WEST GATE TUNNEL PROJECT

TUNNELLING

The West Gate Tunnel Project is building twin tunnels between the Maribyrnong River and the West Gate Freeway, providing a vital alternative to the West Gate Bridge.

The project will ensure quicker and safer journeys and remove over 9,000 trucks from streets in the inner west.

The tunnels are being built using two tunnel boring machines (TBMs) so the community and businesses can continue above ground while work happens below.

4 km Outbound tunnel

2.8 km Inbound tunnel

We are building:

Twin tunnels under Yarraville between the West Gate Freeway and the Maribyrnong River.

Entry and exit portals where the tunnels connect with surface roads.

Ventilation structures at each tunnel exit to circulate air from inside the tunnels.

Freeway Management System to support good traffic flow and safety.

Walking and cycling paths on Hyde Street, Harris Street, Maribyrnong Street and bridges over Whitehall Street, Williamstown Road, Stony Creek and the West Gate Freeway.

New landscaped open space in Altona North and Footscray.

Tunnel safety features for smooth operation of the tunnel including automatic detection for over-height trucks, fire systems and emergency access and exits.

In partnership with:

Transurban

WEST GATE TUNNEL PROJECT

MAJOR TRANSPORT INFRASTRUCTURE AUTHORITY

VICTORIA'S BIG BUILD

VICTORIA State Government

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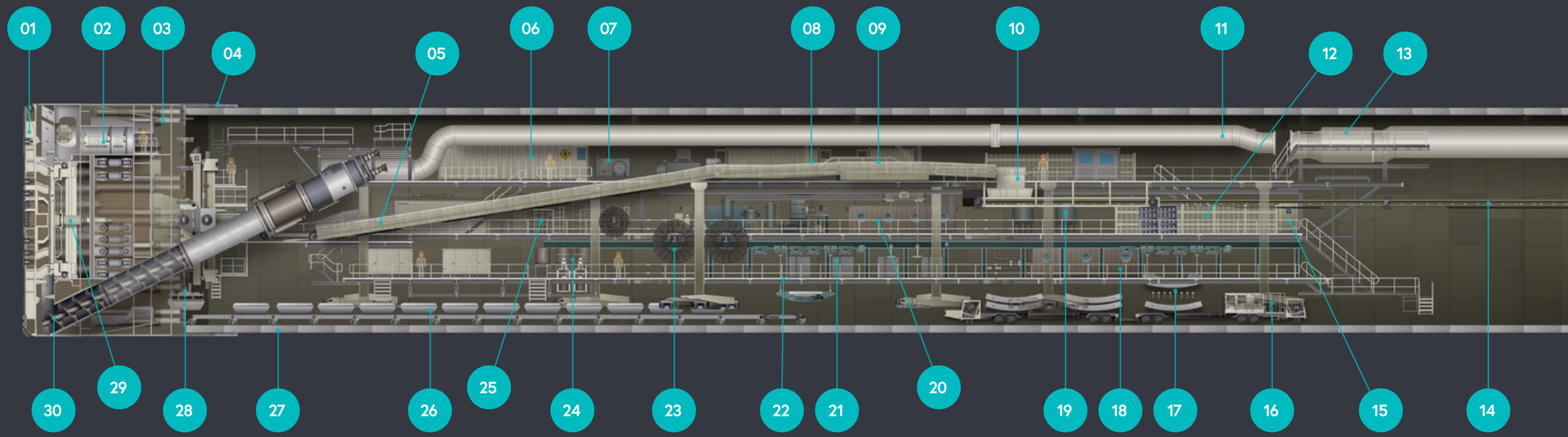


01 Cutterhead
This is the part that rotates and excavates the soil.

02 Air Lock
Acclimatises workers prior to entering and exiting the pressurised excavation chamber.

03 TBM Hydraulic Thrust Jacks
These jacks push the whole TBM forward by creating pressure against the installed precast concrete lining segments. This is what makes it all move forward.

04 Tail Skin
Protective steel skin within which the segmented precast tunnel lining is built. This area is sealed to prevent groundwater entering behind the lining.

05 TBM Conveyor
This is a conveyor belt system that transports excavated material away from the screw conveyor discharge to the tunnel conveyor.

06 Electrical Control Container
Houses the panels for the distribution and control of electrical power to the TBMs' many components.

07 Electrical Transformer
Changes the voltage of the incoming electrical power to a lower usable power for the motors. The electrical power runs from the transformer to the electrical control centre.

08 TBM Control Cabin
This is where the entire TBM and associated systems are operated (the TBM's cockpit).

09 Engineer's Office
This is where the tunnelling engineers plan how the TBM will be operated according to forecast geological conditions – metre by metre.

10 Tunnel Conveyor Transfer
This is where the tunnel soil changes from the TBM conveyor to the tunnel conveyor belt.

11 Ventilation Ducts
This provides a constant flow of clean air and maintains a safe temperature for the workers.

12 Refuge Container
This is a safety refuge for underground personnel.

13 Ventilation Canister
Stores 200m of ducts which feed out as the TBM advances – similar to a telescope unfolding.

14 Tunnel Conveyor Belt
Material is transferred onto a conveyor belt that runs along the length of the tunnel up to the surface. Excavated material is then stockpiled on the surface and transported by trucks to designated fill sites.

15 Toilets

16 Multi Service Vehicle (MSV)
Carries precast lining segments from the surface to the TBM. Also used to transport personnel in the tunnel.

17 Segment Crane
Lifts precast lining segments from the MSV then rotates and carries them to the segment feeder.

18 Bentonite Tank
Storage for ground conditioning fluids.

19 Bentonite Pumps

20 Waste Water Tank

21 Compressors
Provides compressed air for air tools.

22 Cooling Unit

23 Hose Reels

24 Grease Pumps
Used for sealants and lubrication.

25 Hydraulics
Powers TBM hydraulic systems.

26 Segment Feeder
This is a transfer system for precast tunnel lining segments.

27 Tunnel Lining
Concrete segments that form the tunnel.

28 Segment Lining Erector
This machine works just like a big robot arm. It picks up the concrete lining segments using a vacuum plate and then rotates and places them into position to form a ring.

29 Main Drive Unit
This unit houses the main bearing (powered by several motors) and turns the cutterhead.

30 Screw Conveyor
Lifts excavated material from the excavation chamber up to the TBM conveyor. It also enables operation of an earth pressure balance system used for excavating soft material. It essentially maintains the ground support and controls the excavated material transfer.

Tunnelling

Two state of the art tunnel boring machines (TBMs) will build the twin tunnels. These machines use the latest tunnelling technology and are custom designed and built to suit ground conditions in Melbourne's west.

The TBMs start their journey at the northern portal near Whitehall Street in Yarraville and move south west towards the southern portals in the West Gate Freeway. Work will start on the 4 kilometre outbound tunnel first, closely followed by the 2.8 kilometre inbound tunnel. The longer tunnel will take around 18 months to bore.

While the TBM bores through the earth, it also installs the concrete lining – forming walls, roof and base of the tunnel. Behind the TBM, crews work to build the road surface and install electrics, ventilation and safety systems.

Tunnel portals

The portals will form the entries and exits to the tunnels. The southern portal, which is where citybound cars and trucks will enter the tunnel is just west of Williamstown Road. The southern portal where cars and trucks will exit the tunnel heading west, is near Millers Road. The 2 northern portals where vehicles will enter and exit are just south of Footscray Road on the west side of the Maribyrnong River.

Managing construction impacts

Vibration and ground movement

Thousands of tunnels are constructed and operate safely in cities around the world, including the CityLink and EastLink tunnels in Melbourne. Tunnel boring machines are very good at reducing vibration so people living and working above the tunnel may not notice construction happening underground. We will:

- Inspect the properties above the tunnel before and after construction
- Monitor ground movement and vibration levels at all times
- Meet strict targets set to manage vibration and minimise disruption.

Noise from above and below ground

Strict controls are in place to make sure construction noise is well managed and complies with EPA Victoria guidelines. We will:

- Use noise enclosures to reduce noise from major activities at construction compounds, as well as an acoustic shed at where the soil from tunnelling will be loaded onto trucks
- Plan noisy works at times when they cause the least inconvenience where possible and provide advanced notice if any disruptive work is expected to take place
- Monitor noise levels and take action to reduce noise.

Managing tunnelling soil

The West Gate Tunnel construction will see 1.5 million cubic metres of tunnel soil excavated from the tunnel.

The purpose-built shed near the project's northern portal site in Yarraville has been designed to receive the soil excavated by the TBMs. Soil excavated by the TBMs will travel via the covered conveyor and be deposited straight into soil holding bins. Trucks will be loaded inside a purpose-built enclosed shed to reduce noise and contain soil, then before they leave site they are washed, weighed, covered, and GPS tagged.

All trucks will be fully covered and sealed so there is no soil dropping onto the road.

The shed is 90 metres wide and 180 metres long, and houses two 9000m^3 capacity soil bins. This shed is designed to contain noise and dust associated with the soil handling process and will hold approximately two to three days of soil when both TBMs are operating.

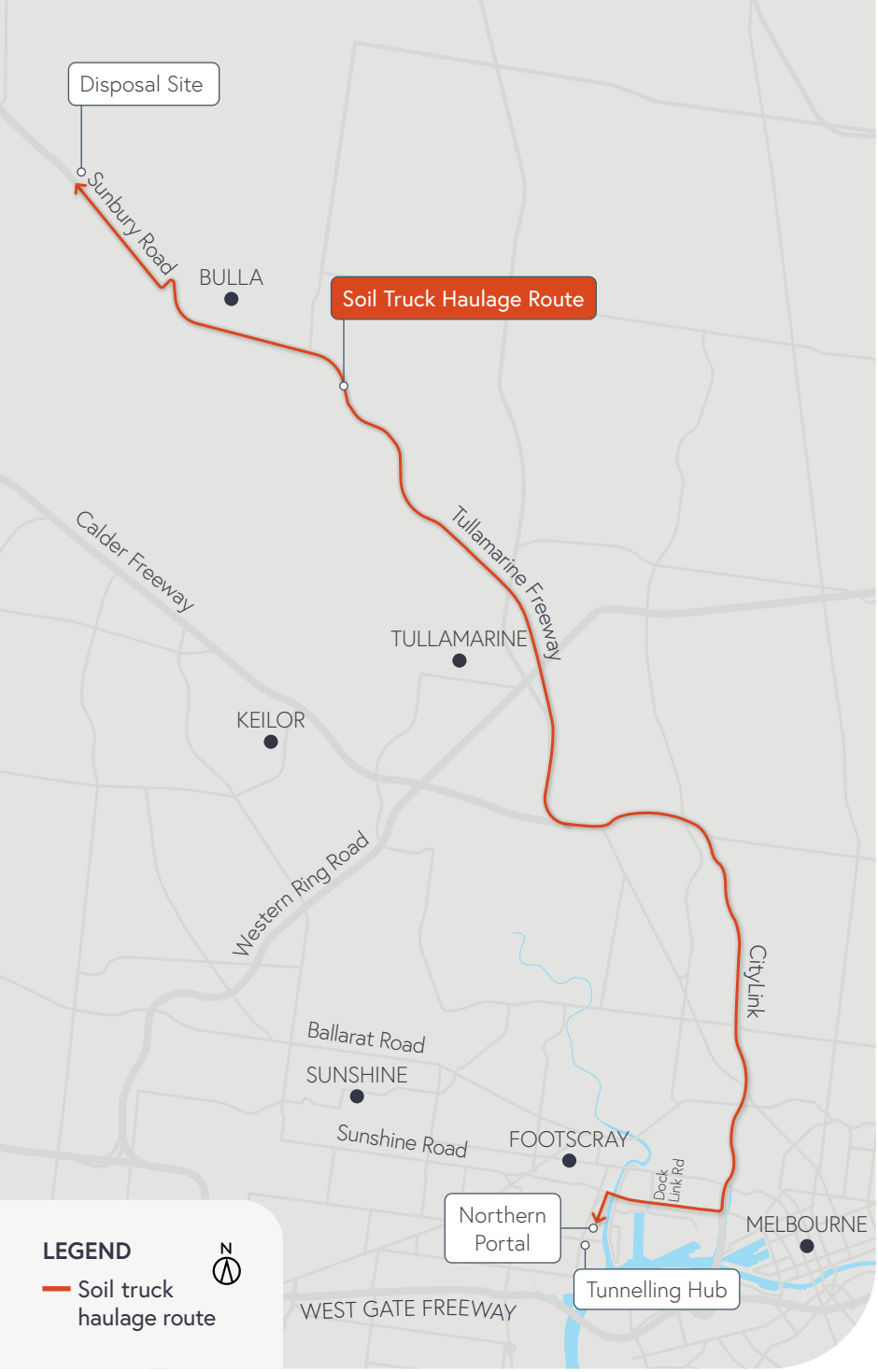
All soil is tested and managed safely in line with EPA requirements and environment and planning controls arising from the project's comprehensive Environmental Effects Statement.

2

Tunnel boring machines operating 24 hours a day to construct the twin tunnels

1.5

Million cubic metres of rock and soil removed from tunnel construction



Transporting soil and construction materials

The West Gate Tunnel Project uses approved truck routes to safely transport the soil to a purpose built disposal site in Bulla and to transport construction equipment and precast concrete segments that line the tunnel to and from our worksites.

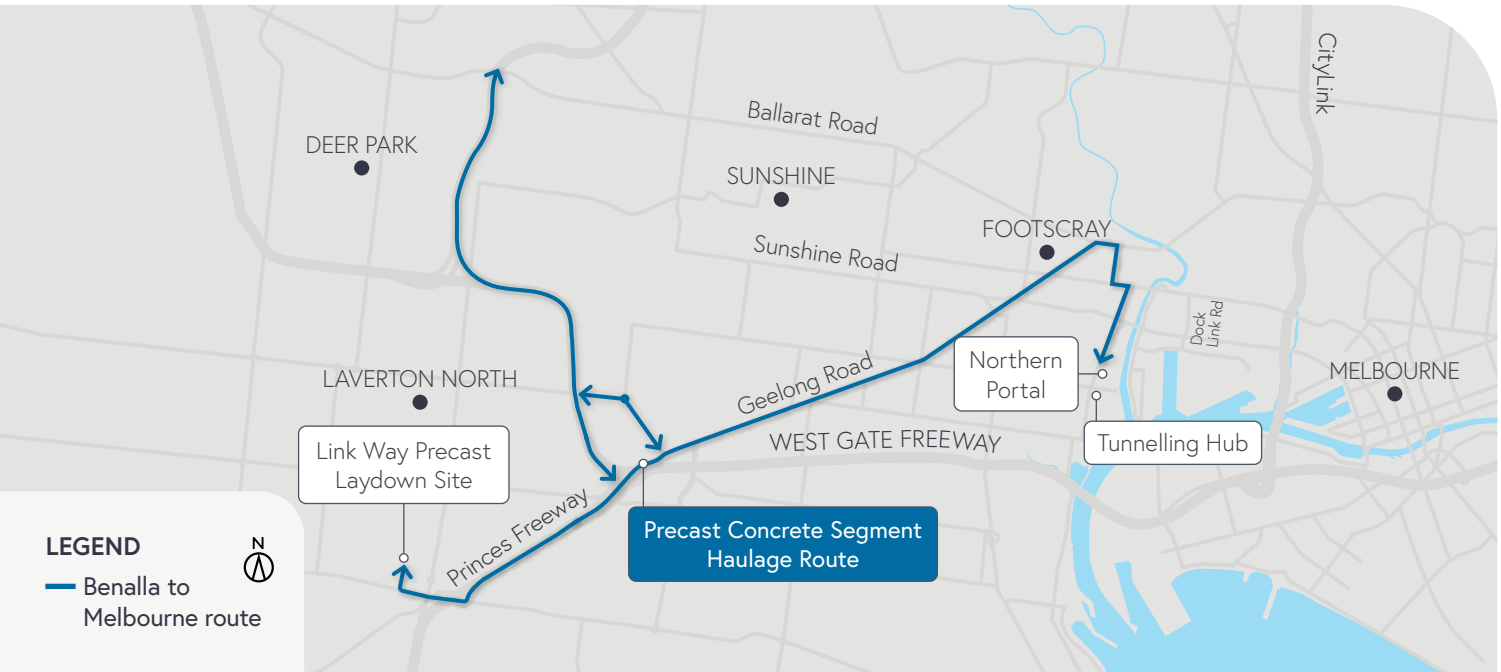
The trucks carrying soil from the tunnel construction will use Whitehall Street, Moreland Road, Footscray Road, CityLink, Tullamarine Freeway and Sunbury Road.

This route uses freeways and arterial roads, minimises travel through residential areas and is the most direct route. By using the shortest route to travel to the disposal site, it minimises the amount of trucks required on the roads.

Given there are other major transport infrastructure projects underway in Melbourne and in case of an unforeseen incident along the preferred haulage routes, we need to ensure there are alternative routes available to transport the soil. If this happens, we will temporarily implement the use of an alternative route for the soil haulage trucks.

A detailed traffic assessment and road safety audit has been carried to ensure the most suitable routes are used and traffic impacts managed.

The precast segments from Benalla will be transported to the Northern portal site on Whitehall Street or to a holding yard in Laverton via approved truck routes.



Did you know?

Saint Barbara is the patron saint of underground workers and it's not uncommon to see pictures of the saint on tunnel walls to ensure the success and safety of workers.

Keeping you informed

We will keep people informed and work together to make things easier during construction.

You can expect to see regular information from us about construction activities happening in your area, including:

- Newsletters to keep you up to date
- Work notifications in your letterbox
- Information on the website
- News and updates on social media.

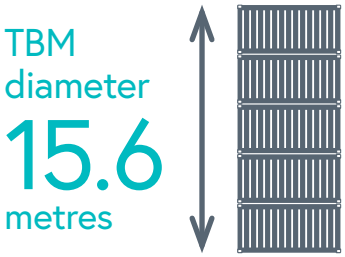
Our West Gate Tunnel Project Information Centre is also open Monday – Friday from 10am–5pm and Saturday 10am–4pm for project information and enquiries.

The Information Centre is located at the corner of Somerville Road and Whitehall Street, Yarraville.

We also have a team that is dedicated to working with the community. They are available 24 hours a day, seven days a week to answer any questions or concerns.

Quick fact

The TBMs being used to build the West Gate Tunnel are the largest in the southern hemisphere, standing at 15.6 metres in diameter – as tall as a five storey building – and 90 metres long.



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westgatetunnelproject.vic.gov.au

Follow us on social media

CONTACT US

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Yarraville VIC 3013

Translation service – For languages other than English, please call 13 14 50.

Please contact us if you would like this information in an accessible format.

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