



PLANNING AND ENVIRONMENT

General Ecology Management Plan

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1 Introduction

1.1 Background to Crossrail

Crossrail will provide an east-west rail link across London. By relieving congestion and shortage of capacity on the existing network it will support London in its role as a world-leading financial, commercial and cultural centre. It will also add impetus to urban renewal in several key areas of the city.

The route will run from Maidenhead and Heathrow in the west through new twin-bore tunnels under central London to Shenfield and Abbey Wood in the east, using existing track in the outer London sections. It will entail the construction of seven new underground stations in the newly tunnelled central section, and the upgrading of National Rail lines in the outer sections to provide interchange with London Underground, Network Rail and bus services. The Crossrail route is shown in *Figure 1.1*.



Figure 1.1: Overview of the Crossrail Route

The main construction worksites will be associated with the tunnel portals at Royal Oak (west of Paddington), Pudding Mill Lane (west of Stratford), Victoria Dock (west of Custom House), North Woolwich (east of Silvertown), and Plumstead (east of Woolwich), and the seven new underground stations in the central area (at Paddington, Bond Street, Tottenham Court Road, Farringdon, Liverpool Street, Whitechapel and Isle of Dogs). Outside central London the main infrastructure changes are associated with a new train maintenance depot and stabling sidings at Old Oak Common, and further stabling facilities at Maidenhead, Ilford, Gidea Park and Shenfield (with facilities for commissioning at Clacton). Other significant works include construction of a flyover structure at Stockley to allow Crossrail trains to access Heathrow, the provision of a rail underpass west of Acton Yard and the upgrading or renewal of existing stations including extensive improvements at Ealing Broadway, Romford, Abbey Wood and Custom House. Numerous minor works including platform extensions, bridge works, and track realignments are also planned across the route, all of which have potential ecological implications. A detailed description of the proposed scheme is provided in the Crossrail Environmental Statement (ES)¹.

¹ The Crossrail Environmental Statement comprises the 'main ES', an Addendum, four Supplementary ESs and four Additional Provision ESs.

1.2 **Legislation and Policy Background**

The Crossrail Act 2008

The Crossrail Hybrid Bill was introduced to the House of Commons on 22 February 2005. The Bill was accompanied by the Environmental Statement (including the supporting Ecology Technical Specialist Report) which presents the outcomes of the ecological studies undertaken to identify and evaluate the features of ecological interest, the findings of the assessment of significance of ecological effects and details mitigation proposals to ameliorate impacts.

The Crossrail Act was granted Royal Assent in July 2008 and provides deemed planning permission for the construction of the works within the lateral Limits of Deviation (LOD) and the Limits of the Land to be Acquired or Used (LLAU) shown on the plans and sections deposited with the Act. The works are subject to conditions set out in Schedule 7 of the Act, which sets out the requirements for agreeing details of the restoration proposals for land which has been temporarily occupied. The works are subject to detailed approvals from various statutory bodies under Schedule 17 to the Act.

Further information of the Crossrail Planning Regime can be found in the Information Papers prepared to support the passage of the Crossrail Bill through Parliament, most notably B5 "The Main Provisions of the Planning Regime" and D05 "Site Reinstatement".

Environmental Minimum Requirements

The Nominated Undertaker will be required to comply with the Environmental Minimum Requirements (EMR), a suite of documents developed in consultation with local authorities and other relevant stakeholders to detail a variety of control mechanisms and mitigation strategies that fall outside of the Crossrail Act. The EMR comprise the Crossrail Construction Code, a Planning and Heritage Memorandum, an Environmental Memorandum and the Register of Undertakings and Assurances given to Parliament and to petitioners during the passage of the Bill.

The EMR require the preparation of Environmental Management Plans (EMPs) to set out how the project will deliver the environmental requirements and how environmental issues that arise will be handled to ensure compliance with the relevant legislation and regulations. The EMPs for the Environmentally Sensitive Worksites listed in Table 5.1 of the Environmental Memorandum are additionally to detail the mitigation, compensation, monitoring requirements and opportunities for enhancement. The EMPs will be discussed with the relevant local authorities and statutory agencies (in relation to EMPs for sensitive sites) and any observations taken into account.

The Crossrail Construction Code requires the preparation of a General Ecological Management Plan and details the issues to be addressed within the Plan, namely:

- the ecological approach to address all environmental issues;
- a programme for outstanding surveys;
- the specific control measures necessary to deliver the requirements of the Crossrail Construction Code including the:
 - methods for watching briefs;
 - measures to be adopted in the event of an unanticipated discovery; and
 - measures for the relocation of certain species.

1.3 **Relevant Legislation and Policy**

In addition to complying with the EMR, the main statutory provisions, regulations and standards relevant to the preparation of the General Ecological Management Plan are listed below:

- Wildlife and Countryside Act 1981 (as amended);
- Conservation (Natural Habitats, &c.) Regulations 1994 (as amended);

- Protection of Badgers Act 1992;
- Countryside and Rights of Way Act 2000;
- Wild Mammals (Protection) Act 1996;
- Weeds Act 1959;
- Salmon and Freshwater Fisheries Act 1975 (as amended);
- Import of Live Fish Act 1980 (as amended); and
- BS5837 Trees in Relation to Construction

With regard to the legal provisions listed above, they make it an offence to undertake certain activities with regard to species. For example, it is an offence:

- to kill or injure all native species of reptile or amphibian, or to uproot certain species of plant;
- to cause to grow in the wild certain non-native, invasive species of plant;
- to damage or destroy a bird's nest or to disturb certain species of bird whilst building a nest; and
- to kill, injure or capture a badger, all bat species, great crested newt or water vole, or to damage, destroy or obstruct access to their resting or nesting places, unless the action is in accordance with the terms and conditions of a licence.

In addition, the Nominated Undertaker for the Crossrail project will be considered a 'public authority' as defined in the Natural Environment and Rural Communities Act 2006. The Nominated Undertaker will therefore have regard, so far as consistent with the proper exercise of its functions, to the conservation (restoration or enhancement) of biodiversity, integrating this commitment within its management processes.

In response to the Convention on Biological Diversity signed in 1992, the UK Government has identified and described a list of the UK's biological resource, and set out a plan for the protection of this resource within the UK Biodiversity Action Plan (UKBAP). The UKBAP sets out the conservation approach for 65 habitats and 1150 species found across the UK.

1.4 General Ecological Management Plan

Purpose

This document forms the General Ecological Management Plan and therefore applies to all works being undertaken under the powers of the Crossrail Act (including enabling works, main works and systems and rolling stock works) during the design, construction and restoration phases.

It details the ecological measures that will be taken at all worksites (insofar as they are relevant) during the construction of Crossrail to ensure compliance with the EMR. The measures presented in the General Ecology Management Plan will form the basis for the preparation of site specific EMPs, and to ease cross reference, each of the generic measures have been allocated a unique code. It is recognised that the site specific EMPs will also include any additional specific ecological measures to be applied at each site. This will be particularly relevant to the Environmentally Sensitive Worksites.

The General Ecology Management Plan does not detail the measures to be taken to protect fisheries or water quality, as these measures will be described in the site specific EMPs and Water Resources Strategy.

Neither does the General Ecology Management Plan detail the site restoration proposals, which will be agreed as part of the Schedule 7 of the Crossrail Act.

Structure of the Document

Section 2 of this report describes the habitats and species predicted within the Crossrail ES to be affected by the works, summarising the scale of the effect where pertinent. Section 3 sets out the mitigation measures that will be applied to ensure compliance with the EMR and pertinent

legislation. Appendix 1 lists the surveys undertaken to date and identifies the programme for completing the outstanding surveys.

For the purposes of the environmental assessment, the Crossrail route has been broken down into component route windows, referenced by an alphanumeric code. In describing features of ecological interest and the location of the works in this report, reference is made to the same route windows described in the Environmental Statement. Appendix 2 contains a plan showing the route windows along the length of Crossrail.

Learning Legacy Document

2 Ecological Issues

No sites of national or international importance will be affected by the construction or operation of Crossrail. However, the ES identifies a number of sites of nature conservation interest alongside the route, namely three Local Nature Reserves and seventeen non-statutory sites (including Sites of Metropolitan Importance for nature conservation, Sites of Borough Importance (Grades 1 and 2) for nature conservation, Sites of Local Importance for nature conservation, Biological notification Sites, and Wildlife Heritage Sites). The locations of these sensitive sites are shown in the plans accompanying the ES.

Together with other areas of semi-natural vegetation along the route, these sites have been subject to survey to identify and evaluate their nature conservation value, based on the habitats and species that they support.

2.1 Survey Programme

Surveys have been undertaken since 2003 to identify the features of ecological interest along the route and to understand the implications of the works. Many of the surveys were completed to inform the Environmental Assessment process and are therefore reported within the Environmental Statement. However, as access was not available to all locations at this time and in recognition of natural variation that can occur over time with ecological systems, a number of additional surveys have been undertaken or are planned to have been completed before works on site begin.

The surveys that have been completed are summarised in Appendix 1, together with a list of the surveys programmed for subsequent years. With regard to the seasonal timings and methods of the outstanding surveys, these will be agreed with the relevant statutory agency, or undertaken in accordance current guidance (or best practice where guidance is not available).

2.2 Habitats

This section provides a summary description of the key habitats recorded along the route of Crossrail during the baseline surveys undertaken to support the preparation of the ES. It also indicates the predicted impact to each of these habitat types; full details of the effects of Crossrail are provided in the ES.

Secondary and Plantation Woodland

Secondary or plantation woodland is locally common the length of Crossrail. It is mostly dominated by the non-native *Acer pseudoplatanus* (Sycamore) and has intrinsically low conservation value but nevertheless is a relatively scarce ecological resource in the London area. Concentrations of these communities along railways are important in the suburbs, both as wildlife corridors and as a habitat for nesting birds and other wildlife. The woodland has developed predominantly on the strips of land alongside the active railways that are subject to irregular (if at all) management.

There will be generally small scale, localised impacts on this habitat type from the works to upgrade the above ground railway infrastructure, although the loss of this habitat type will be more extensive at other locations, such as at Gidea Park Sidings.

Ruderal, Tall Herb and Wasteland Communities

Distinctive semi-ruderal vegetation communities, comprising a wide range of annual and perennial herbs (some of which are only common on railway land and form species-rich communities) are prevalent throughout the length of the above-ground sections of Crossrail. On the track edge bare ground (railway ballast) and short weedy vegetation is prevalent, but further from the track side, where the regular and distinctive management operations of an active railway

are less intense, mosaics of rough grassland, tall herb and scrub habitats have developed. In the absence of management, these communities would eventually become woodland, as part of the succession process of vegetation communities.

The localised loss of small sections of these communities will occur as a result of works to the above ground sections of track, and more extensively for the construction of new stabling sidings, for example at Acton Freight Yard and Old Oak Common. There will also be some temporary loss at the location of the worksites, although they would be expected to regenerate readily following the completion of works. A route wide significant impact is predicted in the ES for the effects on these habitat types.

Water Courses, Ponds and Emergent Vegetation

Crossrail crosses several rivers and canals, and there are a number of ponds in close vicinity of the route. These aquatic habitats support fringing and emergent vegetation communities that are not common in an urban environment and therefore enhance the overall biodiversity along the route of Crossrail. Rivers and canals are additionally important as wildlife corridors. Watercourses and ponds are recognised as Priority Habitats in the UK Biodiversity Action Plan.

Fringing and emergent vegetation is a community not impacted upon significantly route wide, however locally significant patches of emergent vegetation will be affected temporarily during construction works, for example at City Mill River and Stockley Ponds.

The intertidal reaches of the River Lee support areas of intertidal mudflat, a UKBAP habitat, although no intertidal mudflat occurs at the locations of the temporary worksites for the construction of Crossrail. Therefore it is not predicted that Crossrail will affect intertidal mudflat habitats.

2.3 Species

This section describes the species of note recorded along the route of Crossrail during the baseline surveys. It also provides a summary of the predicted impacts to these species; full details of the effect can be found within the ES.

Breeding Birds

As may be expected within an urban and sub-urban environment, the breeding bird surveys undertaken along the route of Crossrail identified largely common assemblages of breeding birds, with between 19 and 42 different species being recorded at each site. However, at some locations Black Redstart, Kingfisher and Hobby were recorded, all of which are listed on Schedule 1 (birds which are protected by special penalties) of the Wildlife and Countryside Act 1981.

Black Redstarts were recorded foraging within and around proposed Crossrail worksites, although no breeding activity was observed in any areas affected by works. Kingfisher nests within burrows in vertical river banks, and localised impacts could occur where suitable habitats are affected by bridge strengthening works, although no burrows have so far been identified within worksites. Hobbies were not recorded breeding during the Crossrail surveys, and although suitable nesting habitat (tall trees) was noted in some locations, it is not thought likely that breeding Hobbies will be encountered during the works.

Other locally scarce species of bird, including whitethroat, lesser whitethroat and linnet were recorded during Crossrail surveys at the Limmo Peninsula. This site is currently occupied by the Docklands Light Railway as a worksite, and any nesting birds in this location are therefore likely to be tolerant of construction activities.

Wintering Birds

Between 25 and 55 species of wintering bird were recorded at each of the sites surveyed (in 15 route windows). A small number of UKBAP, Red list or Amber list species were present at most sites, as may be expected from the habitat types surveyed. Of most interest, however, is the Redshank population (County Importance) which feeds from the mudflats of the River Lea at the Limmo Peninsula, and nature of the impact here will be dependent upon the set up of the Limmo Peninsula worksite.

Reptiles

Common lizard, slow worm and grass snake occur variously along the route at 12 locations. These locations do not generally fall wholly within the boundary of the works, with only a small proportion of the suitable habitat to be lost to works (for example 5% at Roughland Opposite Iver Station). The following reptile population sizes were recorded:

Grass snake: low populations at 2 locations (Route Windows W15, W11);

Slow worm: low populations at 7 locations (Route Windows W21, W11, W3, W4, NE8, SE7 and SE8);
medium population at 3 locations (Route Windows W25, W15 and W14);
large population at Gidea Park Sidings (Route Window NE11)

Common lizard: low populations at Gidea Park Sidings (Route Windows NE11); and
large population at 2 locations (Route Window NE8 and NE9).

One further presence/absence survey and a population survey are to be undertaken during 2008 and 26 further presence/absence surveys are proposed from 2009 across 23 Route Windows.

Amphibians

Small populations of smooth newt have been recorded in Route Windows W11 and NE15; medium populations in Route Windows W13 and W14 and a large population in Route Window W19. A small population of palmate newt has been recorded in Route Windows W11 and NE8.

Great crested newt are present at Shenfield (Route Window NE17) and further surveys to confirm presence/absence are programmed to be undertaken at Stoke Poges Lane Bridge (Route Window W19), Stockley Flyover (Route Window W11) and Manor Wharf (Route Window SE6a).

No ponds with confirmed populations of amphibians will be lost to the construction of Crossrail, although some areas of habitat that provides for foraging and hibernation will be affected by temporary works, and some small areas will be lost to permanent works.

Bats

Field surveys and collation of existing records has indicated that eight species of British bat (Common Pipistrelle, Noctule, Brown-long Eared, Serotine, Daubenton's, Leisler's, Nathusius' Pipistrelle, Soprano Pipistrelle) and one vagrant visitor to the UK (Parti-coloured Bat) have been recorded in the general vicinity of the Crossrail works.

The surveys have located approximately 130 sites which potentially may be used by bats for roosting or hibernation. In the works to date 82 separate Crossrail surveys have not found roosting bats in any location with bat-roost potential. A further 16 surveys are to be undertaken during 2008 at Royal Oak Portal (C1), Bond Street (C4), Farringdon (C6), Whitechapel (W8) and Pudding Mill Lane Portal (C13). A further 48 sites across 35 Route Windows will be surveyed from 2009.

Badger

Five badger setts were recorded in the vicinity of Crossrail, a main sett and an outlying sett at Stockley Flyover (W11), and 3 outlying setts at Iver Station (W14). Subject to detailed design it is

not expected for permanent works to affect these setts, but temporary impacts as a result of disturbance are predicted during the construction. It may be necessary to close one of the setts at Stockley Flyover during the construction phase, due to its proximity to the works and because it will become islanded by a works site.

Water Vole

Surveys were undertaken within 9 Route Windows, and water vole was recorded at one site, Manor Wharf (SE6a). Water voles within three stretches of ditch at Manor Wharf may be affected by the widening of a road to access the worksite, and up to 600m of ditch could be lost. The nature of this impact will be dependent upon the detailed design of the access road.

Plant Species

Nationally scarce species including dittander, rock stonecrop, white mullein and twiggly mullein were recorded in Acton Yard. These casual 'weeds' on the railway ballast, although considered nationally scarce, are not considered to be of importance at this location on account of their native occurrence elsewhere in the UK; their loss is not considered significant within the ES.

Fern communities are present on the walls and arch struts of the approach cutting to Connaught Tunnel. Black spleenwort *Asplenium adiantum-nigrum*, a widespread species that is uncommon in London, was recorded at the site. It is expected for these walls and struts to be lost to the refurbishment of the tunnel, and appropriate measures to safeguard (where possible) the fern communities to be detailed within the site specific EMP for the Connaught Tunnel works.

Non-native Invasive Plant species

Japanese knotweed *Fallopia japonica* and giant hogweed *Heracleum mantegazzianum* have been recorded along the proposed route; these species are listed on Schedule 9 of the Wildlife and Countryside Act 1981 and as such it is an offence to knowingly introduce or cause these species to grow in the wild.

Japanese knotweed has been recorded in 37 Route Windows, and Giant Hogweed in 3 Route Windows. Other non-native invasive species recorded include Indian balsam *Impatiens glandulifera* (which is present in 3 Route Windows) and floating pennywort *Hydrocotyle ranunculoides*, a species found in the aquatic habitats of the Lea Valley (Route Windows C13 and C13a).

Invertebrates

Nine areas of high quality habitat for invertebrates have been identified, where the majority of the interest is associated with the habitats along the existing railway. A total of 31 Nationally Scarce species of invertebrates have been recorded associated with the open ballast and ruderal vegetation present, which rely upon the regular management operations to maintain the habitat conditions.

At North Woolwich a population of the Beetle *Axinotarsis pulicarius* was found, a species that has not been recorded in the UK since 1923. It is classified as 'endangered' within the IUCN's Invertebrate Red Data Book.

Two more Red Data Book species classified as 'rare' were recorded at Hayes and Harlington Station (the Ground Bug *Trapezonotus ullrichi*) and at Acton Yard (the Jumping Spider *Pseudoeuphrys obsoleta*).

The London Borough of Havering lists the Stag Beetle *Lucanus cervus* on its Local Biodiversity Action Plan. Historic records show the presence of this species at Gidea Park Stabling site, although the Crossrail habitat surveys did not record suitable habitat at this location.

Aquatic invertebrates/ Fish and Fisheries

Of the sites with aquatic habitats (including those listed in Table 5.1 of Annex 3 of the EMR) at only Stockley Pond, the Isle of Dogs and Limmo Peninsula were issues relating to aquatic invertebrate or fish communities identified.

Within the docks affected by the proposed works two non-native invasive invertebrate species occur: Zebra Mussel *Dreissena polymorpha* and Chinese Mitten Crab *Eriocheir sinensis*. Both of these species are being considered for inclusion on Schedule 9 of the Wildlife and Countryside Act 1981, which would make it an offence to release or cause the spread in the wild of these species.

Species of fish recorded within the West India Docks included Perch *Perca fluviatilis*, Roach *Rutilus rutilus*, Bream *Abramis brama*, Roach x Bream hybrid, Smelt *Osmerus eperlanus*, Sprat *Spratus spratus* and Flounder *Pleuronectes flesus*; the most prevalent being the first three species listed.

The works at North Dock may have temporary impacts on the ability of fish to pass between North Dock, Blackwall Basin and Poplar Dock thus creating small, isolated populations.

Chinese Mitten Crab *Eriocheir sinensis* has also been recorded from the River Lea and is thought to be present at the worksite at Limmo Peninsula.

3 Generic Ecological Measures

This section describes the generic ecological measures that will be implemented during construction to limit the effect of the works on features of ecological interest and to deliver the requirements of the EMR. It provides details of the 'watching brief' that will be undertaken, and the controls to be implemented in the event of an unanticipated discovery of a protected species. It also details the methods to be employed for the relocation of protected species, where these occur.

The measures have been set out in a tabular form, for ease of cross reference with the Environment Management Plans that will be prepared for the worksites, including those containing the sensitive sites (listed in Table 5.1 to Annex 3 of the EMR). The Environment Management Plans will detail the appropriate control measures for the specific worksites, including the pertinent generic ecological measures and any unique site specific measures as necessary, and will be discussed with the qualifying Local Authorities as well as with the relevant statutory agencies with regard to the sensitive sites.

This section does not present the full extent of the mitigation measures to be implemented; for example, restoration of sites temporarily acquired or used will be detailed within applications made under Schedule 7 of the Crossrail Act. In addition, within the site specific Environmental Management Plans water quality and aquatic ecology management proposals will be presented. These water quality and aquatic ecology management proposals will be developed with the Environment Agency and British Waterways and will detail the site specific measures for minimising and mitigating the effects on the fish and the aquatic environment.

The measures described in this section will be implemented on site by the Works Contractor, as part of their contract requirements.

3.1 *Monitoring*

Monitoring compliance with the General Ecological Management Plan will be undertaken by the Nominated Undertaker, in accordance with a programme of audit and surveillance of the Works Contractors' procedures.

It is anticipated that monitoring requirements for protected species will be specified as part of the terms and conditions for any licences obtained by the Crossrail project. Species monitoring requirements will be implemented and reported to the relevant licensing authority as part of the implementation of the licence conditions.

Where monitoring of site restoration proposals is required, it will be detailed within applications made under Schedule 7 of the Crossrail Act.

3.2 *Licensing*

The Nominated Undertaker will obtain the protected species licences necessary to ensure legal compliance whilst undertaking the works. Where appropriate, route-wide licence applications will be made, to reduce the administrative burden.

Licences in respect of badger, bat, great crested newt and water vole, will be obtained as detailed below.

Badger

An application for a licence under the Protection of Badgers Act 1992 will be made to Natural England for the closure of and disturbance to badger setts, for example at Iver Station (Route Window W14) and at Stockley Flyover (Route Window W11). Sett closures will be undertaken between July to November and will involve soft stopping to determine current occupation prior to installing a one-way gate and hard stopping as appropriate. The licence application will detail the mitigation measures to be instigated prior to sett closure, including the provision of any artificial setts deemed necessary.

Bat

No bat roosts have so far been found within the areas affected by works. Bat surveys are currently planned to be undertaken as detailed in Appendix 1. Should a roost be identified, an application for a licence to damage or destroy a bat roost will be made to Natural England under the provisions of the Conservation (Natural Habitats, &c.) Regulations 1994. The licence application will provide details of the mitigation to be implemented, such as methods for the exclusions of bats prior to undertaking works, destructive searches and details of the numbers, locations and types of artificial roosts to be provided.

Great Crested Newt

Although no ponds supporting great crested newt will be directly affected, ponds supporting great crested newts are within 500m of the works area and are connected to it by suitable habitat. Moreover, although it is not ideal, the works area comprises habitat that could be used by great crested newts for foraging or hibernating. Therefore an application for a licence to damage or destroy habitat used by great crested newts, and to disturb or capture great crested newts will be made to Natural England under the provisions of the Conservation (Natural Habitats, &c.) Regulations 1994. The licence application will detail the mitigation measures to be taken to compensate for any loss of suitable habitat, and the method for destructive searches of the areas affected prior to works beginning.

Water Vole

Water vole has been recorded at only one site along the route. The specific measures to be applied at this site will be detailed in Environmental Management Plan for Manor Wharf.

3.3 Generic Mitigation Measures

The following measures will be implemented by the works contractor as appropriate to address the ecological issues at the work sites along the route. The site specific EMPs to be prepared for the worksites will detail the particular measures to be applied by reference to the codes, listed in the following table. In addition to these measures, the site specific EMPs will detail in full any additional measures to be undertaken at those sites and any particular site restoration proposals that will be undertaken at the sensitive sites (listed in Table 5.1 of Annex 3 of the EMR) in order to provide ecological enhancement measures.

Code	Method	Description
Ec01	Minimise effects of temporary landtake	Temporary worksites (including site accesses) will be located within areas of low conservation value, as far as reasonably practicable.

Ec02	Ecological Restoration Survey	A suitably qualified ecologist will survey temporarily affected areas prior to works commencing to record the characteristic species of each of the habitats present, to inform the restoration design.
Ec03	Restoration of Temporarily Acquired Areas	<p>Restoration of temporarily affected areas will normally be to their pre-construction condition, in accordance with the EMR and Schedule 7 requirements, and to the satisfaction of the Nominated Undertaker. Restoration will be undertaken on or as reasonably practicably close to the end of the construction works as possible.</p> <p>Restoration proposals will be described within applications made under Schedule 7 to the Crossrail Act, and may require natural re-colonisation or planting and seeding with native species as appropriate to the area and necessary to achieve the restoration proposals.</p> <p>Top soil to be used in the restoration of temporarily acquired sites of nature conservation importance will be sourced from locations as close as reasonably practicable, to ensure the seed bank reflects local conditions.</p>
Ec04	Tree and Shrub Clearance	Where required for the works, trees and shrubs will be removed outside of the bird breeding season (1 st March to 31 st July) wherever practicable. Removal within the bird breeding season will be subject to an Ecological Watching Brief.
Ec05	Protection of Trees	Measures to ensure the protection of trees to be retained will be implemented in accordance with BS5837: 2005 'Trees in relation to construction'.
Ec06	Protective Fencing	Protective Fencing will be provided to segregate works areas from ecological features to minimise accidental incursion of workforce or machinery. The fencing will be clearly labelled 'ecological protection zone' and with details of whom to contact should access to the protected area be required.
Ec07	Visual Screening	Hoarding or similar will be erected around construction sites in ecologically sensitive areas to minimise visual disturbance, for example to minimise disturbance to wintering birds on the River Thames foreshore, and for nesting birds on Thames-side grazing marshes.

Ec08	Worksite Lighting	Temporary worksite lighting will be located, angled and shielded to avoid spillage as far as practicable outside of the works area.
Ec09	Ecological Watching Brief	A suitably qualified ecologist will conduct a 'watching brief' prior to and during key stages of works, to search for protected species and ensure legal compliance. The searches undertaken where appropriate will be destructive to minimise the likelihood of the return of protected species.
Ec10	Unanticipated Discovery	In the event of a protected species being found during the 'watching brief', works will cease in the immediate area whilst the Nominated Undertaker is informed and, at the request of the Nominated Undertaker, appropriate mitigation measures are agreed with Natural England.
Ec11	Relocation of Reptiles & Amphibians (excluding Great Crested Newts)	<p>Mitigation at sites supporting small populations of reptiles or amphibians (sites in Route Windows W25, W21, W15, W14, W13, W11, NE8, NE15, SE7 and SE8) will be undertaken as follows:</p> <ul style="list-style-type: none"> - Search and removal of refuges from works area, repositioning refuges where possible within unaffected areas of habitat up to 100m from works site - Relocation of any animals caught to suitable areas of unaffected habitat, a short distance from the works site - Clearance of all vegetation from the areas affected by works to prevent return of animals. Reptile proof fencing may be installed at some sites to prevent any animals returning to the work sites.

Ec12	Translocation of Reptiles	<p>Mitigation at sites where the majority of the suitable habitat for reptiles will be lost to the works (sites in Route Windows NE9 and NE11)</p> <ul style="list-style-type: none"> - Identify a suitable receptor site as close as possible to the donor areas. - Undertake improvement works as necessary to the receptor site - Install artificial refugia within area (at an appropriate density for the site) and allow to settle for 5 days - Undertake capture surveys in accordance with best practice guidance until 10 animals or fewer have been caught in any 10 day period of suitable weather conditions - Undertake destructive search of site, culminating in the clearance of all vegetation from the work site - Monitoring of the translocated population will be undertaken for the following two years to ascertain that the new population has established successfully.
Ec13	Control of Pest Species	<p>The control of pest species (including vermin and rabbits) will be undertaken by appropriately trained personnel in accordance with legal provisions, including the Wild Mammals (Protection) Act 1996.</p>
Ec14	Measures to prevent the spread of Non-native Invasive Plant Species from neighbouring areas	<p>Where invasive, non-native species, including Japanese Knotweed and Giant Hogweed are found in the vicinity of worksites, the work site boundary will be relocated to exclude an area up to 7m (at the direction of a suitably qualified ecologist) from the nearest growing stem to prevent works from coming into contact with propagules (seeds or fragments of stem or root that may give rise to a new plant).</p>
Ec15	Measures to prevent the spread of Non-native Invasive Plant Species within worksites	<p>Where invasive, non-native species, including Japanese Knotweed and Giant Hogweed occur within worksites, consideration will first be given to excluding by fencing an area up to 7m (at the direction of a suitably qualified ecologist) from the nearest growing stem to prevent works from coming into contact with propagules.</p>

Ec16	Measures to prevent the spread of Non-native Invasive Plant Species within temporary worksites of 3 months or less duration	Should the invasive species occur in an area required for temporary works (less than 3 months), the above ground vegetation will be removed to a suitable landfill site and two layers of 2000grade terram or similar will be laid directly on the surface of the soil over an area at least 7m from the nearest growing shoot and weighted with hardcore to a depth of at least 300mm. Upon completion of the works, the hardcore will be removed and following inspection by a suitably qualified ecologist to confirm that invasive plants have not penetrated the hard core, will be reused as appropriate. The terram will be lifted with care to prevent disturbance to the ground and disposed of in a suitable landfill site.
Ec17	Measures to prevent the spread of Non-native Invasive Plant Species as a result of long (>3 months) duration and permanent works	<p>To the direction of a suitably qualified ecologist, an area within 7m horizontally from the nearest growing stem and up to 3m below ground level will be excavated and removed to a suitable landfill site. The ecologist will determine the extent of material to be excavated according to the presence of plant propagules: only once all propagules have been removed will the excavation cease.</p> <p>Machinery and tools used for the excavation, including the boots of construction staff will be cleaned at the site of the excavation until no extraneous material (soil potentially supporting propagules) remains: the arisings of this cleaning process will be disposed of to a suitable landfill.</p>
Ec18	Measures to prevent the spread of Non-native aquatic invertebrates	Should Zebra Mussel or Chinese Mitten Crab be encountered during works, care will be taken to ensure that they are not released as a result of the works. Where necessary, the species will be dispatched humanely.
Ec19	Translocation of fish	Prior to draining water bodies, populations of fish will be translocated to a suitable receptor pond.

4 References

The following reference sources have been consulted during the preparation of the GEMP Environmental Statement:

- Environmental Statement (together with an addendum) and accompanying NTS
- Supplementary Environmental Statement (SES1) and accompanying NTS
- Supplementary Environmental Statement 2 (SES2) and accompanying NTS
- Amendment of Provisions Environmental Statement (APES 1) and accompanying NTS
- Amendment of Provisions Environmental Statement 2 (APES 2) and accompanying NTS
- Amendment of Provisions Environmental Statement 3 (APES 3) and accompanying NTS
- Supplementary Environmental Statement 3 (SES3) and accompanying NTS
- Supplementary Environmental Statement 4 (SES4) and accompanying NTS
- Amendment of Provisions Environmental Statement 4 (APES 4) and accompanying NTS
- Ecology Survey Report 2005
- Water Vole Survey at Manor Wharf 2005
- Ecology Report 2006 Issued Version (DW)(LK)(TH)(AJ) 23 01 07
- Ecology Report 2007 FINAL1 (DW3)(RNC)(BG) 14 12 07
- Ecology Technical Report - *Volume 3, Part 1* Initial Surveys - Results
- Ecology Technical Report - *Volume 4; Part 1* Phase 2 Surveys, Botany
- Ecology Technical Report - *Volume 4, Part 2* Phase 2 Surveys – Invertebrates
- Ecology Technical Report - *Volume 4, Part 3* Phase 2 Surveys – Animals
- Ecology Technical Report - *Volume 5; Part 1* Bird Surveys, Results
- Ecology Technical Report - *Volume 6* Aquatic Ecology

Supporting Information Papers:

- B1 Disapplication of Legislation
- B3 Compliance with Undertakings and Assurances
- B8 Compliance with the EIA Directive and ECHR
- D1 Crossrail Construction Code
- D2 Control of Environmental Impacts
- D3 Excavated Material and Waste Management Strategy
- D4 Treatment of Contaminated Land
- D5 Site Reinstatement
- D6 Construction Traffic
- D7 Maintenance of Public Utilities
- D8 Tunnel Construction Methodology
- D9 Noise and Vibration Mitigation Scheme
- D10 Groundborne Noise and Vibration
- D11 24-Hour Working
- D13 Restitution of Open Space
- D17 Ecological Impacts
- D20 Traffic Management During Construction
- D25 Noise from Fixed Installations
- D26 Surface Railway Noise and Vibration

Appendix 1

Surveys Completed and Programmed to be Undertaken

Completed Surveys

Extended Phase 1 Habitat 2003, 2004, 2005, 2006 (in 70 Route Windows)

Botanical Surveys 2003, 2004, 2005, 2006, 2007 (in 70 Route Windows)

Bat 2004, 2006 (in 28 Route Windows)

Wintering and Breeding Birds 2003 and 2004 (in 62 Route Windows)

Dormouse 2006 (in 2 Route Windows)

Amphibian (Great Crested Newt) 2003, 2004 and 2006 (in 6 Route Windows)

Invertebrate 2004 (in 20 Route Windows)

Otter 2004 (in 5 Route Windows)

Reptile 2003, 2004, 2006, 2007, 2008 (in 26 Route Windows)

Water Vole 2004, 2005 (in 9 Route Windows)

Badger 2005 (in 7 Route Windows)

River Corridor Survey 2003, 2004 (in 4 Route Windows)

Forthcoming Survey Programme

Amphibians:

2008: Great Crested Newt surveys at three locations (Route Windows SE6a & W19)

2009: Great Crested Newt surveys at three locations (Route Windows W21, W12, W11 & W7)

Bats:

2008: Triggering surveys and building inspections at 16 locations (Route Windows C01, C04, C06, C08 and C13)

2009: Triggering surveys, activity surveys and building inspections at 11 locations (Route Windows C3, C5, C9, SE2, SE3, SE4, SE5, SE6 and SE8)

2010-12: Triggering surveys, activity surveys and building inspections at 15 locations (Route Windows W25, W24, W11, C3, C08, C10, NE4, NE9 and SE8)

Reptiles:

2008: Population estimate surveys at 1 location (Route Windows W03)

2008: Presence/Absence surveys at 1 location (Route Windows W08)

2009: Presence/Absence surveys at 5 locations (Route Windows SE01, SE02, SE03, and C13)

2010-12: Presence/Absence surveys at 19 locations (Route Windows W20, W19, W18, W17, W16, W15, W11, W10, W08, W04, W02, W01, C13, NE2, NE4, NE5, NE7 and NE17)

Water Vole:

2009: Survey at Manor Wharf (Route Window SE6a)

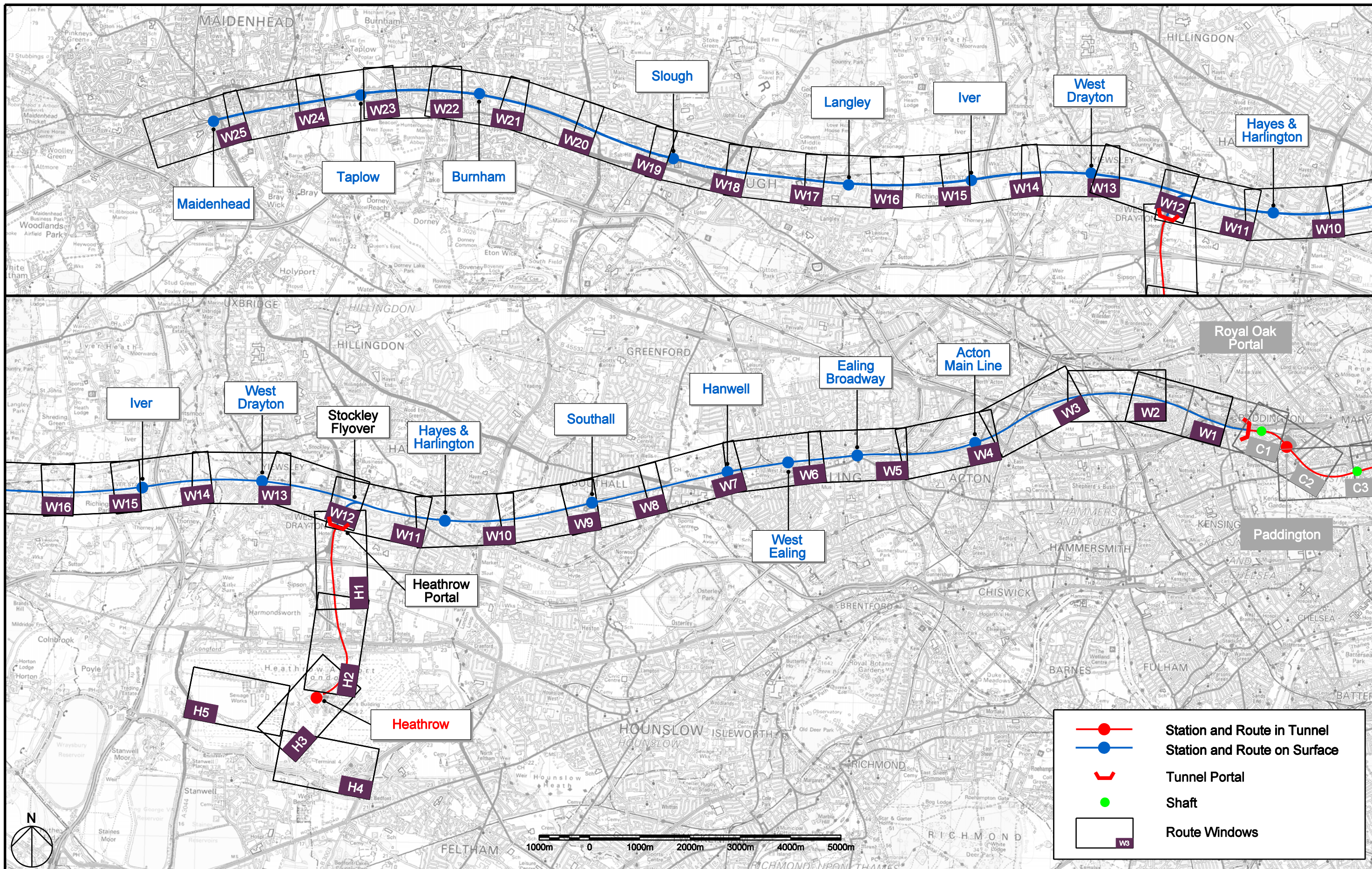
Badger:

2009: Activity survey at 1 location (Route Window W11)

Appendix 2

Crossrail Route Window Key Plans

Learning Legacy Document



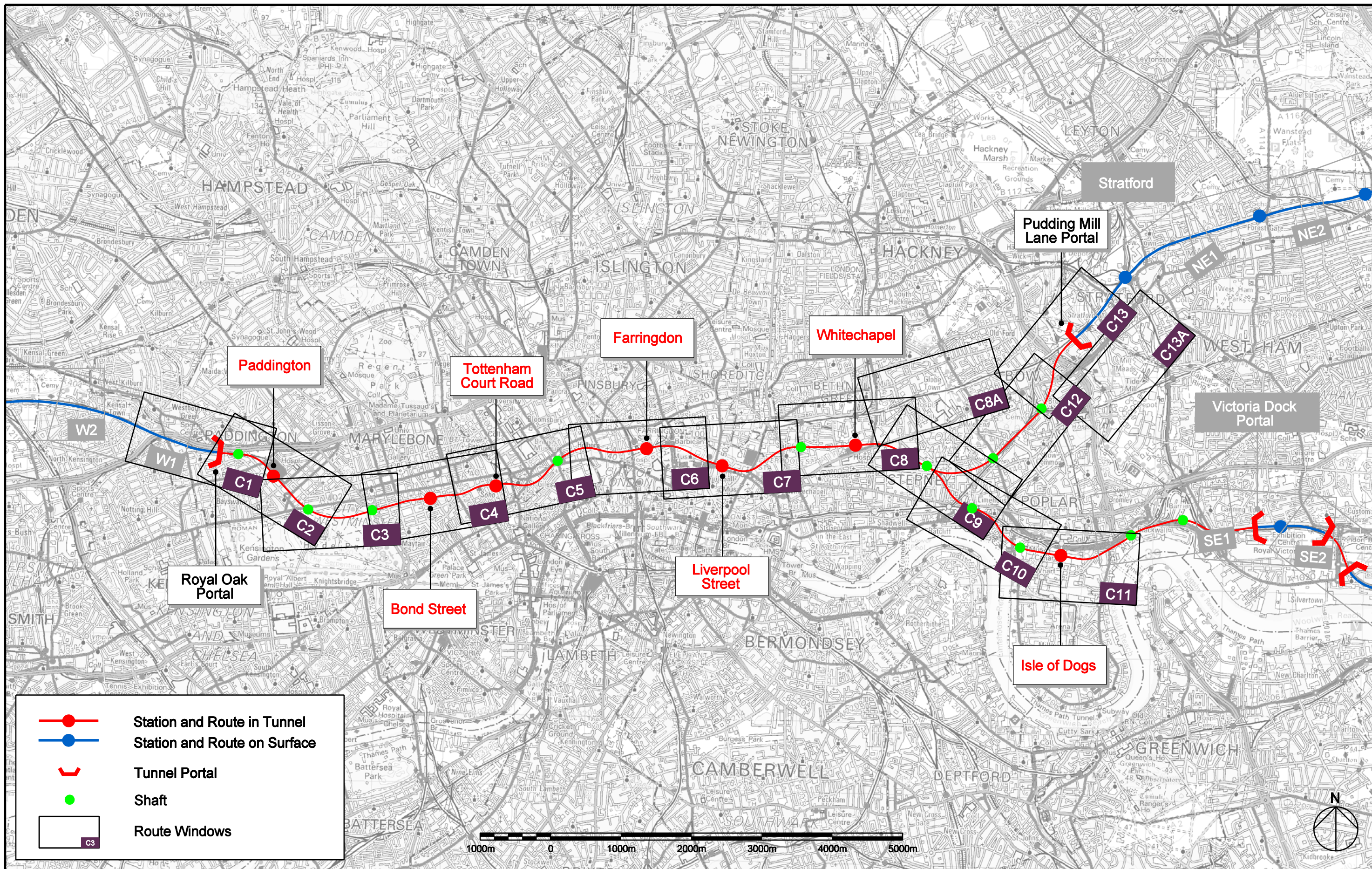
www.crossrail.co.uk

WESTERN ROUTE SECTION KEY PLAN

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MAP
WEST

SCALE: 1:70000 @ A3
25/09/2008 110402-W100-F00-F-5003



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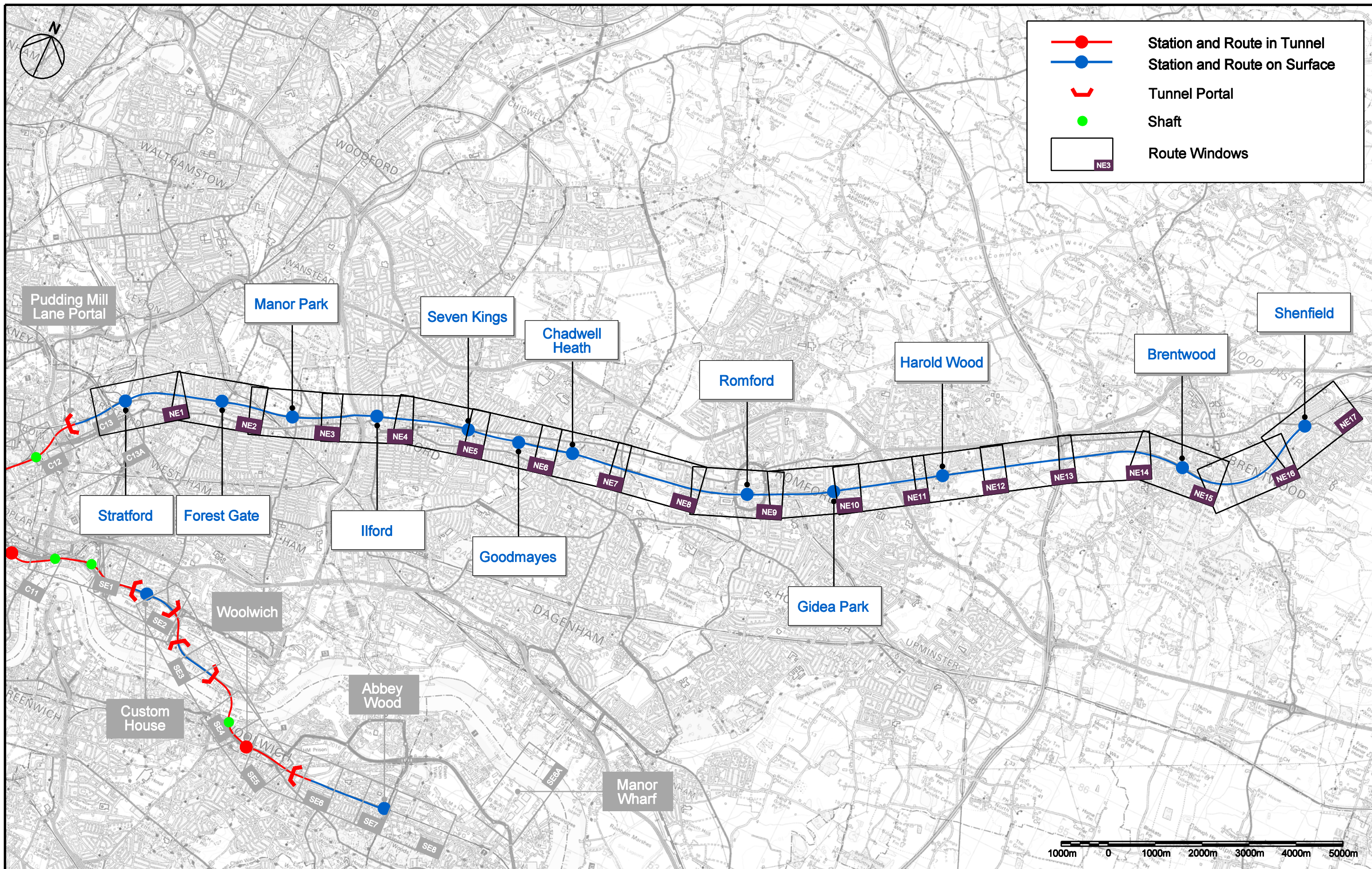
CENTRAL ROUTE SECTION KEY PLAN

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MAP
Central

SCALE : 1:50000 @ A3
110402-C1G00-F00-F-50020

25/09/2008



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NORTHEASTERN ROUTE SECTION KEY PLAN

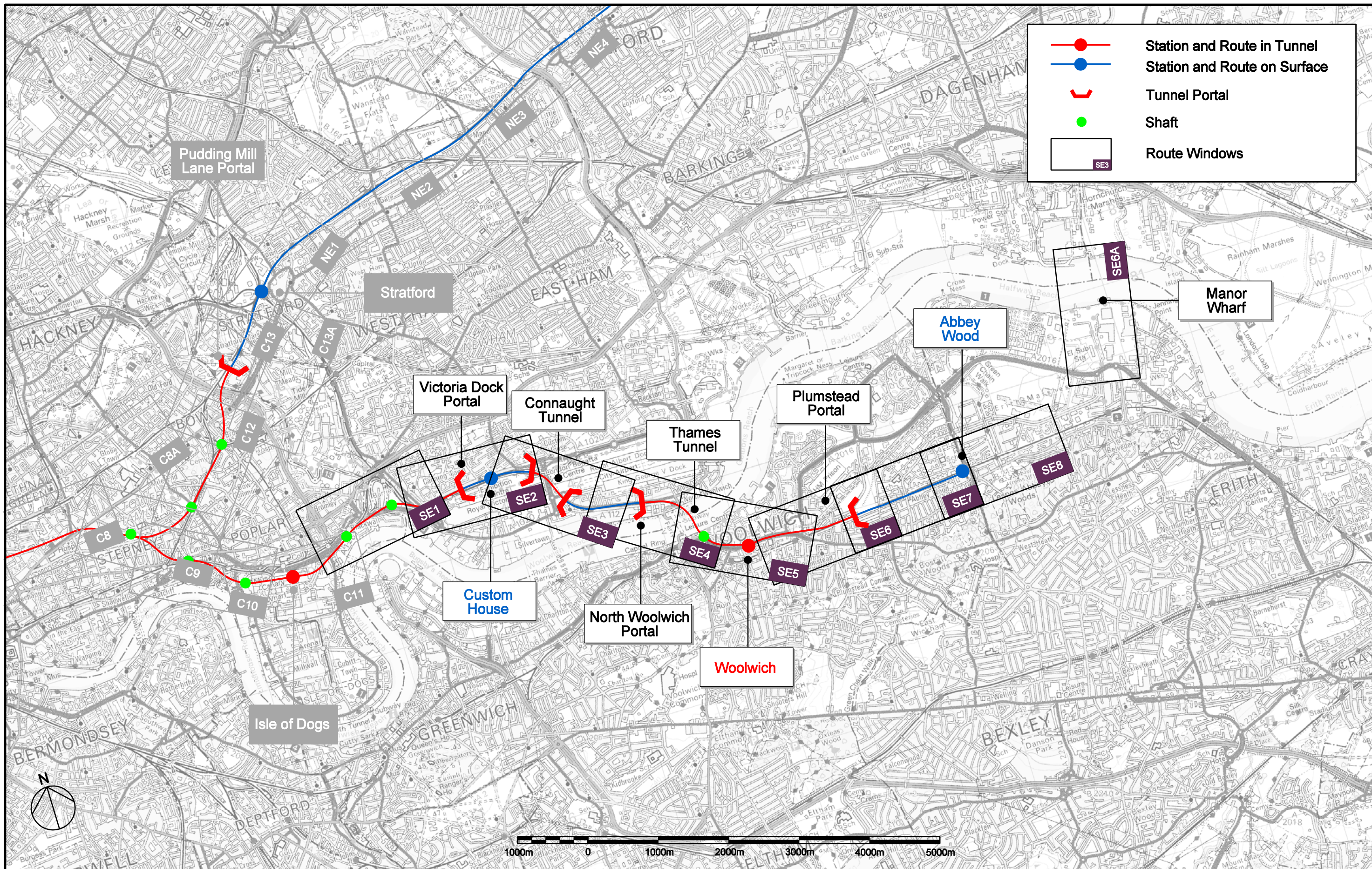
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MAP
N. EAST

SCALE : 1:75000 @ A3

25/09/2008

110402-E1G00-F00-F-50101



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SOUTHEASTERN ROUTE SECTION KEY PLAN

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MAP
S.EAST

SCALE: 1:50000 @ A3

25/09/2008

110402-E2G00-F00-F-50020