5 Information on Trees

Existing Trees

- 5.1 The Environmental Statement (Volume 2) submitted in support of the outline planning application includes a tree survey, carried out in 2004. Drawing numbers 9D.1 and 9D.2 in Appendix 9D record 3 trees (numbered 1, 2 and 3) within the vicinity of the realignment works, to the south of the Great Northern Hotel. Drawing 9D.12 within the same Appendix shows a photograph of the trees at Photo 1.
- 5.2 The three trees are London Planes, planted as typical city street trees and they are also shown on drawing TOWN279.1(97)009 within this submission. As reported in the Environmental Statement, none of the trees are covered by a Tree Preservation Order. Tree numbers 1 and 2 fall into the '2-Moderate' category under BS5837 and three number 3 falls into the '3-Poor' category. The existing heights are 12m, 12m and 9m and the existing crown spreads are 14m, 10m and 8m.
- 5.3 The three trees will ultimately be lost, in order to provide taxi facilities on the eastern side of the southern section of realigned road (south of the 'keyhole' entrance), to serve King's Cross station. These taxi facilities do not form part of this submission and, as explained in the covering letter and Section 6 below, they are being brought forward separately, by Network Rail, as part of their King's Cross Station Enhancement project. The taxi facilities are also part of the King's Cross Central scheme granted planning permission and the loss of the trees is reported within the Environmental Statement, for example at Table 9.8.1 in Part 9 (Volume 2) and paragraph 24.1.36 (Volume 5).

New Tree Planting

- 5.4 The submitted drawings show 13 trees along the western side of Pancras Road. The trees would be Platanus acerifolia (London Plane). This tree species has been chosen because it is identifiable as a traditional London tree, can be pollarded to constrain its size, and has shown a good level of tolerance to city pollution. Around the base of each tree, a cropped granite paving detail will provide a tactile hazard warning. The specification for the new trees is:
 - i) Proposed height: 5-7m
 - ii) Proposed stem diameter: 30-35mm
 - iii) Proposed crown spread: 2-3m
- 5.5 The number and location of the (3) trees shown along the southern section of the road, south of the International entrance, is indicative at this stage, pending further work on below-ground services. The final number and location of trees are to be agreed with and approved by the local planning authority, prior to the commencement of planting.
- 5.6 The timing of the tree planting is addressed in Section 10 (Construction Timetable).

6 Urban Design Report

- 6.1 An Urban Design Report is enclosed. The purpose of design reports, as set out in Condition 16, is to explain "for relevant applications...the underlying approach of the design and explain how it addresses each of the relevant Design Guidelines."
- 6.2 In this case, the Design Guidelines, set out at Annex 1 to the Planning Permission, are not relevant. The Design Guidelines are concerned with the detailed design of buildings, their envelope and façades.
- 6.3 Accordingly, the enclosed Urban Design Report concentrates on the underlying approach of the design for the realigned road. As such, it has regard to and addresses the introductory paragraph of Annex 1 to the Planning Permission which states that:
 - i) Detailed designs should reflect a commitment to ensuring architectural quality and diversity can thrive whilst affording priority to the public realm and achieving an integrated urban grain, with continuity and human scale; and
 - Detailed designs should reflect a suitable level of consultation with the local authority and other statutory bodies; and a commitment to use the Urban Design Statement and Public Realm Strategy as reference documents throughout the design process, such that the original vision is maintained.
- 6.4 The Urban Design Report also explains how and where we have had regard to the draft 'King's Cross Strategic Vision' report, prepared for Camden Council by Ian Ritchie Architects in November 2006.

Realignment of Pancras Road

Urban Design Report

Introduction

This document has been written to provide design information regarding the realignment of Pancras Road, which is part of the enabling works for King's Cross Central.

It explains the underlying approach of the design, having regard to Condition 16 of the outline planning permission 2004/2307/P.

This report does not specifically address the Design Guidelines at Annex 1 of the planning permission as these guidelines are specifically concerned with buildings, their facades and other aspects of their design. The report does however address the introductory paragraph, as part of the underlying design philosophy for the road, stating that:

- i) Detailed designs should reflect a commitment to ensuring architectural quality and diversity can thrive whilst affording priority to the public realm and achieving an integrated urban grain, with continuity and human scale; and
- Detailed designs should reflect a suitable level of consultation with the local authority and other statutory bodies; and a commitment to use the Urban Design Statement and Public Realm Strategy as reference documents throughout the design process, such that the original vision is maintained.

This Report also explains how and where we have had regard to the draft 'King's Cross Strategic Vision' report, prepared for Camden Council by Ian Ritchie Architects in November 2006.

The location of the works means that there are a number of interfaces that have influenced both the final design and the timing of the works. The most significant of these are the construction of St Pancras International Station and associated landscaping, the construction of the Northern Ticket Hall by LUL and Network Rail's proposed Western Concourse.

Design for Quality and Diversity

Pancras Road is an important route in the southern part of King's Cross Central, providing a strong and recognisable link between the Euston Road and Goods Way. Its realignment has been designed to enable a coherent and integrated urban grain to evolve, as the wider development is built out.

The design recognises the importance of public realm, noted within the King's Cross Central Public Realm Strategy (2004) as a physical entity that comprises all the space between buildings that can be freely accessed by the public. It can also include public facilities and buildings such as public transport and stations. The design has concentrated on providing high levels of finishes, suitable for the levels of activity along its length, whilst ensuring it is recognisable as a 'London Street'.

As recognised in the King's Cross Statement Urban Design Statement (April 2004), the realigned Pancras Road has two distinct characters. South of the Gymnasium the road opens up to become part of a major new public space between the two stations; whilst the northern section retains a more relaxed feel, leading up towards Camley Street Natural Park.

The stretch of road opening onto Station Square will be part of a world class public space and a prominent transport gateway for London, located between two grade 1 listed buildings. This will be reflected in the detailing and choice of materials which will include sawn yorkstone and granite, continuing the materials selection of other streets in this area. The main carriageway will be clearly demarcated as tarmac, with taxi areas alongside St Pancras Station formed by setts, reducing their visual dominance. The colours of the granite setts will reflect those found locally, within and around the King's Cross Central site.

Additionally, the need for clear and direct access and interchange at grade between Kings Cross and St.Pancras stations has been a key objective of the design work. The design integrates pedestrian crossings over raised tables in areas corresponding to the main desire lines for the two entrances to St.Pancras station.

The pedestrian crossings will be raised to the same level as the pavements and surfaced with granite setts; the detailing will help to define areas of high pedestrian movement, and reinforce the single identity of Station Square, ensuring it encompasses the pavement area immediately adjacent to Pancras Station. An added benefit is that it will create areas of pedestrian priority increasing the ease with which residents, commuters and visitors can move across the space.

Where vehicle entrances to buildings cross the pedestrian footway, the surface will be finished with granite setts which will demarcate them from the carriageway and footpath. Infrequently used emergency entrances into St Pancras Station will use smaller yorkstone setts to maintain a visual continuity along the pavement.

The stretch of Pancras Road north of the Stanley building will be quieter. The change of paving material from yorkstone to a high quality pc (precast) paving has been used to reflect the change in character. At the northern end of Pancras Road, the corner splay has been designed to enable vehicles servicing Development Zone B to access from the north and also provides an opportunity for the enhancement of any building entrances at that location.

The active frontages, trees, building entrances and vehicle and pedestrian activity, the materials and furniture will become part of an identifiable street pattern, creating a more human scale against the length and dominance of St Pancras Station. This pattern will be reinforced by the street furniture, which will become part of the palette that will be used across King's Cross Central.

Consultation and relationship to the original vision

The design reflects the approved Landscape Proposals Plans. It also reflects the vision described in section 4 of the Urban Design Strategy (2004).

In developing the details, consultation has taken place with a number of statutory bodies including Camden Council, Transport for London and English Heritage. In particular, the detailed design of the highway has been refined in close co-operation with Camden and there have been several discussions regarding the selection of street furniture. The work has also been presented to the Public Carriage Office and TfL Buses.

Additionally, there has been considerable liaison with other interested parties who are working in the area, including CTRL, Network Rail and LUL, to produce a design that recognises the context of other planned major works.

The Ian Ritchie Architects report, prepared for Camden as part of their work to create a strategic vision for the King's Cross Areas, highlights a number of locations in the surrounding area that have the potential for improvement, particularly for pedestrians. Additionally, the report identifies the humanising of streets as an important aspect of this, together with making some suggestions for materials and street furniture to improve the quality and feel of the area.

The design for Pancras Road reflects a number of the principles and ideas within the Ian Ritchie Architects report. The design has concentrated on creating an environment that is pedestrian friendly and does not feel dominated by traffic, despite its function as a main route and access for the servicing of two main stations. Specific elements that have been reflected in the design of Pancras Road include the inclusion of trees, the use of York Stone, granite kerbs, coordinating tactile paving and the option of combined street and pavement lighting with integrated traffic lights.

Relationship with the Development Specification 7

Condition 31 of the Planning Permission requires the development to be carried out in accordance 7.1 with certain Revised Parameter Plans and as described in specified paragraphs of the Revised Development Specification dated September 2005. Sub-para (d) refers to:

"The Principal Access and Circulation Routes shown on drawing KXC007 Rev S together with paras 4.30 – 4.47 and with Annex C to the extent that it provides a summary and indicative specification for the routes only."

7.2 Drawing KXC007 shows Pancras Road as one of the "Existing adopted highways to be modified/realigned." The road is shown in its realigned position. Annex C describes the realigned road as:

"Adopted highway with buses, cars and taxis north-bound and buses and taxis south-bound."

Annex C states a minimum width of 16.5 metres, with a minimum carriageway of 10 metres and 7.3 a minimum of 5 metres of footways. The materials are stated to be:

"Black top on carriageway. Stone units for taxi areas. High quality paving and granite kerbs."

- The proposed layout, design and specification of the realigned road are consistent with the 7.4 summary and indicative specification previously provided by Annex C.
- The proposed layout, design and specification of the realigned road also reflect the broad 7.5 disposition and layout of the landscape scheme components shown on the relevant Landscape Proposals Plan LPP101C. In particular, the proposed highway configuration is essentially the same as that shown within the Landscape Proposals Plan LPP101C and the Revised Illustrative Highway Proposals and Illustrative Scheme Plan submitted in September 2005.
- The proposed highway layout accommodates: 7.6
 - i) Two north-bound lanes, primary for station traffic (including coaches) and public transport (buses);
 - ii) A south-bound taxi lane between Goods Way and the Boulevard junction, with servicing access at the north end to Development Zone B, as explained at para 7.8 below;
 - iii) A segregated cycle lane between Goods Way and the Boulevard junction;
 - A south-bound carriageway from the Boulevard junction to the Euston Road for public iv) transport (buses), taxis, cycles and blue badge holders;
 - Pedestrian footways; v)
 - Taxi and private car pick-up and drop-off for St Pancras International; vi)
 - Taxi pick-up and drop-off for King's Cross station (see para 7.10 below); and vii)
 - Service access for the Great Northern Hotel. viii)
- 7.7 The detailed configuration has of course been refined, through extensive consultation and joint working with Council officers, Transport for London (TfL), RLE and Network Rail.
- As a result of that consultation and joint working, the proposed "taxis only" lane at the northern 7.8 end of Pancras Road would now be used by service vehicles for buildings within development zone B as well as taxis; this will simplify the pattern and length of servicing movements to the

new development from the north. It also means a 'pulling back' of the corner of development plot B3 at ground floor level, within the approved development zone boundary, to achieve appropriate visibility splays. Accordingly, the submitted drawings show a revised illustrative building footprint for plot B3.

- 7.9 The submitted drawings also show:
 - indicative locations for streetlights along the realigned road, together with three options i) for the lamp head. The final details are to be agreed with and approved by the local planning authority, prior to installation of the street lights; and
 - 13 trees along the western side of Pancras Road. One of the Landscape Scheme ii) Components shown on Landscape Proposals Plan LPP101C is "Tree planting along the façade of St Pancras Station." The submitted drawings include such tree planting. The International entrance, is indicative at this stage, pending further work on below-ground services. The final number and location of trees are to be agreed with and approved by the local planning authority, prior to the commencement of planting.
- 7.10 The submitted drawings show, for illustrative purposes and context only:
 - i) various taxi facilities on the eastern side of the southern section of realigned road (south of the 'keyhole' entrance), to serve King's Cross station. These taxi facilities do not form part of the details submitted for approval and are being brought forward separately, by Network Rail, as part of their King's Cross Station Enhancement project;
 - various illustrative details of the King's Cross Central scheme, for example illustrative ii) building plots, to provide context. These details are taken from the Illustrative Scheme Plan submitted in September 2005 (with the exception of amended details for building plot B3; see above) and
 - an arrangement of 85 security bollards, along the west side of the realigned road. These iii) security bollards do not form part of the details submitted for approval and are being brought forward separately, by the CTRL project. Their design nevertheless reflects the information provided on Revised Landscape Proposals Plan LPP114: Standard of Street Furniture Palette. The bollards reflect the need to protect the 'keyhole' entrance and other areas of St Pancras International from terrorist attack.
 - A number of trolley corrals located on the eastern side of St Pancras Station. These iv) corrals are part of the operational station and do not form part of the details submitted for approval. Details of the corrals will be brought forward separately by the CTRL project.

number and location of the trees shown along the southern section of the road, south of the

8 Earthworks and Remediation Plan

- 8.1 An Earthworks and Remediation Plan to deliver appropriate site levels and ground conditions for the realignment and related works is enclosed.
- 8.2 The works involve very minor changes in the vertical alignment of Pancras Road. As such, other than works to install the realigned utilities, the earthworks involved are limited.

Argent (King's Cross Central) Ltd

King's Cross Central

Realignment of Pancras Road: Earthworks & Remediation Plan

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King's Cross Central

Realignment of Pancras Road: Earthworks & Remediation Plan

February 2007

This report takes into account the particular instructions and requirements of our client. It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party

Job number 67940-13

ARUP

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- Figure 7 Pancras Road Earthworks Materials Handling Area Site Plan

Appendices

Appendix A

Site-specific Ground Conditions

Appendix B

Hazard Screening Assessment Details

1 Introduction

1.1 Scope and Objectives

This Plan describes the earthworks and remediation proposals for the realignment of Pancras Road, from its junction with Euston Road to the south, to its junction with Goods Way at the north-eastern corner of St Pancras station. The road realignment is an Enabling Works package of the King's Cross Central Development.

This Earthworks and Remediation Plan report has been prepared by Ove Arup & Partners Ltd (Arup) at the instruction of Argent (King's Cross Central) Ltd (Argent). The report should be read in conjunction with the following documents:

- "King's Cross Central Environmental Statement Volume 4: Part 16 Soils and Contamination Specialist Report" (ES), Arup (May 2004)
- "King's Cross Central Environmental Statement Volume 5: Supplement", (September 2005)
- "King's Cross Central Revised Code of Construction Practice" (CoCP), RPS (September 2005)
- Highways layout, design details and material specification drawings for the realignment of Pancras Road.

Where appropriate, this Plan incorporates and/or refers to information presented in the earlier ES and CoCP documents.

1.2 Description of Works

The works will be along the eastern side of St Pancras station, from Euston Road in the south to Goods Way in the north. The current alignment of Pancras Road loops around the German Gym and Stanley Buildings over its central section. The realignment cuts out this loop, creating a straighter road. Figure 1 shows the King's Cross Central site and Figure 2 shows the Earthworks Construction Area Site Plan for the realignment works.

The works cover an area of approximately 1ha, with a north-south length of approximately 500m and an east-west width of approximately 20m. Currently, the site level at Euston Road is at around +16.75m Ordnance Datum (mOD) which rises to +17mOD adjacent to the German Gym before falling to +16.5mOD at Goods Way.

The works may conveniently be described in three parts, referred to in this report as Areas 1, 2 and 3. A new straight section of road forms Area 2 (the central part of the length). In Area 1 (southern section) and in Area 3 (northern section) the realigned road, utilities and pavements will be constructed on the existing road alignment.

Within Area 1 (chainage 0m to 120m) the ground is currently hard covered comprising a tarmac road surface and paved footpaths.

Over the new central, straight section (Area 2, chainage 120m to 260m) the ground is partly occupied by the Stanley Buildings and partly by hard landscaping/paving.

From the Stanley Buildings to Goods Way (Area 3, chainage 260m to 450m) the surface is a tarmac road and paved footpath.

1.3 Extent and Sequence of Development

The extent and sequence of development is described in Sections 2, 3 and 10 of this submission.

2 Ground Conditions

2.1 Site Investigations

Channel Tunnel Rail Link (CTRL) investigation reports reviewed during the environmental impact assessment (listed in Table 16.1, Volume 4 Part 16 of the ES) provide significant information about ground conditions at the site. Several phases of ground investigation completed for CTRL works have included borehole and trial pit locations that lie within the Pancras Road footprint. In total, 29 locations fall within 15m of the centre line of the road alignment which provides an average sample location density of 18m grid centres. This corresponds to the recommended density for a main investigation under BS 10175:2001¹.

The exploratory locations in the vicinity of Pancras Road are shown on Figures 3 to 6 of this report. Borehole logs and laboratory testing data from these locations have been used in the preparation of this Earthworks and Remediation Plan.

2.2 Soil Conditions

Local ground conditions beneath the footprint of the Pancras Road site have been interpreted from ground investigation information contained in Table 16.1 of the ES, as referred to in Section 2.1 above. The general geological sequence underlying the Pancras Road area is Made Ground overlying a discontinuous unit of Alluvium, which overlies approximately 20m thickness of London Clay. Below the London Clay lie, in turn, the Lambeth Group, Thanet Sands and Upper Chalk as detailed in paragraph 16.4.12 of the ES. Further details on the strata encountered in each of the three assessment Areas, together with the available logs, are provided in Appendix A.

2.3 Groundwater

2.3.1 Perched Groundwater

Perched groundwater was encountered in some locations during the phases of site investigation outlined in Section 2.1 above. This groundwater was not found at all/many locations and is therefore inferred to be to be discontinuous. No observations of a sheen or contaminant odour were noted on investigation logs. Perched groundwaters are not 'controlled waters' and therefore are not water environment receptors under the EPA 1990² and current water legislation.

2.3.2 Local Aquifers

The London Clay is classified as a non-aquifer (aquitard) by the Environment Agency (EA) due to its impermeable nature. At the locality of the King's Cross Central site the London Clay is approximately 20m thick and therefore provides a significant hydraulic barrier to any potential migration of perched groundwater in the Made Ground and Alluvium to the underlying Lambeth Group, Thanet Sands and Upper Chalk.

The Lambeth Group contains the Woolwich and Reading Beds. The Woolwich Beds are typically dark grey, laminated clays of low permeability. The Reading Beds generally comprise more sandy horizons, and are likely to be in limited hydraulic connection with the underlying Thanet Sands. The Thanet Sands comprise very dense, permeable, greenish-grey fine sand and are likely to be in hydraulic continuity with the underlying Upper Chalk in the King's Cross area. The Upper Chalk in the London Basin is classified by the EA as a major aquifer due to its regional importance for potable water supply. The piezometric head in the King's Cross Central area is at approximately -23mOD (approximately 40m below

ground level) within the Lambeth Group. The regional flow direction in the Chalk is interpreted by the EA to be southwards towards the River Thames.

¹ British Standard BS 10175:2001 "Investigation of potentially contaminated sites - Code of practice" ² Environmental Protection Act 1990

3 **Earthworks Proposals**

Extent of Earthworks 3.1

The required earthworks are as follows:

- Earthworks required to change the vertical alignment of Pancras Road along the • eastern side of St Pancras Station.
- Excavation for a combined sewer diversion trench, approximately 200m in length and ٠ up to 6m depth. These works will be staged from north to south, commencing from Goods Way along the eastern side of St Pancras Station.
- Excavation for 2 new gas mains approximately 170m in length between the Coach • Road and Goods Way, generally up to 2m deep, but deeper where valves are required to connect the new pipes into the existing infrastructure.
- Excavation of combined trenches for utility services within the future road and footway corridors, including provision for electricity, communications, street lighting, storm and foul drainage and potable water supply.

The earthworks will be carried out in both new and existing pavement areas. Figure 2 shows the areas within which new pavements will be constructed and areas of existing pavements which will be generally reinstated following installation of utility services.

This Plan does not describe earthworks associated with any small holes required for temporary works, such as signals at the junction of the CTRL haul road. Such earthworks would not be significant.

Cut and Fill Quantities and Types 3.2

An assessment of the volumes of materials that will be excavated and reused in the realignment works is shown in Table 3-1 below:

Total Excavation Volume	14,000m ³ (CUT)
Comprising of:	
1. Trench arisings	11,000m ³ (CUT)
2. Road formation	3,000m ³ (CUT)
Total Fill & Backfill Requirement	7,000m ³
Surplus Volume (to be hauled off site)	7,000m ³

Table 3-1 Estimated Cut/Fill Volumes

[1] Note estimated volumes do not include for bulking

These volumes are necessarily estimates at this stage.

The level changes for the Pancras Road re-alignment range between -0.6m (cut) and +0.3m (fill) from existing site levels. Pending suitability of material, it is proposed to reuse as much existing sub-base and road surfacing as possible for construction of the new pavement.

The bulk of the 14,000m³ excavated material on site will arise from trenches for drainage and utility services installations. Made Ground (and some Alluvium) and existing pavement materials are estimated to comprise approximately 9,000m³ and the remainder (approximately 5,000m³) to be London Clay.

The road level changes will require an amount of fill to achieve the design grades. Broken out pavements and all (or most of) the Made Ground excavated will be suitable for general reuse as sewer trench backfill, or general fill material beneath new pavement sub-base.

An amount of fill is likely to be required within any basement to the Northern Stanley Building. The fill requirement will be confirmed on-site following further investigation by construction and demolition teams.

The net result is an estimated surplus volume of 7,000m³. The total number of truck loads required to cart this material from the works area either off-site or to stockpile within the King's Cross Central development is estimated to be 850 movements during the period of construction (165 days). This figure is based on 8.5m³ truck loads of un-bulked material (as per Appendix 16A of the ES) and includes a contingency allowance for any smaller loads.

In practice, the majority of the surplus material will be removed off site, as indicated in Table 3-1. Section 3.7 below addresses temporary stockpiling and materials handling in more detail.

3.3 **Treatment and Reuse of Demolition Rubble**

3.3.1 **Northern Stanley Building Demolition**

Construction of the middle section (Area 2) of the re-alignment will follow the demolition and clearance of the Northern Stanley Building.

Any materials that are identified as reusable will be recovered and either utilised on-site or removed off-site as follows:

- crushed and stockpiled for use as formation material on site.
- •
- schedule'.

As detailed above, fill is likely to be required to compensate for the basement void created by the demolition of the Northern Stanley Building and removal of its foundations. However, as the building line crosses over the allocated services corridor, the total infill requirement will partially be met by the required area of service, engineered haunching and pavement construction.

Any demolition material from buildings and road planing will be utilised as Type 1 pavement sub-base construction or hardfill backfill in service trenches.

3.3.2 Existing Pavement Surfaces

It is intended to utilise a surface planing machine to remove the bituminous surface of the existing road for reuse as required on site. All sub-base material will be excavated, replaced and suitably compacted where possible.

All existing granite kerbing will be reused where possible. All kerbing material that is not deemed suitable for reuse will be either crushed on or off site for use as granular backfill.

3.3.3 **Excavated Soil**

A proportion of trench excavation arising will be available for use for backfilling. If the condition of the excavated material is deemed unsuitable due to either localised contamination or lack of structural integrity, it will be removed off-site.

Existing building foundations which are of monolithic concrete construction may be

Brick and mortar construction within the existing building is known to be in poor condition and unable to be reused due to the relatively brittle nature of the bricks.

Other materials suitable for architectural salvage will be covered by a 'salvage

Obstructions 3.4

A number of gas holders historically occupied the site between Regents Canal and Pancras Road. A number of these have been previously demolished and backfilled as part of the CTRL works.

Gas Holder Number 12 was previously located within the proposed works area at the northern end of Pancras Road near to the intersection with Goods Way. Demolition of the superstructure above and below ground was carried out as part of works required for the St Pancras Station redevelopment. The main supporting structure of the gas holder was removed to a level approximately 1m below ground level, with the remaining superstructure left in place below ground (greater than 6m depth) and backfilled to ground level.

3.5 **Using Suitable Material On Site (Bulk Earthworks)**

3.5.1 General

The sequence of excavating and relocating material for reuse will be co-ordinated to ensure that the following objectives are met:

- Transportation and double handling is kept to a minimum; and •
- An area is provided for stockpiling material for use during and after the works. ٠

3.5.2 Sequencing

The proposed sequence for relocation of suitable material is shown as follows:

- Carry out bulk earthworks excavate services trenches and cut/fill to subgrade for Pancras Road and either replace (cut and cover where applicable) or temporarily stockpile suitable material. Excess material is to be removed off-site.
- **Remove any unsuitable material** some additional unsuitable material may be • encountered during earthworks. This will be excavated and temporarily stockpiled for testing prior to off-site disposal.
- Drainage of excavations sumps will be created and pumped to keep open excavations free from standing water.

3.5.3 **Drainage of Excavated Areas**

Historical site investigations show that groundwater levels are well below the maximum depth of excavation on site. However, perched water may be present in Made Ground during periods of heavy rainfall.

Excavations will be kept free of standing water in order to minimise the health and safety risk and minimise access difficulties.

3.6 **Unsuitable Materials**

It is expected that only a small proportion of excavated material will be not be reused. Unsuitable material will be generally treated as follows:

- Soft material, not suitable for backfilling in trenches, will be disposed of off-site; •
- Unexpected hotspot contamination encountered during works will be temporarily • transferred to lined skips for testing prior to disposal off-site; and
- Material that may be suitable for backfilling but is surplus to requirements will be disposed of off-site.

3.7 **Temporary Stockpiling and Materials Handling**

Practical Considerations 3.7.1

Suitable material will be temporarily stockpiled for reuse as backfill or sub-base material where required, although the majority of surplus material will be taken directly off-site (Section 3.3). During excavation, material to be reused will be temporarily stockpiled on site. Suitable stockpile material may include:

- Made Ground:
- Trench arisings;
- Road capping/formation material; and
- Building foundation material.

The actual volume of stockpiled material at any given time will be dependent on phasing of the works and the quantity of material deemed unsuitable for reuse as backfill.

3.7.2 Stockpile Location

Due to the current site and land management constraints, there are currently no areas within the King's Cross Central development boundary south of Regents Canal that are available for stockpiling materials.

An area to the north of the site, in the vicinity of Wharf Road and York Road, has been identified as an appropriate location for temporary stockpiling and materials handling, shown on Figure 7. The advantages of using this area for processing and stockpiling include:

- and
- The location is readily accessible from the local road network.

It is currently used as a material handling area for works being carried out on CTRL;

4 **Remediation Proposals**

Introduction 4.1

This Earthworks and Remediation Plan is in accordance with the remediation strategy set out in Part 16 (Volume 4) of the ES.

The ground investigation data available from works completed within the footprint of the Pancras Road realignment works have been reviewed and assessed to determine any specific remediation requirements. A conceptual site model (CSM) has been established from field observations, investigation data and details of the works. From the CSM, all plausible pollutant linkages remaining following the realignment works have been identified. The requirements for any specific remediation measures associated with any identified pollutant linkages have then been considered.

During the construction phase, mitigation measures to prevent risk of harm to human health and risk of pollution of controlled waters will be implemented as detailed in the ES (paragraph 16.6.10) and the CoCP.

4.2 **Conceptual Site Model**

4.2.1 General

In accordance with the current UK (and European) approach to contaminated land assessment and in line with the ES (paragraph 16.6.9), the potential environmental risks have been considered in the context of a conceptual source-pathway-receptor (SPR) model of the site. For the future development, the conceptual model is as follows:

Sources	Possible localised contamination of the overlying layer of Made Ground, and Alluvium (where present), or localised contaminated perched groundwater.			
Receptors	 The general public users of the future Pancras Road, as pedestrians and motorists. 			
	Future maintenance workers for services repairs and new installations.			
	3. Materials used in underground services.			
	[No surface or groundwater controlled waters receptors are included. Surface water receptors are not present and groundwater receptors are confined below a thick layer of London Clay.]			
Pathway Linkages	 There are no direct pathways to the general public future users of the road due to the hard paving capping layer across the whole site. 			
	2. There are potential pathways of dermal contact, ingestion and inhalation for future maintenance workers.			
	3. New services will be placed in selected, clean backfill materials. However, lateral migration of perched groundwater may potentially cause this backfill to become contaminated			

Detailed evaluation of this CSM is given below.

4.2.2 Sources

Potential sources of historical contamination in the vicinity of Pancras Road, as reported in paragraphs 16.4.18 and 16.4.24 of the ES are:

- Ammunition factory; and
- Former printing works.

In addition, Made Ground imported into the area as fill may have been contaminated.

In order to assess the type and degree of any actual contamination at the site, a Hazard Screening Assessment of the soil chemical testing results from the 29 investigation locations outlined in Section 2.1 has been undertaken using appropriate screening criteria, selected in line with the Contaminated Land Exposure Assessment (CLEA) methodology. The screening criteria and details of the assessment are presented in Appendix B of this report. The assessment used the laboratory results from 42 soil samples collected and analysed from within the Pancras Road footprint (investigation locations shown on Figures 3 to 6).

The results of the Hazard Assessment indicate that six samples (15%) had concentrations of lead above the screening value and five samples (13%) had concentrations of the polyaromatic hydrocarbon benzo(a)pyrene above the screening criterion. The significance of these results has been further considered, as follows:

Lead

Although six samples contained lead concentrations above the screening criterion³ of 750mg/kg, the lead US95 mean concentration (the mean concentration with a 95 percentile upper confidence limit) is lower than the criterion. Consequently it is assessed that the lead concentrations are within acceptable limits, particularly considering that the CLEA scenario for commercial/industrial end use is more onerous than the site-specific conditions for the Pancras Road enabling works.

Benzo(a)pyrene

Five samples exceeded the screening criterion⁴ for benzo(a)pyrene. The benzo(a)pyrene US95 mean value (10.2mg/kg) slightly exceeded the screening criterion (9mg/kg). The maximum value test suggested that no statistical outliers are present within the benzo(a)pyrene results. Consequently it is assessed that the recorded concentrations are acceptable, particularly in light of the CLEA commercial/industrial scenario as outlined above.

4.2.3 Pathways

The following pathways are relevant to the conceptual model:

- Human Health: Ingestion, inhalation and dermal contact
- Impacts on Buried Services: Groundwater migration

Ingestion of Soils or Dust

During maintenance activities that require intrusive works, maintenance workers engaged with excavation and excavated material may come into contact with potentially impacted material through ingestion of soils or dust or vapour. These pathways will be removed by implementing appropriate dust suppression working measures and using correct personal protective equipment (PPE) (as detailed in Part C of the CoCP).

³ CLEA Soil Guideline Value for commercial/industrial end-use 750mg/kg ⁴ Arup Generic Assessment Criteria (GAC) value derived for commercial/industrial end use (2004) of 9mg/kg

Inhalation of Vapour or Dust

Volatilisation of hydrocarbon product and soil gases including carbon dioxide and methane may occur in the subsurface. However, as the Pancras Road realignment does not involve any overlying buildings the gas cannot accumulate in confined space. The risk of harm from vapour is therefore negligible. Generation of dust through excavation, and stockpiling of excavated material, may impact maintenance workers and neighbours. However, this will be suppressed by appropriate working methods including keeping stockpiles and potentially dusty areas damp and normal use of appropriate PPE (as detailed in Part C of the CoCP).

Dermal Contact with Soils or Dust

During intrusive maintenance works, maintenance workers who are dealing closely with excavation and excavated material may come into contact with impacted material through dermal contact. This pathway will be removed by implementing appropriate working measures and normal use of correct PPE (as detailed in Part C of the CoCP).

Lateral Migration of Dissolved Phase Contamination

Perched groundwater containing dissolved phase contamination may move off-site or onsite within the Made Ground. However, as no observations of potentially contaminated perched water were made during the phases of investigation and the perched groundwater has been observed to be discontinuous across the King's Cross Central area, the potential for lateral migration of dissolved phase contaminants is negligible.

4.2.4 Receptors

Building Materials and Services

Building materials that are potentially at risk from contaminated soils are utilities pipes and cables installed beneath the Pancras Road footways and pavement, particularly water pipes.

Future Road Users

Future road users, pedestrians and cyclists are not considered at risk, due to the total hard cover of the development.

Maintenance Workers

Maintenance workers who undertake intrusive works beneath the proposed site surface.

Groundwater

The site is underlain by Made Ground and Alluvium which contain discontinuous perched groundwater. As perched groundwater is not classified as controlled waters, it is not considered to be a sensitive receptor. Controlled waters contained within the Upper Chalk major aquifer are assessed to be hydraulically separate from any potentially contaminated perched groundwater by the impermeable London Clay. Therefore, groundwater in the Lambeth Group and Upper Chalk is not considered to be a sensitive receptor.

Ecosystem

No significant ecological receptors have been identified within the Pancras Road footprint (see Part 14 of the ES).

4.3 Plausible Pollutant Linkages

Building materials and services will be emplaced in soils below the proposed footprint of Pancras Road. The designer's specification includes service installation details and states that all services will be laid in clean, inert soils and a clay liner where necessary. Therefore, there are assessed to be no plausible pollutant linkages and therefore no risk of harm to building materials and services.

The proposed construction details for the Pancras Road resurfacing and realignment works show that a minimum thickness of 550mm of sub-base, concrete and tarmac will be present above the ground surface following construction works. This road and pathway surface presents a significant break in the identified pathways from the sources of contamination in the Made Ground to future road users. Therefore there are assessed to be no plausible pollutant linkages and therefore no risk of harm to human health.

The risk of harm to the health of maintenance workers undertaking intrusive works below the road surface will be mitigated by the use of appropriate working methods and use of correct PPE, as required by Health and Safety legislation and the CoCP. Therefore there are assessed to be no plausible pollutant linkages and therefore no risk of harm to human health.

Any perched groundwater located beneath the footprint of Pancras Road is unlikely to migrate significant lateral distances and is hydraulically separated from groundwater in the underlying Lambeth Group and Upper Chalk aquifers by the London Clay. Therefore there are assessed to be no plausible pollutant linkages and therefore no risk of pollution to controlled waters.

4.4 **Remediation Works**

The site-wide remediation strategy for the King's Cross Central development is described within the ES (Volume 4) in paragraphs 16.6.7 to 16.6.9. Paragraph 16.6.8 addresses the strategy for various sub-areas within the development site. The Pancras Road realignment works fall within Area 1.

This Earthworks and Remediation Plan has considered all the available site investigation information and confirms that significantly contaminated ground is not expected to be present or encountered during the earthworks and trenching for the proposed Pancras Road realignment. In view of this, no specific remediation measures are assessed to be necessary.

Notwithstanding the site investigation information, it is possible that localised areas of contamination may exist at the site. Therefore a contamination watching brief will be maintained during the construction phase and any contaminated material identified during earthworks will be set aside for testing. Following classification, the material will be reused or disposed of as necessary, as described earlier in Section 3 and in line with paragraph 16.6.9 of the ES. Validation testing will be undertaken following remediation of hotspots in line with Section 16.9 of the ES.