

# What is tunnel boring?

Teddington Direct River Abstraction Project



We're proposing to create a new tunnel, 20 – 30 metres underground in most locations, to transfer highly-treated water from a new water recycling facility at Mogden Sewage Treatment Works, in Isleworth, to a point on the River Thames upstream of Teddington Weir. The exact alignment of the tunnel is still to be determined, although we have identified a general corridor that the alignment would be within.

We're proposing to build the tunnel using a tunnel boring machine (TBM). This factsheet describes this method, and how small movements of the ground, or "settlement", would be managed.

## Tunnel boring machines (TBMs)

A TBM is a bit like a giant drill, designed to bore through the earth.

It's tried-and-tested technology, used often in London, with several notable recent examples including the Elizabeth Line, the Northern Line extension project and Thames Tideway (see diagram below).

## How would it work?

We'd launch the TBM from a shaft within Mogden Sewage Treatment Works, in Isleworth.

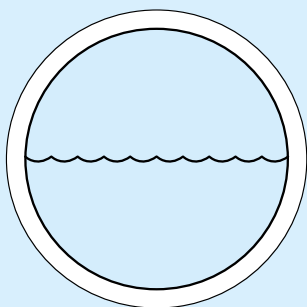
We'd most likely use an earth-pressure-balance TBM, designed to balance earth and water pressures and support the face of the tunnel excavation during tunnelling. Earth pressure balance TBMs are often used for soft ground tunnelling in urban areas.

A rotating cutting head at the front of the TBM breaks up the ground in front of it, transferring the excavated materials back down the tunnel, to be lifted out and transported away from the tunnelling site. Hydraulic jacks push the TBM forwards, and the machine installs pre-made interlocking concrete segments as it goes, to line and brace the tunnel walls. The concrete segments are grouted into place to reinforce the ground and provide extra stability.

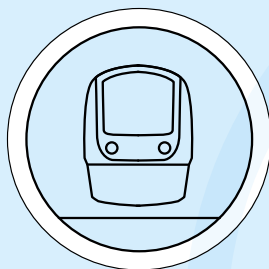
We'd carry out real-time monitoring of the tunnel lining, the surrounding ground and property on the surface, to instantly detect any small movements of the ground.

Well in advance of any tunnelling, we'd seek to undertake defect surveys of properties on the surface where appropriate, to record their pre-tunnelling condition, so that changes caused by tunnelling works (e.g. hairline cracks) could be identified and, if needed, addressed.

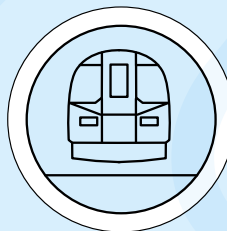
## Recent tunnelling projects in London



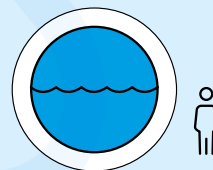
Thames Tideway tunnels  
7.2m internal diameter  
completed in 2023



Elizabeth Line tunnels  
6.2m internal diameter  
completed in 2015



Northern Line  
Extension tunnels  
5.2m internal diameter  
completed in 2017



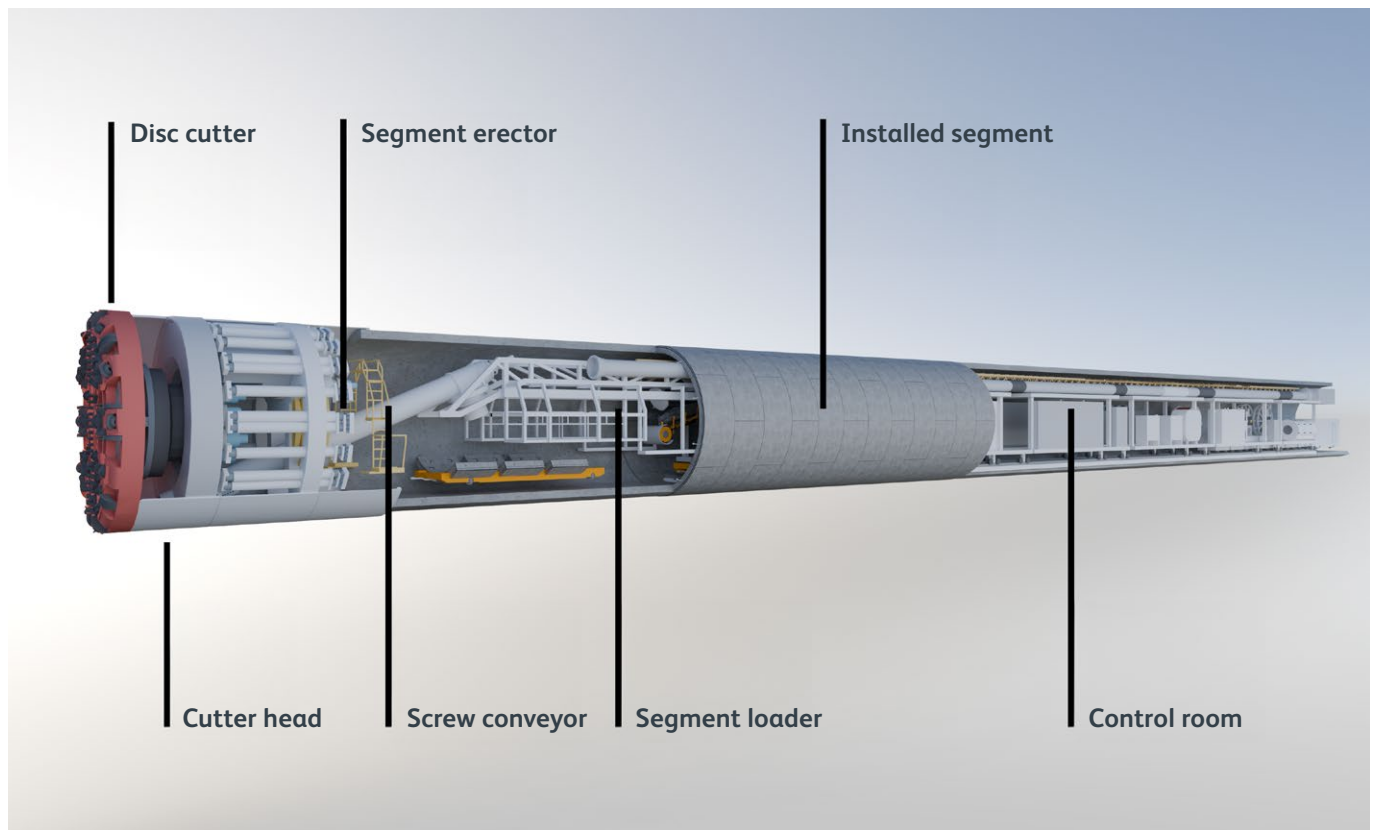
Proposed main  
Teddington Direct River  
Abstraction tunnel  
3.5m internal diameter

## Controlling ground movement

It's highly unlikely that the construction of the new tunnel would have any significant impact on the properties above because the depth of the tunnel (20-30m in most places) would greatly reduce the risk of any impacts.

There are also many things that could be done to prevent tunnel "settlement" (causing movements of the ground) and property damage.

- We will seek to carry out detailed ground surveys and settlement assessments, as well as property surveys where appropriate, to ensure that the tunnelling methods we use could avoid or mitigate any ground settlement
- Interlocking concrete segments would be placed to line and brace the tunnel as it is being excavated by the TBM
- If needed, we'd use jet-grouting before, during and/or after tunnelling works, to reinforce the ground and provide extra stability



We've produced a short animation about tunnel boring, which is available via our website at:

**[www.thames-sro.co.uk/TDRA](http://www.thames-sro.co.uk/TDRA)**