road** between:
  - Carrington Road and Showground Road, with traffic lights at Showground Road
  - Doran Drive and Middleton Avenue
- ▶ **upgrade and widening** of Doran Drive, to allow for two lanes of traffic
- ▶ **footpath upgrades** along Carrington Road (including towards Castle Hill Industrial Estate) and Doran Drive
- ▶ **pedestrian crossings** on Middleton Avenue, Doran Drive and the new access road
- ▶ **air control units** to provide cool air in the warmer months
- ▶ **station access and entry** via a forecourt at the corner of Carrington Road and Doran Drive.



- P** **Parking**  
500 commuter spaces
- B** **Buses**  
2 spaces
- K** **Kiss and ride**  
5 spaces
- T** **Taxi**  
4 spaces
- B** **Bicycles**  
Parking and storage for 40 bicycles

# SYDNEY METRO NORTHWEST

## Castle Hill Station



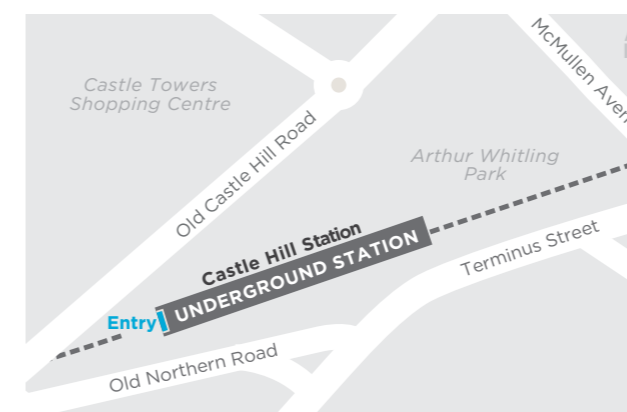
Artist's impression of Castle Hill Station

With Castle Hill expected to support 13,000 jobs by 2036, Castle Hill Station will serve as a major public transport interchange, helping to contribute to the strong growth of the area. It will service one of Australia's largest retail and entertainment precincts.

Castle Hill Station is an underground station, about 25 metres below ground level, located in a major retail and commercial centre.

### The station includes:

- ▶ **retail space** at station entry
- ▶ park **landscaping**
- ▶ **new traffic lights** at Old Northern Road and Terminus Street
- ▶ **modification to the intersection** at Crane Road, Old Northern Road, Castle Hill Road and Castle Street
- ▶ **footpath upgrades** along Old Castle Hill and Old Northern roads
- ▶ **pedestrian crossings** on Old Castle Hill and Old Northern roads
- ▶ **major bus interchange** facilities for buses
- ▶ re-interpretation of **historic elements** from the Arthur Whiting Park
- ▶ **station skylights** integrated as part of the Arthur Whiting Park to provide natural light to the platform and concourse below
- ▶ **station access and entry** via the corner of Norwest Boulevard and Brookhollow Avenue.



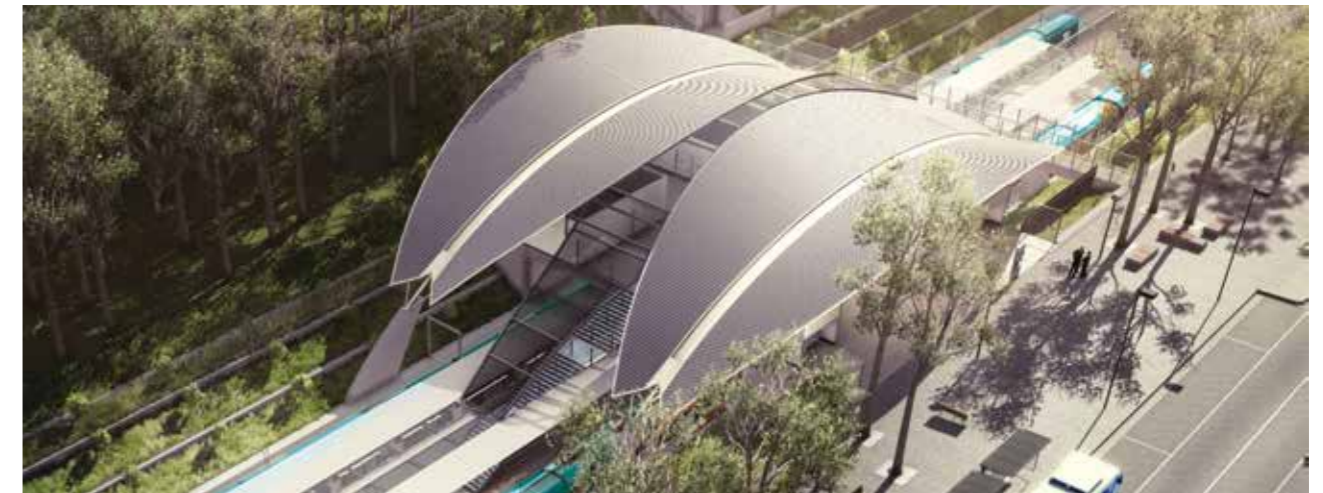
- B** **Buses**  
10 spaces
- K** **Kiss and ride**  
17 spaces
- T** **Taxi**  
9 spaces
- B** **Bicycles**  
Parking and storage for 20 bicycles



View from the crossover cavern to the future Castle Hill Station site, October 2016

# SYDNEY METRO NORTHWEST

## Cherrybrook Station



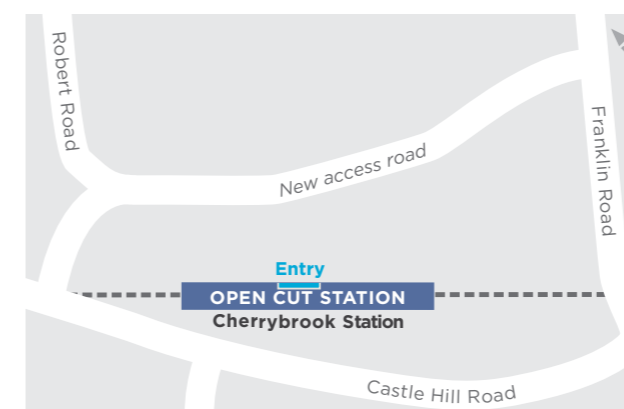
Artist's impression of Cherrybrook Station

Cherrybrook Station will service Cherrybrook, West Pennant Hills and Dural. As an established arterial road, Castle Hill Road provides good links east and west. Cherrybrook is a residential neighbourhood.

Cherrybrook Station is a suburban village station in a cutting, open to the sky, but about seven metres below ground level. A canopy covers part of the platform for shade. The station's location will maximise the use of daylight and natural ventilation.

### The station includes:

- ▶ **retail space** at station entry
- ▶ **new traffic lights** and improved pedestrian safety at Glenhope Road and Castle Hill Road
- ▶ **intersection upgrade** of Franklin and Castle Hill roads to allow left in / left out movements
- ▶ **widening of:**
  - Castle Hill Road on northern side including right-turn bay at Robert Road
  - Franklin Road between Castle Hill Road and Kayla Way
  - Robert Road between Castle Hill Road and the new access road
- ▶ **footpath upgrades** along Castle Hill, Robert and Franklin roads
- ▶ **new intersection** at Robert Road
- ▶ **a new access road** on the northern side of the station
- ▶ **station access and entry** via a new access road off Franklin Road.



- P** **Parking**  
400 commuter spaces
- B** **Buses**  
6 spaces
- K** **Kiss and ride**  
14 spaces
- T** **Taxi**  
4 spaces
- B** **Bicycles**  
Parking and storage for 40 bicycles

# SYDNEY METRO NORTHWEST

## Epping to Chatswood

Sydney Metro Northwest will connect directly with the existing Epping to Chatswood railway to allow the new trains to operate a distance of 36 kilometres between Rouse Hill and Chatswood. While the second underground harbour crossing is being delivered, extending metro rail from Chatswood, customers will need to walk across the platform at Chatswood to change to an existing service.

To convert the existing suburban line to next-generation metro standards, upgrades will be needed, including installing 26 kilometres of new cabling, power and signalling systems and customer improvements such as platform screen doors.

The five existing stations along the line, at Epping, Macquarie University, Macquarie Park, North Ryde and Chatswood, will have screen doors along the full length of the metro platforms to keep people and objects away from the tracks, improving customer safety and allowing trains to get in and out of stations much faster.

From late 2018, buses will replace trains for around seven months between Epping and Chatswood while the line is converted to metro operations. When Sydney's metro services start in the first half of 2019, 15 trains an hour will run in both directions between Epping and Chatswood during the peak - almost four times the number of trains running in the peak direction today.

In peak hours, there will be a train at least every four minutes. On the North Shore Line from Chatswood towards the city, there will be a train every three minutes. The upgrade of the Epping to Chatswood railway is an important part of the \$8.3 billion Sydney Metro Northwest. It's the first step in introducing next generation metro trains to Sydney.

For more information about the temporary transport plan visit [sydneymetro.info](http://sydneymetro.info)



Artist's impression of an underground station at Macquarie Park precinct



TBM3 Isabelle breakthrough at Epping, September 2015

# SYDNEY METRO CITY & SOUTHWEST

## Crows Nest Station



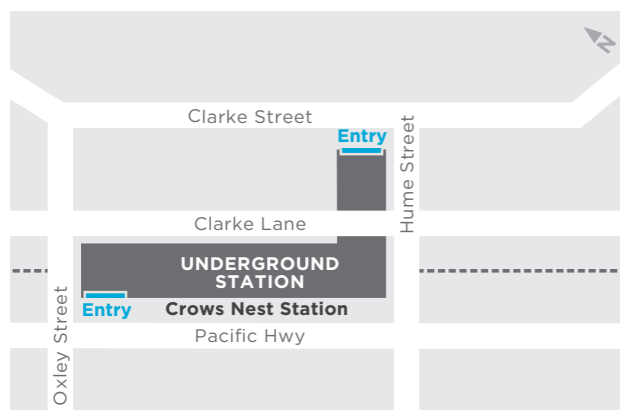
Artist's impression of Crows Nest Station

The station provides new metro rail access to the Crows Nest residential area and serves people within walking and cycling distance. It improves travel to local schools, businesses and Crows Nest village. The station creates a new transport focus on the southern side of the St Leonards specialised centre which supports the St Leonards southern gateway to commercial and mixed-use activities.

Crows Nest station is a single-span (cut-and-cover) cavern with an island platform, 25 metres below ground level. It is located on the western fringe of Crows Nest village.

### The station includes:

- ▶ a **pedestrian crossing with traffic lights** at the Pacific Highway / Oxley Street intersection
- ▶ **pedestrian crossings** on Clarke, Hume and Oxley streets
- ▶ **new bike parking** at both station entries
- ▶ **new kiss and ride and taxi bays** on Clarke Street
- ▶ existing **bus stops** close to the station retained on the Pacific Highway
- ▶ wayfinding **signage** and Sydney Metro information
- ▶ **station access and entry** via the corner of Clarke Street and Hume Street, and the corner of Pacific Highway and Oxley Street.



# SYDNEY METRO CITY & SOUTHWEST

## Victoria Cross Station



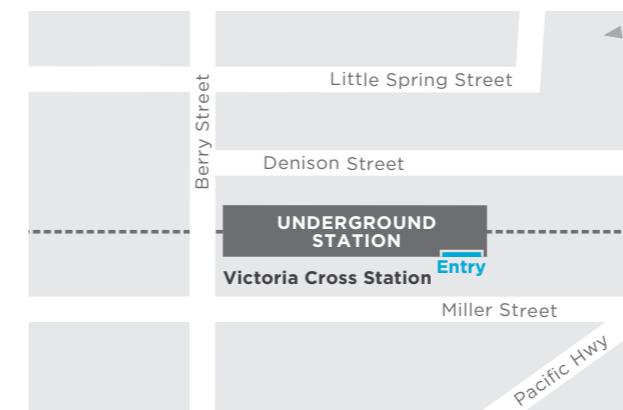
Artist's impression of Victoria Cross Station

A metro station at Victoria Cross supports the continued growth of the North Sydney CBD and enhances Sydney's status as a global city. The station provides new metro rail access to the North Sydney business, education and residential area. It also improves customer experience at the existing North Sydney Station by relieving demand in peak times.

Victoria Cross is built as a single-span (mined) cavern with an island platform 31 metres below ground level.

### The station includes:

- ▶ **new bike parking** near the corner of Miller and Berry streets
- ▶ **new kiss and ride bays** on Berry Street
- ▶ existing **bus stops** close to the station retained on Miller Street
- ▶ wayfinding **signage** and Sydney Metro information within the North Sydney CBD
- ▶ a **traction substation** integrated into the station building (partially underground)
- ▶ a **services building** on Miller Street to the north of the station providing station and tunnel services
- ▶ enhancement of **pedestrian infrastructure** around the station is being investigated further in consultation with Roads and Maritime Services and North Sydney Council
- ▶ **station access and entry** via the pedestrian plaza opening to Miller, Denison and Berry streets.



# SYDNEY METRO CITY & SOUTHWEST

## Barangaroo Station



Artist's impression of Barangaroo Station

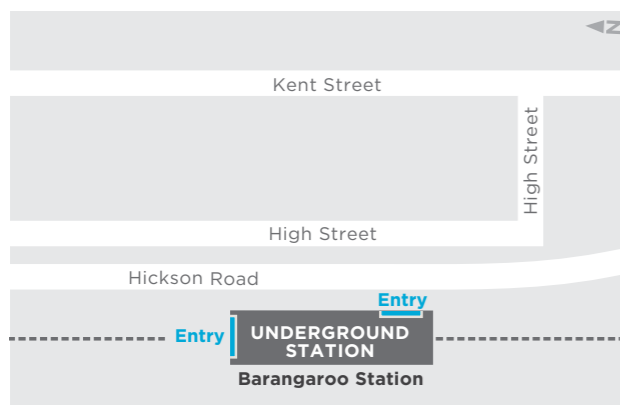
Barangaroo Station improves access to the Walsh Bay Arts and Culture precinct as well as providing easy access to the development's public, residential, commercial and entertainment areas and the new ferry hub. It services the residential areas at Millers Point, Walsh Bay and future residents of Barangaroo, providing high quality public transport access to the latest destination in Sydney.

It also improves pedestrian connections to the northern part of the Sydney CBD and The Rocks, and alleviates congestion at Wynyard and Martin Place stations.

Transport for NSW is working in consultation with Barangaroo Delivery Authority to deliver Barangaroo Station.

### The station includes:

- ▶ **new pedestrian crossing** on Hickson Road
- ▶ **new bike parking** close to the station entry
- ▶ **relocation of the bus stops** on Hickson Road closer to the station entry
- ▶ **new kiss and ride and taxi bays** on the western side of Hickson Road
- ▶ **traction substation integrated** into the station building (partially underground)
- ▶ **wayfinding signage** and Sydney Metro information within the Barangaroo area
- ▶ **transport and access** arrangements are being developed in consultation with Barangaroo Delivery Authority
- ▶ **station access and entry** via Central Barangaroo and Barangaroo Reserve.



Artist's impression of Barangaroo Station



# SYDNEY METRO CITY & SOUTHWEST

## Martin Place Station

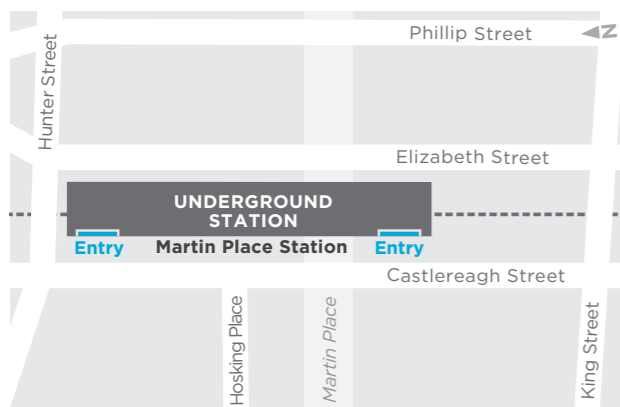


Artist's impression of Martin Place Station

Martin Place Station is integrated with the original Martin Place Station and serves Sydney's high-end commercial and financial district, the Macquarie Street precinct and the Pitt Street retail zone.

The metro station provides efficient interchange in the CBD through convenient, direct connections to the T4 Eastern Suburbs and Illawarra Line platforms and integrates with the public domain and transport access improvements.

Martin Place Station is built as a binocular cavern (mined) with two single side platforms 25 (north end) to 27 (south end) metres below ground level.



### The station includes:

- ▶ **new underground pedestrian link** between the existing suburban and intercity Martin Place Station platforms and the metro station platforms
- ▶ **new bike parking** on Castlereagh Street at both station entries
- ▶ existing **bus stops retained** on Elizabeth and Castlereagh streets
- ▶ existing **taxi ranks** close to the station retained
- ▶ **wayfinding signage** and Sydney Metro information
- ▶ **station access and entry** via:
  - a northern pedestrian plaza opening to Castlereagh, Hunter and Elizabeth streets
  - a southern pedestrian plaza opening to Martin Place and Castlereagh Street.

Underground pedestrian connections to 33 Bligh Street are being investigated in consultation with City of Sydney and local businesses.

# SYDNEY METRO CITY & SOUTHWEST

## Pitt Street Station

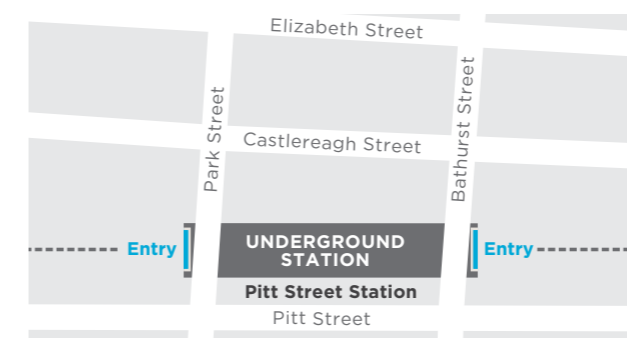


Artist's impression of Pitt Street Station

Pitt Street Station is strategically located at the junction of Sydney's southern CBD and the Midtown retail precinct, close to mixed employment, residential, entertainment, cultural and events-based activities within the southern Sydney CBD and Chinatown.

Pitt Street Station is built as a binocular cavern (mined), 17 metres (north end) to 20 metres (south end) below ground level.

The metro station at Pitt Street serves the retail areas on George and Pitt streets, the civic and entertainment uses on George Street and the emerging southern Sydney CBD residential developments between Park Street and Belmore Park. The station also provides relief to Town Hall Station, and allows interchange onto other modes of public transport including light rail and buses.



### The station includes:

- ▶ **existing bike parking** retained on Castlereagh Street and Bathurst Street
- ▶ existing **bus stops retained** on Castlereagh Street
- ▶ existing **taxi ranks** close to the station retained
- ▶ enhancement of **pedestrian infrastructure** around the station is being investigated further in consultation with the CBD Coordination Office, Roads and Maritime Services and City of Sydney Council
- ▶ **station access and entry** via:
  - a northern pedestrian plaza opening to Pitt and Park streets
  - a southern pedestrian plaza opening to Bathurst Street.

# SYDNEY METRO CITY & SOUTHWEST

## Central Station

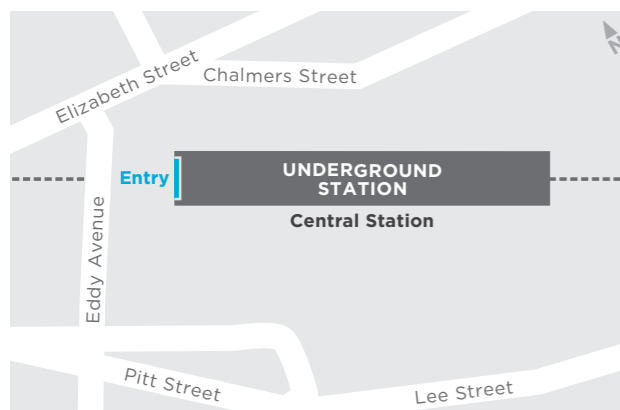


Central Station

The location of the metro station at Central facilitates a critical interchange, fully connecting the station with suburban, intercity and regional rail services, buses, coaches and light rail.

Central Station is a single-span (cut-and-cover) cavern with island platform construction, with the platform 16 metres below ground level.

Transport for NSW is working to develop a vision and plan for the Central Station precinct, focusing on connecting the transport modes with the surrounding recreational, business, residential and educational areas and revitalising public spaces. Work on the new Sydney Metro platforms is part of the wider rejuvenation of the precinct.



### The station includes:

- ▶ **suburban and intercity train interchange** via the existing northern concourse and underground paid pedestrian connections
- ▶ **existing** kiss-and-ride, taxi ranks, bike parking and bus stops retained
- ▶ **services building** (at the end of platforms 13 and 14)
- ▶ **platforms** 13 and 14 are being reinstated as intercity platforms, and platform 15 possibly converted to a suburban platform
- ▶ **wayfinding signage** and metro information
- ▶ **station access and entry** via:
  - existing northern station entry from Eddy Avenue and the main northern concourse
  - existing paid underground pedestrian connections within Central Station.



Artist's impression of an underground station at Central Station

# SYDNEY METRO CITY & SOUTHWEST

## Waterloo Station

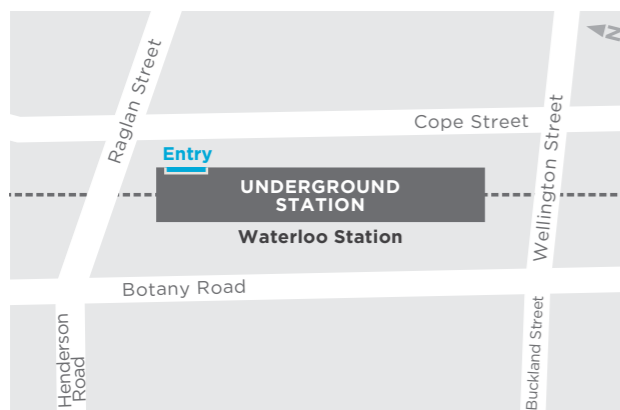


Artist's impression of Waterloo Station

The new metro station at Waterloo will help revitalise the Waterloo precinct and supports the extension of the CBD. It also:

- ▶ provides a high quality connection with bus services along Botany Road
- ▶ provides additional connectivity to Australian Technology Park and Redfern Station
- ▶ contributes to the NSW Government objective to transform Waterloo and Redfern
- ▶ allows further development and expansion of the Global Economic Corridor between the Sydney CBD and Green Square.

Waterloo Station is constructed as a single-span (cut-and-cover) cavern with island platform at a depth of 25 metres.



### The station includes:

- ▶ **new pedestrian crossings** on Raglan and Cope streets
- ▶ **new** taxi, kiss-and-ride bays and bike parking on Cope Street
- ▶ new on-road **marked cycle link** on Raglan Street
- ▶ **existing bus stops retained** northbound along Botany Road
- ▶ **relocation of the bus stops** southbound on Botany Road closer to Raglan Street
- ▶ **relocation of the bus stops** on Cope Street to Botany Road
- ▶ **traction substation** integrated into the station building
- ▶ **enhancement of pedestrian infrastructure** around the station is being investigated further in consultation with the CBD Coordination Office, Roads and Maritime Services and City of Sydney Council
- ▶ **station access and entry** via corner of Raglan and Cope streets.

# SYDNEY METRO CITY & SOUTHWEST

## Sydenham to Bankstown

The Sydney Metro City & Southwest project, which is Stage 2 of Sydney Metro, proposes to upgrade and convert all 11 stations between Sydenham and Bankstown to metro standards. This upgrade addresses one of Sydney's biggest rail bottlenecks.

The T3 Bankstown Line effectively slows down the Sydney Trains network because of the way it merges with other railway lines closer to the city, including the T2 Airport Line and Inner West lines. The suburban trains currently operating on the T3 Bankstown Line will be allocated to other Sydney railway lines.

The upgrade includes:

- ▶ upgrading and converting all 11 stations on the 13.5-kilometre route from Sydenham to Bankstown to Sydney Metro standards, including platform screen doors at all stations and level access between platforms and trains

- ▶ upgrading the interchange between Sydney Metro City & Southwest and Sydney Trains at both Sydenham and Bankstown
- ▶ all stations meet the needs of pedestrians, cyclists, customers catching or getting off buses and taxis, and people being dropped off and picked up in cars
- ▶ improving station way-finding and signage.

These works are the subject of a second Environmental Impact Statement (EIS) in the future, following more planning and technical investigations.

The T3 Line west beyond Bankstown would continue to be operated by Sydney Trains, serving stations between Cabramatta, Lidcombe and Bankstown.

The community will be consulted on the upgrade and conversion process.



Artist's impression of Campsie Station

# Sydney's rail congestion

A railway network built over 160 years

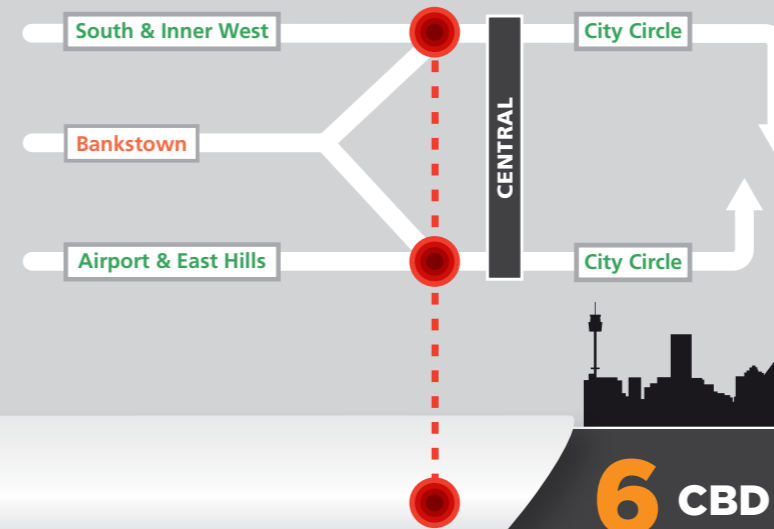
MORNING PEAK HOUR

- T1 Western
- T1 Richmond
- T1 North via Strathfield
- T1 North via Macquarie Park
- T1 North Shore
- T2 Airport
- T2 South & Inner West
- T2 East Hills
- T3 Bankstown
- T4 Eastern Suburbs
- T4 Cronulla
- T4 Illawarra
- Blue Mountains
- Newcastle & Central Coast
- South Coast

**120**  
TRAINS PER HOUR

**15**  
TRAIN LINES

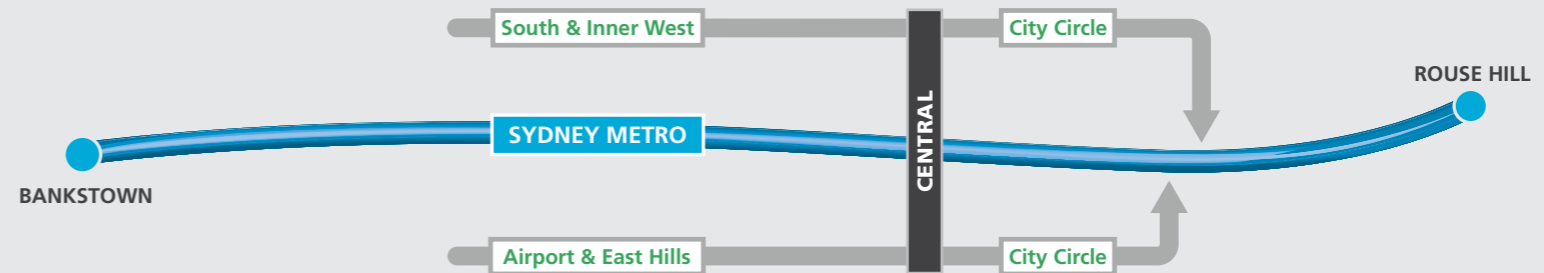
## CURRENT Before Sydney Metro



- The Bankstown Line adds to Sydney's big rail bottleneck
- It funnels trains on to the East Hills and Inner West lines outside Central
- Queuing trains make delays worse, causing backlogs in the west and south west

**6** CBD TRACKS

## FUTURE With Sydney Metro - busting congestion



- Removes the Bankstown Line bottleneck by putting the line on Sydney's new stand-alone metro system
- Suburban trains from the Bankstown Line allocated to other lines
- Clearing the funnel means more trains and more reliable services

# TUNNELLING

Sydney's new metro railway will run through twin purpose-designed and built tunnels.

A number of factors determine the tunnel route and alignment. These include:

- ▶ the location, depth and structure of the stations
- ▶ vertical track grade
- ▶ rock conditions
- ▶ track curvature, to allow train speeds of up to 100 kilometres an hour
- ▶ the physical constraints of the route, including crossing under Sydney Harbour.



Two 300m long tunnels linking the new twin tunnels to the existing railway tunnels between Epping and Chatswood were completed in mid-2015

## STAGE 1 Sydney Metro Northwest

Tunnelling finished in January 2016 on Australia's longest railway tunnels – twin 15 kilometre tunnels from Bella Vista to Epping as part of Stage 1 of Sydney Metro.

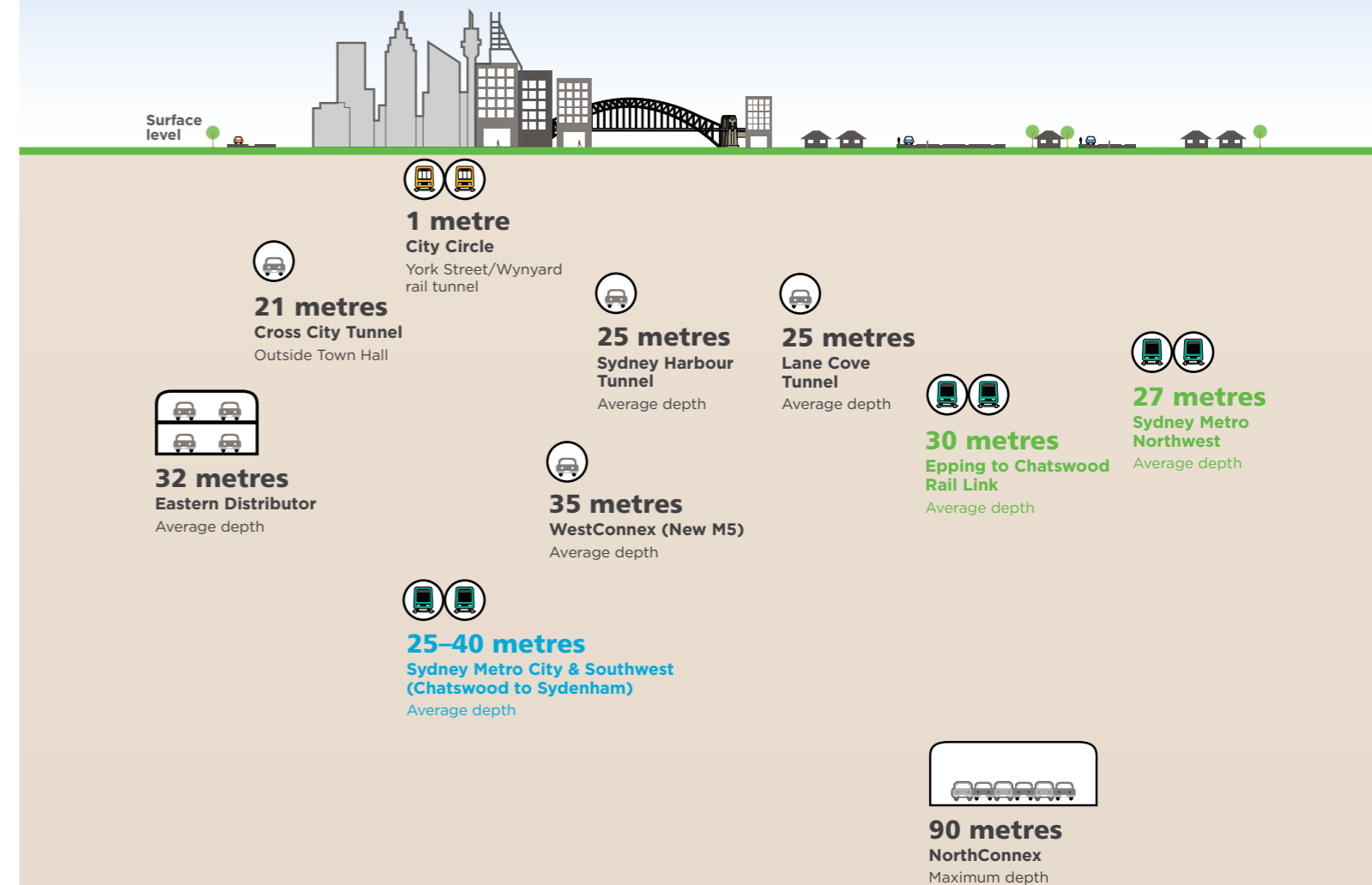
## STAGE 2 Sydney Metro City & Southwest

Tunnelling will start in 2018 on the twin tunnels from Chatswood to Sydenham, including under Sydney Harbour and through the CBD.



Looking out from the Castle Hill cavern into the station site, July 2015

# Average tunnel depths



Artist's impression of tunnel boring machine under Sydney Harbour

## Tunnel boring machines

Four mega tunnel boring machines (TBMs) built the twin tunnels on Sydney Metro Northwest. This was the first time in Australian history four TBMs were used on the one transport infrastructure project.

On Stage 2, five TBMs will be used to deliver the tunnels between Chatswood and

Sydenham. This includes a specialised TBM for the section under Sydney Harbour because of the ground and rock conditions found at the bottom of the harbour.



TBM1 Elizabeth



TBM2 Florence



TBM3 Isabelle



TBM4 Maria



TBM1 Elizabeth from above, just before her launch at Bella Vista, September 2014

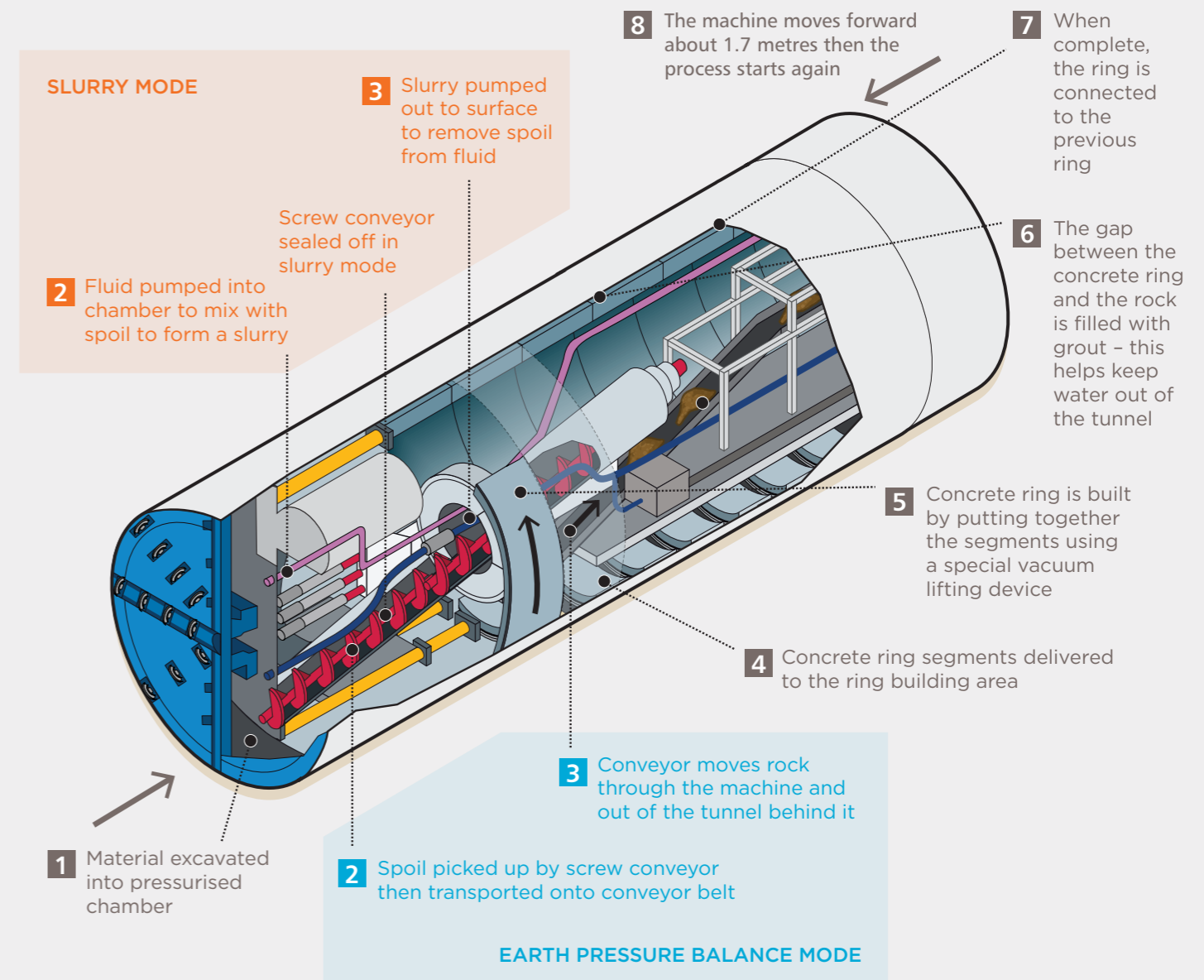
## Tunnelling under the harbour

### A specialised TBM

The specialised TBM will combine two types of TBM technology into one machine, allowing tunnel builders the flexibility to adapt to different ground conditions as the machine progresses.

Both these two technologies keep the pressure inside the chamber the same as the pressure in the ground outside, to control the excavation process:

- > **EARTH PRESSURE BALANCE MODE**  
Uses a screw conveyor and valve to control the pressure by regulating the amount of spoil in the machine. Used for rock conditions
- > **SLURRY MODE**  
Uses pipes and fluid to control the pressure in the machine, by turning the excavated material into a slurry and pumping it out. Used for sediment materials



# SYDNEY METRO TRAINS FACILITY



Workers laying tracks at the Sydney Metro Trains Facility, August 2016

The Sydney Metro Trains Facility at Rouse Hill will house the operations centre for the new fully-automated stand-alone metro railway and is also where the new train fleet will be stabled and maintained.

When services start in 2019, a total of 22 metro trains will be located on site.

Later, it will provide stabling for 46 trains and maintenance services for a fleet of 76 trains as part of Sydney's new metro network. This final design capacity will 'future proof' the needs of Sydney's broader metro rail system.

The site will be a secure area and include:

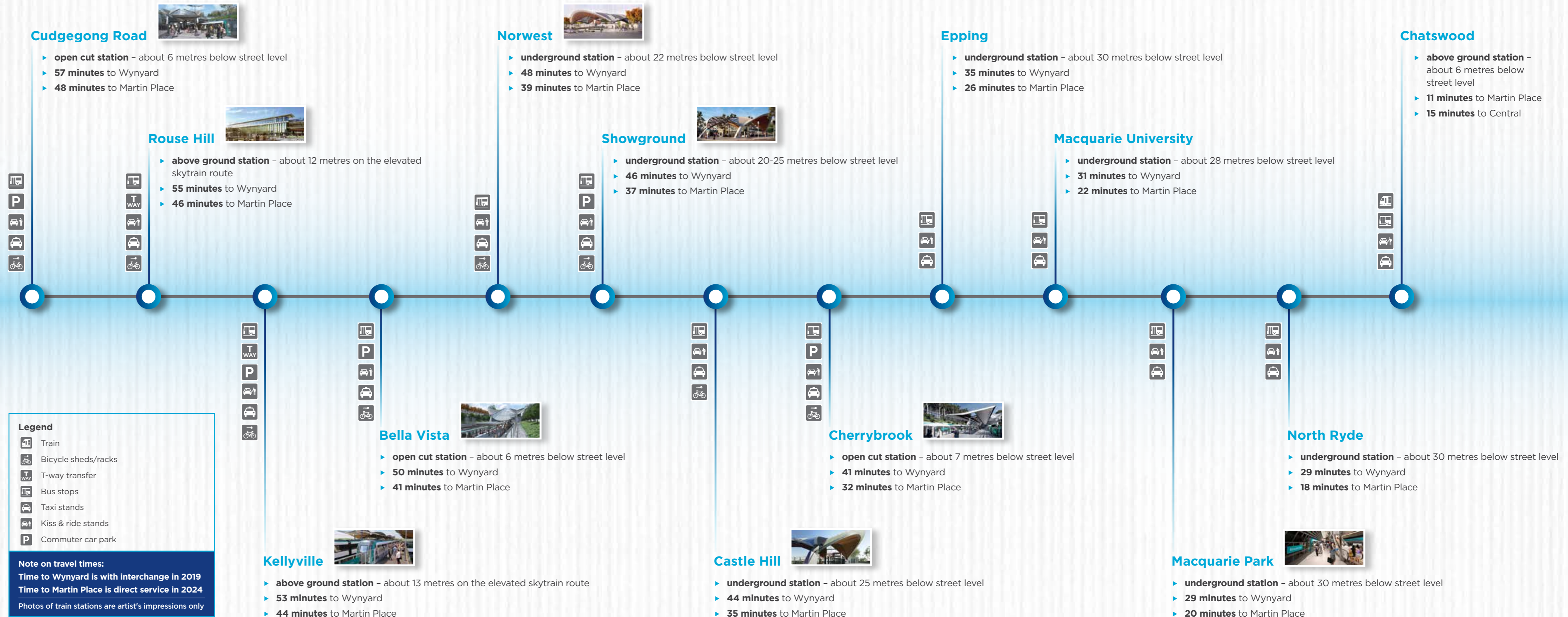
- ▶ train stabling area
- ▶ infrastructure maintenance facilities
- ▶ administration buildings including an operations control centre
- ▶ a power sub-station.

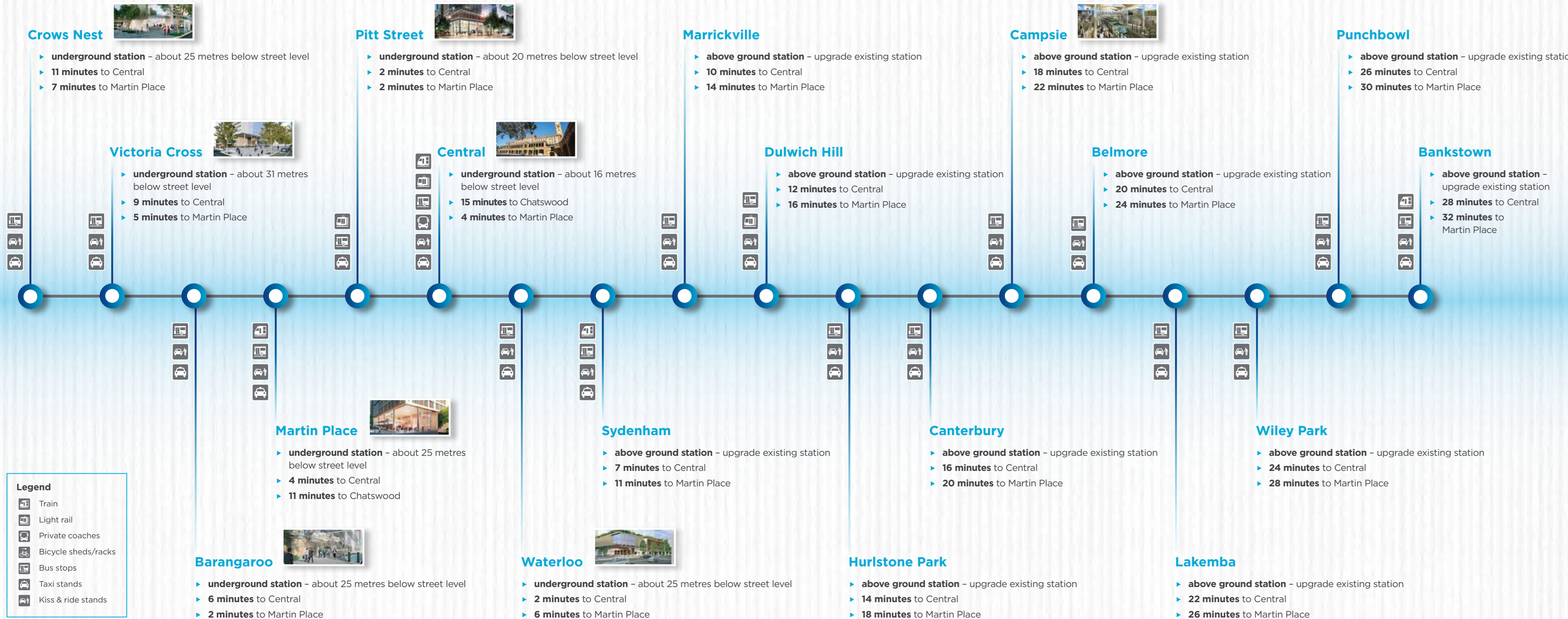
The train maintenance building will be used for:

- ▶ train washing
- ▶ inspections and repairs
- ▶ major train maintenance
- ▶ wheel maintenance.

Trains will be stored in the train stabling facility outside peak periods and between the last service and the first service the next day. Trains will be shut down once the train has been stabled and cleaned.

Trains will be washed in an automated train wash a minimum of twice a week with up to 95 per cent of the water recycled. The facility will operate 24 hours per day, seven days a week.





## KEEPING IN TOUCH

For more information visit our website [sydneymetro.info](http://sydneymetro.info) or contact us via:

### Sydney Metro Northwest

1800 019 989 24 hour community information line

[info@metronorthwest.com.au](mailto:info@metronorthwest.com.au)

Sydney Metro Northwest, PO Box 588, North Ryde, BC NSW 1670

If you need an interpreter, call TIS National on **131 450** and ask them to call **1800 019 989**

### Sydney Metro City & Southwest

1800 171 386 24 hour community information line

[sydneymetro@transport.nsw.gov.au](mailto:sydneymetro@transport.nsw.gov.au)

Sydney Metro City & Southwest, PO Box K659, Haymarket, NSW 1240

If you need an interpreter, call TIS National on **131 450** and ask them to call **1800 171 386**



Hills Harvest Festival at Rouse Hill, September 2016



# APPENDIX

## Appendix A

**Stage 1** of Sydney Metro is under construction. There are thirteen stations including:

- |                  |                        |                  |
|------------------|------------------------|------------------|
| - Cudgegong Road | - Showground           | - Macquarie Park |
| - Rouse Hill     | - Castle Hill          | - North Ryde     |
| - Kellyville     | - Cherrybrook          | - Chatswood      |
| - Bella Vista    | - Epping               |                  |
| - Norwest        | - Macquarie University |                  |

**Stage 2** of Sydney Metro will run from Chatswood to Bankstown including the following stations:

- |                  |                  |              |
|------------------|------------------|--------------|
| - Chatswood      | - Waterloo       | - Belmore    |
| - Crows Nest     | - Sydenham       | - Lakemba    |
| - Victoria Cross | - Marrickville   | - Wiley Park |
| - Barangaroo     | - Dulwich Hill   | - Punchbowl  |
| - Martin Place   | - Hurlstone Park | - Bankstown  |
| - Pitt Street    | - Canterbury     |              |
| - Central        | - Campsie        |              |

## Appendix B

### Key Sydney Metro facts

- Stage 1 – Sydney Metro Northwest opens in 2019
- Stage 2 – Sydney Metro City and Southwest opens in 2024
- 66 kilometres of new metro rail for Sydney
- 31 state-of-the-art, fully accessible metro stations
- 98 percent on time running reliability
- A train every four minutes in the peak
- A train every 10 minutes in the off peak
- Continuous mobile phone coverage through the network
- No timetable – customers will just turn up and go
- Opal Ticketing

### Train features

- Three double doors per carriage for faster loading and unloading
- Level access between platform and train
- Two multi-purpose areas per train for prams, luggage and bicycles
- Wheelchair spaces, separate priority seating and emergency intercoms
- Real-time travel information and live electronic route maps
- Platform screen doors keep people and objects away from the edge and allow trains to get in and out of stations much faster
- Inside you can see from one end of the train to the other
- Heating and air conditioning
- 170 metres long platforms – longer than most of Sydney
- Customer service assistants at every station and moving through the network during the day and night

### Safety

- Sydney Metro is Australia's first fully-automated metro rail network. Around the world, millions of people use these networks every day in cities like Paris, Singapore, Dubai and Hong Kong

### Operations Control Centre

- State-of-the-art network controlled from new high-tech facility at Tallawong Road
- Constant monitoring – Expert train controllers monitor entire metro system
- Security – More than 230 tunnel cameras on Sydney Metro Northwest alone
- Signalling and communication systems – Control the trains, tunnels, platforms and skytrain to deliver a safe and reliable journey
- Faster journeys – System minimises the time trains are stopped at stations and the time between each train

## Appendix C

### Sydney's Rail Congestion

Sydney's current rail system was built over 160 years. There are 120 trains per hour on 15 lines, all coming together on 6 CBD train tracks.

- The Bankstown Line adds to Sydney's big rail bottleneck
- It funnels trains on to the East Hills and Inner West lines outside Central
- Queuing trains make delays worse, causing backlogs in the west and south west

In the future Sydney Metro will help by busting congestion.

- Removes the Bankstown Line bottleneck by putting the line on Sydney's new stand-alone metro system
- Suburban trains from the Bankstown Line allocated to other lines
- Clearing the funnel means more trains and more reliable services

## Appendix D

### Average tunnel depths

- City Circle, York Street/Wynyard rail tunnel – 1 metre
- Cross City Tunnel, outside Town Hall – 21 metres
- Sydney Harbour Tunnel, average depth – 25 metres
- Lane Cove Tunnel, average depth – 25 metres
- Sydney Metro Northwest, average depth – 27 metres
- Epping to Chatswood Rail Link, average depth – 30 metres
- Eastern Distributor, average depth – 32 metres
- WestConnex (New M5), average depth – 35 metres
- Sydney Metro City & Southwest (Chatswood to Sydenham) – 25-40 metres
- NorthConnex, maximum depth – 90 metres
- 

## Appendix E

### Tunnelling under the harbour

1. Material excavated into pressurised chamber

#### SLURRY MODE

2. Fluid pumped into chamber to mix with spoil to form a slurry  
Screw conveyor sealed off in slurry mode
3. Slurry pumped out to surface to remove spoil from fluid

#### EARTH PRESSURE BALANCE MODE

2. Spoil picked up by screw conveyor then transported onto conveyor belt
3. Conveyor moves rock through the machine and out of the tunnel behind it
4. Concrete ring segments delivered to the ring building area
5. Concrete ring is built by putting together the segments using a special vacuum lifting device
6. The gap between the concrete ring and the rock is filled with grout – this helps keep water out of the tunnel
7. When complete, the ring is connected to the previous ring
8. The machine moves forward about 1.7 metres then the process starts again

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[www.facebook.com/sydnymetro](http://www.facebook.com/sydnymetro)



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