

# Sydney Metro West

## A new railway for Western Sydney

PROJECT OVERVIEW, SEPTEMBER 2017



## CONTENTS

Project snapshot	4
The need for new rail	5
Sydney Metro	6
Growing with the west	8
Congestion busting	9
Priority No.1 – Parramatta and the outer west	11
A growing Central City	12
Tunnelling	18
Stations	22
Community consultation	23
Other projects, keeping in touch	23
Appendix	24

## STRATEGIC PLANNING

Mass transit services are a fundamental part of a growing international city. Public transport improvements between Sydney's three cities is part of Transport for NSW's Future Transport strategy. We are not only responding to the needs of today, but also planning for the future with new transport strategies and technology – looking beyond the current pipeline of projects to ensure communities are better places to live, work, play and visit.

Sydney Metro West will be considered within the wider Future Transport process along with initiatives such as the Western Sydney Rail Needs study, road demand and the Parramatta Light Rail for transport around greater Parramatta. The consultation we undertake now will also feed into strategic activities being progressed by the Greater Sydney Commission, Department of Planning and Infrastructure NSW.

Community and industry consultation will be vital in developing the Sydney Metro West project so that an investment decision can be made by the NSW Government at the appropriate time.

## Premier's message



Western Sydney is booming – more people than ever before are living and working here.

This region is the engine room of our State's – and our nation's – economy.

Sydney Metro West will help the region grow and will change Western Sydney forever, connecting Parramatta to the Sydney CBD and securing the region's long-term future.

This new 21st century railway will effectively double rail capacity between Parramatta and the CBD.

The journey between our two great cities will be easier and more reliable, linking communities along the way that have not been previously serviced by rail.

Like the great Sydney Harbour Bridge of a century ago, Sydney Metro West will shape this city for the next 100 years and beyond.

The journey starts today – join us and have your say on this once-in-a-century infrastructure project as we plan for tomorrow's Sydney.

**Gladys Berejiklian MP**  
PREMIER OF NEW SOUTH WALES

## Minister's message



Welcome to Sydney Metro West – a new railway network being designed to grow with Australia's biggest city.

The NSW Government is currently delivering Stage 1 and 2 of

Sydney Metro – 31 metro stations and 66 kilometres of new metro rail, from Rouse Hill in the North West, under Sydney Harbour, through new underground CBD stations and beyond to Bankstown.

This new railway will start operating in 2019, bringing a world-class mass transit system to Sydney – and Australia – for the first time.

The ability to move more than 40,000 people an hour in each direction brings Sydney in line with global cities like Paris, Hong Kong and New York.

Now it's time to get on with the job of delivering new metro rail to more of Sydney, serving the booming west for generations to come.

This is Day 1 – where the community, industry and other stakeholders can shape the future of the best city in the world. Join us for the journey.

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



Sydney Metro West study area

## PROJECT SNAPSHOT

Sydney Metro is the biggest urban rail project in Australian history, transforming how we get around the nation's biggest city.

The Sydney Metro West project is Sydney's next big railway infrastructure investment.

It will deliver a direct connection between the CBDs of Parramatta and Sydney, linking communities along the way that have not been previously serviced by rail and unlocking housing supply and employment growth between the two major CBDs.

New metro rail will become the fastest, easiest and most reliable journey between the Sydney and Parramatta CBDs.

This means Sydney Trains and inter-city services will be freed up for customers in the city's outer west in areas like Blacktown, Penrith and the Blue Mountains. In turn, these services will become more reliable, with increased capacity, reduced crowding and faster travel times.

As a new railway, Sydney Metro West will work together with the existing T1 Western Line, effectively doubling rail capacity from

Parramatta to the CBD and supporting the Greater Sydney Commission's vision for better connections between these two major centres.

The NSW Government will integrate transport and land use planning along the corridor, with the new metro railway line expected to be built largely underground.

Community, stakeholder and industry consultation will now help shape Sydney Metro West's development, including determining the alignment and potential station locations.



The world-famous Sydney Olympic Park

## THE NEED FOR NEW RAIL

More mass transit services are needed between Parramatta and the Sydney CBD because:

- ▶ an extra 420,000 people are expected to move into the corridor between Greater Parramatta and central Sydney over the next 20 years
- ▶ more than 300,000 new jobs will be created by 2036 in the corridor between Greater Parramatta and central Sydney at places like the Parramatta CBD, Sydney Olympic Park and the Bays Precinct
- ▶ the T1 Western Line needs relief because it will be severely overcrowded by the early 2030s.

### Servicing key precincts

The final number of potential stations will be identified following community and industry consultation. Four key precincts to be serviced have initially been identified at:

- ▶ **Parramatta**, where the number of jobs is expected to double over the next 20 years to 100,000
- ▶ **Sydney Olympic Park**, where 34,000 jobs and more than 23,000 residents will be located by 2030
- ▶ **The Bays Precinct**, Sydney's new innovation hub where 95 hectares of land is being regenerated
- ▶ **The Sydney CBD**, allowing easy access to the existing public transport network and Stages 1 and 2 of Sydney Metro, which are currently under construction.

# SYDNEY METRO

Sydney Metro will deliver ultimate capacity for a new metro train every two minutes in each direction under the Sydney CBD – a level of service never before seen in Australia.

Services start in 2019 on the \$8.3 billion Sydney Metro Northwest project, which is Stage 1 of Sydney Metro. It links Rouse Hill in the North West to Chatswood with 13 metro stations and 4000 commuter car spaces.

From 2024, metro rail will extend from the North West, under Sydney Harbour, through new CBD stations and beyond to Bankstown on Stage 2 – the Sydney Metro City & Southwest project.

With a total of 31 metro stations and 66 kilometres of new metro rail, stages 1 and 2 will work together with the existing suburban rail system to help increase rail capacity across Sydney by 60 per cent.



Sydney Metro is Australia's first fully-automated railway. This means trains are controlled from a central operations centre using technology that has been in place around the world for more than 30 years in cities like Paris, Hong Kong and Dubai.

## Customer benefits

Australian-first 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 all metro platforms and only open at the same time as the train doors.



No timetable – customers just turn up and go



Level access between the platform and train



Opal ticketing



Heating and air-conditioning in all metro trains



Continuous mobile phone coverage



New generation of fast, safe and reliable trains



On-board real-time travel information and live electronic route maps



Video help points

Sydney Metro's prototype station, including platform screen doors



## GROWING WITH THE WEST

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

The NSW Government has identified the key growth regions that need to be serviced by Sydney Metro West: Parramatta, Sydney Olympic Park, the Bays Precinct and into the CBD.

This means a corridor will be investigated between the Parramatta River and existing T1 Western Line to:

- ▶ maximise the potential for growth
- ▶ transform and connect communities
- ▶ generate interest within industry to help deliver this mega project.

The NSW Government will work with the community, industry, 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.

The NSW Government will integrate transport and land use planning along the corridor.

The project supports the Greater Sydney Commission's vision for a Central City based around Parramatta that's connected to the established Eastern City by providing improved travel times and service frequency between these two CBDs.

Beyond this corridor, opportunities to extend the line east and west will also be considered.

The costs, final route and the final number of stations will be determined through more detailed planning and industry engagement.

## CONGESTION BUSTING

Sydney Metro West will take customers off existing suburban rail lines, especially in the busy morning peak – cutting crowding and easing congestion.

This means more efficient Sydney Trains services in the west, outer west and regional areas like the Blue Mountains.

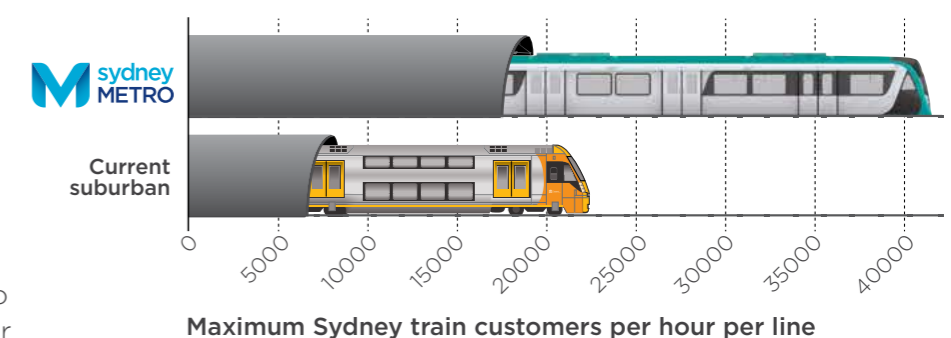
The project would help improve the reliability of the T1 Western Line from areas such as Penrith by cutting crowding.

On the T1 Northern Line, crowding could be reduced as people move to new metro rail because of new and easier travel options.

Working together with the existing T1, Sydney Metro West

effectively doubles rail capacity from Parramatta to the CBD.

Metro rail moves more than 40,000 people an hour in each direction – significantly more than a current suburban line.



Maximum Sydney train customers per hour per line



- ▶ **Sydney's population** is currently 4.6 million and in 20 years it will jump to more than 6 million.
- ▶ **Western Sydney is home to about 47 per cent of Sydney's residents**, 36 per cent of Sydney's jobs and one-third of Sydney's Gross Regional Product.
- ▶ An extra **420,000 people are expected to move into the corridor** between Greater Parramatta and central Sydney over the next 20 years.
- ▶ **More than 300,000 jobs are expected to be created** in the corridor between Greater Parramatta and central Sydney by 2036.
- ▶ By 2036, **3.2 million people will live in Western Sydney** – a population about the same size as Adelaide and Perth combined today.
- ▶ By 2036, **over 50 per cent of Greater Sydney's population will live in Western Sydney.**
- ▶ There are currently more than **4.7 million weekday trips using all transport modes** to, from and within the Greater Parramatta to central Sydney corridor, with just over one million trips during the AM peak period alone. This is expected to increase by 36 per cent in 2036.

## PRIORITY NO. 1 – GREATER WESTERN SYDNEY

### A new focus on Parramatta and the outer west

Sydney Metro West makes it faster and easier to get to Parramatta – from both the east and west, reinforcing it as the Central City.

Extra rail capacity will be delivered to both sides of Parramatta.

From the east, new metro rail on a standalone system will become the easiest and most reliable journey within this growing corridor and from the Sydney CBD to Parramatta.

This frees up capacity on the existing suburban rail system to the west, increasing the reliability of services to and from Blacktown, Penrith and the Blue Mountains, and cutting crowding.

The number of customers using the T1 Western Line has grown 8 per cent over the past two years, not the forecast 2 per cent.

It would be difficult to add significant extra capacity to this line: it cannot be widened for extra tracks without causing widespread community disruption and the acquisition of nearby properties.

Currently, trains can operate as little as every 15 minutes between Parramatta and Sydney outside peak hours, while freight trains also use the line.

The solution is Sydney Metro West – a new, standalone metro railway built mostly underground and able to move more than 40,000 people an hour in each direction, effectively doubling the rail capacity of the area.



### More rail capacity

- ▶ The existing T1 Western Line – which is more than a century old – is expected to be severely overcrowded by the early 2030s, despite ongoing upgrade works and more services.
- ▶ Currently, it moves around 40,000 people in the morning peak hour and is operating at 135 per cent seated capacity.
- ▶ New metro rail will be able to move more than 40,000 people an hour in each direction.
- ▶ Sydney Metro West will work together with the T1 to service the growing needs of Western Sydney, effectively doubling the rail capacity of the Parramatta to Sydney corridor.
- ▶ The project also means faster and more frequent services can be delivered on the Sydney Trains network from outer western Sydney areas like Penrith and Blacktown, with increased capacity for those customers into Parramatta and the CBD.

# A GROWING CENTRAL CITY

Over the next 20 years, the number of jobs in Parramatta is expected to double to 100,000.

Its central location will be one of its greatest advantages and it will be an important area for advanced manufacturing and innovation-driven enterprises.

By 2036, it will be one of Greater Sydney's administrative and business centres, and the Westmead health and education super precinct will continue to grow and lead best practice in medical and education-related industries.

In November 2016, the Greater Sydney Commission released Towards our Greater Sydney 2056, which states now is the time to conceive and plan for Greater Sydney maturing into 'a metropolis of three cities'- the Eastern City (Sydney CBD), the Central City (Greater Parramatta) and the Western City (Western Sydney Airport).

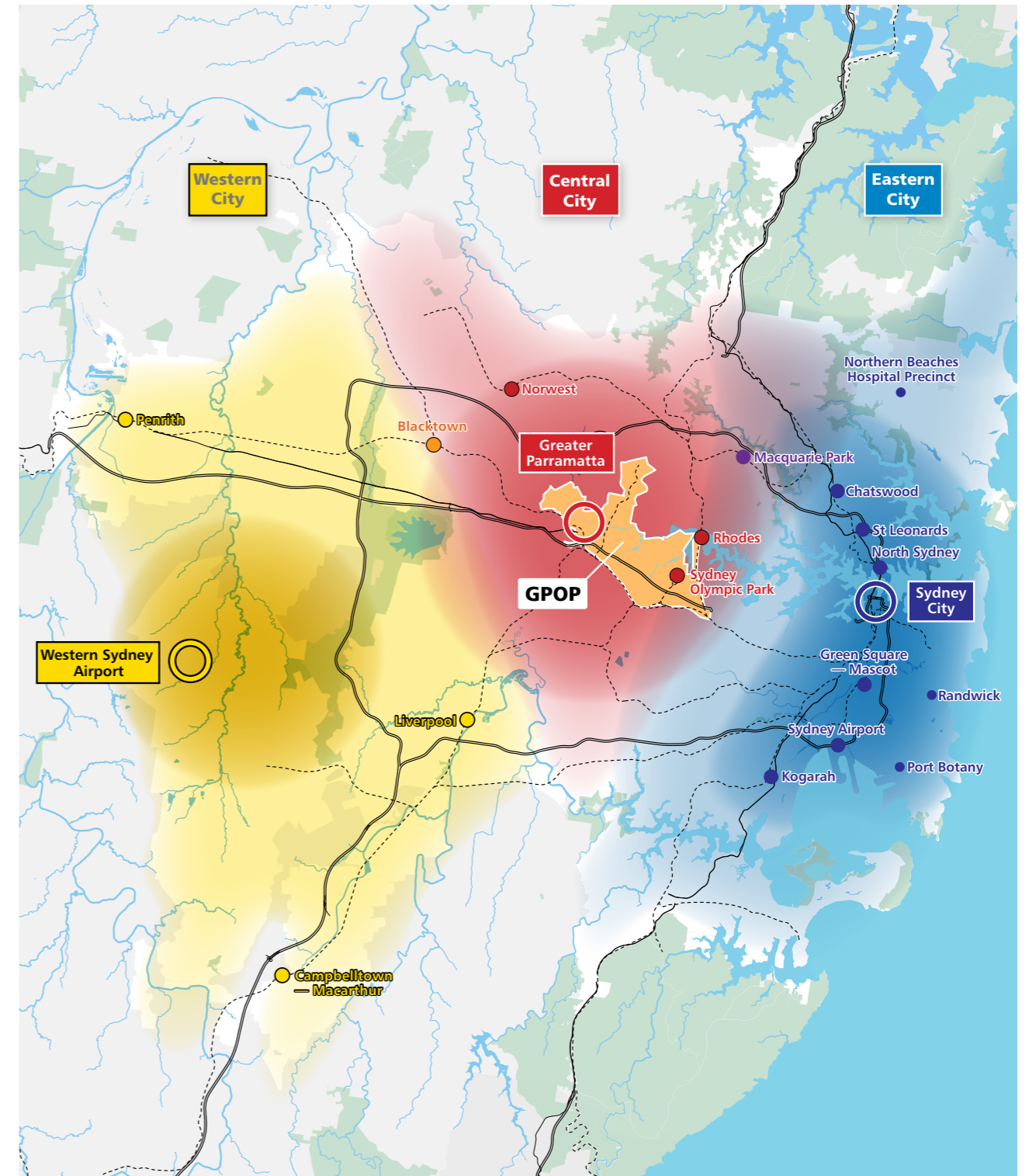
Greater Sydney has the potential to develop its global economy towards a broader mix that embraces education, innovation, technology

and advanced production industries. The reinforcement of the Central City and the emergence of the Western City - catalysed by Western Sydney Airport - gives Greater Sydney a real opportunity to be a diverse global economic powerhouse.

Integrated transport and land use planning is a priority for Greater Parramatta, creating greater transit amenity to bring local and regional businesses closer together, as well as acting as a catalyst for urban renewal.



Artist's impression of Parramatta Station



A Metropolis of Three Cities. Source: The Greater Sydney Commission

The first railway line in NSW was opened in 1855 - running from Sydney to Parramatta. Parramatta was an early colonial settlement and Aboriginal occupation of this area dates back 30,000 years.



Locomotive No. 1, the first railway engine to haul a train on the Sydney to Parramatta Railway



More than 23,000 people will call Sydney Olympic Park home by 2030.

This new growth area will house 34,000 jobs.

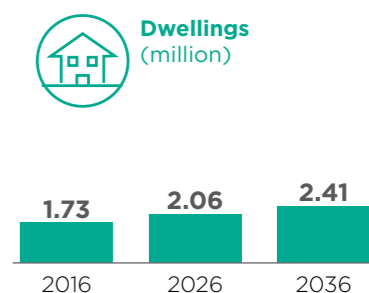
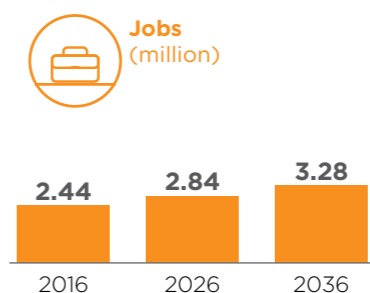
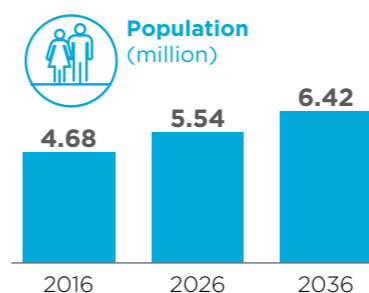
The region will provide for 10,700 homes and retail space will be increased to 100,000 square metres to service the growing community on the Olympic peninsula, including Wentworth Point and Newington, and the future Carter Street community.

The suburb has grown quickly over the past 16 years since hosting the Sydney 2000 Olympic Games, with its Master Plan 2030 being re-calibrated to cater for the growth. This includes identifying potential sites for future primary and high schools.



Artist's impression of an underground metro station at Sydney Olympic Park

First held in 1823, the Sydney Royal East Show is Australia's largest annual ticketed event, attracting over 850,000 people on average. In 2017, more than 88,000 people walked through a life size model of Sydney's new metro train on display at the Show as part of the project's mobile Community Information Centre.



More than 1.7 million extra people will call Sydney home between now and 2036, with the city supporting an extra 840,000 jobs. This means an extra 680,000 dwellings are needed to accommodate that growth.





Artist's impression of Bays Precinct Station

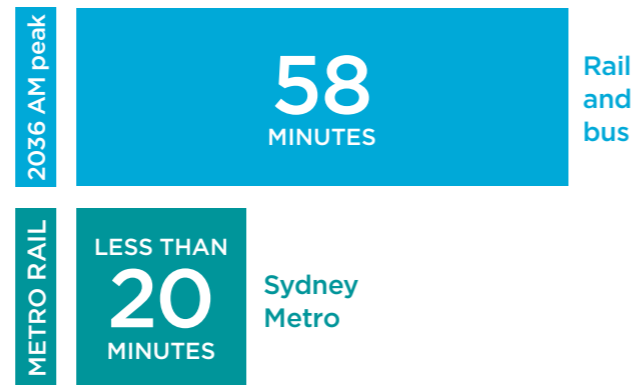
Almost 100 hectares of land is being regenerated at The Bays Precinct, Sydney's new innovation hub.

Sydney Metro West will facilitate the NSW Government's commitment to the area's renewal into an innovation district for technology and business.

It will incorporate a mix of commercial, residential and retail development to encourage innovation and the jobs of the future.

Recognising that an efficient transport system is an enabler to urban transformation, the new metro line will integrate with planning for the growing area.

**Travel times (indicative)**  
Parramatta to Bays Precinct



The Bays Precinct has a rich cultural history, including the White Bay Power Station and the Glebe Island Bridge, as well as Aboriginal and maritime history.

The power station was Sydney's longest-serving, from 1912 to 1984. It was built by the Department of Railways to supply power to the Sydney railway and tramway system.



White Bay Power Station 1930s



**Sydney CBD**

Sydney Metro West will allow easy access to the existing public transport network in the CBD, including and Stages 1 and 2 of Sydney Metro which are currently under construction.

# TUNNELLING

Sydney Metro West is expected to be built largely underground and operational in the second half of the 2020s.

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

- ▶ the location, depth and structure of the stations
- ▶ vertical track grade
- ▶ rock conditions
- ▶ track curvature, to allow high train speeds
- ▶ the physical constraints of the route, including crossing under bodies of water like the Parramatta River.



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

## Sydney Metro tunnels

Twin 15-kilometre tunnels from Bella Vista to Epping were completed in early January 2016 – after just 16 months. At the time, they were the longest railway tunnels in Australia and were delivered by four mega tunnel boring machines.

Tunnelling will soon start again for Stage 2 of Sydney Metro – from Chatswood, under Sydney Harbour, through new underground CBD stations and southwest to Sydenham. The first of five tunnel boring machines will be in the ground by the end of 2018.

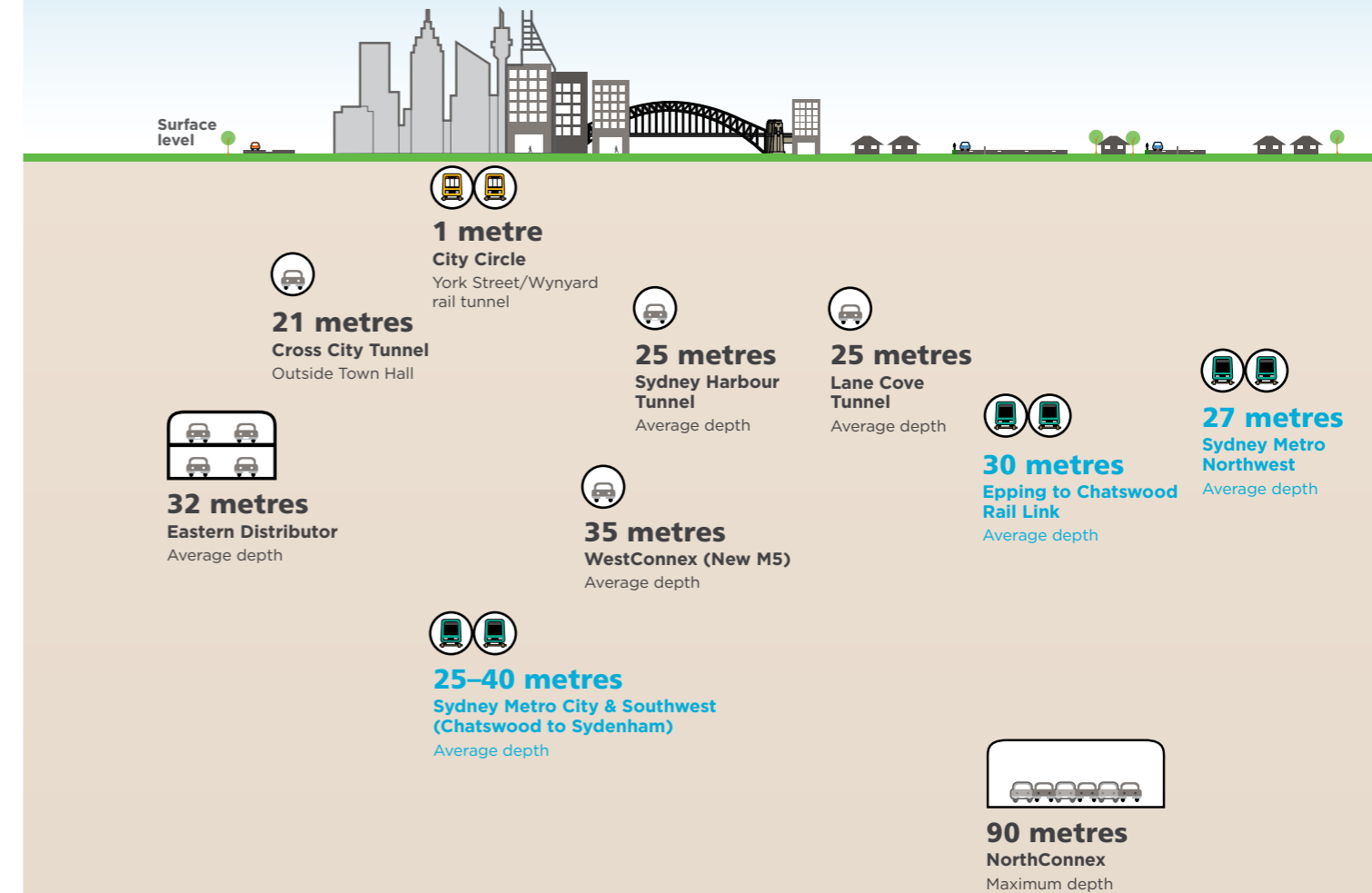


Australia's longest railway tunnels run 15 kilometres from Bella Vista to Epping on Sydney Metro Northwest

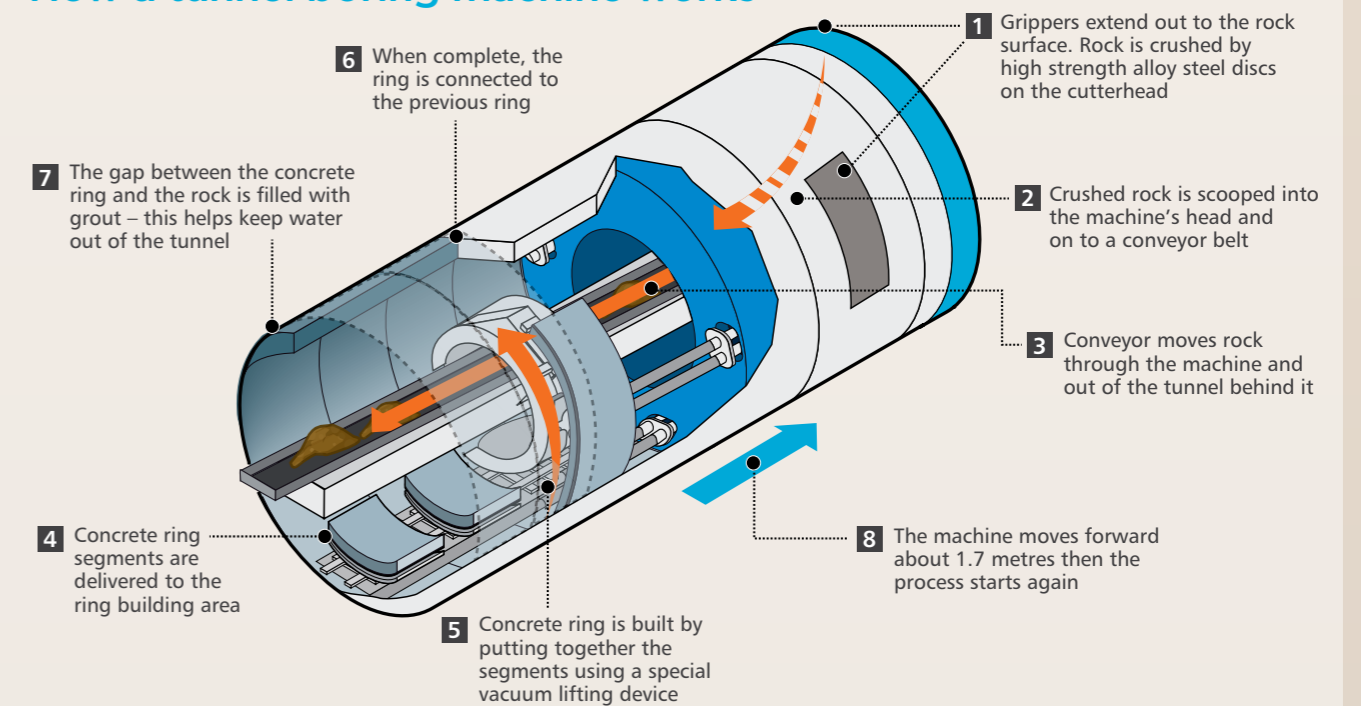


Florence was the second of four mega tunnel boring machines which tunnelled 30 kilometres on Sydney Metro Northwest

# AVERAGE TUNNEL DEPTHS



## How a tunnel boring machine works



# SYDNEY'S NEW METRO TRAIN

## KEY FACTS



**Stage 1 Northwest**  
Opens 2019



**Stage 2 City & Southwest**  
Opens 2024



**Sydney Metro West**

**98%**

**On-time**  
Running reliability

**00:02**

**Ultimate capacity**  
A train every two minutes each way under the CBD



**Connected**  
Continuous mobile phone coverage through network



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

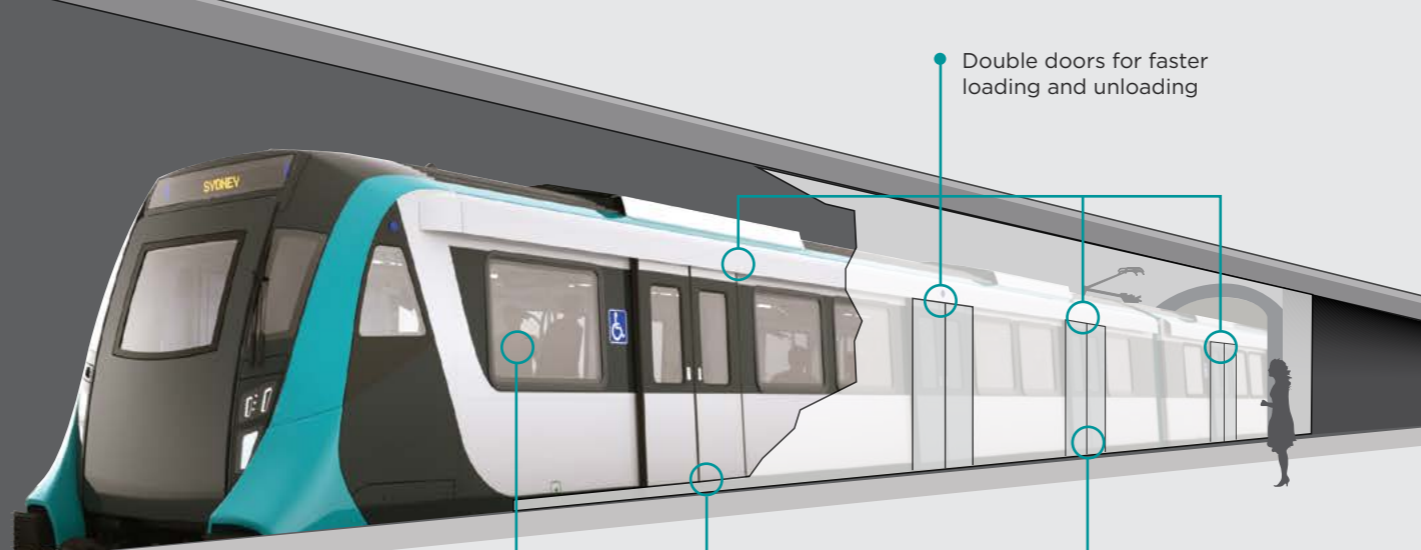


**Opal ticketing**

## TRAIN FEATURES



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



Double doors for faster loading and unloading

Heating and air conditioning

Level access between platform and train



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



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



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

## 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

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

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

**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



Norwest Station, one of the eight new metro stations on the Sydney Metro Northwest project

Customers are at the centre of Sydney Metro's stations – safety is our No. 1 priority.

Stations are designed to be an easy part of daily journeys.

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

Sydney Metro stations are fully accessible for people with a disability, prams and children including level access between platforms and trains.

Platform screen doors on all metro platforms 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.

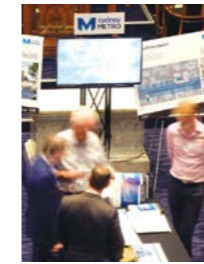
Sydney Metro is the first railway network in Australia to use platform screen doors, which are common around the world.



The new Cudgegong Road Station under construction



The first railway tracks for Sydney Metro, laid in June 2016



## COMMUNITY CONSULTATION

Sydney Metro West is expected to be delivered in the second half of the 2020s – but the early planning work has already started.

The NSW Government is currently delivering the first two stages of Sydney Metro – a \$20 billion-plus investment in a brand new metro railway for Sydney, with Stage 1 opening in the first half of 2019.

Sydney Metro West is a new railway that will work together with the existing T1 Line – effectively doubling rail capacity from Parramatta to the CBD.

The NSW Government has identified the need for this new railway from Parramatta to the Sydney CBD – now it's time to work with the community, industry and other stakeholders like local councils to plan this vital infrastructure.



## WHAT'S NEXT

The key growth regions that need to be serviced by this new railway have been identified: Parramatta, Sydney Olympic Park, the Bays Precinct and into the CBD.

This means a corridor between the Parramatta River and existing T1 Western Line to maximise the potential for growth, to transform and connect communities and to generate as much interest within industry to help deliver this mega project.

Sydney Metro West is an integrated land use and transport project.

The final number of potential stations will be identified following community and industry consultation:

- ▶ Tell us where you would like to see other possible stations and why – we're asking communities along this corridor to have their say;
- ▶ Tell us how you'd like to help us build it – we'll start an industry engagement process to build and run this system, including looking at how we can share in the value created around this corridor to help fund this mega project.



## INNOVATION

Parameters have been set to ensure the best service can be delivered for the most number of people, making sure Sydney Metro West provides value for money for taxpayers and costs are kept as low as possible.

Given the proposed corridor, the project will largely be an underground railway – this means building new tunnels and underground stations integrated with existing transport hubs along the route, and also creating new ones.

We want to be innovative in delivering this new railway. We will investigate how to reduce travel times between the two major centres and between economic destinations along the way – as well as servicing communities along the route with an appropriate amount of stations.

Working with the community, industry and stakeholders, the NSW Government will investigate innovative ways to deliver Sydney Metro Northwest, like value sharing, over station development and precinct development.



## OTHER PROJECTS

Sydney Metro West will be integrated with projects currently being delivered, like Parramatta Light Rail.


Beyond the Sydney Metro West corridor, opportunities to extend the line east and west will also be considered.

West of Parramatta, the Western Sydney Rail Needs study has been underway, including servicing the new Western Sydney Airport.


Sydney Metro West will be part of an integrated approach to solving the long-term transport needs of Greater Western Sydney.


The decision to build Sydney Metro West does not preclude future rail options across the growing Western Sydney region.

## KEEPING IN TOUCH

 **1800 612 173** Sydney Metro West community information line

 **sydneymetrowest@transport.nsw.gov.au**

 Sydney Metro West, PO Box K659, Haymarket NSW 1240

 If you need an interpreter, call TIS National on **131 450** and ask them to call **1800 612 173**

# APPENDIX

## Appendix A

### 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 B

### How a tunnel boring machine works

1. Grippers extend out to the rock surface. Rock is crushed by high strength alloy steel discs on the cutterhead
2. Crushed rock is scooped into the machine's head and on to a conveyor belt
3. Conveyor moves rock through the machine and out of the tunnel behind it
4. Concrete ring segments are delivered to the ring building area
5. Concrete ring is built by putting together the segments using a special vacuum lifting device
6. When complete, the ring is connected to the previous ring
7. The gap between the concrete ring and the rock is filled with grout – this helps keep water out of the tunnel
8. The machine moves forward about 1.7 metres then the process starts again

## Appendix C

### Key Sydney Metro facts

- Stage 1 – Sydney Metro Northwest opens in 2019
- Stage 2 – Sydney Metro City and Southwest opens in 2024
- Sydney Metro West – Late 2020's
- 98 per cent on time running reliability
- Ultimate capacity – A train every two minutes each way under the CBD
- Continuous mobile phone coverage through the network
- No timetable – customers will just turn up and go
- Opal Ticketing

### Train features

- 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

[sydnymetro.info](http://sydnymetro.info)

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



Printed on environmentally responsible paper manufactured using Elemental Chlorine Free (ECF) pulp sourced from certified, well managed forests.

Information in this document has been prepared in good faith and is correct at the time of printing, September 2017.  
© Sydney Metro 2017