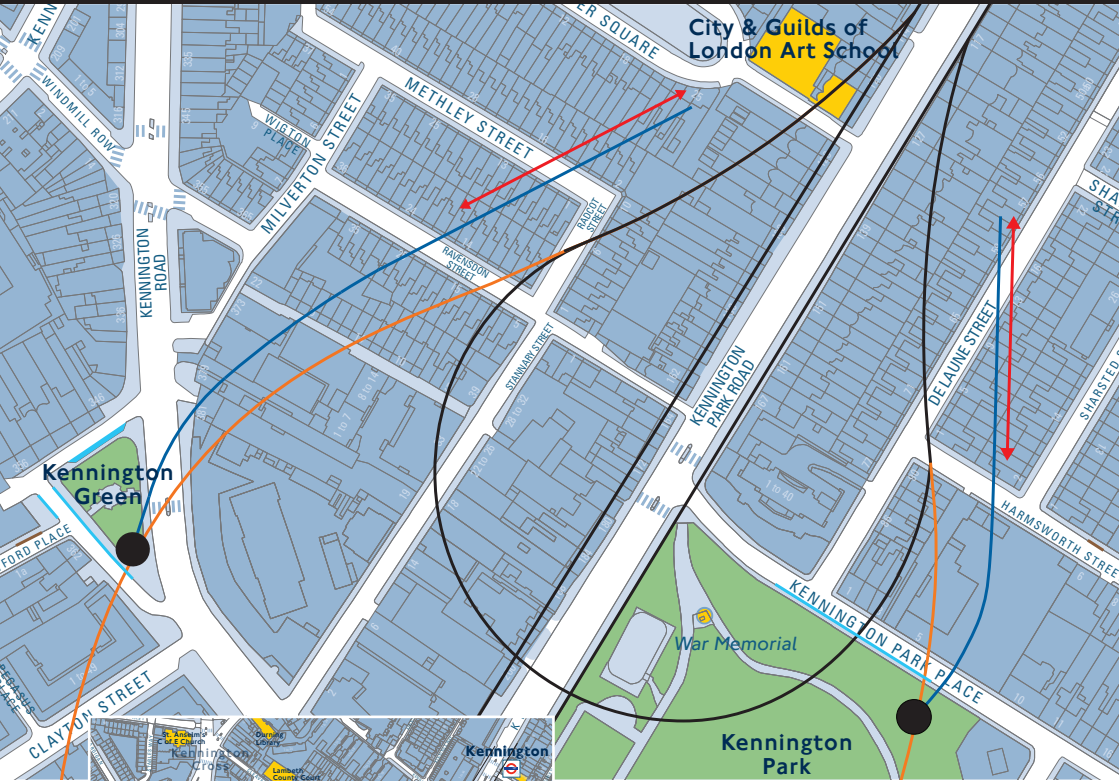


Northern line extension

Factsheet A: Gallery tunnels; connecting the extension to the existing Northern line and stabilising the ground



- Key** (fig 1)
- Northern line
 - Proposed Northern line extension
 - Proposed gallery tunnel
 - Permanent shaft
 - ↔ Approximate compensation grouting area
 - ↔ Suspended parking during construction
 - New resident parking bays during construction



1. Introduction

To build the Northern line extension (NLE) the new tunnels will need to be connected to the existing ones at two different locations on the Kennington loop around 100m south of Kennington station.

To build these connections (known as step plate junctions) there will be a need for ground treatment works to stabilise the ground and reduce ground movements and the risk of settlement damage to properties above. In carrying out these works, our aim is to minimise the disruption to local residents, the local environment and the existing Northern line services as far as reasonably possible.

2. Why are ground treatment works necessary?

Digging the tunnels and shafts required during the construction of the NLE may cause small movements in the ground. This is called 'settlement'. In most cases you would not be able to see the effects of settlement, but sometimes there may be small cracks in plaster, and in a few cases doors or windows may stick. Settlement can, very rarely, affect the structure of a building.

Ground treatment works can minimise settlement and its impact on properties.

We know a lot about how settlement occurs from similar tunnelling projects such as for the Heathrow Express, Jubilee line extension, Docklands Light Railway, Channel Tunnel Rail Link, Crossrail and Thames Water Ring Main. We have also learned a lot about how best to minimise it.

Settlement will be minimised by the tunnelling and excavation techniques used to build the NLE, for example, by using tunnelling machines that will exert a continuous pressure on the surrounding ground so it is less likely to move. Where tunnel boring machines (TBMs) are not used to dig the tunnels, such as the ones at the step plate junctions, compensation grouting is an effective means of doing this.

3. What is compensation grouting?

Compensation grouting is a well established technique employed on tunnelling projects around the world to minimise settlement.

It works by injecting a cement-like grout into the ground to firm up the area where settlement is expected to occur. This is injected via small-diameter underground pipes which spread out from a central shaft or tunnel. This method can be employed very precisely and is an effective way of minimising settlement and damage to buildings



Location of proposed gallery tunnels

4. Gallery tunnel method for ground treatment work

Our TWAO application submitted in April 2013 included powers for two potential methods (via underground ‘gallery’ tunnels or temporary surface shafts at Harmsworth Street and Radcot Street) to connect the old tunnels to the new NLE tunnels and to stabilise the ground. Both of these have been assessed in the Environmental Statement (ES).

Following further feasibility work, we have made a decision to remove the temporary shafts proposed at Harmsworth Street and Radcot Street on the basis they are no longer required. This means that no above ground works will be undertaken at either of these locations and construction works will be progressed from the proposed worksites at Kennington Park and Kennington Green instead. We are therefore taking forward powers for this approach within our TWAO application and deleting those for the temporary shafts.

5. Location and construction of the gallery tunnels

The gallery tunnels would be approximately 3m in diameter and built at a higher level (about 10m below the surface) than the new railway tunnels. Gallery tunnels are built within London clay which provides optimum tunnelling conditions. These tunnels would be constructed from the work sites required for the permanent shafts at Kennington Green and Kennington Park and the materials excavated during their construction would be removed from the shafts at each of the sites. Once the works are completed, the tunnels would be back filled.

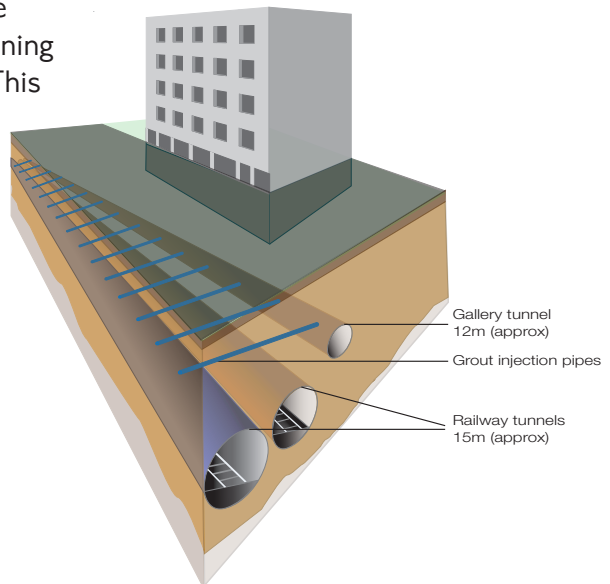
The gallery tunnels and railway tunnels between the permanent shafts and the point at which the new tunnels are connected to the existing ones would be built using a spray concrete lining (SCL) construction method. This

technique involves rapidly spraying the excavated ground with concrete to stabilise it, form the tunnel lining and provide immediate support to the ground.

TBM's cannot be used to construct these sections of tunnel as there would be no space for the removal of the TBM (this was provided for at the base of the proposed temporary shafts) and, in the case of the narrow short gallery tunnels, would not be cost effective.

TBM's will be used to build the remaining railway tunnels south of Kennington.

Details of the impact on traffic and parking specific to each of the sites can be found in Factsheet C: Permanent shaft at Kennington Park and Factsheet D: Permanent shaft at Kennington Green.



6. Code of construction practice

We understand residents concerns about potential disruption during construction of the NLE and we will seek to keep this to a minimum. We will be required to adhere to a strict code of construction practice which is being agreed by the local authorities. The code includes provisions on construction noise, vibration, dust, dirt on highways and working hours. Please see Factsheet H: Our approach to managing the construction impacts of the NLE for more information.

7. Compensation blight and hardship

Owners of land directly affected by construction or operation of the NLE may be entitled to claim compensation. Entitlement to compensation is governed by legislation and case law known as the Compensation Code. In some cases, landowners whose property is directly blighted by the prospect of the NLE may be entitled to require their property to be acquired from them early. Further information both on the Code and on blight is available at www.communities.gov.uk

The construction of the NLE will cause noise and vibration in some areas. This will be controlled as far as possible by implementing measures to limit noise and vibration on the construction site itself.

Levels will be regulated through the code of construction practice and will be agreed with the relevant local authorities. However, there may be circumstances in which noise impacts arise which need to be alleviated further. For those who may be affected by this TfL has a Noise and Vibration Policy in place. This covers aspects such as potential mitigation measures (for example secondary glazing) or in certain circumstances an offer of re-housing on a temporary basis where noise thresholds are likely to be reached for extended periods.

TfL also has a Hardship Policy, where owners of eligible properties who have a compelling reason to sell their property and are unable to do so owing to the NLE, could have their property purchased by TfL. These policies are all available at tfl.gov.uk/nle

8. Tunnelling and ground movement

Initial studies of the route suggest that the worst case predicted settlement of properties affected by the gallery tunnels fall into the 'slight' or less damage classification category. This means that if this predicted damage does occur it will be limited to damage that can be easily repaired such as cracks that could be filled or doors and windows that may stick slightly and that we have a commitment to repair. See Factsheet B: Tunnelling and ground movement, for more information.

9. Further information

Full details about the NLE TWAO application, and the documents to support this are available at tfl.gov.uk/nle

If you would like more information about the proposals please email nle@tfl.gov.uk

To receive this document in large print, audio or another language please call 0800 298 3009.