

Proposed Northern line extension to Battersea

**Temporary Worksites Options: report on
consultation and initial appraisal of options**

March 2012

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1. Introduction and Purpose of this report

Introduction: recent developments in connection to the proposed Northern line extension

For over three years, Transport for London (TfL) has been working on this proposal with Treasury Holdings UK (THUK), the development managers of the Battersea Power Station (BPS) site on behalf of site owners Real Estate Opportunities (REO). REO were required as a condition of the planning permission to promote and make significant contributions to the development of the extension. Promotion included, for example, carrying out appropriate public consultation, in partnership with TfL.

In December 2011, soon after the public consultation which is the subject of this report, REO went into administration. A new owner for the BPS site is now being sought by the administrators. While it had been the intention to publish this report before the end of 2011, this development caused a delay as new arrangements were put in place. In early 2012, the Mayor asked TfL to continue to develop the plans for the Northern line extension in advance of applying for powers to take it forward. The preparation and publication of this report is part of that work.

The results of the consultation, and the findings of the subsequent appraisal described in this report are unaffected by these developments. As already stated, and described in more detail further on in this report, THUK and its professional advisors worked closely with TfL in undertaking this work and preparing this report.

Overview and purpose of this report

In November 2011, Treasury Holdings UK (THUK)¹ and Transport for London (TfL) consulted on locations for temporary worksites required to prepare for the construction of the proposed Northern line extension (NLE) to Battersea. This local consultation followed a formal public consultation in summer 2011 on the route options and sites for permanent shafts². The purpose of this report is to describe:

¹ THUK acted as the development manager of the Battersea Power Station site on behalf of site owners Real Estate Opportunities (REO), and acted on behalf of REO, as the promoters of the proposed NLE until REO went into administration in December 2011.

² A report on this consultation and background to the proposal can be found on TfL's website:

www.tfl.gov.uk/corporate/projectsandschemes/21614.aspx

- the rationale for the temporary work sites identified for consultation;
- the local consultation process of November 2011;
- the technical review of the site options which was undertaken following the consultation; and
- the key technical recommendations resulting from this review, and next steps.

The VNEB OAPF and the need for the NLE

The Vauxhall Nine Elms Battersea (VNEB) area has been identified as having significant regeneration potential (up to 25,000 new jobs and 16,000 new homes) by the Mayor of London. This has been set out in the Opportunity Area Planning Framework (OAPF), which was adopted on 13 March 2012. To support this level of development, a significant expansion of local public transport capacity is required³; including an extension of the Northern line (Charing Cross branch) from Kennington to Battersea Power Station.

Public consultation on temporary worksites and the technical review

In summer 2011, TfL and THUK consulted on route options and sites for permanent shafts. The consultation leaflet and other materials also noted that additional, temporary shafts would be required, and that these would be consulted on later in the year with residents around the proposed locations. More information on the need for these temporary sites is provided in the next section of this report. As the consultation materials indicate, these temporary sites would be required irrespective of the route option finally chosen. During the summer consultation, informal discussions took place with residents about possible options for temporary worksites, in order to inform the consultation planned for later in the year. Discussions were also held with the local boroughs (for the temporary worksites) of Lambeth and Southwark.

The results of the consultation formed an important part of the overall technical review of the site options, which took place once the consultation had closed.

³ The OAPF, and the Transport Study which supports it, can be downloaded from

<http://www.london.gov.uk/who-runs-london/mayor/publications/planning/vauxhall-nine-elms-battersea-opportunity-area-planning-framework>

2. Rationale for Temporary Worksites

The temporary worksites would be required in order to construct temporary shafts to enable ground treatment works in the area prior to beginning construction of the NLE. This section provides more information on why these shafts are needed, and how the potential locations were identified.

Connecting the new Tunnels

The proposed NLE requires the provision of two new 3km tunnels, linking the new terminus at the Battersea Power Station site to Kennington Station.

Irrespective of the route of the extension between the two sites, the two new tunnels will need to connect to the existing Northern line at the Kennington Loop, a piece of underground track that is currently used by trains to turn at the Kennington terminus and begin their journey back up the Northern line.

Step-plate Junction

A 'step-plate' junction will be used to connect each of the two new tunnels to the existing tunnels at Kennington. This type of junction is used where the two tunnels to connect are lined with plates of different diameters. To make the connection, special vertical plates (often, in practice, made of concrete) are put in place to close the gap where the new tunnel encircles the existing tunnel.

This solution will avoid the need for a long-term closure of the Kennington loop, which would severely affect the service that could be run on the existing Northern Line.

For this project, Halcrow was appointed to undertake engineering work and development of the reference design for the proposal, in conjunction with London Underground Limited (LUL). The design specifies two step-plate junctions to connect to both the 'North' and 'South' lines of the existing Northern line, as shown in Figure 1 in section 3. Potential standard mitigation works to protect properties at surface level against any potential adverse effects will be developed, in particular to deal with potential ground movement.

Protecting the surface structures from impacts of tunnelling construction

During major construction works, "grouting" is the standard mitigation often carried out by contractors in advance to protect ground movement. This involves the injection of "cement slurry" into the subsoil of potentially affected areas of land (the green areas in Figure 1). Over time, this then hardens to support the soil, encouraging a denser and more solid sub-surface and making significant ground

movement much less likely. As a consequence, the surface land and properties immediately above the treated areas are protected from potential damage once tunnel construction and connection starts.

In order to carry out the necessary grouting, a temporary construction shaft needs to be excavated from the surface down to approximately 25m in depth, at a diameter of approximately 5-6 metres. Once the works are completed, the shafts would be back-filled and the surface area reinstated to its previous condition, thereby ensuring that there would be no long-term impact on local residents and businesses.

3. Development of Site Options

As described in Section 1, a formal public consultation on the route options and sites for permanent shafts was undertaken in summer 2011. During this time, and in the period following, local community groups and residents were engaged in developing the long list of potential site options for temporary worksites. The most feasible suggestions put forward at that time were then re-presented in the November 2011 local consultation.

Criteria for temporary worksites

As a guide to these discussions, a set of minimum criteria for identifying feasible sites was identified. As already indicated the purpose of the shafts is for grouting. For the grout to be injected into the ground with sufficient accuracy to enable support in the right area, the site of the shaft needs to be within a certain distance of the step-plate junction, and specifically:

- i) **at the point where the step-plate junction is at its widest** (where the mitigation grouting needs to be most accurately injected). According to Halcrow, based on similar grouting carried out elsewhere, the furthest distance from the widest part of the step-plate junction that grouting can be carried out most effectively and accurately is approximately 50m; and
- ii) **at the narrowest part of the step-plate junction** (where the effects of works are less apparent and, therefore, effective grouting can still take place from slightly further away). Halcrow suggested that the furthest distance from the narrowest part of the step-plate junction that grouting can be carried out accurately is approximately 100m.

In order to significantly reduce the potential construction impact of temporary shafts on local residents and businesses, both LUL and THUK agreed that, if possible, only one temporary grouting shaft should be built for each of the two tunnel connections to the existing Kennington Loop (and used for grouting both the widest and narrowest parts of the step-plate junction works).

Halcrow's guide was placed on the NLE consultation website, alongside the following illustrative plan produced by Halcrow, showing the intersecting radii of 50m from the widest point and 100m from the narrowest point. The Halcrow guide and illustration (reproduced below as Figure 1) were also made available at each of the summer's public consultation exhibitions.

Figure 1: Locations for step-plate junctions at the Kennington Loop (Halcrow, Reference Design for the proposal)



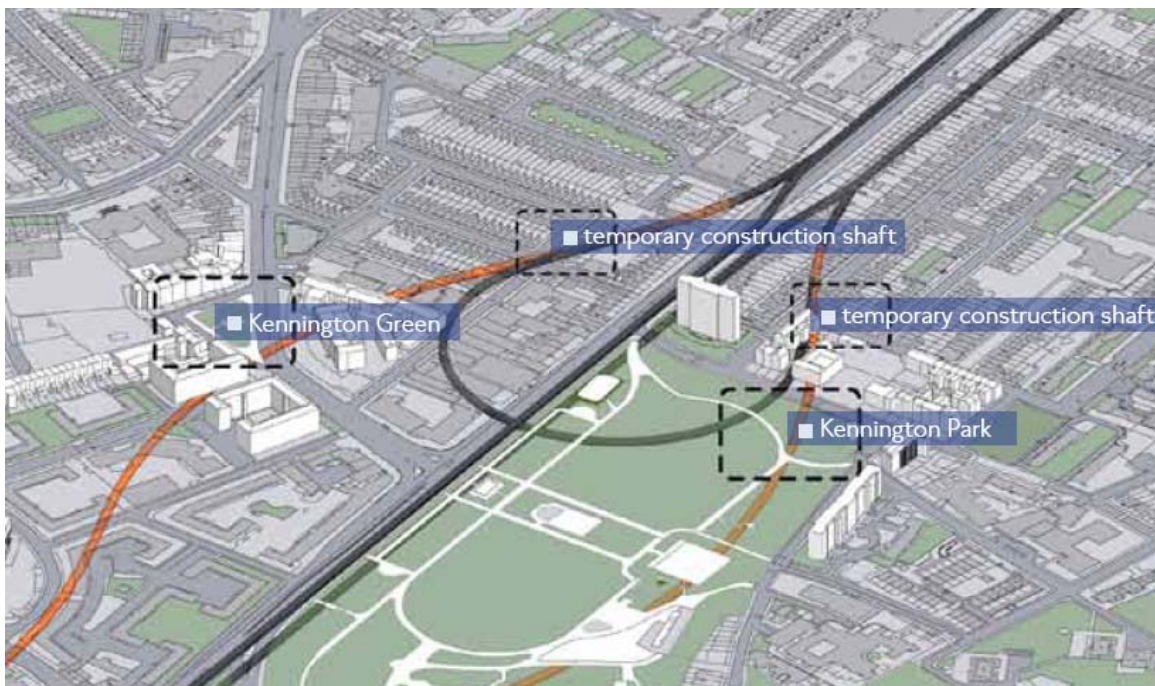
As Figure 1 shows, two specific zones were created: one zone where the potential shaft would ideally be located (i.e. 50m from the widest point and 100m from the narrowest point – shown in green cross hatching), and one zone (shown in purple cross hatching) which, though not the ideal solution technically, could still be feasible.

As a result of these discussions, and following a further technical review, four potential temporary shaft site options were identified for the step-plate junction at the northern section of the Kennington Loop and three options for the southern section. These were then presented in the November 2011 consultation.

4. Public Consultation on Temporary Worksites

In early October 2011, approximately 2,500 leaflets were distributed by hand to local residents and businesses in and around the existing Kennington Loop. The consultation leaflet and its distribution area are at Appendix A and B respectively. As well as setting out the rationale for site selection and the need for ground treatment works, the leaflet noted that although construction work would not start until 2014 at the earliest, TfL and THUK needed to start planning this process now in order to manage the work effectively. The leaflet included a map of possible sites, as shown in Figure 2 below.

Figure 2: Proposed locations for temporary worksites (SDG, Consultation Leaflet November 2011)

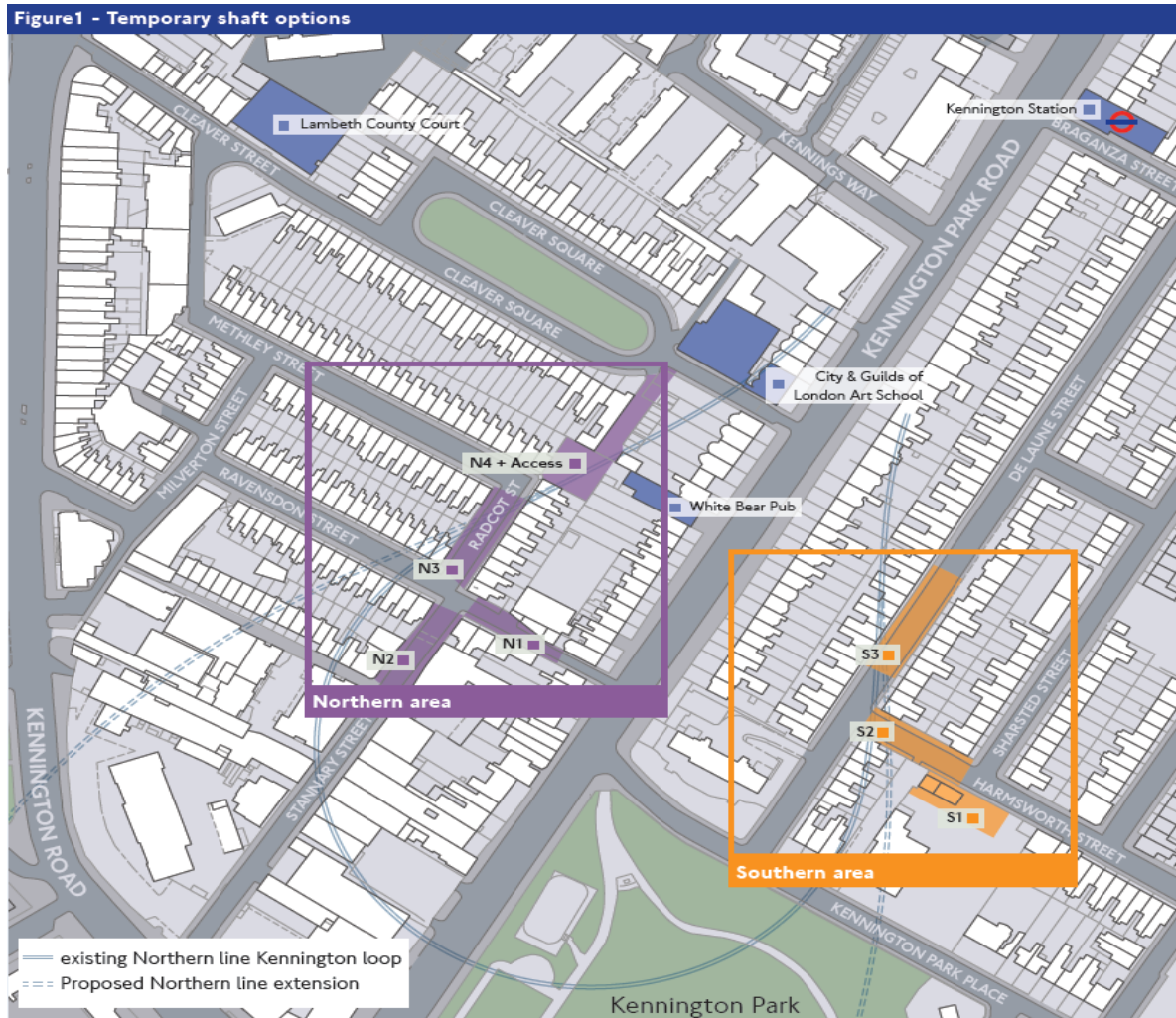


Temporary Worksite Options

As shown in Figure 3 below (Figure 1 in the public consultation leaflet), four temporary shaft location options were identified for the northern area (in LB

Lambeth) and a further three options identified for the southern area (in LB Southwark).

Figure 3: Options for location for temporary worksites (SDG, Consultation Leaflet November 2011)



For the northern area, the four options identified were:

- N1 Ravensdon Street
- N2 Stannary Street
- N3 Radcot Street
- N4 White Bear pub garden, plus access route to Cleaver Square

The Radcot, Ravensdon and Stannary Street options were chosen because of their proximity to the planned step-plate junction. However, as all these options were likely to lead to some traffic impact/public highway closure, the discussions with local community groups and individuals led to the identification of an additional option, which was not on the public highway: the White Bear pub garden.

Although there were some concerns over this option, due to technical difficulties of grouting further away from the step-plate junction, the strength of local feeling and support for this option led to a decision to include it in the local public consultation process.

For the southern area, the three options identified were:

- S1 Bishop's House Children's Centre
- S2 Harmsworth Street
- S3 De Laune Street

As with the northern options, whilst the Harmsworth Street and De Laune Street options were close to the planned step-plate junction and had the same potential for traffic impact/public highway closure, feedback from local community groups and individuals suggested that the Bishop's House Children's Centre should also be considered as a non public highway option (though it should be noted that the option is for part of the garden of the centre). This additional option was also then included in the local public consultation process.

Background Information

To help inform local views, both the consultation leaflet itself and the related public exhibitions and presentations contained the following summary explanatory detail:

- i) **the specific ground treatment works proposed** - involving the injection of a cement/ water mix into the subsoil where the tunnel connection works will take place. This cement then hardens to support the soil and so protects the surface land and properties. To do this, work is required to excavate a temporary shaft of 5-6 metres in diameter from the surface down to around 25 metres below ground, at each site. Around each shaft, a worksite of approximately 30-35 metres

long by approximately 6 metres wide would exist for deliveries, storage and general works use;

- ii) **the construction activity** - the works undertaken at these sites will all be regulated by a Code of Construction Practice which is agreed with the local authority. The Code would require the contractor to manage the impact of the works locally, and could include provisions concerning construction noise, vibration, dust, diversions, dirt on highways, and working hours. Worksites located on a road would use the whole width of the road, which would be closed to traffic for the duration of the works and diversionary routes and parking suspensions put in place. There would be construction activity around the sites including traffic to remove excavated material and deliver site supplies. It is estimated that the work could take between 18 months to two years, although work will not take place every day during this time; and

- iii) **post-construction restoration** - there will be no detrimental long term impact in the local area as a result of the temporary works. Once the works are completed the shafts will be filled and the land restored to how it was before. All the construction is below ground and there will be no new structures visible in the street.

Public Consultation Procedure

Local residents and businesses were able to comment on the proposal in the following ways:

- completing and posting back (postage-paid) the paper questionnaire distributed locally;
- completing the questionnaire online at the NLE consultation website (www.northernlineextension.com);
- emailing the NLE consultation website inbox (consultation@northernlineextension.com);
- telephoning the NLE Project Team on the number provided in the leaflet and online; and

- attending one of the public exhibitions and presentations (see Appendix C for a list of events)

The consultation ran from Monday 3 October to Friday 11 November 2011 (late responses have also been included in the analysis).

Public Consultation Results

At the end of the consultation, a total of almost 250 responses (a relatively high 10 per cent response rate to this type of public consultation process) had been received. This includes responses by paper questionnaire, online and email or letter.

Northern Area (LB Lambeth)

For the northern area shaft site options, over 40 per cent of respondents chose the White Bear pub garden (with access via Cleaver Square) as their preferred option. Of the remainder, over 20 per cent preferred the Stannary Street option, with 11 per cent opting for Radcot Street. Ravensdon Street was the least favoured option, with only 9 per cent of respondents choosing that potential location.

Table 1: Northern area options

Shaft Site Options	No of Responses	%
N1 – Ravensdon Street	22	9
N2 – Stannary Street	51	21
N3 – Radcot Street	27	11
N4 – White Bear garden	108	43
Any of these	15	6
None of these	7	3
No opinion	15	6
No response	3	1
Total	248	100

Southern Area (LB Southwark)

For the southern area shaft site options, 30 per cent of respondents chose the Bishop's House Children's Centre as their preferred option. Of the remainder of those who expressed an opinion, close to 20 per cent preferred the Harmsworth Street option, with 10 per cent opting for De Laune Street, the least favoured option. Of interest, nearly 30 per cent of respondents declared that they had 'no opinion' on the southern area options, suggesting that the majority of respondents to the consultation were mainly focussed on the northern area temporary works plans.

Table 2: Southern area options

Shaft Site Options	No of Responses	%
S1 – Bishop's House Children's Centre	74	30
S2 – Harmsworth Street	42	17
S3 – De Laune Street	26	10
Any of these	19	8
None of these	7	3
No opinion	73	29
No response	7	3
Total	248	100

Option Evaluation

The leaflet stated that the results of the consultation, together with further technical work, would be used to undertake a further overall appraisal of the options. This wider technical appraisal, with significant input from relevant specialist advisers, would form the basis of the final recommendations on the preferred worksites.

5. Technical Appraisal

Although responses from the public consultation were clearly an important factor, there were a range of other technical factors, to take into account in evaluating the optimal temporary shaft site locations.

TfL and THUK engaged the following professional advisory services to support the technical aspects of the temporary worksites evaluation:

- Halcrow – engineering & construction issues
- Steer Davies Gleave (SDG) – transport impacts
- URS – environmental aspects
- Ardent – land and property issues

Technical Factors

The technical advisory team identified a list of influencing factors in appraising the potential site options. These are standard criteria typically used in this type of assessment. It should also be noted that the terms used are intended to cover a wide range of potential activity, and there will be further consideration of these effects prior to any work commencing. For example, 'potential for road closure' encompasses short-term, temporary closures and does not, at this stage, fully quantify these, which would in any case need to be agreed with the local authority closer to the time. And in this instance, pedestrian access would continue to be maintained.

Each of these was also given a weighting to reflect its importance to the appraisal, as set out below.

High Impact Weighting

- effect of construction traffic on surrounding areas
- potential compulsory purchase required
- effectiveness of grouting mitigation works

- public consultation responses

Medium Impact Weighting

- potential for road closure
- impact on access to property
- heritage issues
- ecology impact, including trees
- environmental (noise and air quality) impact

Low Impact Weighting

- potential for a reduction in car parking spaces for worksite and 10m rigid routes
- impact on utilities

Technical Appraisal Workshop

Following the closure of the formal public consultation process and evaluation of the responses, the technical advisory team, along with representatives from TfL and THUK, held an all day technical appraisal workshop [(14 November 2011)], to evaluate the temporary worksite options for both the northern and southern areas. The summary scores for each area are outlined below.

Northern Area

Radcot Street emerged as the option with least relative impact. Although Radcot Street, Ravensdon Street and Stannary Street would all be likely to require road closures, the impact of construction traffic is greater in Stannary Street (including on businesses) and property access issues are greater in Ravensdon Street.

Shaft Site Options	Total Score (higher score = higher potential <i>adverse</i> impact)
N1 – Ravensdon Street	61
N2 – Stannary Street	62
N3 – Radcot Street	53
N4 – White Bear garden	59

Although the White Bear option was the most-preferred in the public consultation, it would be the only option requiring compulsory purchase of private land, not easily justified for short term temporary works, particularly when other feasible options exist. Concerns over the potential effectiveness and accuracy of any grouting at the White Bear (given its much greater distance from the step-plate junctions than the other options) was also an important factor, and contributed to the preference for Radcot St.

Southern Area

These options were appraised using the same approach as for the northern options, resulting in the following option assessment:

Shaft Site Options	Total Score (higher score = higher potential <i>adverse</i> impact)
S1 – Bishop’s House Children’s Centre	70
S2 – Harmsworth Street	55
S3 – De Laune Street	61

Harmsworth Street emerged as the option having potentially the least relative impact. Although Harmsworth Street and De Laune Street would both be likely to require road closures, the construction traffic impact is greater in De Laune Street, as is the potential adverse impact on ecology, noise and air quality.

Although the Bishop's House option came out on top in the public consultation, like the White Bear option, it would be the only option requiring compulsory purchase of private land (in this case the garden of a children's centre), not easy to justify for short term temporary works. In addition, the Bishop's House option had the potential for significant adverse heritage and ecology impacts.

6. Recommendations and Next Steps

Following a local public consultation process and a detailed technical appraisal, it is recommended that the following options are taken forward as preferred options for the temporary worksites:

- **Radcot Street (Northern Area)**

- **Harmsworth Street (Southern Area)**

Although each of these preferred options will need to be kept under review as the design and development process continues, it is recommended that each of the relevant London boroughs endorse the temporary worksite recommendation in their area.

Next steps

It is for the London Boroughs of Lambeth (northern area) and Southwark (southern area) to consider and formally endorse the preferred sites, and/or request that further work is undertaken on the options. TfL will make available to them the information set out in this report as well as answering any other queries they may have. Regardless of which options are taken forward, there would be further work done with the boroughs on the best way to mitigate and manage the traffic and construction impacts of the work. Appropriate agreements about working practices would be put in place before work starts.

TfL will continue to develop the proposed scheme and will be undertaking further public engagement in 2012.

Appendix A: Public Consultation Leaflet

Proposed Northern line extension to Battersea

We would like your views on the location of temporary worksites in your area

Earlier this year we consulted you on the proposed extension of the Northern line to Battersea via Nine Elms. What you told us, along with other work on the engineering and other aspects of the proposals, is now being considered by TfL and the developer, Treasury Holdings. We will report to you on the results and our preferred route for the future by the end of this year.

All of the route options will require temporary work to prepare for the connection of the extension to the existing tunnels at Kennington. In your area, we would need to undertake work around De Laune Street and Radcot Street. We intend to start this work in 2014 and would like your views on the location of these temporary worksites. Although this is some time away, we need to start planning this process now in order to manage the work effectively. You can comment on these works by:

- completing the attached questionnaire, which can also be filled in online at www.northernlineextension.com or
- emailing your comments to consultation@northernlineextension.com

Please let us have your views by Friday 11 November 2011.

Why are these temporary worksites needed?

The work we need to do would allow the future construction of a junction to connect the extension to each of the existing Northern line tunnels close to Kennington. We first of all need to stabilise the ground in the area so that the buildings above are protected from settlement. These are called 'ground treatment works', and would need to be done at each of the two points where the extension would connect to the Underground line below ground.

The Northern line and Kennington station would continue to operate as usual.

What ground treatment works are proposed?

The work we propose to undertake involves the injection of a cement / water mix into the subsoil where the tunnel connection works will take place. This cement then hardens to support the soil and so protects the surface land and properties. To do this, we need to excavate a temporary shaft of 5-6 metres in diameter from the surface down to around 25 metres below ground, at each site. Around each shaft, we will need to have a worksite of around 30-35 metres long by around 6 metres wide for deliveries, storage and general works use.



MAYOR OF LONDON

TREASURY
HOLDINGS

Transport for London



The potential locations for the worksites

The locations shown below have been developed in discussion with local residents during the recent consultation. All of these options are feasible.

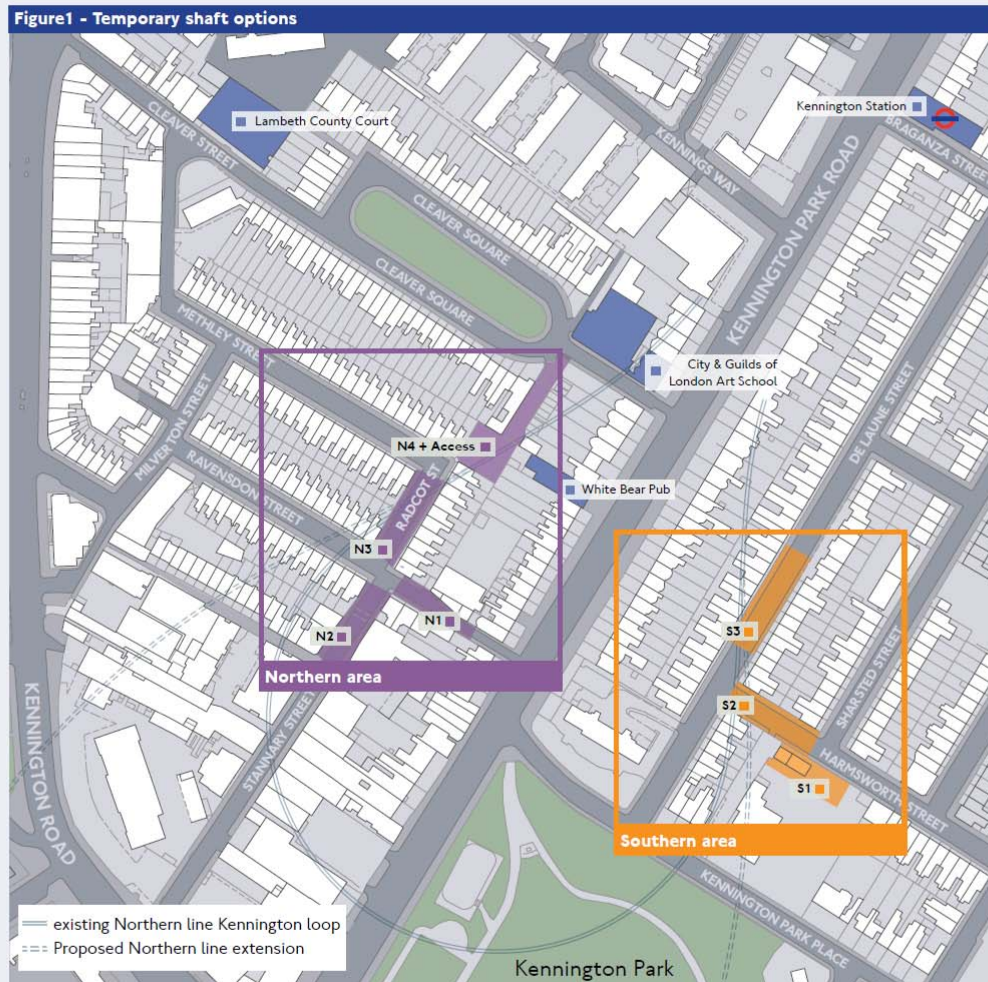
The results of this consultation together with further technical work will inform the decision on the preferred worksites.

Northern area

We need one worksite in this area, and have identified four possible locations (N1, N2, N3 and N4) as shown in Figure 1 below.

Southern area

We need one worksite in this area, and have identified three possible locations (S1, S2 and S3), as shown in Figure 1 below.



Supporters include:



During construction

The works undertaken at these sites will be regulated by a Code of Construction Practice which is agreed with the local authority. The Code would require us to manage the impact of the works locally, and could include provisions concerning construction noise, vibration, dust, diversions, dirt on highways, and working hours.

Work sites located on a road would use the whole width of the road, which would be closed to traffic for the duration of the works and diversionary routes and parking suspensions put in place.

There will be construction activity around the sites including traffic to remove excavated material and deliver site supplies. We estimate the work to take between 18 months to two years, although work will not take place every day during this time.

What about when it's finished?

There will be no detrimental long term impact in the local area as a result of the temporary works. Once the works are completed the shafts will be filled and the land restored to how it was before. All the construction is below ground and there will be no new structures visible in the street.

1. What are your preferences for the location of the temporary worksite in the Northern area (see Figure 1)? Please tick one only

- N1 Ravensdon Street
- N2 Stannary Street
- N3 Radcot Street
- N4 White Bear pub garden plus access route to Cleaver Square
- Any of these
- None of these
- No opinion

2. What are your preferences for the location of the temporary worksite in the Southern area (see Figure 1)? Please tick one only

- S1 Bishops House Children's Centre
- S2 Harmsworth Street
- S3 De Laune Street
- Any of these
- None of these
- No opinion

3. Do you have any other comments?

4. In what capacity are you responding to the consultation?

- As an individual
- As a representative of a business
- As a representative of a community/voluntary organisation

5. What is your home/work postcode?

Home

Work

6. Are you:

- Male
- Female

7. What is your age group?

- Under 16
- 16-24
- 25-44
- 45-64
- 65-74
- 75+

8. Do you have a mental or physical disability that limits your daily activities or the work you can do, including any issues due to your age?

- Yes
- No

9. What is your ethnic background?

Thank you for taking the time to complete this questionnaire.

Please send it back by
Friday 11 November 2011.

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Further Information

We will be holding a public exhibition for you to find out more about the temporary ground treatment works on the following date:

Tuesday 11th October, 7pm,
Durning Library, 167 Kennington Lane

Alternatively, to read further information on the selection of worksites please visit our website www.northernlineextension.com. Please call the project team on **020 7501 0676** if you would like to ask any questions.

You can comment on these works by:

- completing the attached questionnaire, which can also be filled in online at www.northernlineextension.com or
- emailing your comments to consultation@northernlineextension.com

Please let us have your views by **Friday 11 November 2011.**

2 | |

Northern line extension consultation
Freepost TK218
32 Upper Ground
LONDON
SE1 9YA

If you would like to receive this document in large print, audio or another language please call 0800 298 3009

Mailing instructions

Step 1
Moisten the
gummed area



gummed
area

Step 2
Fold along
line A and seal



Step 3
Place in a post box –
there is no need to
affix a stamp

Treasury Holdings and their service providers will use your personal information for the purpose of administering this consultation and assessing opinions on the extension. Your personal information will be properly safeguarded and processed in accordance with the requirements of the Data Protection Act 1998.

Appendix B: Public Consultation Meetings

Formal (arranged prior to start of consultation)

Durning Library, 167 Kennington Lane, 11 October 2011

Informal (arranged in response to requests received)

De Laune Street Residents Association (at Royal British Legion, Braganza St), 1 November 2011

Heart of Kennington Association, 5 September 2011

Bishop's House, Children's Centre, 4 November 2011

Radcot/Ravensdon/Stannary Residents, Alderman House, 8 November 2011

Cleaver Square Residents, City & Guilds Art School, 8 November 2011

Appendix C: Leaflet Distribution Map

Proposed Northern Line Extension Temporary Shafts - Leaflet Distribution Area Sheet No. 5



Appendix D: Technical Appraisal Matrices

Option Appraisal: Temporary Shaft Sites N1 to N4 (northern area)															
Ref	Option Summary	Notes	Option Assessment											Total	
			Criteria												
Notes: Criteria L (score 1), M (score 2) and H (score 3). Scoring 0 for least impact, 5 for most impact				Reduction in parking spaces (for worksite and 10m rigid routes)	Effect of construction traffic on surrounding area	Impact on access to property	Compulsory Purchase required	Road closure required	Impact on utilities	Heritage issues	Ecology impact (including Trees/ TPO issues)	Impact of mitigation works (grouting effectiveness)	Consultation	Environmental Impact (Noise and Air Quality)	
				1	2	3	4	5	6	7	8	9	10	11	
			Weighting /3												
				L	H	M	H	M	L	M	M	H	H	M	
				1	3	2	3	2	1	2	2	3	3	2	
N1	Ravensdon Street		Score	3	3	5	0	5	3	1	1	2	4	2	61
			Result	3	9	10	0	10	3	2	2	6	12	4	
N2	Stannary Street		Score	5	5	3	0	5	3	1	1	3	2	2	62
			Result	5	15	6	0	10	3	2	2	9	6	4	
N3	Radcot Street		Score	5	3	1	0	5	3	1	1	1	3	4	53
			Result	5	9	2	0	10	3	2	2	3	9	8	
N4	White Bear Pub Garden + Access		Score	2	1	2	5	0	1	4	3	5	1	1	59
			Result	2	3	4	15	0	1	8	6	15	3	2	

Option Appraisal: Temporary Shaft Sites S1 to S3 (southern area)															
Ref	Option Summary	Notes	Option Assessment												
			Preference Priorities												
Notes: Criteria L (score 1), M (score 2) and H (score 3). Scoring 0 for least impact, 5 for most impact			1	2	3	4	5	6	7	8	9	10	11		
			Reduction in parking spaces (for worksite and 10m rigid routes)	Effect of construction traffic on surrounding area	Impact on access to property	Compulsory Purchase required	Road closure required	Impact on utilities	Heritage issues	Ecology impact (including Trees/ TPO issues)	Impact of mitigation works (grouting effectiveness)	Consultation	Environmental Impact (Noise and Air Quality)		
			Weighting /3												
			L	H	M	H	M	L	M	M	H	H	M	Total	
S1	Bishops House Children's Centre		Score	2	2	3	5	0	1	5	5	3	1	4	70
			Result	2	6	6	15	0	1	10	10	9	3	8	
S2	Harmsworth Street		Score	3	3	3	0	5	3	3	1	1	3	2	55
			Result	3	9	6	0	10	3	6	2	3	9	4	
S3	Delaune Street		Score	4	4	1	0	5	3	1	2	2	4	3	61
			Result	4	12	2	0	10	3	2	4	6	12	6	

Please see Section 5 of the report for more information about the appraisal methodology.