

Building the Fremantle Line tunnel

OCTOBER 2012



Western end of the tunnel.

Sinking the Fremantle Line, from William Street to Lake/King Streets, is one of the first stages of the Perth City Link – a Federal, State and Local Government project to connect the CBD and Northbridge and redevelop the heart of Perth.

In early 2012, work began to build the new 600 metre covered section of the Fremantle Line, west of Perth Station.

When completed in mid-2014, the land above will have five new connections between the city and entertainment precincts and create the foundation for the Perth City Link vision to grow.

The construction stages

In the future, parts of the tunnel will have multi-storey buildings above them. To provide a stable and strong foundation for these buildings, some of the foundations must go as deep as 40 metres below the surface, into the bedrock below.

Classed as a heavy civil project, sinking the Fremantle Line will occur less than

five metres away from the operating train services, giving Fremantle passengers a good look at what's happening.

Here is a simple explanation of how the tunnel will be built.

Laying the foundations

A number of piling techniques are being used across the site, to address various challenges. At the western and eastern declines bored piles are installed into the Kings Park formation, more than 40 metres below.



Did you know... bentonite's ability to absorb and store moisture makes it a highly-used ingredient in cosmetics.

perth city link
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Digging the diaphragm walls

Without treatment, the sandy soil would be like digging a hole at the beach, with the sand continuously refilling the hole. To avoid this, a clay-like powder (bentonite), is mixed with water into the hole as it is dug. Doing this creates a coating which supports the sides and stops the walls from collapsing.

Pouring the walls

Before concrete is poured, reinforced steel cages are inserted. Between 14 to 16 metres in length, the eight to ten tonne cages are made offsite, delivered to the site, joined and inserted in the holes by cranes.

When a section is prepared with a steel reinforced cage, concrete is poured the following day. Once all the walls are built the roof is installed.

Lowering the water table

As the site is located above what was once Lake Kingsford, the next step is to lower the water table, also known as dewatering, using a number of wells installed between the tunnel walls (purple dots on map). The water is treated to remove the high level of iron and adjust pH levels before being pumped back into the ground by nearby recharge wells (blue dots on map) to maintain water level around the site.

Over the life of the project a gegalitre (one billion litres) of water will be pumped out of the construction area, treated and pumped back into the ground. That's enough to fill 400 Olympic size swimming pools.

Excavating the tunnel

With the roof completed, the site will look quiet above ground, but will be a hive of activity below ground with the tunnel itself excavated to allow the base slab to be poured.

Sinking the Fremantle Line will involve removing 83,000m³ of soil. Of this 65,000m³ will be treated to allow it to be reused in other projects or as landfill.

Installing the rail

Once the tunnel is built the final step is to install almost 3.5 kilometres of overhead wires and track, with 4,800 rail



Location of dewatering and recharging wells.



Bored piling.

sleepers. During this work the systems which power and run the rail network will also be installed.

The final product

In 2014, the first Fremantle Line train will run through the new tunnel and pedestrians will walk easily between Northbridge and the CBD at ground level, where rail tracks once were.

Contact information

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Visit www.perthcitylink.wa.gov.au

Thank you for your cooperation and patience as we work to reconnect Northbridge and the CBD.

From late 2011 until mid-2014, the Perth City Link Rail Alliance will deliver the project to sink the Fremantle Line from William Street to Lake/King Streets as the first step of the Perth City Link.

The project will link the CBD and Northbridge for the first time in more than 100 years. Works also include:

- building a new pedestrian underpass from Perth Underground to Perth Station
- increasing platform capacity to cater for special events