

Western Harbour Tunnel – Stage two major announcement FAQs

December 2022

Is Transport considering an alternative methodology for package two (Stage 2 – northern) of Western Harbour Tunnel for the tunnel?

It is normal for a tenderer to present alternative options including methodologies through the tender process.

An alternative option of using a Tunnel Boring Machine (TBM) to tunnel beneath Sydney Harbour was proposed and Transport has since explored and assessed the benefits of a TBM methodology, as opposed to dredging and the use of immersed tube tunnels.

Following this extensive and critical process, Transport has determined the TBM methodology to be the best overall solution to deliver Stage 2 tunnelling beneath Sydney Harbour.

Does the TBM option avoid the issue of dredging Sydney Harbour?

A Tunnel Boring Machine (TBM) has the capacity to tunnel through the rock bed and marine clay, beneath the harbour as opposed to dredging. This removes the need to manage harbour sediment and subsequent disposal to landfill or offshore.

Transport has determined the TBM methodology to be the best overall solution to deliver Stage 2 tunnelling beneath Sydney Harbour. Transport remains committed to minimising impacts to the community and the environment.

Is there a cost benefit to this option?

Acciona Construction Australia submitted an alternative methodology of using a Tunnel Boring Machine (TBM) to tunnel beneath the Sydney Harbour seabed. This design was assessed and selected, as part of their overall solution, which provides the best value for the people of NSW, and further minimises impacts on the local community and environment.

Is Transport therefore conceding that dredging the Harbour is environmentally unsafe?

Dredging is a relatively common activity within New South Wales ports and coastal waters, with specialised contractors and equipment designed to meet project and environmental requirements in a variety of conditions.

What we were planning is similar to previous work already carried out on many projects within Sydney Harbour, including at Garden Island in 2019.

When will work in the harbour start?

The Stage 2 contract was awarded as of November/ December 2022. The TBM solution requires a Planning Modification to the Minister's Conditions of Approval, which may take up to a year to finalise before work starts beneath the harbour.

Construction can start on various parts of the project in 2023 while the planning modification process for the TBM is underway.

Frequently asked questions

How long will the project take?

Tunnelling on Stage 1 started on 29 June 2022 under Emily Street, Rozelle and will reach Victoria Road in December 2022. We will then tunnel under the suburb of Balmain in Q2 2023 and Birchgrove in 2024.

Major work for Western Harbour Tunnel stage 2 is expected to start in late 2023 and will continue for approximately 5 years.

When is the tunnel due to open to traffic?

Major work for Western Harbour Tunnel stage 2 is expected to start in late 2023 and will continue for approximately 5 years.

What is a Tunnel Boring Machine (TBM)?

A tunnel boring machine, often referred to as a TBM, is a machine used to excavate tunnels.

What type of TBMs is being used on Western Harbour Tunnel?

Following a rigorous assessment of the local ground conditions, a Mixshield TBM has been selected as the most appropriate type of TBM for the Western Harbour Tunnel.

How does a Tunnel Boring Machine (TBM) work?

At the front of the TBM is a cutter head which excavates the ground. As the tunnel advances, precast concrete segments are installed to support and permanently line the tunnel.

The excavated material is mixed with slurry and transported to a Slurry Treatment Plant. The excavated material is separated from the slurry and prepared for recycling or disposal.

What will you do with the excavated material?

Excess material or material that cannot be reused on the project will be taken to an approved location that can receive the material. Some material may be suitable for use on other projects.

Where is the Slurry Treatment Plant?

It is currently proposed that the Slurry Treatment Plant will be located in the underground ventilation cavern. This section of the tunnel will be excavated as part of Stage 1 in Rozelle.

How many TBMs will there be?

There will be two TBMs used to tunnel the southbound and northbound road tunnels. They will not bore alongside each other simultaneously. It is standard practice that the TBMs are spaced out meaning one will start first and bore at a distance ahead of the other.

How big will the TBMs be?

The TBMs used for the Western Harbour Tunnel are the third biggest in the world. The TBMs are expected to each be about 16.4m in diameter, however, the final width may be reduced through the detailed design process. The TBMs are about 120m in length.

How far will the TBMs tunnel?

Our specialised TBM machines will each tunnel for about 1.5km from Birchgrove to Waverton including under the Sydney Harbour seabed, connecting the northern and southern ends of the project.

What are the Stages and which stage will the TBMs be used for?

The Western Harbour Tunnel is being delivered in two stages. The southern section of the tunnel, Stage 1, is being delivered by John Holland CPB Contractors (JHCPB) and includes the excavation of 1.7km of the tunnel between Emily Street in Rozelle to Cove Street in Birchgrove. They are using road headers and more information can be found at nswroads.work/wht-stage1

Stage 2 includes connections from Stage 1 under Cove Street, Birchgrove, to the Warringah Freeway near North Sydney, the crossing under the Sydney Harbour and complete tunnel fit-out. Transport and our awarded contractor, Acciona Construction Australia, are committed to creating opportunity for local businesses and suppliers on this major project. In collaboration with industry, the delivery of Western Harbour Tunnel will include the development and implementation of a business capability program to increase the capability and capacity of ANZ Small and Medium Enterprises and social enterprises.

Will the TBMs be used to tunnel the entire alignment? Why not?

Our specialised TBM machines will tunnel for about 1.5km under from Birchgrove to Waverton including under the Sydney Harbour seabed, connecting the northern and southern ends of the project. The TBM methodology has been adopted as an alternative to using the originally planned Immersed Tube Tunnel construction method. With the expected geology under Sydney Harbour, the TBM method is efficient and has a reduced impact on the environment and community.

The majority of the Western Harbour Tunnel will be excavated using electrically powered machines known as roadheaders, as planned. Roadheaders were found to be less suited to tunnelling beneath the harbour, as opposed to under land.

Frequently asked questions

What is a roadheader?

A roadheader is an electrically powered excavation machine that has a rotating, rock-cutting head on the front, mounted to a boom. When the underground rock is cut using a roadheader, a loading device typically transfers the rock onto a conveyor belt which runs the spoil onto haulage trucks.

What is the benefit of using road headers?

The roadheader tunnelling method has been the preferred construction technique for almost all major motorway tunnels in Sydney. This method will be used to tunnel the majority of the Western Harbour Tunnel, with the exception of the section beneath the Sydney Harbour seabed, as planned.

Using roadheaders to tunnel north and south of the Harbour is the preferred method largely because of the suitable ground conditions and flexibility these machines provide in excavating different tunnel shapes.

Is there a dive site required?

No additional temporary construction sites are required. In fact, the adoption of the TBM methodology means that we have reduced the total number of temporary construction sites needed by four. The two sites on Sydney Harbour, and the sites at Berrys Bay, Waverton, and Yurulbin Point, Birchgrove, will no longer be required for construction.

Where do the TBMs enter the earth and start tunneling from?

The TBMs will be assembled in an underground launch cavern that will be excavated in Birchgrove. No additional dive or launch sites are required for the TBMs.

Each piece of the machine will be transported on a truck to the Western Harbour Tunnel entry, which is already excavated as part of the Rozelle Interchange, and driven to the underground launch cavern.

What is a launch cavern?

This is an area underground, where the TBMs are assembled to start tunnelling under Birchgrove towards Waverton. This will likely be located underground in Birchgrove, near the harbour. The final depth of the excavation tunnel will be known throughout detailed design.

Does the TBM launch cavern get filled in?

The majority of the launch cavern used to assemble and launch the TBMs, does not get filled in and instead becomes part of the operational and permanent road tunnel.

What happens with the TBM when it finishes tunnelling?

TBM machines can only move in one direction. Once we have completed tunnelling the TBM section of the project, the TBMs will be driven into a 'receiving chamber'. We will salvage as much of the machine as possible, removing it in pieces back through the entrance to the tunnel at Rozelle.

The cutterhead and shield of the TBMs cannot be safely salvaged and will be buried underground and encapsulated in the receiving chamber. This is a normal process when tunnelling using the TBM methodology, and all safety and environmental measures will be carried out to ensure it is safely buried. Burying the cutterhead and shield of the TBMs mean we do not need to create an above-ground construction site to remove them, which would have significant impacts on the local community.

Why is this only now the preferred method to tunnel beneath the Harbour?

Since the development of the concept design in 2017 and the proposed reference design in 2018 for the project, technology and the market have evolved. Sydney Metro has recently proven the efficiency and success of using a TBM to tunnel in varying ground conditions beneath Sydney's Harbour.

Was a TBM considered during the Environmental Impact Statement?

A design using a TBM was originally considered as part of the EIS. At the time, an Immersed Tube Tunnel approach was assessed as being the most suitable option due to the nature of the project as well as the local ground conditions beneath Sydney's Harbour.

Since the development of the concept design in 2017 and the proposed reference design in 2018 for the project, technology and the market have evolved. Other projects have recently proven the efficiency and success of using a TBM to tunnel beneath Sydney's Harbour.

As this methodology was not fully assessed and approved during the EIS, we will need to seek further approval from the NSW Minister for Planning to use the TBM methodology through a modification, which the community will be consulted on in late 2023. This is a standard process when making changes to an approved major project.

Frequently asked questions

How will the TBMs produce the type of tunnel required for a motorway, rather than what it has been used for on Sydney Metro?

Our specialised TBMs will tunnel for about 1.5km under the Sydney Harbour seabed. The TBMs used on the Western Harbour Tunnel are the third largest TBMs in the world, larger in size than those used for Sydney Metro, to create the road tunnel.

The TBM methodology has been adopted as an alternative to using the originally planned Immersed Tube Tunnel approach. The majority of the Western Harbour Tunnel will be excavated with roadheaders on north and south sides of the harbour, as planned.

Which communities directly benefit from this change in method?

The benefits of going with a TBM delivery methodology under Sydney Harbour are significant for the people of NSW. Where there was previously construction sites planned on water and land around Berrys Bay and Yurulbin Point, those communities in Waverton and Birchgrove will no longer be impacted by those construction sites.

What does this mean for residents in Birchgrove?

Change in methodology means we no longer require a temporary construction site at or cofferdam at Yurulbin Point. As a result, there will be no above ground Western Harbour Tunnel tunneling site at this location impacting local residents, meaning we can avoid the temporary impacts of an above-ground tunnelling site, such as noise, dust, vehicle haulage, visual amenity and loss of open space. There will be no impact to Birchgrove Wharf, and its ferry operations.

Will Yurulbin Point still have landscaping work done?

Transport and its contractor, Acciona Construction Australia, will be carrying out further planning and detailed design work on the project over the next 12 months, which will consider further opportunities to deliver improved community outcomes. This will also refine the tunnel alignment and depth as part of detailed design.

What does this mean for residents in Waverton?

Change in methodology means we no longer require a construction site at Berrys Bay cofferdam at Balls Head for main work. As a result, there will be no Western Harbour Tunnel construction work activities at this location, meaning we can avoid the temporary impacts of an above-ground tunnelling site, such as noise, dust, vehicle haulage, visual amenity and loss of open space. There will be no impact to harbour operations or the Coal Loader Sustainability Centre and no temporary relocation required for the MV Cape Don.

Will there be more vibration and will properties be affected?

Our objective is to ensure there are no buildings at risk of damage from vibration and settlement impacts while we are carrying out our work.

The new TBM method does not pose additional risk to properties from vibration.

As is the standard process for tunnelling, we will offer eligible properties in close proximity to the tunnel alignment and any settlement or vibration-intensive works a free property condition survey. While we are building, we will monitor noise and vibration to make sure it meets the appropriate guidelines.

Will you be delivering on the Berrys Bay Master Plan?

Despite no longer needing to use Berrys Bay temporarily for Western Harbour Tunnel construction, the NSW Government is committed to returning the space to the community as foreshore parklands and public spaces. Without the construction site at Berrys Bay, work to revitalise Berrys Bay in Waverton can start much sooner than initially expected.

Transport prepared a draft master plan for Berrys Bay which was open for community feedback in October 2022. The plan will provide a vision to transform the former industrial land of Berrys Bay into usable public open space. Transport is currently preparing a Submissions Report following community feedback.

When does construction start?

Early work for Stage 2 may include further geotechnical investigations, archaeological investigations and more, and is expected to start early 2023.

Subject to detailed design, major work for Western Harbour Tunnel stage 2 is expected to start in late 2023 and will continue for approximately 5 years.

Frequently asked questions

How many people will be employed?

Will create up to 6,900 full time jobs during delivery.

NSW Government's Infrastructure Skills Legacy Program sets mandatory requirements for infrastructure agencies to meet minimum targets for skills, training and diversity. Some of these minimum targets that will apply to Western Harbour Tunnel include 20% of Trades Workforce to be Apprentices; 20% of the Project Workforce to be Learning Workers; 2% of the Trades Workforce to be Women; and 8% of the Project Workforce to be Young People.

Where is the TBM coming from?

The contractor is still undertaking the procurement process to source the machines. More information about where the TBMs will come from will be known once the contractor has completed this process.

Will the materials be locally sourced?

Transport and our awarded contractor, Acciona Construction Australia, are committed to creating opportunity for local businesses and suppliers on this major project. In collaboration with industry, the delivery of Western Harbour Tunnel will include the development and implementation of a business capability program to increase the capability and capacity of ANZ Small and Medium Enterprises and social enterprises.

How will businesses benefit?

Transport and our awarded contractor, Acciona Construction Australia, are committed to creating opportunity for local businesses and suppliers on this major project. In collaboration with industry, the delivery of Western Harbour Tunnel will include the development and implementation of a business capability program to increase the capability and capacity of ANZ Small and Medium Enterprises and social enterprises.

Which companies were shortlisted for Stage 2?

Following an Expression of Interest process, the three shortlisted tenderers for Stage 2, northern tunnelling of the project, marine work and tunnel fit-out were ACCIONA Construction Australia, Bouygues Construction Australia & VINCI Construction Grands Projects JV, and John Holland, CPB Contractors and UGL Engineering JV.

How do you know you have got the best outcome for the taxpayer?

The procurement process involved inviting tenderers to submit proposals to deliver Stage 2 of the Western Harbour Tunnel, and an extensive period of rigorous investigation and negotiation to determine the preferred tenderer.

What is a procurement process?

The procurement process involved inviting tenderers to submit proposals to deliver Stage 2 of the Western Harbour Tunnel, and an extensive period of rigorous investigation and negotiation to determine the preferred tenderer.

In November/ December 2022, Western Harbour Tunnel Stage 2 awarded the \$4.24b contract to Acciona Construction Australia.

What are the mechanisms in place to ensure the project is carried out in line with the project's planning approval?

The Western Harbour Tunnel will be delivered and operated in line with all relevant guidelines and the projects' planning approvals. As is standard for a major project reporting and auditing mechanisms are in place within Transport for NSW, and externally with Department of Planning and Environment and other overseeing authorities.

Will there be an independent certifier for the project?

Transport for NSW has engaged The APP Group as the Independent Certifier for Western Harbour Tunnel Project. The Independent Certifier will ensure that the project is delivered in accordance with the agreed design document and planning approvals. Transport looks forward to working with The APP Group to ensure that Western Harbour Tunnel is delivered successfully.

What are the tolling plans for Western Harbour Tunnel?

The NSW Government has announced the Western Harbour Tunnel will be tolled but the proposed toll level has not yet been determined.