



Tunnel Boring Machine – Frequently Asked Questions

Two Earth Pressure Balance Tunnel Boring Machines will excavate the Airport Link mainline tunnels from Kalinga Park to Lutwyche.

ABOUT THE TBMs

What is an Earth Pressure Balance (EPB) Tunnel Boring Machine? An Earth Pressure Balance Tunnel Boring Machine is a specific type of Tunnel Boring Machine (TBM) designed to control the soil pressure at the face of the TBM and to excavate through the specific ground conditions encountered from Toombul to Lutwyche.

How does the TBM work?

The TBM is a complex purpose-built machine consisting of numerous components to excavate, line the tunnel and remove excavated material.

To excavate the tunnel the cutterhead turns while the thrust cylinders push forward, effectively drilling into the ground. The excavated soil and rock passes through the excavation chamber, through the screw conveyor and onto the TBM belt to be removed.

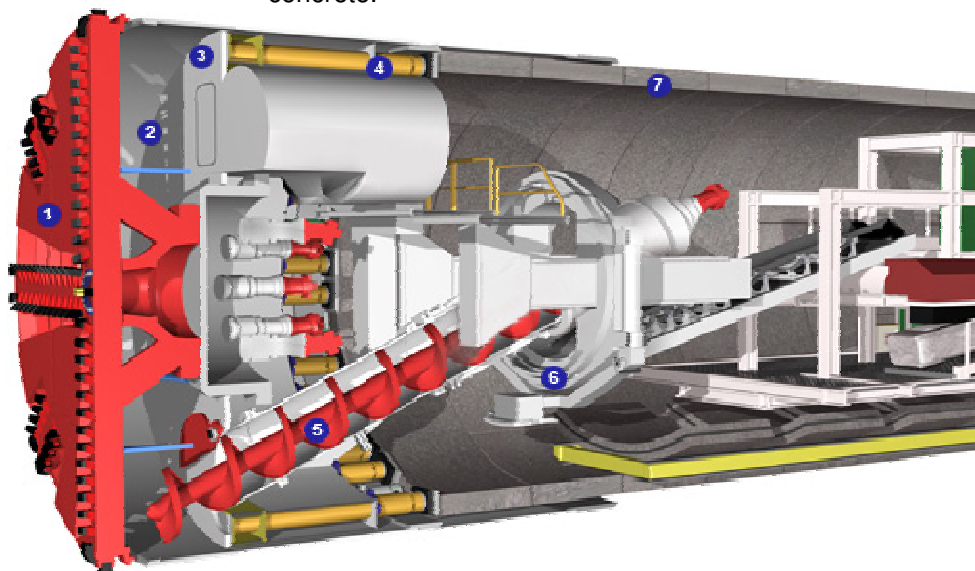
Every two metres the TBM stops and the erector installs the segments to line the tunnel (refer to the diagram below). The TBM is then ready to tunnel again. As the machine moves forward grout is injected behind the previously completed rings to secure them in the ground.

Why is an Earth Pressure Balance TBM used as opposed to roadheaders? The TBMs chosen are designed to suit the ground conditions which are predominantly clays and siltstones through the Kalinga Park to Lutwyche section of the project alignment. For this project, the soft and mixed ground conditions at the start of the tunnels at Kalinga Park required an Earth Pressure Balance TBM. Roadheaders are suited for harder ground conditions.

The TBMs are extremely safe to use when excavating softer ground but can also cut through rock that is six times harder than concrete.

Earth Pressure Balance Tunnel Boring Machine

1. Cutterhead or Cutting wheel
2. Excavation chamber
3. Bulkhead
4. Thrust cylinder
5. Screw conveyor
6. Erector
7. Segment lining





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How far underground will the TBM operate? What is the lowest depth of operation?

The depth varies from approximately 8m at its launch point to below 55m from the surface at its deepest point.

How many kilometres will the TBM tunnel? The TBMs will carve 2.5 kilometres of the main line tunnels from Toombul to Lutwyche.

How long will it take to excavate the tunnels? It is expected to take approximately 12 months to excavate the main line tunnels from Toombul to Lutwyche.

How many people work on each TBM at a time?

Up to 22 people at a time can work on sections of the TBM. The crews work along the length of the machine. At the front of the machine are the ring builders and operators; road deck builders are in the middle and service handling and conveyor builders are at the back of the machine.

How is the TBM guided through the ground? A number of control survey points and stations have been installed across the entire project alignment to support the TBMs guidance systems. The design alignment is also loaded into the guidance system.

The guidance system provides an actual and predicted position on a dedicated screen in the operator's cabin against the design alignment and the TBM operator adjusts the pressures on the thrust cylinder groups to steer the TBM to the required alignment.

What happens when an aquifer is to be tunnelled through? The EPB machines have been specifically chosen for the purpose of excavating through the project alignment's ground conditions. The accelerated grout process will minimise impact on underground aquifers. The combination of a sealed TBM system, gasketed lining and grouting will minimise impact to the groundwater regime.

How will the tunnel cross passages be excavated? Steel plates will be installed at the cross passage locations. These plates will be removed for excavation with a small excavator and rock hammers where required.

WHAT TO EXPECT

How will I know when the TBM is getting close to my property? TJH will be distributing regular progress updates as tunnelling approaches properties within close proximity to the tunnel alignment.

TJH will also be door knocking properties directly above the tunnels to provide advance notification of the machines' progress.

Will I experience vibration and / or noise during the TBM process? Residents within close proximity to the Tunnel Boring Machine alignment may experience some vibration and/or regenerated noise as the TBM progresses through their area. Residents within close proximity may experience some vibration and / or regenerated noise as the TBM approaches, is directly beneath and/or is slightly past their property. The level of vibration experienced may vary with consideration for the depth of the tunnel, ground conditions and the structure of the building on the surface.

TJH will have vibration monitors placed at regular intervals along the alignment.

What is regenerated noise? Regenerated noise is created when vibration from tunnel excavation travels through the ground and causes a building's flat surfaces to vibrate, creating an audible noise.



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What should I do if I experience vibration or regenerated noise? Thiess John Holland operates a 24 hour Community Hotline. Should you have concern about the level of regenerated noise or vibration being experienced please phone 1800 721 783.

Is the condition of structures above the tunnels being reviewed prior to tunnelling activities? It is standard practice to offer building condition surveys to property owners within the immediate vicinity of works to document the condition of properties prior to the start of construction.

Building condition surveys are provided to the owner free-of-charge and are referred to in the unlikely event that construction causes some impact to buildings.

TJH must repair damage that is demonstrated to be as a result of tunnelling activities

What should I do if my property is damaged as a result of tunnelling activities? Should you identify damage to your property which you believe to be as a result of tunnelling activities, please phone the Community Hotline on 1800 721 783.

What are the hours of operation? Tunnel excavation will take place 24 hours per day, seven days per week. The tunnelling operation will be supported from the Kalinga Park West Worksite, spoil conveyor and a purpose-built spoil handling facility at Nudgee Road.

MONITORING

What type of monitoring will TJH be doing?

TJH will be monitoring for vibration, ground conditions and noise in accordance with the Coordinator General's project conditions.

Where will monitoring take place? A number of survey points have been installed along the project alignment for twice daily monitoring by surveyors.

Vibration monitors will be installed along the project alignment as approved by property owners and / or residents.

TJH will conduct internal noise monitoring in consultation with residents within close proximity to the tunnel alignment.

Where can I get more information? For more information about tunnelling in your area, please contact the Community Relations team on 1800 721 783 or email contactus@tjh.com.au