

The background of the entire page is a photograph of a tunnel boring machine (TBM) cutterhead. The cutterhead is a large, circular metal structure with numerous cutting tools, including scrapers and scrapers, arranged in a radial pattern. It is shown in a close-up, slightly angled view, with a concrete tunnel wall visible on the left. The foreground is filled with large, light-colored rock fragments that have been cut by the machine.

Sustainability Report 2017

About this report

The Sydney Metro Sustainability Report 2017 outlines our sustainability performance by providing a snapshot as of June 2017, focusing on environmental and socio-economic outcomes.

As the first sustainability report to be produced by the Sydney Metro Delivery Office, this report addresses performance data from the commencement of the Northwest project in 2011 through to 30 June 2017. The report demonstrates how sustainability requirements are helping to shape the successful delivery of the Sydney Metro program of works, with a focus on the Northwest project as the most advanced project.

Public reporting on our sustainability performance will become an important regular feature of the organisation.

For feedback, questions or additional information about this report, please contact:
SydneyMetro.Sustainability@transport.nsw.gov.au

Front cover image: Tunnel boring machine (TBM) on the Sydney Metro Northwest project

Table of contents

1	Sydney Metro program of works	12
2	Sydney Metro Northwest	14
3	Sydney Metro City & Southwest	17
4	Governance	18
5	Measuring sustainability performance	22
6	Environmental sustainability	26
7	Socio-economic sustainability	46
8	Progress on City & Southwest	64
9	Planning for the future	69
10	Awards and recognition	70
	Appendix A	72
	Appendix B	74
	Appendix C	75



Workers on site at the Sydney Metro Train Facility under construction at Cudgegong Road.



Above: NAIDOC Week (National Aborigines and Islanders Observance Committee Week) celebrations at Sydney Metro Community Information Centre, Castle Hill, July 2016.
Right: Digital Aboriginal artwork by Dedoma: Artwork is on display at the Sydney Metro Macquaire Park office.



Acknowledgment

Sydney Metro would like to acknowledge and pay respect to the Dharug people of the Bidigal, the Barramatagal, the Tungargal, and the Burubarungal clans as the traditional custodians of the land the program is being delivered upon, forming part of the wider Dharug Nation.

Sydney Metro acknowledges and would like to pay respect to past and present Elders, and extend that respect to all Aboriginal, and Torres Strait Islander people who reside on or near Sydney Metro projects.

Foreword

Australia's biggest public transport project is well on its way, and will revolutionise how we get around our great city for generations to come. From the first half of 2019, this world-class mass transit system will help Sydney become a more liveable city.

The journey in delivering Sydney Metro has taken the better part of this decade; a journey that has been meticulously planned, reviewed and adjusted to get the best outcomes for our customers and our communities.

From day one in 2011, delivering a sustainable new railway for Australia's biggest city has been at the heart of Sydney Metro. We've worked together with the community to shape Sydney Metro; indeed community feedback has helped refine and define the projects, delivering better outcomes and better benefits. Through careful planning we have made – and are still making – choices that set new benchmarks for the delivery of sustainable infrastructure.

Sydneysiders will enjoy the practical benefits of a transport system that places high priority on sustaining the environment for ourselves and for future generations. But more than this, we are supporting social and economic sustainability. Safety is our number one priority, for our workers and the general public.

We are working hard to support our city's economic growth. We are supporting people seeking training and jobs. We are supporting communities and people from varied backgrounds, and we are successfully improving the quality of life for many people.

Our sustainability strategies are an integral part of our vision – to deliver a product for the customers of today, and leave a legacy for generations to come. As such a large program of works, we recognise our ability to influence industry and set new benchmarks and standards in environmental and socio-economic spheres. Sydney Metro benchmarks against international best practice, and we are leading the way in Australia – shaping sustainability in the transport sector not only within government but wider industry.

Welcome aboard the largest urban rail infrastructure investment in Australian history.

Tom Gellibrand

Acting Program Director
Sydney Metro Delivery Office



Our approach

Sydney Metro is Australia's biggest public transport project. It is made up of:

- › Sydney Metro Northwest (in the construction phase and moving towards operational readiness) (see page 14)
- › Sydney Metro City & Southwest (major construction activity has started in the Sydney CBD) (see page 17)
- › Sydney Metro West (in early development).

This Sustainability Report 2017 primarily focuses on the Northwest project, being the most progressed. In due course, sustainability reporting will cover the entire Sydney Metro program. The report outlines Sydney Metro's sustainability performance to date, and highlights key benefits for our stakeholders: our future customers, contractors, workers and the wider community. Through the case studies there is a focus on the tunnelling activities. Tunnelling on Sydney Metro Northwest has been a significant part of activities to date, and has allowed for great innovation in the areas of occupational health and safety, workforce development and spoil management.

The Sydney Metro Sustainability and Environment Policy (see page 19) outlines our commitment to minimising environmental impacts, while maximising socio-economic benefits. This commitment is supported by the project sustainability strategies, which ensure sustainability is embedded in all aspects of project activities and seamlessly integrated into the design, procurement, delivery and operational processes.

Sydney Metro is committed to delivering reliable and innovative infrastructure and best practice in sustainability. Sustainability underpins our core program objectives, with a holistic approach that considers the environment (short, medium and long-term), and safety, wellbeing and socio-economic advancements to the community.

Sydney Metro considers that minimising our environmental impact and footprint across a project lifecycle – while maximising socio-economic benefit – is good for business.

From day one, Sydney Metro has placed environmental and socio-economic contractual requirements on our Principal Contractors and other partners that were beyond business as usual. Working hand-in-hand, our contractors and staff across the program have been able to deliver on these requirements, and at times exceed expectations. See page nine for key highlights up to 30 June 2017.

As we look back at our journey since 2011, Sydney Metro's efforts can be identified as:

- › leading the infrastructure sector
- › minimising or mitigating our impact during delivery
- › minimising or mitigating our future impacts during operation
- › innovating and seeking transformative opportunities to leave a lasting legacy for future generations, and for the community.

Such a large program of works has the ability to influence industry and set new benchmarks in environmental and socio-economic spheres. Benchmarked against international best practice, the organisation is leading the way in Australia and shaping sustainability in the transport sector not only within government but across wider industry.

Northwest sustainability highlights

Construction

During tunnelling activities, **2.5 million cubic metres of spoil** were excavated – enough to fill nearly **1,000 Olympic size swimming pools**



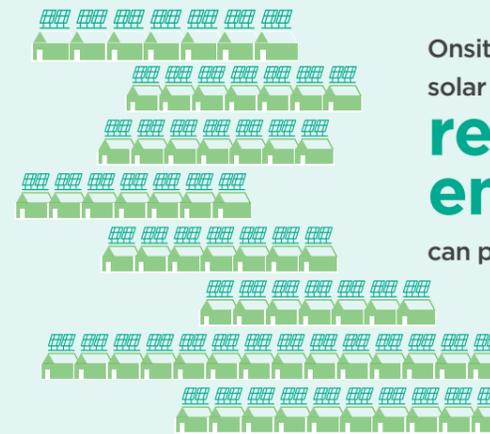
100%

of clean spoil has been beneficially reused

1100 households (220,000 kilolitres) of potable water usage saved during construction through the use of non-potable water sources



Operational



Onsite solar panel

renewable energy



system Sydney Metro Trains Facility

can power up to

267 households over 1.5 million kilowatt hours per year



95% of construction and demolition waste has been recycled (over 64,000 tonnes)

350 Australian & New Zealand

small-to-medium enterprises in the supply chain



Pedestrian and cycling connections will make walking and cycling easier, resulting in health benefits to customers

240 secure



bicycle parking space will be delivered

More than 13,000 Aboriginal artefacts, some dating back 4,500 years were catalogued and preserved for future generations



Over 1400 new sustainable jobs –

providing employees with sufficient experience to achieve future employment



100%

of the **operational electricity**

for the Northwest project will be offset

(this is estimated at 134 gigawatt hours a year)



Three major sustainable development awards won,

including the Premier's Award for making NSW A Better Place to Live.

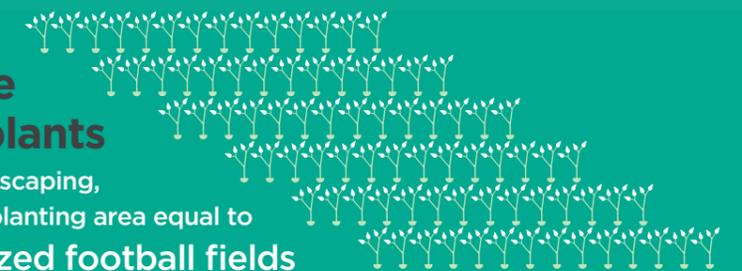
Over 15.9 million hours worked

with a commitment to sending everyone home safely



Nearly one million plants

used in landscaping, covering a planting area equal to **34 full sized football fields**



As of June 2017



Our values drive the direction and vision for Sydney Metro, and are integral to the organisation's ongoing success.



EXCELLENCE

Sydney Metro takes pride in being customer centric. The program is efficient and adaptable, making timely risk informed decisions. Together Sydney Metro aims for excellence in delivery and a sustainable future.



ACHIEVEMENT

To meet priorities, and deliver outcomes for customers and stakeholders, at Sydney Metro staff and Senior Executive support one another holding each other accountable, being adaptable and always ready to take ownership.



INTEGRITY

Sydney Metro listens and acts with integrity, respect decisions and opinions of others and promotes mutual respect and trust.



SAFETY & WELLBEING

Sydney Metro thinks 'safety' and acts safely, striving for healthy work life balance and extending a caring approach to colleagues, the environment and the community in which Sydney Metro works.



COLLABORATION

Sydney Metro creates positive relationships - proactively solving problems and achieving successful outcomes with each of our colleagues, customers, stakeholders and partners.



INNOVATION

Sydney Metro is cutting edge, creative and forward thinking. Delivering sustainable and innovative solutions, the program is committed to continual improvement.

1. Sydney Metro program of works

Sydney Metro is Australia's biggest public transport infrastructure project and is being delivered by the Sydney Metro Delivery Office within Transport for NSW.

The new stand-alone metro network will revolutionise the way Australia's most populous city travels. The current 4.3 million population of Sydney is projected to increase to 6.2 million by 2036. Employment is expected to increase from its current level of 2.1 million workers to 3.1 million by 2036, with rail network demand expected to increase 41 per cent by 2026.

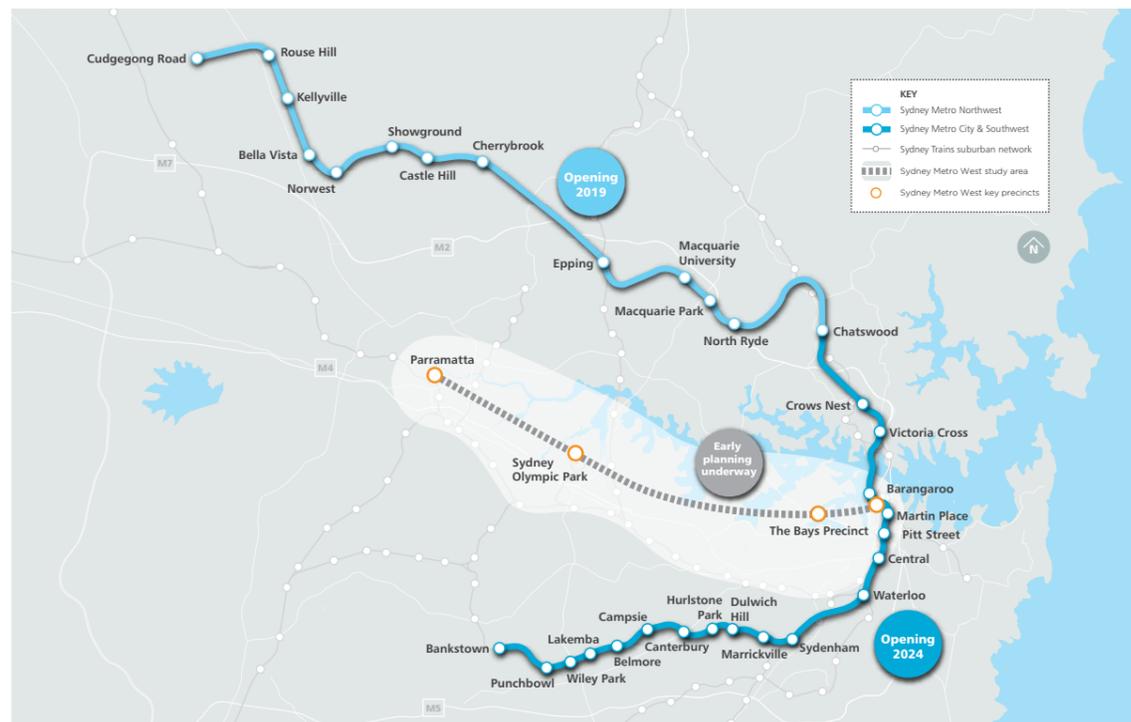
To support this growth, the New South Wales (NSW) Government is focused on increasing the capacity, availability and accessibility of its public transport network.

The majority of this growth is expected to occur in western Sydney. With this vision in mind the NSW Government tasked the Sydney Metro Delivery Office with connecting Sydney's North West with the South West through Sydney's central business district (CBD) and beyond.

The Sydney Metro Northwest and Sydney Metro City & Southwest projects will deliver 31 metro stations and 66 kilometres of new metro rail – transforming the way people move around Sydney.

The Sydney Metro program is made up of:

- › Sydney Metro Northwest is under construction, rapidly moving towards operational readiness in the first half of 2019.
- › Sydney Metro City & Southwest project has seen construction works commence in 2017, which is expected to be completed in 2024.
- › Metro West is in the early stages of design and project development.



Sydney Metro has a clear vision for its projects to demonstrate environmental and socio-economic best practice during construction and operation. Sustainability underpins the core project objectives and is integrated across all project stages.

Sydney Metro will make a positive contribution to Sydney by improving connectivity and access to employment opportunities, education and health precincts, retail and commercial centres, and green open spaces. The projects will help meet expected demand caused by population increase over coming decades, delivering a safe, reliable, and sustainable product.

Sustainably linking Sydney's North West, and South West, through the CBD with a vision for the future.

Economic benefits

The program will boost economic activity by more than \$5 billion a year along the 66-kilometre route. By creating better connectivity and opening up land development opportunities, business logistics will be greatly improved, particularly for knowledge-based businesses.

Sydney Metro will deliver this major economic boost by:

- › improving access to jobs
- › changing the way people move about the city and reducing congestion
- › allowing people to travel from one key centre to another in minutes
- › enabling housing and employment growth along Sydney's Global Economic Corridor in the North West and in Bankstown.

About 60 per cent of people will work in the Global Economic Corridor, which stretches from Norwest and Parramatta to Macquarie Park, through Chatswood, North Sydney and the Sydney CBD, and on to Sydney Airport. Sydney Metro will connect people across Sydney to these jobs.

To support this growth, NSW will require infrastructure to support 40 per cent more train trips, 30 per cent more car trips and 31 per cent more households. Sydney Metro is identified as a key infrastructure project as part of the NSW Government's infrastructure investment program



The NSW Government is committed to the creation of 150,000 new jobs by 2019, one of the NSW Premier's 12 key priorities.

Through investment in infrastructure such as Sydney Metro, new jobs and apprenticeships are being created from the construction sector, delivering huge flow-on benefits to productivity, wages and the state's overall economic performance.

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



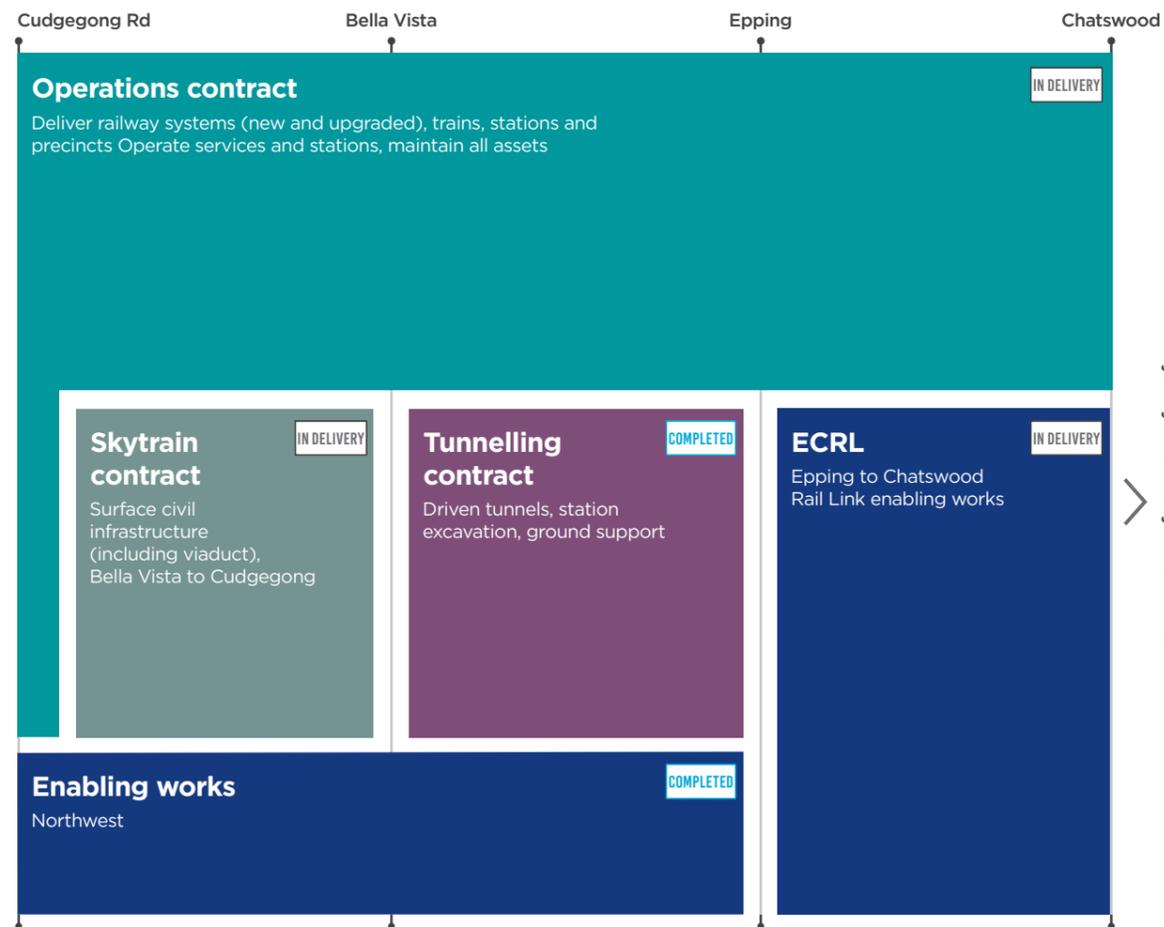
Artist's impression of Kellyville Station

2. Sydney Metro Northwest

The \$8.3 billion Sydney Metro Northwest is the first stage of Sydney Metro, stretching from Rouse Hill to Chatswood. The first fully automated metro rail system in Australia will deliver eight new railway stations, five upgraded stations, 4000 commuter car spaces, 36 kilometres of new metro rail and a reliable public transport service to a region with the highest car ownership levels per household in Australia. A Northwest Sustainability Strategy was developed in 2012, outlining key strategic objectives for the project.

Three Principal Contractors have been engaged to deliver the Northwest project. The construction of Sydney Metro Northwest is meeting its set sustainability targets - leading Australia in best practice. Passenger services start in the first half of 2019.

The contract packages for the Sydney Metro Northwest project as at 30 June 2017 are:



Artist's impression of Kellyville Station from above



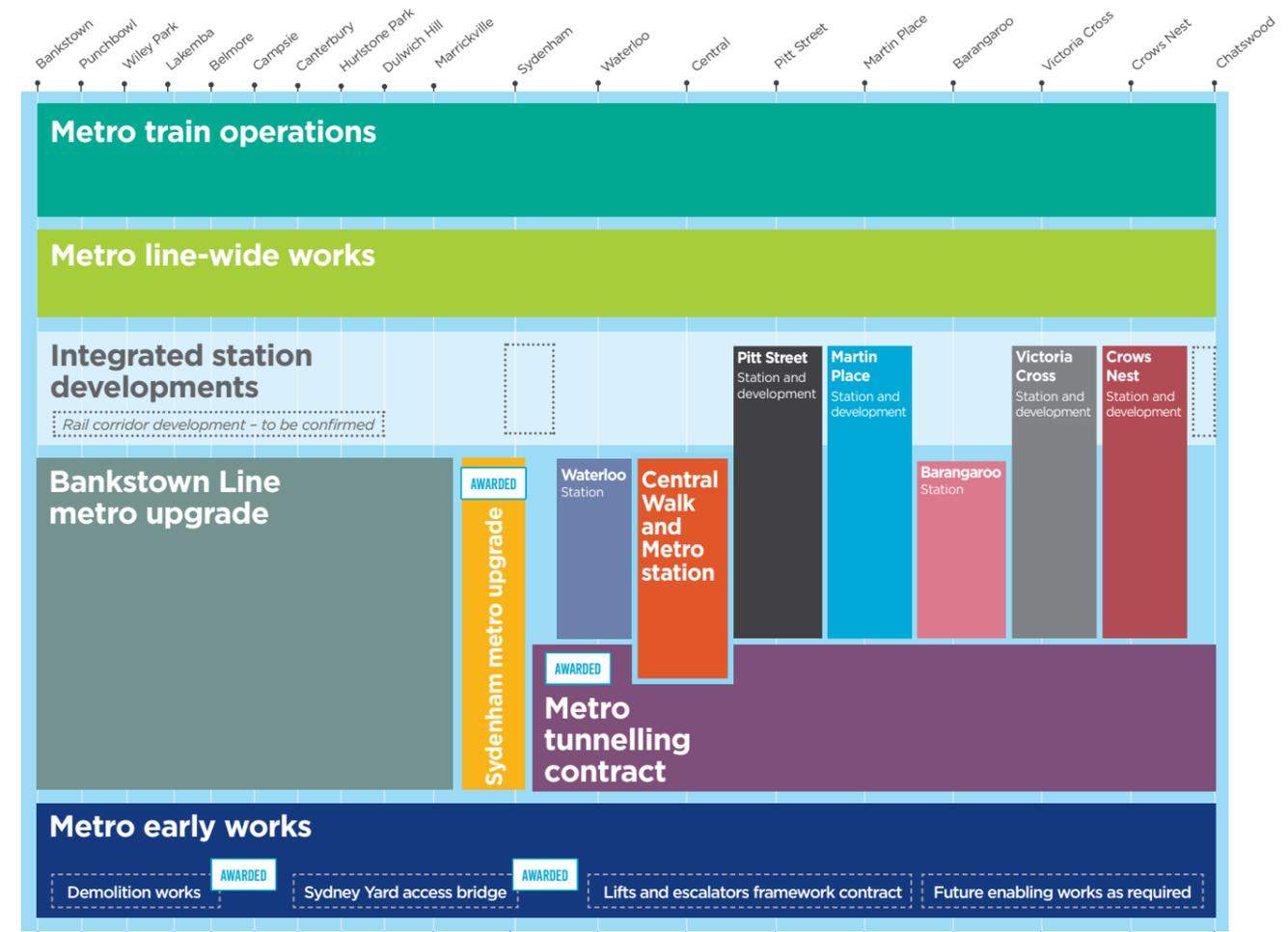


3. Sydney Metro City & Southwest

The Sydney Metro City & Southwest project extends into the Sydney CBD and beyond to Bankstown. It will be delivered through multiple contract packages. The City & Southwest Sustainability Strategy is available on the Sydney Metro website at sydneymetro.info.

The project is made up of several large and small contract packages, varying in complexity. As at 30 June 2017, the Metro tunnelling contract, Sydney Yard access bridge (SYAB), and Demolition works contracts have been awarded.

City & Southwest contract packages are:



Artist's impression of Victoria Cross Station precinct

4. Governance

Our organisation

The sustainability function within Sydney Metro sits within the Safety, Sustainability and Environment team. The team is across all areas of the program including:

- › environmental and social policy and systems development
- › business case development and procurement
- › commercial and transaction processes
- › contract management and assurance processes
- › planning approvals and compliance
- › skills and industry participation.

Sustainability resources are embedded across the project lifecycle with key specialists in areas such as acoustics, land management, and heritage.



Workers 21 metres under Norwest Boulevard at Bella Vista; concreting metro railway tracks in the city-bound tunnel

Our policy

The Sydney Metro Environment and Sustainability Policy was developed to encompass Sydney Metro's commitment to sustainable outcomes on projects. The policy was endorsed by the Sydney Metro Executive in 2011, during the first year of the Northwest project and has been reviewed every two years to ensure any new initiatives, lessons learned, and developments are captured.

Sydney Metro has adopted a holistic approach with the aim of achieving new benchmarks in infrastructure delivery. Sustainability is reinforced in all core program and project areas, and is integrated across all stages - planning, design, procurement, construction, operation, and maintenance. The focus is driven through strategies that provide successful social, economic and environmental outcomes.

Sydney Metro's approach to safety and wellbeing is governed by the Health and Safety Strategic Plan (2016-19), which is aligned with the Transport for NSW's Safety Strategic Plan 2015-2018.

“ We are excited about the benchmarks in sustainability we could achieve in transport infrastructure and look forward to sharing these achievements with our customers and key stakeholders. ”

Rodd Staples

Former Program Direct 2011-November 2017
Northwest Rail Link Sustainability Strategy 2012



Environment
& Sustainability
Policy



This Policy reflects a commitment in our delivery of the Sydney Metro program to:

- Align with, and support, Transport for NSW (TfNSW) Environment & Sustainability Policy.
- Optimise sustainability outcomes, transport service quality, and cost effectiveness.
- Develop effective and appropriate responses to the challenges of climate change, carbon management, resource and waste management, land use integration, customer and community expectation, and heritage and biodiversity conservation.
- Be environmentally responsible, by avoiding pollution, enhancing the natural environment and reducing the project ecological footprint, while complying with all applicable environmental laws, regulations and statutory obligations.
- Be socially responsible by delivering a workforce legacy which benefits individuals, communities, the project and industry, and is achieved through collaboration and partnerships.

To deliver on these commitments, the Sydney Metro team will:

Industry leadership

- Implement coordinated and transparent decision making, by engaging with stakeholders and suppliers, encouraging innovation and demonstrating sustainability leadership.
- Explore new benchmarks for the transport infrastructure sector by requiring high standards from our designers, contractors and suppliers, building on experience gained through development of Sydney Metro Northwest.

Community and customer

- Provide accessible, safe, pleasurable, and convenient access and transport service for all customers.
- Establish positive relationships with community and stakeholders to maximise opportunities to add value to local communities.

Land use integration and place making

- Create desirable places, promote liveability and cultural heritage, and optimise both community and economic benefit.
- Balance transit oriented development opportunities with stakeholder expectations.

Embedding environmental and social sustainability

- Establish robust sustainability objectives and targets.
- Maintain an environmental management system that is integrated into all our project activities.
- Ensure thorough and open environmental assessment processes are developed and maintained.
- Develop and maintain an environmental management framework to embed best practice pollution management and sustainable outcomes during construction.
- Apply effective assurance processes to monitor performance against the project environment and sustainability objectives and identify appropriate reward or corrective action, as required.
- Apply environment and sustainability specific processes to the procurement of delivery activities.

Accountability

- Undertake public sustainability reporting.
- Hold employees and contractors accountable for proactively meeting their environmental and social sustainability responsibilities.
- Provide appropriate training and resources necessary to meet our responsibilities.

Rodd Staples
Program Director, Sydney Metro

Our strategies

Sustainability has been a key part of the Sydney Metro story from day one and continues to help define the success of the program. Embedding requirements from an early stage into project development and contracts has been key to Sydney Metro's success in developing and implementing best-practice standards.

Sydney Metro sustainability strategies provide the framework for effective management of sustainability. The strategies respond to the *Transport Administration Act (1988 NSW)* and Transport for NSW (TfNSW) Policy, which requires public transport agencies to 'promote the delivery of transport services in an environmentally sustainable manner'.

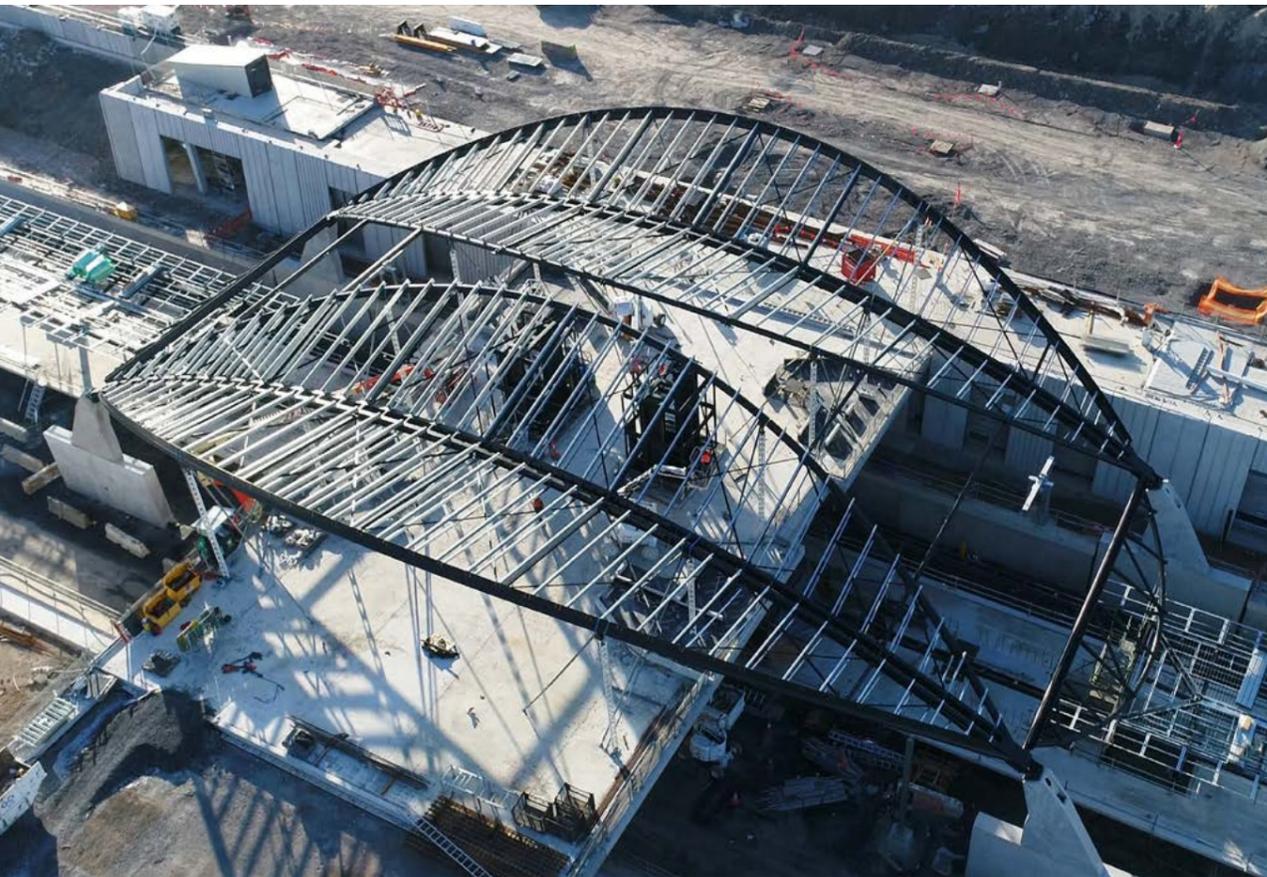
Northwest

In 2011, the Northwest Sustainability Strategy (formally the Northwest Rail Link Sustainability Strategy) was developed and key objectives and targets were embedded into contractual documentation. The Northwest Sustainability Strategy was finalised in October 2011 and outlines 43 targets, and 14 key themes.

The Strategy benchmarked initiatives and targets against similar world-leading infrastructure projects through a study of 32 international projects and eight organisations. This enabled key sustainability initiatives to be embedded into contractual documentation. For a complete list of targets refer to Appendix A, which details the sustainability performance of the Northwest project against strategy targets.

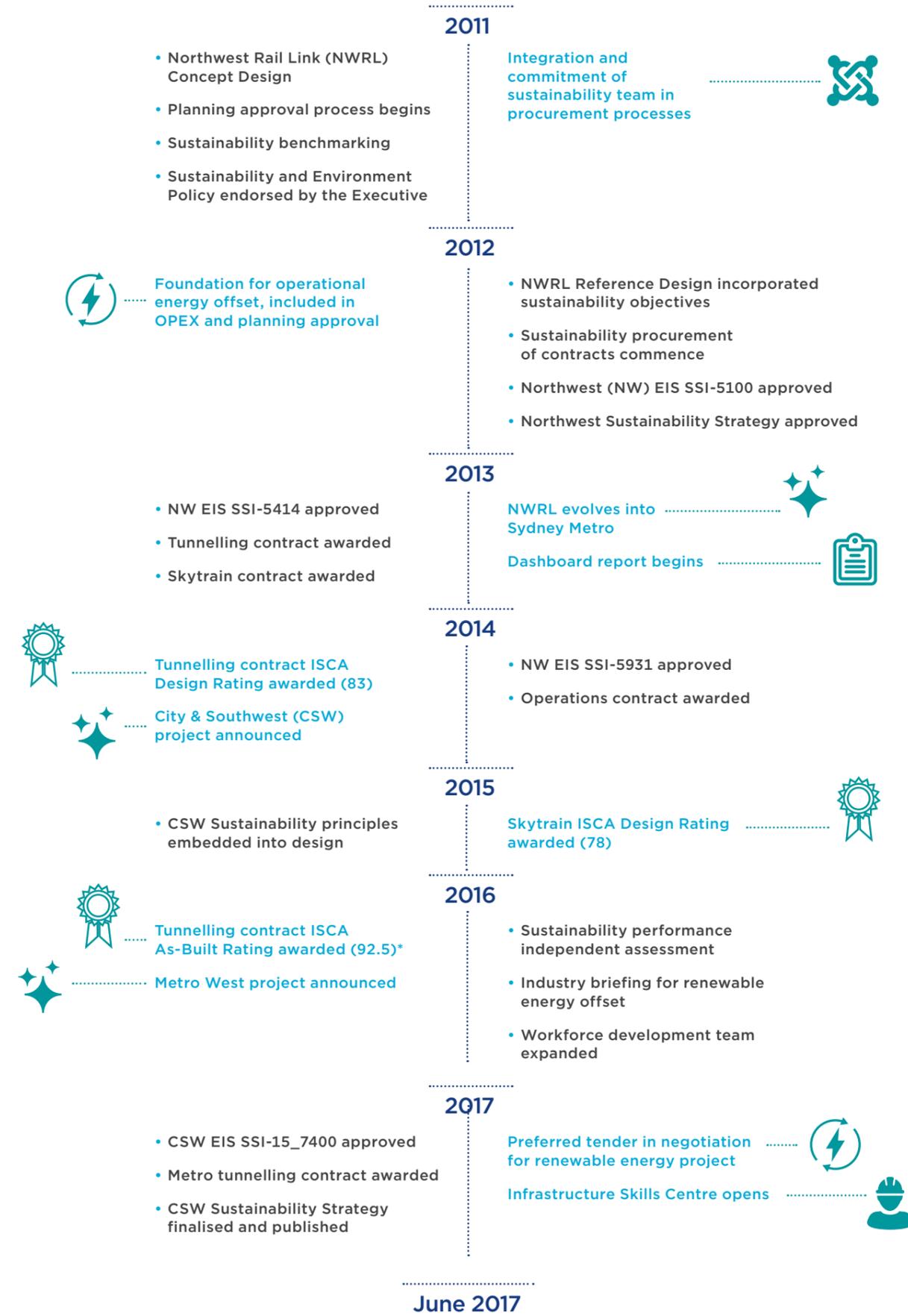
City & Southwest

Sustainability on the Sydney Metro City & Southwest project has been modelled on the Northwest project, incorporating lessons learned, and responding to location-specific opportunities and constraints. Strategic objectives outlined in the City & Southwest Sustainability Strategy have been built into each contract package that will deliver key components of the project. The Strategy is publicly available at sydneymetro.info.



Cudgegong Road Station under construction

Our sustainability story



*Highest awarded IS As-Built rating to date

5. Measuring sustainability performance

Sustainability performance is measured against targets and rating tools that are agreed to by Principal Contractors in advance during the procurement process. The focus of this section will be the Northwest project.

The Northwest Sustainability Strategy incorporates:

- › the Infrastructure Sustainability Council of Australia's (ISCA) Infrastructure Sustainability (IS) rating scheme
- › Transport for NSW's Sustainable Design Guidelines (SDGs).

These rating systems have helped provide a robust framework to quantify performance, as described below.

ISCA Infrastructure Sustainability rating

Sydney Metro Northwest requires Principal Contractors to register with the ISCA IS rating scheme and to achieve a minimum 'Excellent' rating – in other words, a minimum score of 65.

Northwest contracts registered for the IS rating scheme to date are the tunnelling contract, skytrain contract, and operations contract. As of 30 June 2017, only the tunnelling and skytrain contracts have been assessed under the IS rating scheme.

	Targeted rating and certification	Design rating	As-built rating	Operational rating
Tunnelling	65 'Excellent'	83 'Leading'	92.2* 'Leading'	Not applicable
Skytrain	65 'Excellent'	72 'Leading'	Targeting 65	Not applicable
Operations	65 'Excellent'	Targeting 65	Targeting 65	To be assessed

*As-Built rating award to tunnelling contract (92.2 Leading) is highest award IS As-Built Rating to date. ISCA Rating targeted and awarded for Sydney Metro Northwest.

Sustainable Design Guidelines

Transport for NSW's Sustainable Design Guidelines are used by the design and project teams in Northwest. Through each stage of the project, contractors are required to confirm that the number of initiatives incorporated into project works complies with the percentage required under the guidelines for compulsory and discretionary initiatives.

Contractors are expected to reach a minimum 'Gold' rating – 100 per cent of compulsory requirements and minimum 80 per cent of discretionary requirements.

As of 30 June 2017, the tunnelling contract contractor has submitted documentation for a final SDG rating due to the stages of delivery reached for each contract.

Target	Tunnelling	Skytrain	Operations
100 per cent compulsory and 80 per cent discretionary	Platinum*	To be assessed	To be assessed

*'Platinum' rating equates to 100 per cent compulsory and above 90 per cent discretionary.



Aerial view of Sydney Metro Trains Facility under construction at Rouse Hill



Independent assessment

Sydney Metro commissioned an assessment to assess performance against sustainability themes and targets established in the Sydney Metro Northwest Sustainability Strategy (October 2012). At the time of assessment, only the Sydney Metro Northwest project was in construction. The independent assessment involved interviewing key personnel, reviewing documentation and data, and assessing contractor requirements.

Findings indicated that of the 43 performance targets established for the Northwest project, 36 were being met or on track to be met; there were six targets where the overall intent of the target was being met; and one target that was no longer applicable.

Breakdown of the sustainability targets being met



The independent assessment concluded that the scope of the Northwest Sustainability Strategy and the performance of Sydney Metro Northwest was in keeping with international best practice for similar projects.

Refer to Appendix A for a detailed analysis of the independent assessment of Sydney Metro Northwest.

Bridge work at Kellyville, delivering community benefits by reducing construction impacts

6. Environmental sustainability

Sydney Metro, as a long-term program, recognises that the environment will be affected by construction and operation now and into the future. Sydney Metro is focused on minimising impacts through:

- › avoiding and reducing energy demand, while maximising energy efficiency
- › maximising carbon offsetting, and mitigating climate risk
- › minimising the wastage of water
- › taking a responsible approach to supply chain procurement
- › minimising impact on the physical environment.



A 1.1 megawatt (MW) solar photovoltaic array has been built on top of the Sydney Metro Trains Facility at Rouse Hill.



95 per cent of all construction and demolition waste – in excess of 64,000 tonnes of material to date – has been recycled.



Nearly 900,000 native plants are being procured to landscape over 80 hectares of land around stations.



Diligence with environmental compliance procedures has ensured that there have been no significant pollution or non-compliance events to date.



The skytrain being installed above Samantha Riley Drive at Kellyville: massive concrete segments weighing up to 90 tonnes were put in place at night to minimise impacts on the road network.

Energy and carbon

Sydney Metro is committed to:

- › improving the shift towards using low carbon transportation
- › reducing operational, construction and embodied carbon emissions where feasible
- › identifying low carbon energy generation and procurement solutions.

Sydney Metro Northwest is adopting energy efficient design and construction, including reducing fuel usage, as an ongoing objective.

All Sydney Metro contractors are applying the energy management hierarchy to reduce energy demand during design, construction and operation. This hierarchy involves working through a series of steps to address energy management and greenhouse gas emissions through the course of delivery.

Key targets – status to date

100 per cent operational electricity offset	<i>On track</i>
Minimum 5 per cent operational energy demand* sourced from onsite renewables	<i>On track</i>
20 per cent construction electricity offset	<i>On track</i>
10 per cent reduction on operational electricity demand	<i>On track</i>

*only applies to operational energy demand from stations, maintenance facilities and carparks



Preparing the roof of the Sydney Metro Trains Facility to install the 1.1 megawatt (MW) solar array

Construction energy use

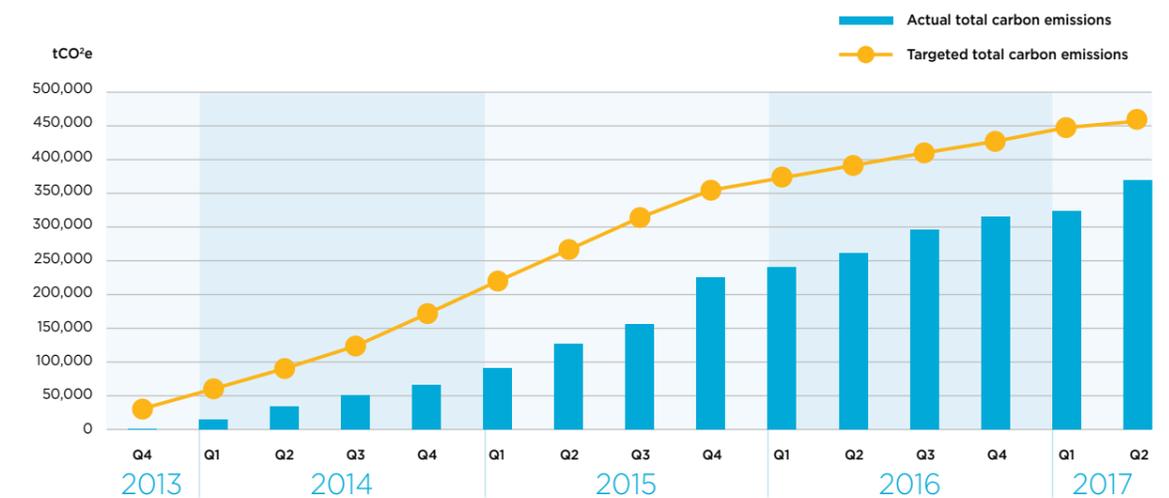
Sydney Metro Northwest has set targets for all Principal Contractors on electricity and fuel usage for construction activities. In addition, a minimum of 20 per cent of the total electricity required for construction activities is to be offset through either one or a combination of options – the purchase of renewable energy and/or carbon offsets. The intent of these targets is to minimise the carbon footprint of construction activities.

- › The tunnelling contract has sourced GreenPower from Energy Australia equivalent to 20 per cent of the electricity used for construction use.
- › The skytrain contract has purchased carbon offsets equivalent to 20 per cent of construction electricity use.
- › The operations contract is sourcing GreenPower for high-voltage and low-voltage construction electricity use (to be finalised in 2019).

As of June 2017, carbon emissions from fuel, electricity and materials associated with construction activities for these three contracts were on track to achieve the set targets.

Carbon emissions

Fuel, electricity and materials (cumulative)



Embodied energy

'Embodied energy' refers to the energy that goes into producing manufactured materials, such as concrete and steel. The energy used to manufacture these key building materials produces greenhouse gases and leaves behind a carbon footprint.

Concrete and steel comprise the majority of materials used on the project by volume, with 1,100,000 tonnes and 48,000 tonnes consumed as at June 2017.

Contractors have undertaken life-cycle assessments for all concrete and steel used in the construction of permanent and temporary project works. These life-cycle assessments have informed the selection of appropriate low environmental impact materials. Where practical, the amount of cement used has been reduced so as to minimise embodied carbon emissions, with a focus on using low environmental impact alternatives and recycled concrete and aggregate. Contractors have been encouraged to prioritise the use of pre-cast elements which resulted in less waste being generated and less energy being used in construction compared to concrete cast in-situ.

Portland cement is a key greenhouse gas intensive material used in concrete, and the proposed quantities used have been reduced by more than 30 per cent. This reduction was achieved through the use of supplementary cementitious material such as fly ash and ground granulated blast furnace slag, which are waste by-product from other industries.

Energy efficiency: stations, Sydney Metro Trains Facility, and rolling stock

In designing the systems that make up Sydney Metro Northwest, energy efficiency and management frameworks were embedded from the beginning. This has resulted in cohesive designs that are energy efficient and will perform against strict criteria.

Sydney Metro Northwest stations are more than just the structures that shelter customers from the elements. The canopies serve multiple functions to enhance the sustainability performance of stations. The canopies are specially designed to:

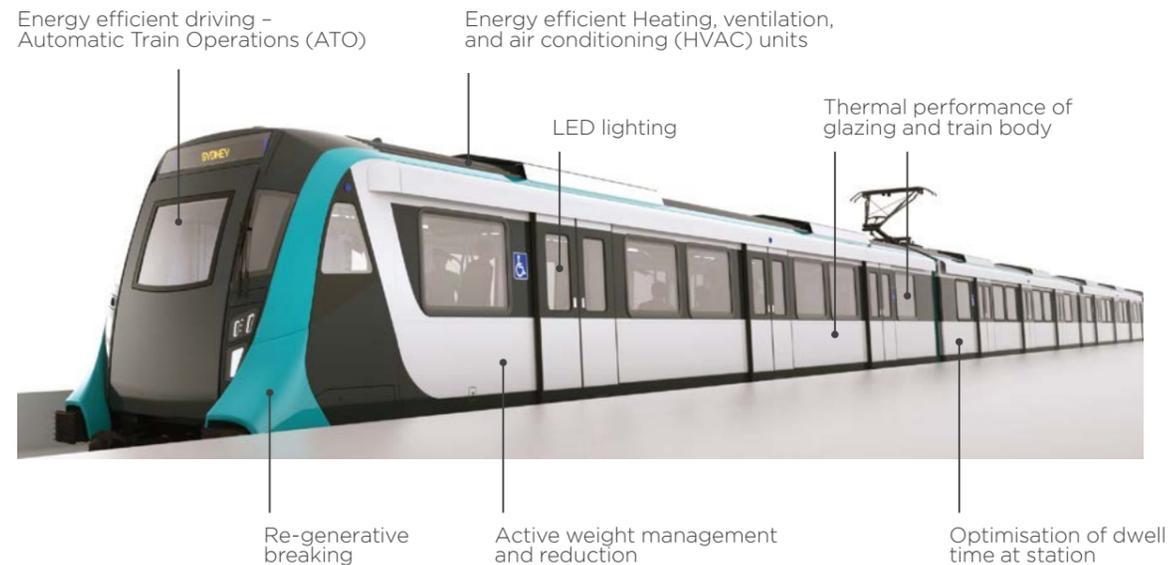
- › enable solar access for natural lighting, so as to minimise artificial lighting usage
- › utilise heat reflective materials and natural ventilation to reduce the reliance on mechanical systems for air quality and control
- › harvest rainwater for onsite uses, such as irrigation and toilet flushing.

Where artificial lighting and mechanical systems (such as air conditioning systems) are the only option, the stations are being designed to achieve a minimum 10 per cent improvement on the energy efficiency performance stipulated in the Building Code of Australia.

Sydney Metro trains (rolling stock) have been designed with key energy efficiency features to minimise energy demand and use, as shown in the image below.

These design features include a system of regenerative braking to reduce the amount of energy consumed in traction. Regenerative braking occurs when energy from braking is captured back into the trackside powerlines (rather than being simply being lost as heat) and passed on to power another metro train within range. This technology has the potential to save 31 per cent energy used during peak operation, and 14 per cent during off-peak operation.

The Sydney Metro Trains Facility at Rouse Hill will serve as the stabling and maintenance facility for the trains, and also the administration and operational control centre for Sydney Metro.



DID YOU KNOW ?

The primary raw material in Portland cement is usually limestone, which is heated at high-temperatures with ground clay and fed into a rotary kiln. This process results in clinker. More than half of the emissions from cement making are a result of heating limestone. On average to make one tonne of cement it takes 0.87 tonnes of greenhouse gas emissions. Sydney Metro is working to minimise greenhouse gas emissions by using alternative to clinker where possible.

The maintenance workshops are designed to minimise energy use for heating, cooling and lighting through: north-facing glazing which provides shading from the sun in mid-summer, an articulated façade which incorporates dampered louvres for controlled natural cross-ventilation, and extensive natural lighting.



Construction taking place at Sydney Metro Trains Facility

The administration building is being designed to achieve:

- › A 4 Star Green Star rating
- › 4½ star NABERS Energy – Whole Building rating
- › 4½ star NABERS Water rating
- › 4½ star NABERS Waste – Whole Building rating

Operational energy

The operations contractor is developing a model to optimise operational energy use. This model will forecast the operational electricity demand, set a baseline for electricity use, and monitor the efficient use of energy during the operation of Sydney Metro Northwest. The current estimated demand is 134 giga-watt-hours per annum.

Onsite renewables

The north-facing rooftop of the maintenance building located within the Sydney Metro Trains Facility will house a 1.1 megawatt (MW) solar photovoltaic system. This solar array will meet the project target of sourcing: 5 per cent of stations, 10 per cent of Sydney Metro Trains Facility and station precincts operational electricity (low voltage) from onsite renewable sources.

Offsite renewables

Sydney Metro is committed to offsetting 100 per cent of operational electricity for the Northwest project. Currently the project is finalising the procurement process for this offset.

Key targets – Status to date

Undertake climate change risk assessment	<i>On track</i>
Identify and implement adaptation measures	<i>On track</i>
Address all extreme, high, and medium climate change risks	<i>On track</i>

Early identification of climate change risks

Sydney Metro is aligned with the NSW Government’s commitment to take effective action on climate change and to make NSW more resilient to a changing climate. Accordingly, the design and build of the Sydney Metro system addresses the likely impacts of climate change risk over the life of the railway line, and builds in appropriate resilience and future flexibility.

From its inception, Sydney Metro has recognised the importance of early identification of the risks that the changing climate can pose to long-term infrastructure assets. As such, climate change risks have been identified and addressed from early stage design, with risks being revisited on an ongoing basis through project delivery.



Dawn on 28 May 2017 - the first morning where both bridge towers over Windsor Road were in place. The bridge is constructed to with stand identified climate risk.

Our approach

Sydney Metro has taken a forward-looking approach toward climate risks, such as increased flooding and extreme temperature events. For example, the design process for Sydney Metro Northwest has involved careful consideration of the adaptability and resilience of the project not only in the near-term (2030) but the long-term (2070).

Sydney Metro Northwest undertook an assessment of climate change risks early in project development. The aim was to understand potential risks and impacts to determine appropriate measures to manage and mitigate identified risks during construction and operation.

All Principal Contractors have developed and implemented adaptation measures to address risks identified as extreme, high and medium.

The operations contractor conducts Annual Climate Change Risk Assessments and Adaptation (CCRA) reviews, which include:

- › updates of projections
- › review of design program status
- › engagement with designers
- › workshops with the operator
- › updates to the CCRA report.

This information is used to ensure appropriate design responses are made to mitigate identified climate risks. For example:

- › The potential increase in rainfall intensity and severe weather events has been included in the flood modelling. This has informed station and drainage designs, so as to ensure the safety of customers and continued operation.
- › Equipment that is critical to the safe and continuous operation of Sydney Metro Northwest is housed in dedicated temperature-controlled rooms, which are designed to deal with extreme ambient temperatures.
- › Ventilation systems for tunnels and stations are designed to maintain customer comfort during hot summer days well into the future.
- › The air conditioning units on trains are designed to cope with extreme ambient temperatures and maintain customer comfort.
- › Permeable surfaces make up the majority of the Sydney Metro Trains Facility, allowing rain to sink into the ground. Native vegetation is planted where operational requirements allow. These features help prevent local flooding and control discharge.
- › At Rouse Hill Station, for example, designers have lowered the proposed roof level and raised the façade to give customers greater protection during extreme weather events.

DID YOU KNOW ?

Key climate risks for rail infrastructure in Australia are:

- › Increases in temperature
- › Increased in rainfall intensity
- › Increased severe weather events
- › Increased frequency of bushfires
- › Reduction in overall annual rainfall.

Waste and recycling

Sydney Metro is committed to the efficient management of materials and waste. It is minimising the amount of materials used in projects where possible, and there is a heavy focus on recovering, reusing and recycling construction and demolition waste.

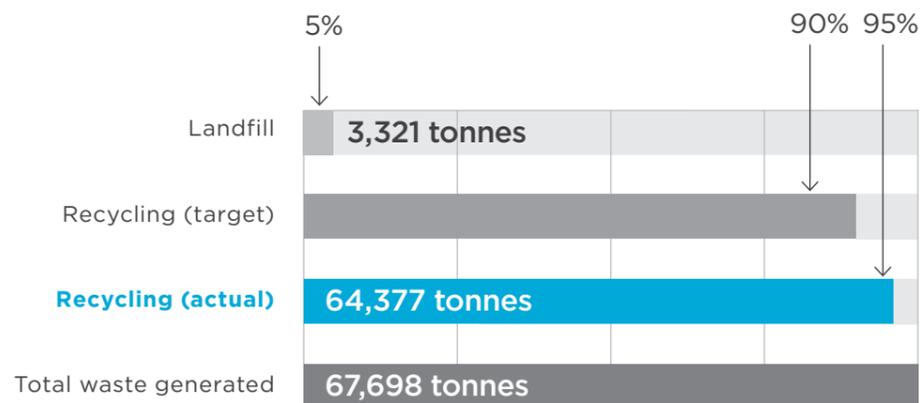
Key targets –status to date

90 per cent construction and demolition waste recycling	<i>On track, at a rate of 95 per cent</i>
100 per cent clean spoil reuse	<i>On track</i>

Construction and demolition waste management

As of June 2017, Sydney Metro Northwest has generated 67,698 tonnes of construction waste. Of this, 64,377 tonnes have been recycled (96 per cent).

Waste generation across the project



Spoil management

All clean spoil excavated during the project has been beneficially reused. Sydney Metro Northwest has been meeting its 100 per cent clean spoil reuse target. As of June 2017, 6.2 million tonnes of spoil have been reused in the project; in other developments like housing and industrial developments in Greater Western Sydney including Bunnings at Blacktown; and in an environmental project at Prospect Reservoir.

During the design process, Sydney Metro worked towards reducing the amount of spoil generated during excavation. By reducing the depth of new underground stations, 480,000 cubic metres less spoil was excavated.

DID YOU KNOW ?

The classification of spoil is based on the Environmental Protection Agency's Waste Classification Guidelines. 'Clean spoil' or 'virgin excavated natural material' means natural materials (such as clay, gravel, sand, soil or rock fines), that have been excavated from areas that are not contaminated with manufactured chemicals, or with process residues, as a result of industrial, commercial, mining or agricultural activities. Clean spoil is a highly sought after and valuable resource that has many uses.

CASE STUDY Tunnelling for the future

Large quantities of spoil were generated from underground excavation for tunnels, stations and a cross-over cavern at Castle Hill. As part of the tunnelling contract for Sydney Metro Northwest – which involved the excavation of Australia's longest rail tunnels and the building of five new underground stations, and two service facilities – approximately 4.3 million tonnes of spoil were generated. This was enough material to fill almost 1000 Olympic size swimming pools.

The soil was carefully tested at each site before excavation commenced. Any contaminated soil was separated, removed from site, and disposed of safely in accordance with planning and environmental approvals. Tunnelled spoil was also tested to ensure correct classification, which in turn determined how spoil could be best reused.

Looking for opportunities to reuse spoil was a priority for the project and a 'spoil hierarchy' was created to inform options. Those within the project were given the highest priority followed by, environmental works, other development projects, land restoration, and as a last option landfill management.



Tunnel Boring Machine breaking through at Showground Station

Spoil management hierarchy as applied to the spoil generated during the Northwest tunnelling contract

MOST FAVOURED OPTION

REDUCE

RECOVER & REUSE

SYDNEY METRO SITES

247,000 TONNES

ENVIRONMENTAL WORKS

37,000 TONNES

LAND RESTORATION

8,000 TONNES

OTHER DEVELOPMENTS

4 MILLION TONNES

TOTAL SPOIL REUSE
4.3 MILLION TONNES

LANDFILL (ONLY CONTAMINATED SPOIL)

Water use and efficiency

Sydney Metro seeks out new ways to reduce water consumption, and encourages contractors to reduce water usage and use non-potable water (non-drinking water) sources for suitable construction and operational activities.

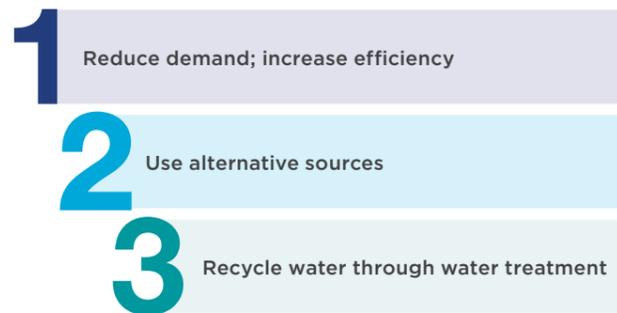
Water efficiency measures are incorporated into all designs, to ensure potable water and non-potable water savings are realised. This section looks at how water efficiency targets have been met for Sydney Metro Northwest.

Key targets – Status to date

Source 100 per cent of non-potable water demand from non-potable sources during construction	<i>Is unable to meet 100 per cent target</i>
Source 100 per cent of non-potable water demand from non-potable sources during operation	<i>Is unable to meet 100 per cent target</i>

Water efficiency hierarchy

This hierarchy has been applied during the design process to reduce the amount of water required in the operation of maintenance facilities and stations. It has also been used successfully during construction.



Water use in construction

Infrastructure construction involves significant use of both potable, and non-potable water especially during major civil works. As of June 2017, the Northwest project has used 13 per cent less than its total targeted water consumption amount, with over 840,000 kilolitres of water consumed.

Key initiatives to reduce potable water use in construction activities include:

- › use of non-potable water in concrete batching, subject to suitable quality
- › re-use of stormwater for dust suppression, wheel washing and revegetation works
- › use of recycled water during tunnel boring, on the conveyor belt.

Northwest contractors have maximised the use of non-potable water sources where possible. However, the nature of variable rainfall patterns limits on-site water capture and storage opportunities, and non-potable water demand has exceeding supply at times. This is particularly the case where connections to the Sydney Water Rouse Hill Recycle Network were not realised. The lessons learned from the Sydney Metro Northwest project have been captured and applied to the Sydney Metro City & Southwest project.

DID YOU KNOW ?

Potable water is water that is of drinking quality, while non-potable water is not. The standards that define potable water are described in the Australian Drinking Water Guidelines.



Water truck at Cudgegong Road Station site

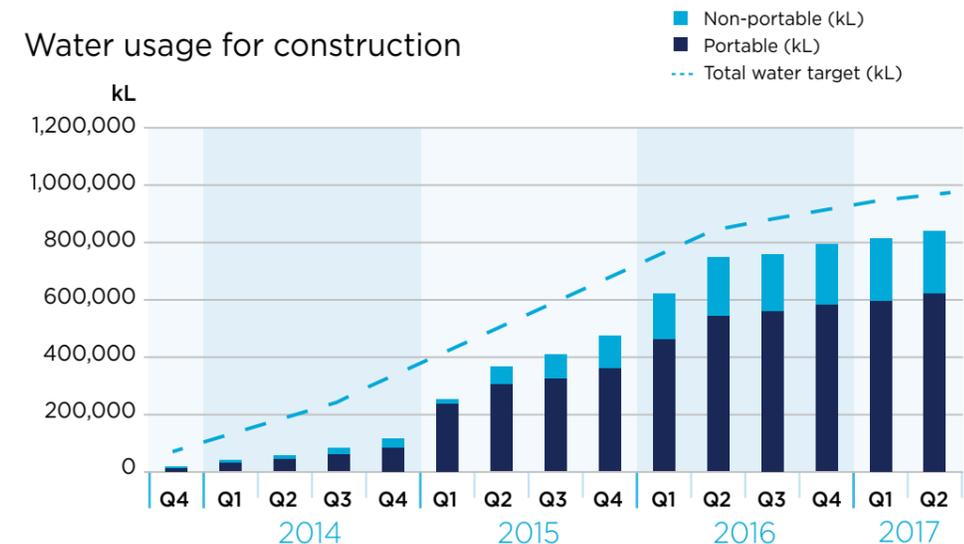
Water usage during operations

New Sydney Metro Northwest stations at Kellyville, Rouse Hill and Cudgegong Road are being connected to Sydney Water's Rouse Hill Recycled Water Network, and will use 100 per cent non-potable water for cleaning, toilet flushing and irrigation where appropriate, estimated at over 7,000 kilolitres annually.

Rainwater tanks are being installed at all new stations and the Sydney Metro Trains Facility (SMTF). The primary use for the captured rainwater is landscape irrigation. Stations that are not connected to the Rouse Hill Recycled Water Network will use captured rainwater to supply at least 60 per cent of annual non-potable water demand.

Stations have been designed to incorporate water-efficient fittings that meet high Water Efficiency Labelling and Standards – Australia's water efficiency labelling scheme.

The Sydney Metro Trains Facility will be supplied with recycled water from the Rouse Hill Recycled Water Network for all non-potable use. This is estimated at over 4900 kilolitres annually. Within the facility, the train-washing building will allow a train to be washed completely, in seven minutes using recycled water, with at least 80 per cent of the wash-water to be reclaimed for reuse.



This section looks at measures to sustain and enhance biodiversity. The project has employed a range of methods to mitigate impacts on biodiversity.

Key targets – Status to date

Dedicate areas for biodiversity legacy	<i>On track, landscaping and restoration approaches</i>
Offset impacts to biodiversity	<i>Achieved, biodiversity offset package</i>

Mitigating ecological impacts

The Northwest project has implemented an Ecological Monitoring Program (EMP) to monitor the effectiveness of mitigation measures and ensure that the ecological values of the surrounding environment are not significantly impacted by the project. Each Principal Contractor implements the EMP as part of their respective Construction Flora and Fauna Management Plan (CFFMP). In addition to the EMP, the project has secured biodiversity offsets for the loss of native vegetation and threatened species habitat that cannot be avoided or mitigated.



Epacris purpurascens var. purpurascens

Pre clearance survey

Pre-clearance surveys were undertaken before construction commenced at each site. These surveys helped to verify the findings of the three Environmental Impact Statements (EIS), which identified approximately 31 hectares of vegetation which could be directly affected by project construction. They also helped to confirm ecological mapping in the EIS, vegetation type boundaries, and vegetation condition and species composition such as Epacris purpurascens var. purpurascens in the areas to be cleared for construction. The surveys also maximised the retention of vegetated areas within the construction sites.

Nest Box Plan

One of the key elements of the pre clearance surveys was the identification of hollow-bearing trees, which are used by birds and other animals for nesting. Under the Nest Box Plans held by the three Principal Contractors, hollow bearing trees that were removed were to be offset by installation of nest boxes. Currently, more than 50 hollow bearing trees have been removed and 163 nest boxes installed to offset this impact. Nest boxes are generally monitored annually and have already begun to provide habitats for native fauna, including Brushtail and Ringtail Possums, Sugar Gliders, an Australian Wood Duck, Musk Lorikeets and Lace Monitors.



Installed nest box

BioBanking

As part of Sydney Metro's biodiversity offset package, potential biodiversity impacts caused by the project are being offset by investing in NSW BioBanking sites. These offsets were successfully secured early in the Northwest project. Of the 31 hectares of vegetation cleared as a result of construction, 12 hectares have been offset by the Growth Centres Certification Orders. The remaining 19 hectares were addressed in the Biodiversity Offset Strategy to have a target offset area of 68 hectares, based on the condition of the vegetation being impacted.

In order to achieve this biodiversity offset target, the project has purchased a total of 896 biodiversity credits from registered NSW BioBanking sites. Credits were purchased from two main sites:



The remaining 82 credits were purchased from:

- › Hills Shire Council for certified Turpentine vegetation
- › Hornsby Shire Council for certified Blue Gum vegetation
- › Western Sydney Parklands for non-certified vegetation.

Ecological monitoring and management

Regular environmental site inspections incorporate ecological monitoring and management activities. Environmental managers and independent environmental representatives inspect the ecological conditions of areas, both within and surrounding the construction footprint, and address issues ranging from pest control, weed management and native species monitoring, to erosion and sediment control.

Greening the Northwest corridor

Sydney Metro Northwest is currently procuring nearly one million plants for planting at the Sydney Metro Trains Facility, stations and along the surface sections of the corridor. The total landscaping area of Sydney Metro Northwest is over 80 hectares, over two and a half times the size of the Cumberland State Forest in Cherrybrook. This is almost half the size of Centennial Park. The plants currently under procurement are drought resistant native Australian flora with over 100 various species of trees, shrubs, ground cover, grasses and climbing species being secured.

Approximately one kilometre of creek is being improved along the Northwest rail alignment between Kellyville and Cudgegong Road stations, enhancing the ecological value of the area. In addition, design enhancements are restricting some anticipated interactions and impacts to riparian vegetation.

Sydney Metro's improvements and revegetation initiatives are making a positive contribution to the Greater Sydney Commission's Green Grids initiative, which aims to create a highly connected and diverse network to enhance green spaces and promote healthy living.

DID YOU KNOW ?

'BioBanking' is a market-based scheme that provides a streamlined biodiversity assessment process for development and a rigorous and credible offsetting scheme - as well as an opportunity for rural landowners to generate income by managing land for conservation.

For more details please visit environment.nsw.gov.au.

Sydney Metro is committed to heritage conservation, and identifying opportunities to enhance heritage value. This section looks at heritage performance on the Northwest project.

Key targets – Status to date

Enhance heritage value	On track
Develop partnerships, and promote local heritage values	On track

The environmental assessment for Sydney Metro Northwest identified that both Aboriginal and non-Aboriginal artefacts could potentially exist within the project footprint. During the archaeological salvage program and early works, several historical sites and artefacts were uncovered.

Sydney Metro is currently identifying suitable repositories for the collections and working to communicate the importance of these finds through its *FastTracking the Future* education program.

Aboriginal heritage

Most of the artefacts uncovered were Aboriginal, and revealed a rich history of occupation in the area during the last 4500 years. Sydney Metro undertook an archaeological salvage program to identify Aboriginal sites prior to the commencement of construction.

The Aboriginal salvage program was the largest of its type in Sydney’s North West region to date and employed registered Aboriginal parties (groups or individuals) who assisted in excavation, artefact identification and retrieval. The Aboriginal sites identified and the numbers of artefacts discovered are listed in the table below. For more detail please refer to the report available through the Sydney Metro website at sydneymetro.info.

Archaeological sites and Aboriginal artefact discovery

Area	Number of sites identified	A number of artefacts recovered	Findings
Bella Vista Station to Tallawong Road Rouse Hill	24	13,019	90 per cent of all artefacts were made from red silcrete
Showground Station to Epping	3	None	No archaeological significance, sites highly disturbed by twentieth century development

DID YOU KNOW ?

‘Microdebitage’ consists of fragments of small material remains as a result of making stone tools. The existence of microdebitage at sites is a good indicator that a site is of high quality and undisturbed either by natural or human causes.



Sieving excavated material for Aboriginal artefacts as part of the Sydney Metro Northwest program

Past linkages and traditional custodians

Aboriginal use of the current rail corridor as a historical transport route parallels the contemporary development of the Sydney Metro Northwest metro alignment.

Each of the investigated and salvage archaeological sites illustrated the varying ways and great length of time in which Aboriginal people utilised the environment. Investigations undertaken as part of the definition and planning for Sydney Metro Northwest have identified that local Aboriginal people were living within the project lands as far back as 4500 years and continuously through to European settlement. However, this corridor of land was only one part of a very extensive Aboriginal community spread across the Cumberland Plain. Regional comparison of the archaeological assemblage informs a link between occupied areas around Caddies Creek, Mungerie Park, Second Ponds Creek, Eastern Creek and Marsden Park.

It is likely that the artefacts uncovered belonged to the Darug-speaking clan, and the primary value of the findings is that they provide an opportunity to increase awareness of the Aboriginal history and cultural practices in the area. A final archaeological salvage program report is available on the Sydney Metro website and contains a comprehensive ‘Lithics database’ detailing key information for each of the artefacts that were recovered.

Historical heritage

In addition to the works above, an archaeological excavation program to identify non-Aboriginal sites was undertaken before construction commenced. Carried out in accordance with an approved methodology, this program covered five dig sites at Kellyville Station, Cherrybrook Station, Castle Hill Station, Showground Station, and the White Hart Inn site to recover, record, conserve and protect any finds.

The most significant historical find on the Sydney Metro Northwest project was the ruins of a colonial inn at Kellyville.

Discovery of the White Hart Inn

Sites uncovered during excavation works near the intersection of Old Windsor Road and Windsor Road at Kellyville were identified to be from the early 19th century White Hart Inn.

The evidence indicates the White Hart Inn was a substantial building, possibly two-stories with deep sandstone footings. Artefacts uncovered at the site include coins, a toothpaste canister bearing an image of Queen Victoria, medicine bottles and a ceramic doll’s leg. Currently, these are on displayed at the Sydney Metro Community Information Centre in Castle Hill.

DID YOU KNOW ?

Sarah Tighe who owned the White Hart Inn in the 1830’s was one of few women in the colony who were issued a publican’s license. Her ownership is of historic importance as it sheds light on women’s role as innkeeper during the early years of the colony, as women were not allowed to own property until the 1870s unless they were widowed or legally separated from their husband.

Archaeologists and historians have long suspected an inn had existed in the area; however little documented evidence remained to provide verification. This is a significant find highlighting the colonial heritage of the North West area.

Sydney Metro has demonstrated its commitment to preserving this find for future generations by redesigning the skytrain viaduct. Original plans had been to locate a pier in the middle of the then-unknown site. The redesign required the lateral movement of the pier and adjustments to subsequent span lengths and adjacent piers, requiring significant re-engineering and design. The site was then exhibited to the public during an open day in April 2014 after which it was protected with geofabric and covered for conservation. The White Hart Inn is currently being considered for listing as a State significant heritage item.

To help in the interpretation of the find, the Sydney Metro *FastTracking the Future* education program has incorporated a lesson about the site.



From left to right; images depict: artist’s impression of the White Hart Inn; excavations taking place at the White Hart Inn site; and archaeological findings from the site.

FastTracking the Future education program

The rationale, process and findings for the Northwest archaeological excavation and salvage programs have been incorporated in Sydney Metro's school education program, *FastTracking the Future*.

FastTracking the Future primary and secondary teaching books contain syllabus-based lessons that allow students to explore the significance of these finds in their community. The Northwest archaeological program links to numerous NSW Education Standards (NES) K-10 curriculum areas, such as history, geography and science. Additionally, the program supports the cross-curriculum priorities of sustainability and Australian Aboriginal and Torres Strait Islander culture and histories that all schools must incorporate. The program covers:

- › exploring the importance of country and place to Aboriginal people, with a focus on the Darug people and language of the North West Sydney region
- › understanding what life was like for Aboriginal people before arrival of Europeans, including how the natural environment and resources were used in a sustainable way
- › the importance of protecting local Aboriginal heritage, researching the history of the Hills Shire Darug tribe Aboriginal sites in the area
- › the types of sources archaeologists have unearthed and used to piece together the ancient history of the North West Sydney region.

Lessons utilise the European heritage archaeological salvage program as a teaching and learning context, and specifically focus on the White Hart Inn – what this find reveals about colonial life and how the colony was shaped.

Since 2014, the *FastTracking the Future* program has reached more than 8650 school students across 30 schools.

Using artefacts

In addition to curriculum-related lessons, artefacts uncovered during the construction process of Sydney Metro Northwest are made accessible to schools through excursions, virtual classrooms and the school holiday program. These showcase the importance of the heritage finds and support authentic and engaging learning experiences for students, underpinned by a place-based learning pedagogical approach.

As part of 2016 NAIDOC Week (National Aborigines and Islanders Day Observance Committee Week) Sydney Metro organised an Aboriginal artefact display cabinet for public viewing at the Community Information Centre at Castle Hill. A similar display was also organised for 2016 History Week regarding non-Aboriginal artefacts. These artefacts currently remain on display to the general public at the Community Information Centre.



National Aborigines and Islanders Day Observance Committee (NAIDOC) Week celebrations at Sydney Metro Community Information Centre, Castle Hill, July 2016



Environmental management

Key targets – Status to date

Zero major pollution incidents	<i>On track</i>
Maintain a high level of compliance with planning approvals	<i>On track, less than 1 in 100 non-compliance at any given time</i>

Currently, Sydney Metro is being delivered under four major planning approvals issued by the Department of Planning and Environment (Appendix B). In addition to these approvals, multiple smaller projects are also approved under the Environmental Planning and Assessment Act 1979, and works are also carried out as exempt development under the Infrastructure State Environmental Planning Policy.

The conditions contained in these approvals create thousands of environmental compliance requirements, which are met by Sydney Metro's delivery partners, both during the course of construction and the eventual operation of the network. Sydney Metro treats compliance with these requirements with utmost importance, and they form a cornerstone for benchmarking environmental performance expectations.

A range of strategies that characterise our approach to environmental management are outlined below – and make up the Construction Environmental Management Framework. These have been successfully implemented and have resulted in zero major pollution events to date.

The management plans that make up the Construction Environmental Management Framework



Tendering and assessment

Environmental considerations are a key component to the procurement of delivery contracts. Not only do the tenderers have to respond to a high standard of performance expectations, they also need to demonstrate their construction readiness.

Tender submissions may include initial environmental management plans, which respond to environmental conditions and the details of environmental resourcing, roles and responsibilities. These are carefully assessed to help ensure the best outcome for the project and the environment.

Leveraging contracts with delivery partners

Each Sydney Metro project has a delivery strategy that determines how the work will be partitioned between the Principal Contractors. Understanding the scope of the resulting activities and associated environmental impacts for each Principle Contractor is fundamental to determining responsibilities and the nature and scheduling of compliance requirements.

Environmental staff work hand-in-hand with commercial teams to embed the requirements of planning approvals into each contract. This allows environmental performance expectations to be clearly understood by tenderers, ensuring environmental risk minimisation forms a fundamental component of delivery.

A key document to support this approach is the Construction Environmental Management Framework, which sets minimum requirements for environment and sustainability management systems and plans. This document is included in each Environmental Impact Assessment available at planning.nsw.gov.au

The requirements contained in the framework set a standard for working with Sydney Metro and ensure there is a fundamentally consistent approach to the management of environment and sustainability issues during construction.

Relationships with external stakeholders

Many stakeholders are interested in excellent environmental outcomes for Sydney Metro. Through strong community engagement, coupled with robust environmental monitoring and surveillance (see below), Sydney Metro strives to maintain high levels of project awareness within the community and to simultaneously reduce the impact on these key stakeholders.

In addition to the community, stakeholders include a variety of regulatory agencies such as the Environment Protection Authority (EPA), the Office of Environment and Heritage (OEH) and the Department of Planning and Environment (DP&E). Sydney Metro works collaboratively with these agencies to ensure they are aware of our activities, environmental performance and the actions taken by Sydney Metro to minimise environmental impacts.

Monitoring and reporting

During delivery, both Sydney Metro and its Principal Contractors engage in environmental monitoring and surveillance programs aimed at understanding our impacts and facilitating pro-active management initiatives. This involves a combination of face-to-face collaboration, environmental inspections, auditing of environmental management systems and incident response processes. This surveillance delivers a level of assurance that we are appropriately managing environmental risks and fostering a culture of continual improvement.

This area is representative of the Sydney Metro Northwest monthly compliance rate between September 2016 and August 2017 (1429.7)

This is representative of the monthly non-compliance rate during this period (0.6 in 100)



There are also targeted monitoring programs in place. For example, the Sydney Metro Northwest Construction Noise and Vibration Management Strategy aims to minimise noise and vibration impacts by:

- › scheduling high impact noise and vibration work within standard working hours for maximum three-hour periods, with a minimum one-hour respite in between
- › reducing noise levels using acoustic sheds and noise walls onsite, supported by restricted work hours and management actions such as using non-tonal reversing alarms on trucks at night
- › regular noise monitoring to reduce the risk that noise management levels are exceeded
- › a 24-7 community information phone line and other lines of communication to the project for the community to report noisy works and respond effectively to these complaints
- › education and reinforcement of acceptable behaviour from staff – such as avoiding loud music, shouting, swearing, and appropriate movement of materials like metal on-site.

Other similar monitoring programs are in place for flora (biodiversity offsetting), fauna (nest box monitoring) and water quality.

Water Quality Monitoring Program

The Northwest project has a Water Quality Monitoring Program that monitors surface water and groundwater quality along the alignment. The program is implemented by all Principal Contractors as part of their respective Construction Soil and Water Management Plans. The surface water quality monitoring is undertaken at locations on watercourses immediately upstream and downstream of exposed surface construction sites to mitigate potential sediment transportation impacts.

Prior to and during construction, surface water and groundwater quality monitoring was undertaken. Surface water quality data obtained generally indicated low impact to watercourses.

Monitoring for groundwater draw down and groundwater quality was undertaken regularly during the tunnelling works. With those works completed, no discernible impacts were reported.

Influencing policy development

A genuine desire to create positive influences and to maintain currency of best-practice management techniques underpins engagement with key regulatory agencies whose policies apply to Sydney Metro. Examples include evolving approaches to environmental planning and assessment or facilitating the priorities of the EPA as they develop or amend legislation.

Sydney Metro participates in government-led steering committees and leadership groups to help shape these policy decisions to achieve outcomes which are realistic and achievable and return tangible benefits to the environment and the community.



Sydney Metro City & Southwest Chatswood to Sydenham Environmental Impact Statement community engagement session at Kirribilli, November 2016

7. Socio-economic sustainability

Sydney Metro is providing new opportunities to develop a highly skilled workforce in the Greater Sydney region. Significant investment in training and education has contributed to the high standards in place for the delivery of the metro railway, stations and maintenance facilities. Sydney Metro is committed to creating sustainable jobs, and ensuring transferable skill sets are developed in the workforce in support of a strong and growing economy.

It is a key priority for Sydney Metro to maintain and instill best-practice health and safety standards across projects, and to help raise awareness of best practices in health and safety in wider government and industry. It is important to Sydney Metro to deliver projects with minimum adverse impact to community, and with regular community engagement.



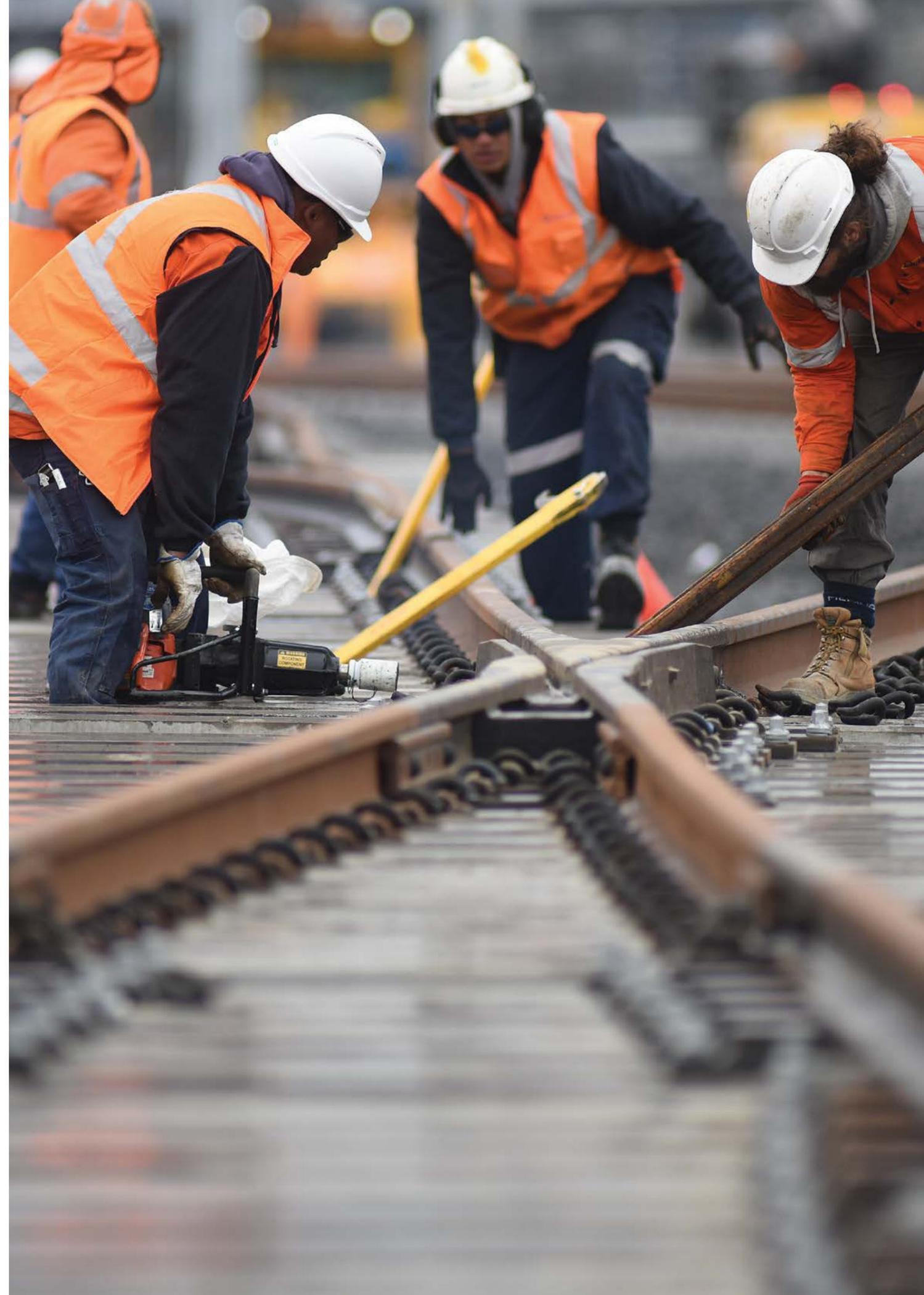
Zero fatalities – safety is a core value and priority for Sydney Metro, and is our number one target



4 kilometres of new cycleway and 240 secured cycle parking spaces



More than 10,000 people undergoing the Sydney Metro Industry Curriculum Program



Sydney's first metro railway tracks laid at Rouse Hill, June 2016

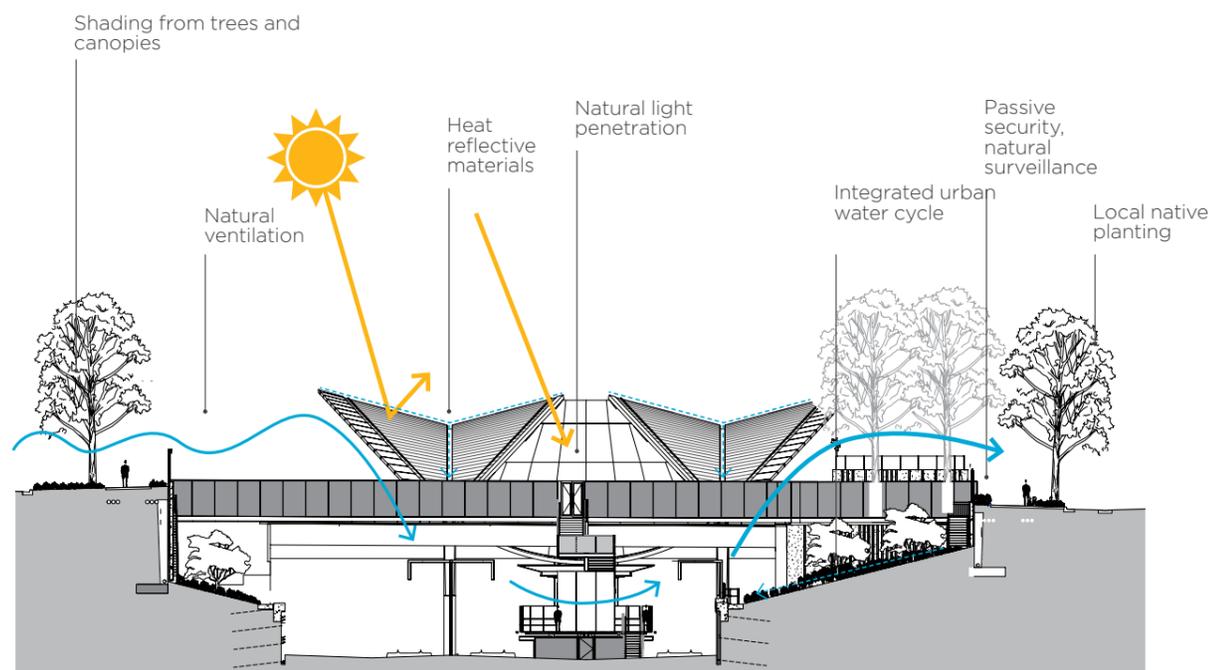
Creating a great customer experience through design

Customers are at the centre of everything Sydney Metro does. By keeping nearby residents and businesses informed, responding to community issues and managing risks, Sydney Metro can address concerns directly affecting all key stakeholders.

Key targets – Status to date

Actively engage all relevant stakeholders	<i>On track</i>
Ensure place managers are engaged during planning and construction	<i>On track</i>
Communicate delivery timeframes to community, and seek input	<i>On track</i>
Ensure customer safety at stations	<i>On track</i>

Careful use of passive sustainable design will help Sydney Metro to ensure the comfort, safety, and wellbeing of customers. This approach has allowed the Northwest project to develop station designs that are adaptive and climate resilient. Customers have been consulted during of the design process. Based on customer feedback, the design of the new Sydney Metro Northwest stations ensures efficient passenger circulation and improves ventilation and use of natural light. Simulations have been carried out at a prototype station located opposite the Sydney Metro Trains Facility at Rouse Hill, testing customer interactions with Sydney Metro's station designs.



The image displays a typical underground Sydney Metro Northwest station, and the passive design features incorporated to improve customer experience through landscaping, ease of access, natural ventilation flows, energy efficiency and water-usage reduction features.

Encouraging a healthy lifestyle

To improve health and wellbeing benefits to customers, pedestrian and cycling connections are being delivered. For example, a three-metre-wide shared user pathway will stretch four kilometres from Rouse Hill to Kellyville along the alignment of the skytrain. More than 240 secure bicycle parking spaces are also being put in place across the eight new metro stations from Cudgegong Road to Cherrybrook.



Artist's impression of Cherrybrook Station precinct

Talking to the community

Sydney Metro exhibited and sought submissions for the three Northwest Environmental Impact Statements (Appendix B) via free media, community information sessions, and community relations work. The Community Information Centre was established in mid-2011 and has become a focal point for Sydney Metro information and displays.

The project team engaged residents, businesses, community groups and senior stakeholders including peak groups, local members of parliament, councils and councillors. A program of industry engagement ran alongside this. Once planning approval was secured, community engagement was progressively handed over to our Principal Contractors. For a full list of stakeholders consulted, please refer to Appendix C.

As the Sydney Metro program has progressed, community consultation has also escalated with initiatives like the Mobile Community Information Centre attending community events and major events like the Sydney Festival and the Sydney Royal Easter Show, where more than 88,000 people walked through the project's life-size train model in 2017 alone.

Sydney Metro requires each contractor's place managers to be the main point of contact for residents and businesses in dedicated areas along the route of the project – establishing a clear point of contact for the community and other stakeholders to interact and communicate openly.

DID YOU KNOW ?

Located near the Sydney Metro Trains Facility is a fully equipped prototype Sydney Metro station simulation. This prototype has been used to inform the community about the Sydney Metro Northwest project, and gather feedback related to how customers interact and experience the new stations.



Prototype Sydney Metro Northwest station stimulation

“ The health, welfare and safety of every person connected with Sydney Metro is critical to our overall success—whether you are a member of our team, one of our contract partners, or part of the community for whom we are building Australia’s biggest public transport project. ”

Rodd Staples
Former Program Director
2011–November 2017
Sydney Metro Delivery Office

Sydney Metro is leading best practice in health and safety across industry, driven by the Health and Safety Strategic Plan (2016–19), which is aligned with the Transport for NSW’s Safety Strategic Plan 2015–2018. The long-term success and legacy of the Sydney Metro program is dependent on safety and wellbeing performance, and supported by:

- › embedding safety and wellbeing as a core value in all decision making
- › establishing proactive consultation and open communication regarding health and safety
- › benchmarking projects against other world-class metro systems and transport infrastructure projects and sharing lessons learned in order to achieve excellence
- › establishing a safe and just culture supported by strong visible safety leadership
- › identifying, understanding and managing existing and emerging hazards, and risks
- › driving Sydney Metro to be a leader in safety and wellbeing across industry by measuring performance and focussing on lead indicators and catastrophic risk.

Sydney Metro has achieved excellence in safety and wellbeing during the design and construction of the Northwest project. On the design front, innovations such as Australia’s first platform screen doors, safe station design, advanced fully-automated signalling and tunnel safety technologies are just some of the initiatives which make Sydney Metro a leader in safety and wellbeing on a global stage.

During the construction of Sydney Metro Northwest, safety, health and wellbeing best-practice has been proactively managed and continuously improved. An example of this is the occupational health and hygiene program which was implemented on the Sydney Metro Northwest Tunnels and Station Civils contract, which focussed on reducing exposure to disease-causing hazards.

CASE STUDY
Occupational health, hygiene and wellbeing

Sydney Metro recognises the important issue of work-related illness and diseases, in addition to safety. Each year, more than 250 workers in Australia die from an injury sustained at work, while more than 2,000 workers die from these work-related illnesses. Our health and safety strategy specifically enables health risks to be managed through targeted occupational health and hygiene programs.

Sydney Metro Northwest reducing health impacts while tunnelling

Common occupational health hazards in tunnelling include respirable crystalline silica, respirable dust, and diesel emissions. Over-exposure to these hazards can lead to diseases such as chronic obstructive pulmonary disease, silicosis and lung cancer.

The Sydney Metro Northwest Tunnel and Station Civils contract worked to eliminate and reduce exposures to these disease-causing hazards well before tunnelling commenced. This began with the design of the tunnel ventilation systems and the use of purpose-designed plant, and continued through to engineered dust suppression, procedural controls, medical surveillance and specialised respiratory-protection protocols.

Through focussing on requirements at the start of the project, the Northwest tunnelling contractor was able to identify world-leading standards that could be applied to control exposure to these hazards and also enable them to benchmark performance.

A key element of the success of the program was the process of ongoing consultation and engagement with the workforce. This enabled workers to be more aware of the hazards in their area and more willing to participate in exposure monitoring and use controls effectively - and ultimately enabled improvements to the program and implementation of new initiatives to reduce exposure to health hazards.

The program resulted in an improved work environment during the construction of Australia’s longest rail tunnels, and was a step change in the minimisation of workers’ exposure to harmful substances.



Workers at the cross-over cavern in Castle Hill during tunnelling works



Partnerships and collaboration

Sydney Metro works in partnership with industry, regulators and the community, to promote knowledge sharing and achieve excellence in health and safety.

Sydney Metro has formalised its collaboration and partnerships with key stakeholders including SafeWork NSW, Mates in Construction and TrackSAFE, as described below.

Collaboration Protocol with SafeWork NSW

SafeWork NSW is the regulator responsible for the administration of Work Health and Safety (WHS) and Workers Compensation legislation in New South Wales. SafeWork NSW is committed to working in partnership with the NSW community to achieve safer workplaces, effective rehabilitation, and recovery at work for injured workers.

On 19 April 2017, Sydney Metro and SafeWork NSW signed a Collaboration Protocol, formalising collaboration on WHS matters to leave a lasting legacy of improved WHS standards across the Sydney Metro program, NSW, and wider industry.

The protocol objectives are to:

- › Create effective communication strategies and channels.
- › Share technical knowledge and expertise.
- › Achieve and promote WHS innovations and best practice.
- › Establish effective verification/compliance strategies.
- › Establish an Emergency Management and Business Continuity approach.



Rodd Staples, Former Program Director, Sydney Metro and Peter Dunphy, Executive Director, SafeWork NSW signing the Collaboration Protocol

DID YOU KNOW ?

Rail Safety Week is an annual community awareness week held in Australia and New Zealand designed to engage the community in safe rail practices. Every year, Sydney Metro participates in Rail Safety Week.

Through the initiative Sydney Metro aims to create a heightened awareness of the importance of rail safety. Up to 61 rail, police and government organisations from across Australia and New Zealand participate in Rail Safety Week.

For more detail see tracksafefoundation.com.au/rail-safety-week/



Workers assembling the canopy frames at Cudgegong Station

Partnerships to enhance wellbeing

Sydney Metro recognises the significant immediate and long-term impacts of mental health and wellbeing in the workplace. This has meant actively addressing mental health issues - including the prevention of suicide in construction through education, creating a culture of openness and demystifying mental wellbeing. Sydney Metro has partnered MATES in Construction, and TrackSAFE Foundation to enable this.

MATES in Construction (MIC) is a charity established in 2008 to reduce the high level of suicide among Australian construction workers. According to MIC:

- › Construction workers are more than twice as likely to suicide as other people in Australia.
- › Construction workers are six times more likely to die by suicide than through a workplace accident.
- › Male apprentices in construction are two and a half times more likely to suicide than other young men who are not apprentices in construction their age.

TRACKSafe Foundation is a registered harm prevention charity, established by the Australian rail industry to reduce near collisions, injuries and fatalities on the rail network.

On 11 October 2016, Sydney Metro proudly entered into a joint working relationship with MATES in Construction and TrackSAFE Foundation to collaboratively tackle mental health issues in the construction and rail sectors. Sydney Metro continues to promote engagement and build awareness of mental health issues in the construction and rail industry.

The success of our mental health and wellbeing initiatives to date include:

- › Sydney Metro has engaged with MIC since 2016 to train over 100 individuals from Sydney Metro, the wider Transport for NSW cluster and delivery partners to recognise and assist those suffering from mental health crisis.
- › Sydney Metro continues to raise the issues of mental health awareness and suicide prevention through promoting RU OK? Day, and 'Flying the Flag' across our construction sites and offices for MIC.
- › Sydney Metro works continuously with TrackSAFE through national initiatives such as Rail Safety Week and Rail RU OK? Day to improve education and awareness of the rail corridor, and to promote safety and wellbeing in the rail industry.
- › Sydney Metro has recently been added to the RailRes app developed by TrackSAFE to assist rail industry employees develop mental health resilience through offering useful tools aimed at relaxation, mindfulness and learning how to challenge and change negative or unhelpful thoughts.
- › From August 2017, every worker on Sydney Metro projects is required to go through the Sydney Metro Orientation Training Program, which focuses on the program's core value – safety and wellbeing. As part of this training, every worker will be provided with an introduction to MATES in Construction, and the impact of mental health and construction and rail industry trauma on individuals.

Moving forward, Sydney Metro will seek opportunities to develop joint initiatives and programs targeting suicide prevention, and support resources for rail and construction employees exposed to trauma.

Research initiative: collaboration with Royal Melbourne Institute of Technology (RMIT)

Health and Safety research is one of the key initiatives of the Sydney Metro Health and Safety Strategic Plan 2016-19. In June 2017, Sydney Metro entered into an agreement with RMIT to progress research for three topics on health and safety:

- › methods to foster an enabling culture and aligned values relating to work health and safety in the construction supply chain
- › the barriers to implementing the hierarchy of controls to reduce health risks
- › effective training techniques to influence a positive change in health and safety outcomes.

The agreement includes the creation of a lead researcher role to manage the collaborative research projects. Detail regarding research projects and learnings will be shared through future sustainability reports.

Adopting a Safe System approach to road safety

Sydney Metro has adopted a Safe System approach to the issue of increased heavy vehicle traffic on the road network. The Safe System approach aims to create a road transport system which minimises road accidents by focusing on:

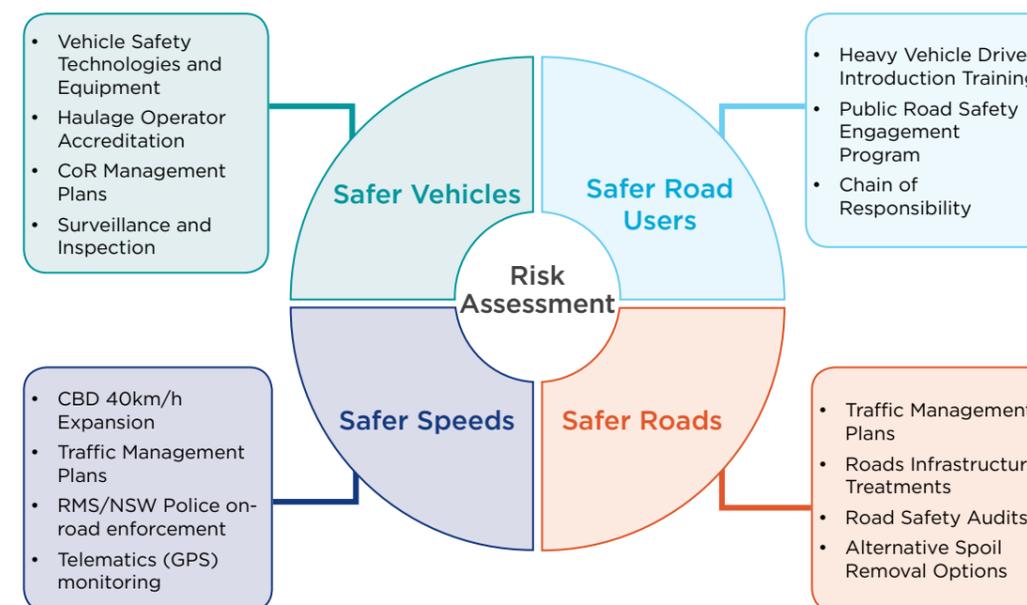
- › improving vehicle safety standards used on the project
- › increasing driver education and public road user awareness
- › identifying and addressing haulage route hazards
- › investigating opportunities for alternative spoil removal
- › managing chain of responsibility obligations, monitoring and enforcing haulage operations
- › managing construction traffic with an emphasis on road safety.

The approach encourages a better understanding of the interaction between the key elements of the road system: vehicles, road users, roads, and travel speeds.

Public education: awareness campaigns and events

Sydney Metro in collaboration with Transport for NSW aims to raise awareness and education to public road users about sharing the road safely with heavy vehicles through the development of an integrated road safety campaign called 'Be Truck Aware'. This campaign focuses on works occurring around the Sydney central business district, as part of the City & Southwest project.

The Sydney Metro Safe System Approach to Managing Road Safety



Principal Contractor Standard

Sydney Metro's Principal Contractor Health and Safety Standard combines Sydney Metro's requirements in a single document. This is used to inform requests for tenders and contract documents for the City & Southwest projects, and future Sydney Metro projects. The standard communicates Sydney Metro's health and safety requirements to delivery partners, and allows them to respond appropriately.

The Standard contains a number of key requirements that represent best health and safety practices including:

- › Principal Contractor health and safety resource staff must possess relevant qualifications and experience to be able to work on Sydney Metro work sites.
- › Occupational health and hygiene requirements include engaging an independent certified occupational hygienist, and submitting an Occupational Health, Hygiene and Wellbeing Plan to demonstrate conformance to required standards.
- › Health and Safety Performance Index (HSPI) helps to drive leadership and measures performance consistently across the contracts that makes up the Sydney Metro program.
- › Plant specific requirements require appropriate higher level controls on plant to reduce the risk of entrapment.

DID YOU KNOW ?

The metro tunnelling under the Sydney Harbour will require the removal of 2.4 million cubic metres of excavated spoil as part of Sydney Metro City and Southwest. To ensure this spoil is safely transported Sydney Metro has: increased safety truck driver initiatives for station excavation and building (not just managing spoil from tunneling); implemented awareness training for truck drivers, and prepared an awareness campaign for the public that will be launched towards the end of 2017.

- Be Truck Aware, as discussed above.

Developing the workforce and building industry capability



Aboriginal pre-employment program cohort 2017

Sydney Metro is committed to building skills, jobs, and industry capacity through its delivery program. The current scale of infrastructure investment across Australia, combined with the use of new technologies, has created widespread industry skills shortages and gaps. Sydney Metro's Workforce Development Strategy, implemented in 2012, seeks to address these issues. The strategy aligns with key government policy objectives. Sydney Metro projects present an ideal opportunity to:

- › develop new industry capacity and capability
- › provide sustainable employment for local people and under-represented groups
- › develop a highly skilled and transferable workforce for NSW.



12,733 employees across the Northwest project



Over 1300 new sustainable jobs* created in tunnelling, skytrain and operations works on the Northwest project



574 new sustainable jobs* for Greater Western Sydney

*Refers to new employees who have not worked for the employer during the six months prior to their start date and with no direct employment for a minimum of 26 weeks and 15 hours per week. All employment is subject to the conditions of the National Employment Standards.

Workforce sustainability is fundamental to the success of the Sydney Metro program and projects. Ensuring sufficient workforce capacity and capability will improve worker productivity and quality and improve workplace health and safety. By providing a positive workplace culture, embracing diversity, and valuing the wellbeing of workers, Sydney Metro has been able to retain the existing workforce as well as become an employer of choice for new entrants and skilled workers. This has enabled Sydney Metro to become more competitive not only in NSW but Australia wide, and is delivering a positive economic impact to benefit individuals, the wider community, industry, and government.

DID YOU KNOW ?

Recognising the needs of industry and employers, Sydney Metro has developed and will continue to develop-demand-led programs. As part of this approach, Sydney Metro Northwest began working with Principal Contractors early in the project to understand the training and developmental needs of workers. A range of programs were established as a result, including The Tunnel Construction Competency Framework (refer to the case study on page 61 for further details).

Sydney Metro Northwest

In 2012, the Sydney Metro Northwest Workforce Development (WFD) Strategy was developed in support of the Sydney Metro Northwest Sustainability Strategy. It was developed in consultation with key industry, government and education stakeholders and objectives included:

- › support local labour-force participation
- › resolve skills shortages locally and nationally through targeted skills development
- › maintain competitiveness of the construction sector by attracting skills locally and nationally
- › ensure procurement decisions in the transaction management phase support efforts by NSW and Australian governments to increase workforce participation
- › encourage the next generation to pursue careers in engineering and construction.

The objective of the Workforce Development Program was to develop new industry capacity, and a highly skilled transferable workforce for NSW. The program aims to achieve this by providing sustainable employment for local people and under-represented groups. Uniquely, it set minimum requirements for employment, apprenticeships and training.

Sydney Metro City & Southwest

The 2012 WFD Strategy has been revised and developed for the City & Southwest project. The new Workforce Development and Industry Participation Strategy was launched in 2016, and reflects progress and lessons learned from Northwest and addresses skills, jobs and industry properties for the City & Southwest project.

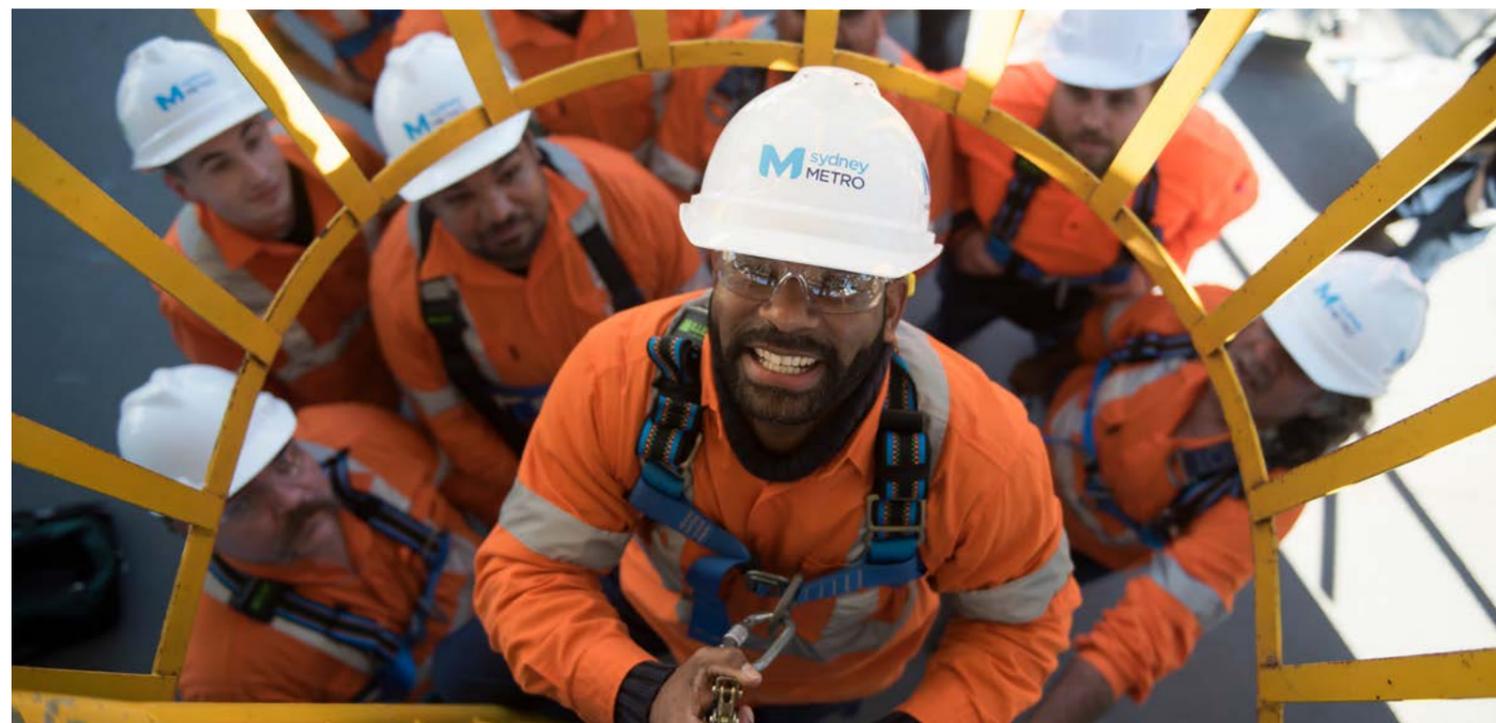
Supporting local employment

Sydney Metro is committed to providing sustainable employment for local people of the Greater Western Sydney area. Currently, 40 per cent of Sydney Metro's workforce* has been hired from the Greater Western Sydney area.

Sydney Metro has achieved this local employment by placing contractual requirements on Principal Contractors and collaborating with contractors to deliver pre-employment programs. The pre-employment program was designed to support local employment, as well as build skills and job opportunities for under-represented groups.

*Refers to employees who have worked for the employer for a minimum of 26 weeks and 15 hours per week. All employment is subject to the conditions of the National Employment Standards.

Aboriginal Pre-employment program participants 2017



CASE STUDY

Pre-employment program, improving employment opportunities for local unemployed people

Sydney Metro's pre-employment program helps local and long-term unemployed people find jobs on major transport infrastructure projects.

Launched in November 2014, it was awarded the 2015 NSW Premier's Award in the category 'Making NSW a better place to live'. The program provides tailored technical training and employability skills, instilling confidence and increasing communication and team working skills. Training is aligned to specific job roles and existing vacancies with Sydney Metro's contractor partners.

Key partners are Job Active providers, who source program participants, and Registered Training Providers who deliver the training. To date, six programs have achieved a 96 per cent completion rate. Of those who completed the program, 77 per cent gained employment.

Following the precast programs, 12 participants employed in a Sydney Metro pre-cast yard completed a traineeships in Process Manufacturing, which has now been added to the NSW Skills List as a result of increased requirements.

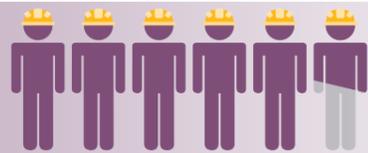
In June 2017, the operations contractor, with support from Sydney Metro, Yarn'n and TAFE NSW delivered a Civil Construction pre-employment program with an Aboriginal focused cohort. Fourteen participants graduated and are now employed on Sydney Metro Northwest, and have completing a traineeships.

The model has been recognised as best practice by the Australian and NSW governments, and has been successfully replicated across other industries and jurisdictions.

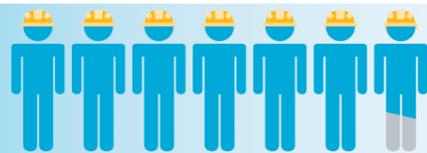
Number of long-term unemployed people who have found sustainable jobs through the Sydney Metro workforce program



36 employed
on Sydney Metro projects



55 employed
across the construction industry



67 completed
the workforce program



71 participated
in the Sydney Metro workforce program

Resolving skill shortages

To date, 70 per cent of the workforce across Sydney Metro has completed accredited training, exceeding the project target of 20 per cent. All training is nationally accredited. Apprentices are employed for a minimum of 26 continuous weeks, ensuring high quality work experience and encouraging successful completion. New sustainable jobs must exceed 26 weeks, providing employees with sufficient experience to achieve future employment.

Skills development programs delivered on the Northwest project include:

- › accredited pre-employment programs for long-term unemployed people
- › an Indigenous New Entrant Tunnelling Program resulting in eight of nine participants attaining employment. Participants were able to commence their accredited learning journey from pre-employment, furthering their skills and competences through continuous development
- › Apprenticeships and Traineeships – Certificate III Process Manufacturing (Concrete Production); Certificate III Engineering (Mechanical Trades); Certificate III Electro - technology Electrician
- › Tunnel Competency Framework and delivery program (refer to case study on page 61 for further detail)
- › ensuring the clarity of contractual definitions accurately determines scope for workforce development requirements
- › engaging subject matter experts across tender and delivery phases to support development and implementation of requirements
- › Sydney Metro has reviewed its contractual requirements to ensure that in the future, only training that extends skills beyond 'business as usual' will be recognised.



Sydney pre-employment program participant, 2015

Working with industry and government

In 2014, Sydney Metro identified further benefits that could be achieved by bringing industry expertise and government partners together to form the Skills and Employment Advisory Group (SEAG). The purpose of SEAG is to inform, advise, and support the delivery of the Workforce Development Plan and associated programs. SEAG members have a shared interest in Sydney Metro workforce development objectives, and include:

- › NSW Government members include: Transport for NSW, Department of Industry, State Training Services, and TAFE NSW
- › Australian Government members include: Department of Education and Training, Department of Jobs and Small Business, and Australian Industry Standards
- › Industry partners include: Price Waterhouse Coopers, CPB Contractors, John Holland, Dragados, Ghella, Laing O'Rourke, Salini Impregilo, and Northwest Rapid Transit.

The SEAG collaboration brings together accredited training and employment providers, skilled industry experts, and related Australian and NSW government agencies to develop and deliver programs.

The collaboration is developing a highly skilled and transferable workforce, setting new benchmarks in quality, productivity, and workplace health and safety. The project is providing a skills bank for NSW and contributing to overcoming skill shortages, with highly skilled workers already transitioning to new opportunities on other major civil infrastructure projects in NSW.

This is a sustainable model, undertaking initiatives that have already been replicated, expanded, and adopted elsewhere in NSW and Australia. This includes major projects such as WestConnex, Sydney CBD Light Rail, and Capital Metro, Canberra. Similar programs have been duplicated across other sectors including hospitality, logistics, commercial cleaning and general construction.

As a result of the successive collaborative efforts through the Skills Employment Advisory Group, a NSW Infrastructure Skills Centre has been built. This new centre provides a centralised learning hub offering training and support services, and is aimed at new industry entrants, the existing workforce, apprentices, and local communities. This centre is funded by both by the Australian and NSW governments. The NSW Infrastructure Skills Centre is a leading example of collaboration across levels of government, providing synergies across major projects.

The centre has been recognised by the Department of Employment as a prime model of collaboration and co-design that reflects the Australian Government's ambitions for Job Active. An innovative job brokerage is currently in development which supports the growth of local employment and increased participation from under-represented groups.



Workers inside a tunnel on the Northwest project



Workers on the tunnelling on the Northwest project

CASE STUDY

Tunnelling to the future: occupation development framework

Sydney Metro funded Skills DMC to develop a tunnel competency framework providing career progression pathways for workers from pre-entry through to supervisory level roles.

The program, implemented by the tunnelling contractors, involved all tunnel workers taking part in a week-long accredited training program.

More than 1000 workers completed the program, which took place at a tunnel simulation centre located at Sydney Metro Northwest's Showground station site. The centre included a life-size replica of a Sydney Metro Northwest tunnel. Participants in the program also used 3D virtual reality goggles to provide them with a realistic perspective from within a tunnel boring machine.

The tunnel training program provided practical knowledge and skills development that Sydney Metro Northwest directly translated into the project. The program developed a 'skill builder' approach, resulting in nationally accredited skills that contribute to full qualifications across civil infrastructure career pathways.

The framework created a new industry skills development and training benchmark which, for the first time, provided an entire workforce with externally validated competency standards. Sydney Metro's tunnel workforce transitioned to employment with WestConnex and NorthConnex, providing other NSW projects with a ready-made, well trained and competent workforce.

DID YOU KNOW ?

Less than 50 per cent of Aboriginal and Torres Strait Islander people aged 15 years and over are employed in Australia. Sydney Metro's Aboriginal Participation Strategy supports the increase of Aboriginal employment across the program, addressing local and national skills shortages among the Aboriginal and Torres Strait Islander community.

Building on lessons learned: improving our diversity and inclusion

Increasing the participation of local people and under-represented groups is a key objective for Sydney Metro. Innovative new programs such as the Sydney Metro pre-employment program have supported the employment and retention of people from under represented groups.

The table below outlines the achievements to date on the Northwest project for the skytrain and operations contracts workforce. Further development to enhance diversity and inclusion within Sydney Metro projects will be strived through new programs and contractual requirements within City & Southwest contract packages. These new programs will have a particular focus on Aboriginal participation, women in non traditional trades and senior management roles, the long term unemployed, and young people under 25.

Based on lessons learned from Northwest, Sydney Metro will now include defined contractual requirements to drive successful outcomes, collaborate with other agencies to provide resourcing and expertise for specified groups, and engage with communities and representative bodies to provide support and increase participation.

Diversity and inclusion employment statistics (number of people) for skytrain and operations contracts workforce

Diversity and inclusion	
People with a (registered) disability	48
People from culturally and linguistically diverse backgrounds (CALD)	239
Young people under 25	439
Long term unemployed (over 26 weeks)	174
Young people not in education, employment or training (over 13 weeks)	21

The success of the Workforce Development Program is a key outcome for Sydney Metro Northwest. Leveraging lessons learned from the Northwest project, Sydney Metro has developed an even more effective and targeted approach to raising industry skills and providing sustainable local employment in NSW moving forward, with a focus on developing the workforce for the City & Southwest project.

Targeted support and programs include:

- › The NSW Infrastructure Skills Centre at Annandale, designed in conjunction with Sydney Metro to address skills and jobs requirements across the project and offering accredited pre commencement training, addressing critical skills gaps, supporting the transferability of skills to workers and encouraging further learning
- › Sydney Metro Industry Curriculum - offering mandatory pre commencement training
- › Aboriginal Participation Programs - increasing Aboriginal employment and business.

DID YOU KNOW ?

A total of 60 per cent of the workforce who have completed the Sydney Metro Industry Curriculum have not held any previous tertiary qualifications. Sydney Metro Industry Curriculum was introduced to address skills gaps, mitigate skill shortages, and support upskilling amongst the Sydney Metro Workforce.



From left to right: Managing Director of TAFE NSW, Rodd Staples Former Program Director Sydney Metro, Senator the Hon Nigel Scullion the Minister for Indigenous Affairs, and Adam Marshall Minister for Tourism and Major Events, and Assistant Minister for Skills

CASE STUDY The Industry Curriculum

The Sydney Metro Industry Curriculum (SMIC) was introduced to address skills gaps because of new technologies or previous lack of investment in training in high-risk work areas in construction; and more specifically sectors experiencing skills shortages due to the scale of the NSW and Australian infrastructure program. It also seeks to develop leadership skills for all supervisory staff. Currently, 5 per cent of the workforce who have supervisory responsibility have no leadership training.

The training is a mandatory requirement across all Sydney Metro City & Southwest contracts.

The NSW Department of Industry provides SMIC with funding and resources, supporting the program in mitigating critical skills shortages and gaps. These include tunnel construction, pre-cast manufacture, demolition, heavy haulage, civil and rail systems. SMIC programs ensure that all workers have met a minimum level of proficiency through nationally recognised units of competency. These act as a pathway for workers to upskill further through Certificate III and above qualifications.

Between February and June 2017, Sydney Metro has achieved successful delivery of the following SMIC skills set to these numbers of people:

› Demolition	371
› Heavy haulage	41
› Rail	10
› Civil	11
› Leadership	10

Sydney Metro anticipates a minimum of 800 workers will undertake SMIC training by December 2017.

Looking to the future, Sydney Metro has anticipated new skills needs in the technical areas of rail operation in Australia. The new Sydney Metro rail system is the first fully-automated railway in Australia. Sydney Metro has identified this as an opportunity to develop skillsets that will assist Australia and Australian business to become more competitive, driving new business opportunities nationally and globally.

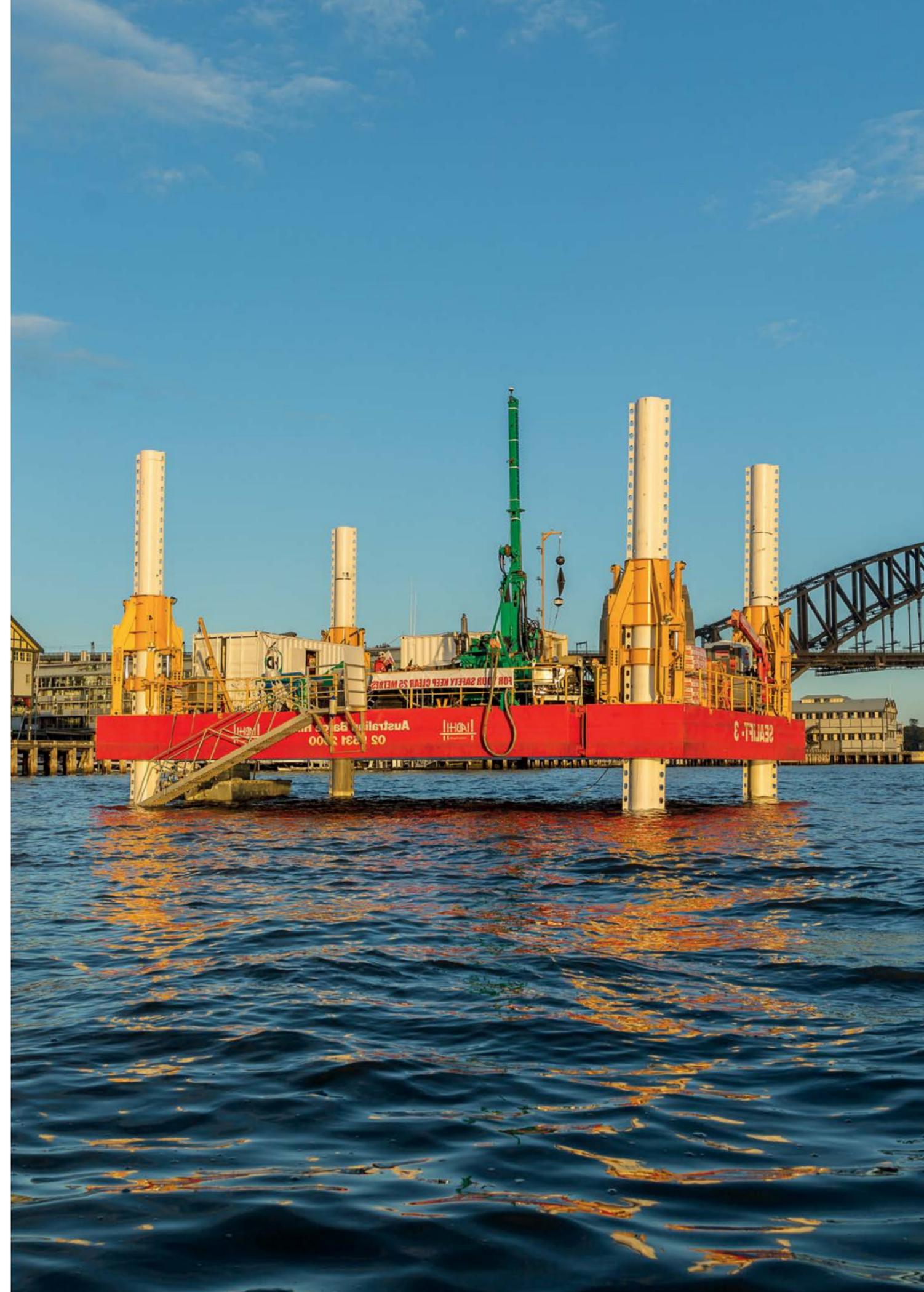
8. City & Southwest

Based on achievements, lessons learned, and working hand-in-hand with contractors and government on the Northwest project, Sydney Metro has put in place improved targets for the Sydney Metro City & Southwest project, including:

- › ensuring energy efficiency of design, including innovative solutions such as incorporating wayside energy storage alongside regenerative braking – where residual energy is recovered from braking trains, and captured in capacitors along the alignment, to be used by metro at a later time
- › using the Green Star rating tool for underground stations, a specific As-Design and As-Built tool has been developed for Sydney Metro
- › optimising supply chain and procurement practices for the responsible sourcing of materials. This includes higher standards around replacing energy intensive clinker in Portland cement with supplementary aggregates, and sourcing reinforced steel that is produced using manufacturing processes that require less energy
- › offsetting mandatory greenhouse gases, to be increased to 25 per cent during construction
- › providing opportunities regarding workforce training and development, and engaging long-term unemployed
- › a vision for strengthening recognition of heritage, particularly regarding Central Station and other sites
- › where possible, considering affordable housing in integrated station developments and priority precincts.

All Northwest targets have been retained where appropriate, and tailored to be applicable in the City & Southwest context.

In early 2017 geo-technical work was completed on Sydney Metro City & Southwest, with demolition and construction works scheduled to begin in the second half of 2017. Sydney Metro City & Southwest delivery activities will be discussed in detail in the 2018 Sustainability Report.



Sydney Metro City & Southwest second Sydney Harbour crossing drill barge

 <p>Governance</p>	<ul style="list-style-type: none"> › A high level of attainment (minimum ISCA IS Rating of 65 'Excellent') for relevant infrastructure. › 5 Star Green Star ratings for relevant buildings. › Align with a high rating using the TfNSW Sustainable Design Guidelines.
 <p>Carbon & energy management</p>	<ul style="list-style-type: none"> › Achieve at least a 20 per cent reduction in carbon emissions associated with construction, when compared to business as usual.* › Offset 25 per cent of the electricity needs for the construction phase of the project. › Achieve at least a 20 per cent reduction in carbon emissions associated with operations, when compared to business as usual.* › Maximise the capture and reuse of energy generated from braking trains. › Design buildings (stations and stabling buildings) to achieve at least a 15 per cent improvement over performance requirements set out in Section J of the National Construction Code. › Source 5-20 per cent of the low voltage electricity required at above ground stations from onsite renewable energy sources. › Offset 100 per cent of the electricity needs for the operational phase of the project.
 <p>Environmental performance</p>	<ul style="list-style-type: none"> › Zero major pollution incidents. › New emission standards will be identified and applied to diesel equipment and vehicles during construction.
 <p>Climate change resilience</p>	<ul style="list-style-type: none"> › Mitigate all extreme and high level risks. › Mitigate a minimum of 25 per cent of medium level risks (e.g. include increased flooding, increased temperatures, sea level rise and increased storm events).
 <p>Resources - water efficiency</p>	<ul style="list-style-type: none"> › Reduce water use by at least 10 per cent compared to business as usual*. › Source at least 33 per cent of the water used in construction from non-potable sources. › Source at least 33 per cent of the water used in operations from non-potable sources. › Implement rainwater harvesting and reuse systems at construction sites and above ground stations. › Source at least 60 per cent of the water used at above ground stations from harvested rainwater.
 <p>Resources - waste & materials</p>	<ul style="list-style-type: none"> › Reduce the environmental footprint of materials used on the project by at least 15 per cent compared to business as usual*. › Use concrete which has an average Portland cement replacement level of more than 25 per cent. › 100 per cent beneficial reuse of usable spoil. › Recycle or reuse 90 per cent of recyclable construction and demolition waste. › Recycle or reuse 60 per cent of office waste during the construction phase. › Recycle or reuse 80 per cent of the waste generated during operations. › Recycle or reuse 65 per cent of office waste during operations. › 60 per cent of reinforcing steel is produced using energy-reducing processes in its manufacture. › Source 100 per cent reused, recycled timber or responsibly sourced timber.

 <p>Biodiversity conservation</p>	<ul style="list-style-type: none"> › Minimise vegetation clearing. › Establish native landscaping targets.
 <p>Heritage conservation</p>	<ul style="list-style-type: none"> › Prepare a Heritage Strategy, including stakeholder engagement with relevant stakeholders. › Implement the Heritage Strategy during design and delivery, to conserve and activate. › Maximise opportunities for archaeological research and future interpretation of archaeological finds. › Opportunities for heritage interpretation identified and implemented at appropriate station precincts.
 <p>Liveability</p>	<ul style="list-style-type: none"> › Station interchanges designed in accordance with the Interchange Access Plans and modal hierarchy. › Stations and precincts designed in accordance with the Sydney Metro Design Guidelines. › Maximise the provision of secure access and covered bicycle parking spaces, and safeguard for future expansion of bicycle parking.
 <p>Community benefit</p>	<ul style="list-style-type: none"> › Implement initiatives which will provide tangible benefits to local community groups during the construction period. › Implement initiatives which will provide tangible benefits to the broader local community beyond the construction period. › Identify key drivers for affordable housing and work with other lead agencies to identify opportunities and develop an appropriate response.
 <p>Supply chain</p>	<ul style="list-style-type: none"> › All Principal Contractors develop and implement sustainable procurement strategies.
 <p>Workforce development</p>	<ul style="list-style-type: none"> › Refer to the Sydney Metro City & Southwest Workforce Development and Industry Participation Strategy, which is a separate document to be read in conjunction with the City and Southwest Sustainability strategy and outlines priorities, objectives and targets to address workforce development.

* Note: 'Business as usual' (BAU) is defined as that which is used in the applicable rating scheme for the respective target (e.g. ISCA Rating Tool, Green Star and TfNSW CERT).



9. Planning for the future

Construction on the Sydney Metro Northwest project will continue in 2017/18 with the Northwest operations contract making up the bulk of works underway with stations, the maintenance facility, track laying and corridor works. Work will also be commencing around precinct development and activation strategies over the next 12 months, in partnership with Landcom.

On the Sydney Metro City & Southwest project, construction activities have started in the Sydney CBD with the demolition of buildings and preparation for tunnelling works under Sydney Harbour. The sustainability team will work towards embedding requirements into new contracts, and ensure contractors are working to the highest sustainability and safety standards.

Key goals over the next financial year include:

- › Develop a program-level sustainability strategy.
- › Quantify economic sustainability benefits, with an increased focus on social sustainability.
- › Continuously improve the approach to minimise environmental impacts.

Further develop the workforce, and safety and wellbeing approaches based on lessons learned from the Northwest project and from other projects nationally and internationally.

- › Benchmark and reassess what current international best practice looks like regarding sustainable development in rail infrastructure, and associated impacts, with a particular focus on how to implement these into the future.

The Sydney Metro program will continue to work towards a vision of a transformative legacy for Sydney, and is committed to continuously improving our approach to the sustainable and safe development of these new metro rail projects. Building on the lessons learned from Northwest, higher standards for design, procurement and delivery are being embedded in all future contracts. This standard is updated regularly to encompass emerging best practice and innovation from industry, as well as driving a world class approach to delivering rail infrastructure that will change how people get around Australia's biggest city.

Artist's impression of Victoria Cross Station

10. Awards and recognition

GREEN GLOBE AWARD FOR PUBLIC SECTOR LEADERSHIP (NSW) (2016)

Sydney Metro won the NSW Government's 17th Green Globe Award for Public Sector Leadership, which recognises environmental excellence, leadership and innovation. Sydney Metro received the award for a commitment to sustainability through initiatives such as recycling 100 per cent of crushed rock during tunnelling and recycling 95 per cent of all construction waste.

Other key initiatives included offsetting operational carbon emissions through a renewable energy project; offsetting biodiversity through securing NSW BioBanking sites and the promotion and protection of heritage items uncovered during the project.

The Green Globe judges said of Sydney Metro that it is 'establishing a high bar for best practice civil engineering projects'.



Members of the sustainability team at the NSW Government's 17th Green Globe Awards

PREMIER'S AWARDS FOR PUBLIC SERVICE (NSW) (2015)

The Sydney Metro Northwest pre-employment program won the NSW Premier's Award for 'Making NSW a better place to live'. The awards recognise the work and contribution of public sector employees and agencies, as well as private and non-government organisations.

The Pre-employment Program is a partnership involving Sydney Metro Northwest, TfNSW, TAFE NSW - Western Sydney Institute, Salini Impregilo JV, CPBJHD, Break Thru People Solutions, Global Skills and Workforce International.

It helps long-term unemployed and those from disadvantaged groups from Western Sydney find a sustainable job. Participants take part in a transport infrastructure program that incorporates personal development training, and tailored skill and capacity building. The program has achieved a 93 per cent successful completion rate, with 70 per cent of participants being placed in jobs.

SUSTAINABILITY IN INFRASTRUCTURE AWARD (2015)

Sydney Metro Northwest's tunnel builders - CPB John Holland Dragados (CPBHJD) - were awarded a Leading Infrastructure Sustainability (IS) Design rating by the Infrastructure Sustainability Council of Australia. This is the highest possible rating. CPBJHD received the award for their efforts to reduce greenhouse gas emissions by 24 per cent through a variety of initiatives that included using B5 blended fuel, using hybrid excavators and providing fuel efficiency training. They also reduced water use by 37 per cent through a closed-loop recirculation network.

BANKSIA AWARD FOR INNOVATION IN SOCIAL INFRASTRUCTURE (2014)

Sydney Metro Northwest won the Banksia Awards for innovation in social infrastructure for projects above \$100 million. The Sydney Metro Northwest project was highlighted as having a clear vision to achieve new benchmarks in sustainable infrastructure delivery. The judges said that Sydney Metro Northwest provided 'an impressive integrated approach to sustainability in design, construction and operation for a transport project'. They also noted that the project will make a positive contribution to the community by extending public transport, and enabling sustainable growth in the North West region.

INTERNATIONAL ASSOCIATION OF PUBLIC PARTICIPATION'S CORE VALUE AWARD (2014)

The Sydney Metro Northwest project team won the Australasian Transport Award for community engagement. The judges said that the team was selected in 'recognition of excellence in the field of public participation, demonstrated through the development and implementation of an outstanding project'.

PLANNING INSTITUTE OF AUSTRALIA (NSW) AWARD FOR EDUCATION (2014)

Sydney Metro Northwest's Fast Tracking the Future education program, launched in 2015, was recognised by the Planning Institute of Australia (NSW). The program judges considered the program to be an innovative and important initiative developed specifically for school aged children to engage directly with Australia's biggest public transport project. They also said that it presented school children with a unique opportunity to participate in the delivery of a major infrastructure project, which was likely to change their built environment and impact their lives now and into the future.

INTERNATIONAL EROSION CONTROL ASSOCIATION AUSTRALIAN ENVIRONMENTAL EXCELLENCE AWARD (2014)

The Sydney Metro Northwest project's tunnel builders - CPBJHD - were awarded the International Erosion Control Association (IECA) Australian Environmental Excellence Award. The award recognised the innovative environmental approach in building the 15 kilometres twin tunnels between Bella Vista and Epping. The \$1.15 billion tunnelling works have a range of diverse environmental management challenges due to significant earthworks required in built-up areas and adjacent to bushland.

The award recognised the project for the extensive planning that took place prior to works commencing, along with best practice techniques, methods and innovations which helped achieve positive outcomes for the environment.

Key initiatives highlighted included:

- › the reuse of 100 per cent of spoil (1,677,000 cubic metres) on and offsite
- › teaching workers about environmental practices such as spill and dust management, basic sediment controls and dewatering through an industry-first tunnelling program
- › using wheel-wash sprayers and boot washes to reduce sediment tracking
- › combining sediment control techniques to make them site specific. For example, a modular trap system at Epping helped remove the need for a sediment basin.

2015, 2016, 2017 NSW TRAINING AWARDS IN CATEGORY OF NSW INDUSTRY COLLABORATION OF THE YEAR

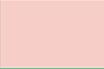
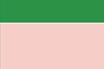
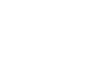
Sydney Metro was selected as a finalist for the 2015, 2016, and 2017 NSW Industry Collaboration of the Year. These awards recognise outstanding achievement in the vocational education and training sector. The awards honour and review the achievement of student, trainers/trainers, and training organisations, large and medium employers.

Appendix A

These findings from an independent assessment undertaken by Ernst & Young 2015-16 detail the sustainability performance of the Northwest project against strategy targets.

Fullfils target	On track to fulfil the target	Does not fulfil the target	Does not fulfil the target but meets its intent	No longer applicable
				
At least two out of the three criteria are being met	At least one criterion is being met but full compliance will be achieved at a later stage	None of the criteria are being met	None of the criteria are being met; there are activities in place that indirectly meet the intent of the target	This target is no longer applicable to Sydney Metro Northwest

Theme	Target	Rating
Governance	1.1 High-level of attainment in the Australian Green Infrastructure Council Infrastructure Sustainability Rating Tool	
	1.2 High-level of attainment in TfNSW's Sustainable Design Guidelines	
Climate change	2.1 Undertake a climate risk assessment and identify and implement adaptation measures to address climate risks on the project	
Carbon management	3.1 Off-set 100 per cent of the operational electricity needs	
	3.2 Source five per cent of operational energy demand from onsite renewable or low carbon sources at the stabling yard, maintenance facility, stations or car parks	
	3.3 Off set 20 per cent of the construction electricity needs	
Energy efficiency	4.1 Achieve a 20 per cent reduction in energy demand on a reference case to be achieved through design	
	4.2 Zero artificial lighting provided to 95 per cent of the concourse and platform area during the day	
	4.3 Identify targets for construction related energy efficiency/energy reduction	
Land use integration	5.1 Create and provide cycle ways and facilities at stations	
	5.2 Provide open spaces around stations	
	5.3 Restore creeks around stations	
Customer experience	6.1 Actively engage local communities, potential customers and other stakeholders	
	6.2 Ensure there are place managers during the planning and construction phases	
Community benefit	7.1 Provide community legacy projects	
	7.2 Demonstrate safety initiatives to deter crime	
	7.3 Host community workshops to communicate delivery time frames and receive input from community members	
	7.4 Incorporate public art at all stations	
	7.5 Provide access to project development and benefits for curriculum development at all local education facilities	
Resource land	8.1 Identify percentage reduction in efficient use of land	

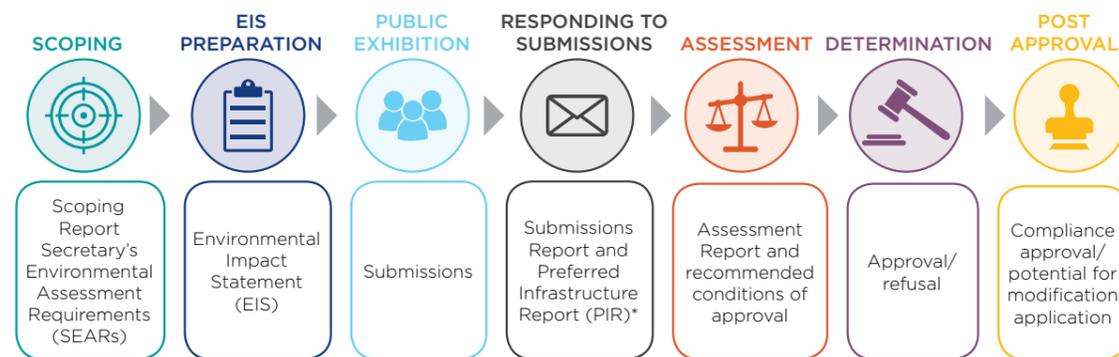
Theme	Target	Rating
Resource - water efficiency	9.1 Source 100 per cent of non-potable water demand from non-potable sources during operation	
	9.2 Source 100 per cent of non-potable water demand from non-potable sources during construction	
Resource - waste and materials	10.1 Reuse 100 per cent of clean spoil	
	10.2 Recycle 90 per cent of construction and demolition recyclable waste	
	10.3 Identify reduction in embodied carbon, compared to a reference design	
Heritage conservation	11.1 Identify and implement opportunities to enhance heritage values	
	11.2 Develop partnerships with relevant stakeholders to utilise heritage places to promote local heritage values	
Biodiversity conservation	12.1 Provide dedicated areas for biodiversity legacy on site	
	12.2 Off set biodiversity as determined by the Regulator	
Pollution control	13.1 Ensure zero major pollution incidents	
Supply chain (workforce)	14.1 Support skills development in the delivery of Sydney Metro Northwest to establish a lasting 'skills' legacy for Western Sydney	
	14.2 Assist in resolving skills shortages nationally through a workforce development approach where training and education systems are industry led	
	14.3 Encourage the next generation to pursue careers in construction and engineering in the infrastructure sector through targeted and innovative school, university and educational institute programs	
	14.4 Facilitate training and educational opportunities through work placements, apprenticeships and graduate internships	
	14.5 Promote partnerships with government agencies to assist with funding of relevant skills and employment programs	
	14.6 Encourage diversity and inclusion in the recruitment programs	
	14.7 Encourage diversity and inclusion in the recruitment programs	
Supply chain sustainable procurement	15.1 Document sustainable procurement requirements within tenderers	
	15.2 Share and build supplier knowledge on sustainable procurement	
	15.3 Include requirements for sustainability skill sets in integrated teams during tender process	
	15.4 Require tenderers to demonstrate staff with sustainability skills in organisation charts	
	15.5 Build sustainable procurement procedures and penalties into the contract	
	15.6 Embed sustainability in assessment criteria and provide rationale	
	15.7 Embed sustainability objectives into every aspect of the process from planning through the tender process to measurement of results	

Appendix B

Planning approval pathways

Conditions of Approval from the Department of Planning and Environment form the basis for how the project is managed during construction and operation. As outlined in the DP&E Guidelines, Sydney Metro used the following pathway to seek approval for the Northwest project, and Sydney Metro City & Southwest.

Department of Planning and Environment's planning approvals pathway



* PIR applies to SSI projects only

The planning approval process for Sydney Metro projects began in May 2008, when a Concept Plan Approval was granted for the Northwest project. The table below outlines the current Environmental Impact Statements for Sydney Metro Northwest, and City & Southwest projects. Documents and full details are available via the Sydney Metro website.

Sydney Metro planning approvals as at 30 June 2017

STAGE 1	STAGE 2	
Sydney Metro Northwest Formally the North West Rail Link	Sydney Metro City & Southwest*	
<p>EIS 1—SSI_5100—Major Civil Construction Works: Epping to Rouse Hill, assessed a 23 kilometre track rail corridor and eight new stations <i>Approved September 2012</i></p> <ul style="list-style-type: none"> › Modification—SSI_5645 Showground Station. Approved April 2013 <p>EIS 2—SSI_5414—Stations, Rail Infrastructure and Systems: Assessed station layout, via duct design, rail infrastructure, power, transport interchange aspects, final road layout and landscaping <i>Approved 8 May 2013</i></p> <ul style="list-style-type: none"> › Modification—SSI_5414 Windsor Road Bridge. Approved May 2014 <p>EIS—SSI_5931—Sydney Metro Trains Facility (formerly RTRF) for the expansion of the train stabling and maintenance facility at Rouse Hill <i>Approved January 2014</i></p>	<p>EIS—SSI_7400—Chatswood to Sydenham: Assessed 16.5 kilometres of track rail between Chatswood and Sydenham, including seven new metro stations. <i>Approved January 2017</i></p> <p>Following modification applications have been lodged by mid 2017:</p> <ul style="list-style-type: none"> › Modification 1—Victoria Cross Services Facility and Artarmon Substation › Modification 2—Central Walk › Modification 3—Martin Place Station › Modification 4—Sydenham Station and Metro Facility South. 	<p>EIS 1—SSI_8256—Sydenham to Bankstown: currently under development, will assess 13 kilometre long section of rail line between Sydenham and Bankstown, to update stations along the corridor and convert to metro standards</p>
<p>Review of Environmental Factors (REF)* Epping to Chatswood Rail Link Conversion *Plus multiple other REFs were undertaken as part of Park 5 assessment</p>		

*City & Southwest project is split into two EIS's being progressed one after the other

Appendix C

Stakeholder relationships: detailing stakeholders consulted and key areas of engagement in the development and delivery of Sydney Metro projects.

Stakeholder	Key areas of engagement
Community	
<ul style="list-style-type: none"> › Residents and resident groups › Businesses and business groups › Land owners › Education and religious facilities › Representatives from the Aboriginal community 	<ul style="list-style-type: none"> › transport amenity and reliability › ensuring safety › heritage › accessible design and social inclusion › concerns about environmental impacts such as noise, dust and pollution › convenience related concerns such as road closures, loss of parking, increase in traffic and heavy vehicle movements
Customers	
<ul style="list-style-type: none"> › Potential public transport users 	<ul style="list-style-type: none"> › understanding needs and expectations › discussions on comfort and price › understanding drivers for existing rail users versus non-rail users
Government	
<ul style="list-style-type: none"> › Commonwealth and State elected officials › NSW government departments and agencies › Local councils › Emergency services 	<ul style="list-style-type: none"> › working collaboratively to create a project that is of maximum benefit for the community › managing of the timely dissemination of relevant project information to Commonwealth, State and local elected representatives
Service providers	
<ul style="list-style-type: none"> › Water, power and telecommunication providers 	<ul style="list-style-type: none"> › engaging on topics such as ensuring the reliability of essential services that support the project
Industry	
<ul style="list-style-type: none"> › Academic institutions › Contractors › Peak bodies › Transport associations › Unions 	<ul style="list-style-type: none"> › mutually beneficial relationships to identify and mitigate risks associated with the project › leveraging opportunities for the workforce, students and community

