



## King's Cross Station Enhancement Project

**Environmental Statement** 

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## 1 INTRODUCTION

## 1.1 ABOUT THIS DOCUMENT

- 1.1.1 Network Rail (NR) is promoting a project to significantly enhance the infrastructure at King's Cross Station in central London ("the King's Cross Station Enhancement Project"). The purpose of the project is to modernise passenger facilities and station operations to meet the current demands on the Station infrastructure and to accommodate growth in the future.
- 1.1.2 This document is an Environmental Statement (ES) for the purposes of the Town and Country Planning (Environmental Impact Assessment) (England and Wales) Regulations 1999, SI No.293 (the 'EIA Regulations'), and reports the findings of the Environmental Impact Assessment (EIA) that has been undertaken for the King's Cross Station Enhancement Project. In so doing, it describes the environmental effects arising from the construction and operation of the project and, where required, the measures that are intended to mitigate or remedy any potentially significant adverse effects.
- 1.1.3 The ES has been prepared by Environmental Resources Management (ERM) on behalf of NR. ERM is an independent environmental consultancy with extensive experience of undertaking EIAs of major infrastructure schemes.
- 1.1.4 In undertaking the EIA and preparing this ES, ERM has worked with a team of specialists to assess the environmental effects of the project within their particular area of expertise. The EIA team is described in Box 1.1.

EIA Co-ordination:	ERM
Planning and Land Use:	ERM
Construction and Operational Noise:	ERM
Socioeconomics:	ERM
Construction Dust.	ERM
Contaminated Land and Construction Waste	ERM
Water Resources:	ERM
Townscape and Urban Design:	John McAslan and Partners
Pedestrian and Traffic Movement:	Arup
Archaeology:	MoLAS
Cultural Heritage:	CGMS & ERM
Protected Species:	Carter Ecological

## Box 1.1 The EIA Team

## 1.2 THE KING'S CROSS STATION ENHANCEMENT PROJECT

1.2.1 The current layout of King's Cross Station is disjointed and is characterised by restricted passenger accumulation areas. Particularly in view of the predicted increase in passenger numbers in future, improvements to the concourse facilities are required in relation to passenger arrivals, ticket purchasing, provision of train information, comfortable waiting areas, circulation of passengers from one destination to the next and facilities for interchange between transport modes.

- 1.2.2 In addition to the increased number of passengers within the Station, proposals for a major redevelopment of the lands immediately to the north of the Station <sup>(1)</sup> indicate that, if these other developments are granted planning permission and go ahead, there will be increased pedestrian flows in and around the Station, in particular moving between Euston Road and the proposed development to the north.
- 1.2.3 This ES supports a single planning application that aims to secure consent for the following infrastructure that will be built and commissioned in phases from January 2008 onwards:
  - a new Western Concourse, taxi facilities and, where required, associated townscaping;
  - a new platform (designated Platform Y), which will require demolition of the Engineer's Bothy in the Station throat, to enable the provision of an enhanced train timetable;
  - the demolition of the existing Southern Concourse and the development of a new Southern Square;
  - interventions, demolitions and modifications to the Western Range of the Station; and
  - the refurbishment of the Western Range offices.
- 1.2.4 The development area defined by the redline drawing in the planning application is shown in Figure 1.1.
- 1.2.5 A detailed description of the development proposals is given in Chapter 2. Chapter 2 describes that the delivery of the development proposals will require the following types of works to be carried out:
  - new architectural and structural works;
  - removal of listed structures;
  - remodelling and refurbishment of existing infrastructure; and
  - works required to link with other developments.

## 1.3 THE PURPOSE OF THE ENVIRONMENTAL STATEMENT

1.3.1 The King's Cross Station building, designed in 1850 by Lewis Cubitt, is one of the most significant examples of railway architecture in the country, and it falls wholly within the London Borough of Camden's King's Cross Conservation Area. The Station comprises the Main Train Shed, a Suburban Train Shed to the west, the Eastern and Western Ranges, and a 1970s addition of a Southern Concourse. The Station is a Grade 1 listed building<sup>(2)</sup> and is in close proximity to the Grade 1 listed St Pancras Station and the Grade 2 listed Great Northern Hotel, both to the west.

<sup>(1)</sup> Notably the King's Cross Central (KXC) development being promoted by Argent. Network Rail and Argent have been in continued discussion, which has ensured that the interfaces of the projects are understood and to allow proper consideration of the combined or cumulative effects.

<sup>(2)</sup> A 'listed building' is one that is included on the Lists of Buildings of Special Architectural or Historic Interest, issued by the Department of Culture, Media and Sport (DCMS).

- 1.3.2 An application for the scheme is being made under the Town and Country Planning Act 1990. The planning application will be submitted to the London Borough of Camden in order to obtain the necessary permission for the scheme to be constructed. The scheme falls generally within the category of "urban development projects" for the purposes of the Town and Country Planning (Environmental Impact Assessment) (England and Wales) Regulations 1999 <sup>(1)</sup> <sup>(2)</sup> ("the EIA Regulations"). Such projects, where they are in excess of 0.5 hectares, are referred to in the EIA Regulations as "Schedule 2 development" and require the preparation of an ES.
- 1.3.3 Furthermore, given the sensitivity of the area, an EIA has been carried out and the findings reported in this ES. This has been prepared in accordance with the EIA Regulations, the EIA Directive and good practice guidance (contained in documents such as DETR Circular 02/99 entitled Environmental Impact Assessment).
- 1.3.4 In determining the planning application, the local planning authority must take into account the environmental information contained in this ES. Regulation 2(1) of the EIA Regulations stipulates that the ES must include at least the information referred to in Part II of Schedule 4:
  - 'a description of the project comprising information on the site, design and size of the development;
  - a description of the measures envisaged in order to avoid, reduce, and if possible, remedy significant adverse effects;
  - the data required to identify and assess the main effects which the development is likely to have on the environment;
  - an outline of the main alternatives studied by the applicant and an indication of the main reasons for his choice, taking into account the environmental effects; and
  - a non-technical summary of the information provided under the above headings'

and 'such of the information referred to in Part I of Schedule 4 [of the EIA Regulations] as is reasonably required to assess the environmental effects of the development and which the applicant can, having regard in particular to current knowledge and methods of assessment, reasonably be required to compile'.

1.3.5 This ES has been prepared in accordance with those requirements. Table A.1 shown in Annex A identifies where in this ES each item of information referred to in Schedule 4 of the EIA Regulations can be located. This ES has also been prepared with reference to the checklist of matters to be considered for inclusion in an ES given in Appendix 5 of the EIA guide from the Office of the Deputy Prime Minister (ODPM) <sup>(3)</sup>.

<sup>(1)</sup> Regulation 2(1) 10(b)

<sup>(2)</sup> SI 1999 No 293, came into force 14 March 1999.

<sup>(3)</sup> DETR (2000) Environmental Impact Assessment: A Guide to the Procedures. HMSO. November.

## 1.4 THE ROLE OF CONSULTATION IN THE EIA

## General

- 1.4.1 Consultation with statutory bodies and interested parties is a key part of assessing the environmental effects of a project. Consultation is essential in order to gain a full understanding of the baseline environment and the nature of any potential effects. It is also important in ensuring that the project is designed to maximise the benefits it can deliver. The EIA guide from the ODPM <sup>(1)</sup> makes it clear that consultation is a key undertaking in the EIA process.
- 1.4.2 The aim of the consultation process has therefore been to ensure that the views of statutory bodies and interested parties are identified early on in the outline design of the project. This consultation is an ongoing process and will continue throughout the detailed design and into the implementation phase of the proposals.
- 1.4.3 Consultation meetings have been held at various stages in the project development process with a number of organisations, as listed in Table B1.1 in Annex B. The purpose of the consultation that has been undertaken to date is also given along with its current status. These organisations include:
  - London Borough of Camden;
  - London Borough of Islington;
  - Greater London Authority;
  - Transport for London;
  - Department for Transport;
  - London Transport User's Committee;
  - relevant train operating companies;
  - English Heritage;
  - Victorian Society;
  - Commission for Architecture and the Built Environment;
  - London and Continental Railways; and
  - Argent (the promoters of the King's Cross Central development scheme to the north of the Station).

## **Environmental Scoping Report**

- 1.4.4 An Environmental Scoping Report setting out the proposed scope of the EIA was issued to a range of bodies with a potential interest in the project.
- 1.4.5 A description of the scoping exercise that was undertaken is provided in *Section 3.5.* A list of those bodies consulted, together with a summary of their responses, is provided in *Annex C*.
- 1.4.6 The purpose of the consultation on the EIA scope and methodology was to ensure that the views of statutory bodies and interested parties were identified early on in the EIA process. It was then possible to take these views into account in the ES and in developing the outline design of the project.

## 1.5 DEALING WITH UNCERTAINTIES

1.5.1 Any deficiencies in the data necessary to undertake the EIA are identified in the ES at the appropriate point. Where this is the case, any assumptions that have been made to facilitate completion of the EIA have been described and explained in the methodology sections of the individual topic chapters.

## 1.6 STRUCTURE OF THE ENVIRONMENTAL STATEMENT

- 1.6.1 Following this section, the ES is structured as follows:
  - *Chapter 2* provides a description of the project, its operation and construction and the main alternatives considered;
  - Chapter 3 sets out the approach to the EIA;
  - Chapter 4 explains the planning policy and land use context for the project; and
  - *Chapters 5* to *14* identify the significant likely effects of the project, both permanent/long term and temporary/short term.
- 1.6.2 Maps, photographs and other illustrations are presented at the end of the chapter where their first reference appears in the text. A series of Annexes providing supporting technical information follows the main text in this document, viz:
  - Annex A Information to be Included in ESs.
  - Annex B Status of Consultation.
  - Annex C Responses to Consultation on Environmental Scoping Report.
  - Annex D Construction Programme.
  - Annex E Draft Environmental Management Plan.
  - Annex F Additional Planning Policy Information.
  - Annex G Additional Archaeological Information.
  - Annex H Additional Cultural Heritage Information.
  - Annex I Additional Townscape and Visual Assessment Information.
  - Annex J Additional Transport Information.
  - Annex K Additional Noise Assessment Information.



## THE KING'S CROSS STATION ENHANCEMENT PROJECT

## 2.1 OVERVIEW

2

2.1.1 This section of the ES describes the existing station infrastructure that will undergo a number of changes to accommodate the King's Cross Station Enhancement (KXSE) project. It then sets out the objectives of the KXSE project, the constraints that influenced the project's design, the alternatives that were considered and the way in which the project will be constructed and operated. *Figure 2.1* illustrates the key features of the existing station and some of the prominent buildings in the local area.

## 2.2 THE EXISTING STATION INFRASTRUCTURE

## Background

- 2.2.1 King's Cross station lies within the London Borough of Camden, on the boundary with the London Borough of Islington. The station occupies an area of approximately 3.2 ha, comprising a Main Train Shed, a Suburban Train Shed to the west and a Southern Concourse.
- 2.2.2 King's Cross station, together with the adjacent St Pancras station, form a transport hub of strategic importance at the national, regional and local level. The station currently provides linkages to the national and suburban rail network, London Underground, London Buses and pedestrian and cyclist networks and functions as key points of interchange. Its role will be shortly enhanced to that of an international gateway with the completion of the Channel Tunnel Rail Link (CTRL) terminus at the adjacent St Pancras station. Euston station, another important London Underground and mainline station, is located some 850 m to the west of King's Cross.
- 2.2.3 King's Cross station was completed in 1852. The station originally comprised the Western Range, the Main Train Shed, which includes the southern façade, and the Eastern Range. The Suburban Train Shed was added in 1875 and then extended and a new roof added in 1895. Currently, the station is comprised of eleven platforms; platforms 1-8 are contained within the Main Train Shed and platforms 9-11 within the Suburban Train Shed.

## Train Sheds

- 2.2.4 King's Cross station comprises two separate train sheds. The Main Train Shed is a large and visually dominant building, distinguished by its southern façade, which faces Euston Road, featuring two large, semi-circular arches. It comprises two vaulted roofs that are three quarters glazed and houses platforms 1 to 8. Passing underneath all eight platforms is the On Board Services (OBS) access tunnel that enables access to the platforms for the delivery of services to the trains. The roof vaults are 32 m wide, 22 m high and 245 m long.
- 2.2.5 The Suburban Train Shed was originally opened in 1876 and enlarged to its present form in 1894. The Suburban Train Shed is located to the northwest of

the Main Train Shed and houses platforms 9 to 11. The southern walls of the Suburban Train Shed enclose a two-storey office building that extends over the full width of the shed. The southern gable end of the shed has parapet detailing similar to the German Gym although the southeast corner was modified sometime around 1917. This part of the train shed has historic significance due to this fact. The modern shed roof is a light steel trussed pitched and hip structure, supported on lattice girders spanning between the western boundary wall of the station and the west walls of the North East Block and the northern building. The internal elevation to platform 9 (Western Range) is of various phases of construction and original openings form the North West and Northern buildings have been heavily modified.

- 2.2.6 The area between the Suburban Train Shed and the Western Range was covered by a canopy described variously as the Parcel Yard Canopy or the 'northern' canopy. This canopy is believed to date from 1894. The Suburban Train Shed is connected to the Main Train Shed but it is not specifically referenced in the listing description for the Grade I listed King's Cross station.
- 2.2.7 Within the Main Train Shed there is an existing footbridge. This is a wrought and cast iron bridge, about 2.5 metres in width, which connects the platforms 1 to 8 across the Main Train Shed, about half way along the present platforms. Manufactured by A Handiside and Co Ltd, of Derby, it is of a design which could have been contemporary with the original station. At second landing level, the stairs provide access to the first floor levels of the Western and Eastern Ranges, but otherwise the footbridge is free standing and the building facades make no concession to the design of the footbridge.
- 2.2.8 The footbridge stairs to platform 8 are mounted on 8 round columns with octagonal bases and capitals. The balustrades are cast iron in a fretwork design. The main footbridge has lattice parapets, 2m high between platforms 5 to 8 and 1.7 metres high between platforms 1 and 4. The parapet has been infilled with plastic corrugated sheeting. Originally there were intermediate stairs leading from the footbridge to platforms 2/3, 4/5 and 6/7. These have been removed and the lattice parapet reinstated.
- 2.2.9 At the western, platform 8, end, the stairs are in original condition and included a double clock with shared drive facing both ways along the platform. At the platform 1 end, an extended later platform provides access to the Eastern Range offices through a modern door as well as the original entrance.

## Western Range

- 2.2.10 The Western Range extends along the full length of the Main Train Shed. It is made up of six components that starting from the northern end comprises the following: the northern building; the northwest building; the Link Building; the Bomb Gap (caused by Second World War bomb damage); Old Booking Hall and the southern wing.
- 2.2.11 The Western Range was constructed as part of the original station and comprises a four-storey northern wing and three-storey southern wing with a two-storey ground floor booking hall fronting the western elevation of a three-storey central section of the building.

## Eastern Range

2.2.12 The Eastern Range originally comprised a single storey structure enclosing and providing the roof to the Cab Road running parallel with York Way. The Cab Road currently provides the temporary location for the taxi drop-off and pick-up while the London Underground Northern Ticket Hall works are being carried out. Once the London Underground works are complete the taxi drop off will revert to their normal location on the western side of the station. The original Eastern Range structure has since been extended and modified. The principal changes have been the construction of two storeys of office accommodation at the beginning of the 20th Century and the addition of a steel framed mezzanine floor in the 1960s.

## **Southern Concourse**

- 2.2.13 The Southern Concourse was added to the station in 1972 as a temporary measure to provide additional floor space that was required in response to the increasing numbers of passengers from the Northern, Piccadilly and Victoria underground lines and the main line station itself. **Great Northern Hotel**
- 2.2.14 The Great Northern Hotel, although not an integral part of the King's Cross Station infrastructure, lies between King's Cross and St Pancras Stations and opened in 1854 as a purpose built station hotel. The Hotel is currently owned by the [Secretary of State for Transport]. Ownership is expected in due course to pass into the King's Cross Central property portfolio. The Hotel is currently unoccupied having temporarily become operationally unviable due to its proximity to LUL construction activity. The King's Cross Central project is seeking ultimately to bring the hotel back into use. The hotel was designed such that its concave face overlooked a small garden (now no longer present) and faced the Old Booking Hall in the western range of the station.

## Pancras Road

- 2.2.15 The public highway arrangement and operations that exist in 2006 are to change significantly over the next few years prior to the commencement of the KXSE project, (hence the choice of 2008 as the project baseline year) due to the CTRL works at St Pancras station. The road layout will comprise an anticlockwise gyratory around St Pancras station along Pancras Road, Goods Way and Midland Road. Euston Road, which fronts the station, will remain as it is today but with modified signals at the junctions with Pancras Road and Midland Road.
- 2.2.16 The main changes that will be undertaken to the road layout include the following:
  - Pancras Road will be realigned to accommodate two northbound lanes on an alignment that avoids the Great Northern Hotel and the German Gymnasium. The new highway will provide for on-street bus stops, station passenger set down facilities, two-way cycle route along the eastern edge and footways along both sides of the carriageway.
  - Midland Road will become one-way southbound south of Brill Place. Bus stop facilities will be provided along with taxi pick up facilities.

• Goods Way will be realigned to pass underneath the new St. Pancras rail bridge and will form a two-way highway with signal junctions at Pancras Road and Midland Road.

#### 2.3 THE OBJECTIVES OF THE PROPOSED PROJECT

- 2.3.1 Network Rail has developed the following objectives for the KXSE project:
  - to provide a unified concourse for suburban and intercity platforms;
  - to provide a new Platform Y at least 300 m in length to accommodate longer trains and enable more trains to use the station;
  - to allow better servicing of trains;
  - to allow improved station operations;
  - to provide a good passenger accumulation area allowing for 15-minute delays to train services;
  - to provide good visual connections between platforms;
  - to minimise walking times;
  - to introduce new ticket barriers;
  - to provide improved passenger facilities to those that exist at the moment, such as ticketing, left luggage, catering and retail etc;
  - to provide good intermodal and public realm links; and
  - to provide a self contained evacuation strategy.
- 2.3.2 During the development of the project consideration has also been given to the design aspirations described in London Borough of Camden's King's Cross Opportunity Area Planning and Development Brief<sup>(1)</sup>. The project development has also aimed to provide synergy with the Argent King's Cross Central proposals on the former Railway Lands to the north of the station.

## 2.4 DEVELOPMENT OF THE PROJECT AND CONSIDERATION OF ALTERNATIVES

#### Introduction

2.4.1 The EIA Regulations require that the main alternatives that have been considered need to be outlined in the ES. The principal reasons for their rejection in favour of the chosen project should also be given taking into account environmental effects. In light of this, the following sections provide:

(1) London Borough of Camden (2004) King's Cross Opportunity Area Planning and Development Brief.

- an overview of the main physical constraints provided by the local geography of King's Cross station and its immediate surroundings;
- an overview of the strategic alternatives for the project and a summary of the reasons which have led to the proposed project emerging as a preferred option;
- the alternatives to the chosen project which have been considered and the rationale behind the selection of the project for development; and
- the ways in which the chosen project has been refined so as to minimise any significant adverse environmental effects.

#### Constraints

- 2.4.2 Before describing the concourse options that were considered, it is important to understand that the best solution for delivering the objectives described in *Section 2.3* would be to provide an enlarged Southern Concourse. This is because in station operability terms the most efficient and safe operation of a railway station can be achieved by locating the passenger concourse at the end of the platforms, in this case the southern end. The existing Southern Concourse is therefore located in the ideal location for station operability purposes, albeit undersized for current requirements. An enlarged Southern Concourse should therefore be considered the preferred option.
- 2.4.3 The geographical constraints that exist at King's Cross station do not make the provision of an enlarged Southern Concourse straightforward. Euston Road lies immediately to the south of the existing concourse and prevents expansion in this direction. To the east of the King's Cross York Way prevents any eastwards expansion of the station. Expansion to the north is constrained by the station throat and the tunnels under the Regent's Canal.
- 2.4.4 It is, therefore not practicable to deliver the preferred option. Instead a compromise has been sought by taking into consideration the constraints that exist. These constraints have led to exploring the possible solutions that could be achieved by locating the concourse to the west of the station. This leads to the less desired operationally but nevertheless only practicable solution given the constraints to providing a grade level Southern Concourse. The options considered are described in more detail in the following section.

## **Concourse Options Considered**

- 2.4.5 The following six options were considered for the siting of the new King's Cross Concourse (see *Figure 2.2*):
  - grade level Southern Concourse within existing Main Train Shed;
  - grade level Southern Concourse outside existing Main Train Shed;
  - southern mezzanine level concourse;
  - northern mezzanine level concourse;
  - below grade concourse; and
  - grade level Western Concourse.

## Grade Level Southern Concourse within Existing Main Train Shed

- 2.4.6 This option would involve creating a new Southern Concourse within the existing Main Train Shed. In order to accommodate the new Southern Concourse it would be necessary to move the platform buffer stops north by approximately 135 m. The platforms would also have to be extended northwards by a similar amount.
- 2.4.7 The main entrance to this concourse would be through the southern façade with a link through the Western Range to a small secondary Western Concourse built at the southern end of the Suburban Train Shed.

## Grade Level Southern Concourse outside Existing Main Train Shed

2.4.8 This option would involve an almost like-for-like replacement of the existing arrangement, but would vary in that it would occupy a larger footprint and would connect to a secondary Western Concourse in front of the Western Range and the Suburban Train Shed. Passenger and staff movements would be predominantly via the southern façade and through the Western Range.

## Southern Mezzanine Level Concourse

- 2.4.9 This option involved creating a new main concourse within the existing Main Train Shed at a mezzanine level. This mezzanine level concourse would be suspended over the platforms at the southern end of the Main Train Shed and would extend northwards from the southern façade to approximately half way along the length of the platforms. This main concourse would then link with a secondary Western Concourse located on the southern end of the Suburban Train Shed via a pedestrian link through the Western Range of King's Cross station.
- 2.4.10 Passengers and staff would be able to move around the station between the existing ground level areas and the new mezzanine level concourse via a series of escalators and lifts. These would link up from the station entrances and down to the platforms as required.

## Northern Mezzanine Level Concourse

- 2.4.11 The creation of a new mezzanine level concourse to the north of the Main Shed would involve suspending a new concourse over the northern ends of the platforms. The entrance to this concourse would be from the west of the Suburban Train Shed.
- 2.4.12 As would be the case for the southern mezzanine concourse, passengers and staff would be able to move between the existing ground level areas and the new mezzanine level concourse via a series of escalators and lifts.

## Below Grade Concourse

2.4.13 Creation of a below grade concourse would involve creating a main concourse below ground to the west of the Main Train Shed and to the north of the new London Underground Northern Ticket Hall. Connections would be made up to the platforms and down from the station entrances to enable passenger and staff movement.

#### Grade Level Western Concourse

2.4.14 A grade level Western Concourse could be created between the Main Train Shed and the Great Northern Hotel. This new concourse would link to the platforms in the Main Train Shed by creating walkways through the Western Range. It would also connect directly to the southern end of the Suburban Train Shed and links to the St Pancras station and London Underground facility below.

## **Option Evaluation Exercise**

- 2.4.15 An option evaluation exercise was undertaken for the potential locations of the new concourse described above. The exercise followed a criteria-based approach using a rating mechanism to characterise the likely effect of each of the alternative projects with regard to a range of environmental issues, in addition to issues such as cost and operability. The environmental issues that were considered included the following:
  - urban design;
  - heritage and listed building effects;
  - noise;
  - light pollution;
  - local air quality;
  - biodiversity;
  - road traffic implications;
  - potential site contamination; and
  - water environment.
- 2.4.16 The exercise identified that a new grade level Western Concourse would best meet the operational requirements while aiming to minimise detrimental environmental effects and wherever possible optimise positive effects. This option was therefore taken forward for further development.
- 2.4.17 A description of the key issues that were considered in assessing the suitability of the options is provided in *Table 2.1*.

## Table 2.1Advantages and Disadvantages Associated with the New ConcourseOptions

Option	Key Issues
Grade level Southern Concourse within existing Main Shed	<ul> <li>Ideal operational solution for King's Cross station Main Train Shed.</li> <li>Solution not ideal for Suburban Train Shed, which takes 40% of station's passengers.</li> <li>Space not available in the station throat to accommodate the movement of the buffers and platforms northwards by 135 m.</li> <li>Land acquisition and major and expensive civil engineering works required north of the station throat with associated disruption to station operation.</li> <li>The concourse would have poor connections with other transport modes.</li> </ul>
Grade level Southern Concourse outside existing Main Shed	<ul> <li>Ideal operational solution for King's Cross station.</li> <li>Main Shed southern façade not revealed and does not create urban space south of station as desired by London Borough of Camden.</li> <li>Southern Concourse area is too small to accommodate the required concourse size.</li> <li>The feasibility of constructing the new concourse while at the same time</li> </ul>

Option	Key Issues
	demolishing the existing concourse would be very difficult to coordinate.
Southern Mezzanine Level Concourse	<ul> <li>Heritage issues as a result of mezzanine level being constructed within the listed train shed <i>eg</i> views of the Main Train Shed roof would be significantly impaired.</li> <li>Multiple level changes between the station entrance, the new concourse and the platforms would be operationally unacceptable.</li> <li>The concourse would have poor connections with other transport modes.</li> <li>Providing the link from mezzanine to platforms would require a reduction in the number of platforms within the Main Train Shed from eight to six, which would be operationally unacceptable.</li> </ul>
Northern Mezzanine Level Concourse	<ul> <li>Heritage issues as a result of mezzanine level being constructed within the listed train shed eg views of the Main Train Shed roof would be significantly impaired.</li> <li>Multiple level changes between the station entrance, concourse and the platforms would be operationally unacceptable.</li> <li>The concourse would have poor connections with other transport modes, in particular London Underground.</li> <li>Providing the link from the mezzanine to platforms would require a reduction in the number of platforms within the Main Train Shed from eight to six, which would be operationally unacceptable.</li> </ul>
Below grade concourse	<ul> <li>Multiple level changes between the station entrance, concourse and the platforms would be operationally unacceptable.</li> <li>The concourse would have poor connections with other transport modes.</li> </ul>
Grade level Western Concourse	<ul> <li>Would allow for the potential reinstatement of the bomb gap to be incorporated into the project.</li> <li>Connects with the Suburban Train Shed.</li> <li>Would allow the Main Train Shed southern façade to be revealed and would allow for the provision of an urban space south of the station as desired by London Borough of Camden.</li> <li>Opening up of part of the Western Range required with associated Listed Building issues.</li> <li>Potential conflict with Great Northern Hotel.</li> <li>Minor alterations required to move buffers on platforms 5 to 8 northwards by approximately 10 m.</li> </ul>

## Grade Level Western Concourse Sub-Options Considered

- 2.4.18 There are a number of different configurations that could be developed with the Western Concourse option, which can be broadly categorised under the following three headings:
  - 'Gap' between Great Northern Hotel and Western Concourse.
  - Western Concourse abutting Great Northern Hotel.
  - Removal of Great Northern Hotel.
- 2.4.19 A summary of the key issues that were considered in evaluating the suitability of these different options is provided in *Table 2.2*.

# Table 2.2Advantages and Disadvantages Associated with the Western Concourse<br/>Sub-Options

Option	Key Issues
Description	
'Gap' between Great Northern Hotel and Western Concourse	<ul> <li>Split station with two concourses and operations due to smaller Western Concourse with subsidiary southern concourse.</li> <li>Station cannot be gated</li> <li>Increased extent of opening up of Western Range at ground level in a Grade 1 listed building.</li> <li>Taxi set down and pick up located north of hotel with taxis leaving station heading north only.</li> <li>Servicing of hotel needs to be accommodated.</li> <li>subsidiary southern concourse required, therefore the southern façade of station not revealed.</li> </ul>
Western Concourse abutting Great Northern Hotel	<ul> <li>Provides largest western concourse internal volume.</li> <li>Pedestrian route bottleneck around western side of Great Northern Hotel, which requires demolition of parts of ground floor of hotel to create arcade to ease bottleneck.</li> <li>Taxi set down and pick up located north of the Great Northern Hotel with taxis leaving the station heading north or south.</li> <li>Southern façade of station revealed.</li> <li>Servicing of hotel needs to be accommodated.</li> </ul>
Removal of Great Northern Hotel to relieve conflict between station operability and King's Cross Central pedestrians.	<ul> <li>No station operability case to be made for demolishing hotel.</li> <li>Requires demolition of Grade II listed building.</li> <li>Significant effects on King's Cross Conservation Area.</li> <li>Private car set down and pick up south of the Great Northern Hotel/station only.</li> <li>Impact on current taxi proposals for St Pancras station.</li> <li>Southern façade of station revealed.</li> </ul>

## **Evaluation of Western Concourse Sub-Options**

- 2.4.20 The Grade-Level Western Concourse sub-options are influenced by the necessary functionality of the concourse, which is described earlier in this chapter, the requirements of others, and the limited space available. A functional Western Concourse could be constructed within the available space between the Western Range and the Great Northern Hotel; however, the predicted pedestrian flows between Euston Road and King's Cross Central development cannot be satisfactorily accommodated, during station disruptions and closures, without some modification to the basic Grade-Level Western Concourse concept.
- 2.4.21 These modifications range from creation of a "gap" between the concourse structure and the Great Northern Hotel, to the entire removal of the Hotel. No acceptably sized and functional Western Concourse could be achieved if such a gap is allowed. A gap between the Western Concourse structure and the Great Northern Hotel requires a further concourse facility to the south of the main train shed, restricting, if not eliminating, the Southern Square provision. The desired exposure of the southern façade of King's Cross Station would also not be possible.
- 2.4.22 A Western Concourse structure that abuts the Great Northern Hotel, with no arcading, could work satisfactorily for the station, but neither results in an acceptable nor welcoming public realm around the Hotel nor allows sufficient

space for the predicted pedestrian flows between King's Cross Central and Euston Road, given the requirements for Pancras Road agreed with the London Borough of Camden, and assuming that the Great Northern Hotel is retained, particularly at times of concourse closure. Such an arrangement would also compromise the 'gateway' to King's Cross Central and access to the Hotel.

- 2.4.23 Removal of the Great Northern Hotel would overcome the conflict between station requirements and King's Cross Central pedestrians, but with an adverse significant effect on cultural heritage, which is described in Chapter 7: Cultural Heritage.
- 2.4.24 Recognising the constraints and opportunities, an option was developed that, while retaining the Great Northern Hotel, will require the reconstruction of the ground floor of the hotel to create a pedestrian arcade through the hotel at street level. Multiple options for the configuration of the arcade were studied leading to the adoption of a favoured arrangement, closest to the pedestrian 'desire line' that now forms the basis of the KXC stakeholders' complementary application. This configuration also minimises interventions with the existing cores and staircases. See GNH arcade application for further information.

## **Options for Footbridge Over Platforms 1 to 8**

#### Overview

- 2.4.25 The ornamental wrought iron footbridge that spans Platforms 1-8 was constructed in about 1873. The footbridge appears to have been constructed in two halves the section form Platforms 1-4 of wrought iron, and the section over platforms 5-8 of steel. The bridge provides access to Platforms 1 and 8 only. The difference is possibly due to post was repairs after the bridge sustained some bomb damage. The footbridge is currently clad with corrugated, glass and reinforced plastic sheeting fixed to balustrades. Landings and treads are a mixture of early timber wood block flooring or PVC rubber tiles laid on concrete. At the centre of the bridge is an historical analogue clock.
- 2.4.26 From the early stages of the Western Concourse design, it was apparent that large numbers of station passengers would need to be accommodated on the mezzanine floor while waiting for trains. Safe and legible access to platforms all the platforms in the Main Train Shed is needed to alleviate flows through the ground floor southern gate line. It is estimated that 20% of the total departing passengers will access the platforms using this route. One of the main design constraints has been the off-set angle between the existing bridge new concourse mezzanine area.
- 2.4.27 A number of potential locations for this link were examined to balance visibility of the entrance from the concourse and the impact on the Western Range.
- 2.4.28 Three options for the location of this bridge were assessed as follows:
  - 1. Re-use of existing over bridge with offset connection to the Western Range
  - 2. Re-use of existing over bridge with a straight connection to the Western Range and new concourse

- 3. New train shed over bridge to north of existing bridge
- 2.4.29 A summary of the key issues that were considered in evaluating the suitability of these different options is provided below.

## Re-use of existing over bridge with offset connection to the Western Range

- 2.4.30 The bridge only has connections to platform 1 and 8, and does not serve platforms 2 to 7. Historically there have been stairs to the island platforms but these have been removed. At either end of the structure, the bridge steps down as it meets the eastern and western ranges. Re-using the bridge in its present location would require substantial structural alteration to each of the ranges to form the new escalator and lift connections and it will also be necessary to re-level the lower end sections of the bridge.
- 2.4.31 This option assumed a 'cranked' off-set connection at the junction of the western range, to allow the new bridge linking with the concourse mezzanine to connect on bay further to the north. This option, while workable structurally, compromises station operability by its cranked platform, which creates a bottleneck for departing passengers. The works to the existing bridge are also likely to be of high risk. It is probable that significant strengthening will be required to ensure that the bridge is structurally adequate and serviceable for crowd loading. The bridge supports would require strengthening to carry new escalators and additional supports as all station platforms need to be accessed via this structure. Foundations would need to be incorporated where escalators and lifts do not coincide with previous platform stair positions. Two additional columns would be required to support the northern side of the existing bridge on platform 6/7 in addition to re-levelling the lower end sections of bridge.

## Re-use of existing over bridge with a straight connection to the Western Range and new concourse

2.4.32 This option investigated the potential to create a direct and aligned link with the main concourse to achieve the operational performance requirements for this important access route. In this instance, the connections through the Range would require removal of a fine existing stair and puncture the eastern façade of the Western Range through an ornate and finely detailed Venetian window. The structural works to the footbridge outlined in the first option, would also be needed. This option was discarded as it required the demolition of the fine stair and Venetian window details in the Western range which are specifically identified in the listing description for the Grade I listed building.

## New train shed over bridge to north of existing bridge

2.4.33 The option of a new over bridge in the main train shed, one structural bay to the north of the existing over bridge creates a direct and clear link between the concourse and the platform access route. This alignment has two benefits. First, in terms of customer orientation, the common vertical alignment between the bridge and the grade level link will provide one clear point of access to the main train shed platforms from the northern end of the concourse, helping with way finding and orientation. Secondly, in order to reconcile the levels between the concourse mezzanine and the main train shed over bridge it will be necessary to reconstruct and lower the floor slab in the Range where the two bridges meet. If the ground and first floor levels are aligned, the structural interventions into the range are consolidated in one area, which will have significant heritage benefits. This option was the optimum operational solution as the link is clearly visible from the main concourse (it sits within the main ring of columns that support the concourse roof).

#### Summary of Alternatives

- 2.4.34 A Western Concourse was found the best compromise taking account of available land (and other constraints), while still achieving an acceptable, if not ideal, station operation. Furthermore, it recognises London Borough of Camden's desire for public realm space to the south of the Main Train Shed.
- 2.4.35 The environmental effects of the Western Concourse are predominantly those on listed buildings, so demolition of the Great Northern Hotel would have been a last resort. A solution that allowed acceptable functioning of a Western Concourse without constraining the King's Cross Central's predicted pedestrian flow during station disruptions and closures was found. Although the preferred option has some adverse effects on heritage (demolition of the lower part of the Great Northern Hotel and the Western Range), there is the benefit of exposing the southern façade of King's Cross station, the renovation of significant parts of the Western Range, as well as the creation of a public square at its front.
- 2.4.36 A replacement footbridge will be provided as an important secondary access from the upper mezzanine level of the new concourse to the mainline platforms. This secondary access will help to alleviate potential congestion in the waiting areas and at the gate lines in the main western concourse. The replacement footbridge will itself be a light weight steel and glass structure, but has to incorporate escalators and lifts down to each platform. It will be sited approximately 10 m further away from the station front and will require the removal of an existing, unsightly, OLE gantry. It may be possible to replace this with OLE fixings direct to the bridge. The escalators will face north, unlike the existing stairs, which faced the station entrance. The advantages of the new link are: the continuous straight connection to platforms; new construction throughout designed for loadings and to meet accessibility standards and legislation.

## 2.5 DESCRIPTION OF PROJECT ELEMENTS

## Introduction

2.5.1 Passenger facilities and operations at King's Cross station would be replaced and modernised to alleviate the current space constraints within the station, and to accommodate expected passenger growth in the future. The increasing number of passengers using future train services requires well planned, clear and legible concourse facilities within which to arrive, gather tickets and train information, wait comfortably, circulate from one destination to the next, and interchange between transport modes. Front-of-house passenger facilities and back-of-house station facilities have been carefully planned to make best use of the limited land in the vicinity, while ensuring efficient station operations.

- 2.5.2 In addition to the increased number of passengers within the station, the King's Cross Central development proposals immediately to the north of the station suggest that in the future there will be major pedestrian flows in and around King's Cross station, in particular moving between Euston Road and the former Railway Lands to the north of the station. The development of the project has therefore sought to ensure that these additional pedestrian movements can be accommodated without causing conflicts with station related passenger movements.
- 2.5.3 The proposed project comprises three main elements:
  - new passenger related project elements;
  - new station operational project elements; and
  - refurbishment of existing station buildings.
- 2.5.4 These components are described in more detail below. It should be noted that not all of these project elements require planning permission prior to their implementation, and indeed some are being implemented by other projects, such as London Underground's Northern Ticket Hall works. However, they have been described in this section because they are important in understanding the wider environmental effects of the KXSE project. The potential environmental effects that they may cause are described in the relevant Chapters of this ES because they form part of the wider project.

## **Passenger Related Project Elements**

- 2.5.5 This section describes in greater detail the passenger-related project elements that are located on the western and southern sides of the main King's Cross station. Elevations and plans illustrating these project elements are shown in *Figure 2.3* to *Figure 2.10* respectively.
- 2.5.6 The proposed Western Concourse design is influenced by functional requirements and the constraints that exist. The concourse must, as noted above, be of sufficient size to accommodate the expected passenger flows consistent with acceptable modern standards. Information on passenger flows and accumulation standards is set out in *Chapter 9: Transport and Pedestrian Movements*.
- 2.5.7 Rail passengers mainly interchange with London Underground at King's Cross, and the project includes the necessary connections with the new Northern Ticket Hall and the upgraded London Underground [Tube] Ticket Hall as shown in *Figure 2.3*. Connection with surface-level transport provisions, including buses, taxis and cyclists, are also accommodated as indicated in *Figure 2.3*. The constraints on the concourse design are the shape of the available space at the western side of the station<sup>(1)</sup>, the loading restrictions imposed by the underlying London Underground Northern Ticket Hall, the setting of the Listed Buildings, and the recognition of future pedestrian movements in the vicinity.
- 2.5.8 The proposed new concourse would be semi-circular in plan, responding to the concave eastern elevation of the Great Northern Hotel, with radial roof supports centred on the Old Booking Hall. At its highpoint the new concourse

roof meets the central bay of the Western Range below cornice level. The roof is proposed as a propped diagrid shell<sup>(2)</sup>, which avoids transfer of lateral loads onto the London Underground structure and the Western Range, both of which are sensitive to non-vertical loading. The diagrid shell would be supported by vertical concrete columns and inclined props. A number of localised transfer structures relating to the London Underground infrastructure below are incorporated within the depth of the concourse floor.

- 2.5.9The roof would be covered in a panellised system of diamond-shaped aluminium panels with a glazed, semi-circular central roof light providing a simple interface with the Western Range. A V-shaped 'lattice column' or 'funnel' will extend down to the ground floor from the central roof light in front of the Old Booking Hall (see Figure 2.5). A mezzanine perimeter structure within the concourse would be supported on independent columns, their positioning coordinated with the London Underground structural layout below. The concourse canopy incorporates a glazed perimeter canopy that will provide weather protection for pedestrians immediately outside the concourse (see Figure 2.6), and external canopies will be provided by Network Rail at the taxi drop off zone. The external walls of the concourse will be made of glass panels, which will provide some external illumination from lighting within the concourse. There will however need to be some additional lighting provided for the waiting areas outside the concourse, under the perimeter of the roof canopy, for the benefit of those passengers waiting for taxis.
- 2.5.10 Passenger-related facilities would be located primarily to the east and west of the accumulation area within the new Western Concourse. To the west of the passenger accumulation area a new crescent of accommodation provides space for retail units and catering accommodation. A bank of escalators connecting with the London Underground Northern Ticket Hall will be provided at the outer edge of the central bay of the crescent (*see Figure 2.3*). A second bank of escalators will be provided in the northern end of the reinstated ticket office which will provide access down to the Northern Ticket Hall only. Catering accommodation and passenger waiting areas are provided above at mezzanine level.
- 2.5.11 A walkway will be created from the mezzanine area that cuts through the Western Range to link with the replacement passenger footbridge over platforms 1 to 8. The replacement footbridge is required because the existing footbridge has a 'dog leg' where it connects with the Western Range, which creates a bottleneck for departing passengers. The effects on departing passenger movements of the existing and new footbridges are described in *Chapter 9: Transport and Pedestrian Movements*.
- 2.5.12 The replacement footbridge will be located to the north of the existing footbridge, which will enable to removal of the 'dog leg'. This replacement footbridge will be for the use of departing passengers only and will include downward escalators to the platforms and also lifts for mobility impaired passengers. The provision of the new passenger bridge will require the removal of the existing passenger bridge. The effects on cultural heritage

<sup>(1)</sup> The retention of the Great Northern Hotel was a main constraint on space (see section on Alternatives for fuller discussion)

<sup>(2)</sup> The diagrid shell system is a very efficient structural form which utilises the geometry of the building to achieve a very thin structural depth and low steel structure weight.

resulting from the removal of this footbridge are described in *Chapter 7: Cultural Heritage*. The new footbridge is required to ensure the smoother transition of passengers from the mezzanine level to the platforms.

- 2.5.13 To the northwest of the concourse, a new retail outlet, baggage storage area and new toilet blocks will be constructed in the Western Range, above the basement facilities described in the next section. In the Western Range, ground level accommodation is primarily retail and interchange accommodation, with passenger support services and catering outlets located towards its northern end, passenger lounges at first floor level, and offices above. One of the most significant aspects of the works to the Western Range is the provision of the new centrally located ticket office in the Old Booking Hall.
- 2.5.14 The proposed Western Concourse provides 11,265 m<sup>2</sup> of gross internal floor space over two levels as follows:
- 2.5.15 At concourse level (including the Western Range but excluding platforms beyond gatelines), 8,360 m<sup>2</sup> allocated:
  - 5,030 m<sup>2</sup> for accumulation, waiting space and for concourse circulation;
  - 1,195 m<sup>2</sup> for passenger accommodation (ticket office, WCs etc); and
  - 2,135 m<sup>2</sup> of A1 retail space.
- 2.5.16 At mezzanine/1st floor level, 2,875 m<sup>2</sup> allocated:
  - 365 m<sup>2</sup> for passenger lounges;
  - 695 m<sup>2</sup> for office accommodation;
  - 655 m<sup>2</sup> for station facilities; and
  - 1,160 m<sup>2</sup> of A3/A4/A5 retail space.
- 2.5.17 The ground floor of the new concourse will include 2,135 m<sup>2</sup> of A1 retail floorspace. Larger retail units will be located on the western side of the concourse adjacent to the four main entrance points. Smaller retail units will be situated on the east side of the main concourse within the western range, providing separation from platforms 1 to 8.
- 2.5.18 A mezzanine floor will be inserted over looking the western concourse and will include the remaining retail floorspace. This level will include an area for food and drink units, with a designated seating area provided. The total floorspace of the mezzanine will comprise 1,160 m<sup>2</sup> of A3/A4/A5 units.
- 2.5.19 The existing on-board catering services (OBS) facilities in the basement of the Western Range will be retained, and new fire detection, public address and customer information systems, and IT/radio networks would be provided. A series of new lifts would be installed in the Western Range.
- 2.5.20 The main concourse volume will be naturally ventilated and unheated. Localised heating, cooling and ventilation systems will be provided for all the permanent cellular concourse accommodation, supplied by a central distribution system to minimise local plant requirements. Cooling plant, heat exchangers and boiler plant will be located at high level in the Western Range and above the Old Booking Hall. Independent mechanical ventilation systems

are also provided for the loading bay, plant room area and OBS accommodation.

- 2.5.21 New water tanks and fire water supplies will be located within the new service yard accommodation area. Smoke extract for the new concourse, Main Train Shed and western platforms will be by high-level natural ventilation; however, the Western Range and OBS/station servicing areas will have mechanical smoke extract facilities. Connections with London Underground entrances will be provided with fire shutters to prevent smoke movement between stations. Sprinklers will not be required in the new concourse and train sheds, but will be provided in public areas of the Western Range and the OBS/station servicing facilities. Access for fire fighters for the concourse and Main Train Shed will be from the Southern Square and Pancras Road, with fire cores located in the Western Range (and in the station servicing areas described below). The fire strategy assumes installation of new fire detection systems, voice alarms, emergency lighting, power and signage throughout the station.
- 2.5.22 Station evacuation requirements, and provision of major interchange elements including London Underground entrances, bus stands, taxi and car facilities, are facilitated within the public realm. The public realm has been designed in close consultation with project stakeholders through a Joint Design Group<sup>(1)</sup>. The Southern Square and station forecourt adjacent to Pancras Road forms part of the project. The provision of this is made possible by removing the existing Southern Concourse that would also have the added benefit of revealing the southern façade of the Main Train Shed (see *Figure 2.7*). A Northern Square forms part of the King's Cross Central development proposed on the former Railway Lands to the north of the station, though NR has specific evacuation requirements that need to be accommodated as part of this square.
- 2.5.23 To provide a sense of scale, the Southern Square will be comparable in scale with Leicester Square; Pancras Road will be of the same width as the Euston Road. Landscape treatment for the Southern Square will rely on hard, durable finishes with a simple ground-plane allowing unrestricted pedestrian movement (except for the obvious presence of the London Underground vents). In the station forecourt to the west, the use of complementary hard materials will reduce the effect of vehicular facilities on the pedestrian environment and define the north/south route, around and through the Great Northern Hotel. Structured tree planting will reinforce the Pancras Road corridor and provide seasonal interest along the edge of the site.
- 2.5.24 Without such an arcade, pedestrians moving between the Southern Square and the proposed King's Cross Central development would naturally divide either side of the Great Northern Hotel. At times of closure of the western concourse, the eastern route will not be available. Discussions with the London Borough of Camden on the highways requirement of Pancras Road indicate that the maximum pavement width available between the Great Northern Hotel and the carriageway will be in the order of 2.5 m. This is not sufficient to cope with predicted pedestrian flows in this location during periods of station disruption and closure (see Chapter 9: Transport and Pedestrian Movements).

(1) The Joint Design Group comprises Network Rail, London Underground, London and Continental and Argent.

- 2.5.25 In order to ease pedestrian flow congestion on the eastern route, passing between the Great Northern Hotel and the station during these periods, non-station related pedestrians would be encouraged to move via the proposed arcade through the lowered ground floor of the Great Northern Hotel (see *Chapter 7: Cultural Heritage*). An illustration of the arcade proposals is shown in *Figure 2.8*.
- 2.5.26 In addition to the works to create the arcade at street level of the Great Northern Hotel the King's Cross Central developer will demolish the existing extensions to the Great Northern Hotel. This will include the demolition of the basement (3 offices) and ground floor extension (kitchens, toilet and office) on the southwestern façade and the fire escape which crosses the extension. The demolition of the basement (storage) and ground floor extension (ladies toilets) on the northern façade; the removal of the railings along the southwestern and northern sides of the hotel; cover the lightwell around the southwestern and northern sides of the hotel; and renovate the affected façades so as to match, as closely as possible, the existing fabric of the hotel and the new paving surfaces that will be provided around it. The London Borough of Camden has already resolved to grant planning permission / listed building consent as part of its decision on the King's Cross Central development masterplan.

## **Station Operational Project Elements**

- 2.5.27 This sub-section describes the station and train servicing facilities<sup>(1)</sup>, and those for station-related activities. In addition the provision of the new Platform Y at the eastern side of the station is described.
- 2.5.28 The primary objective influencing servicing is to minimise conflict between passengers and goods delivery vehicles to and within the station, thereby improving passenger safety and operational efficiency. The location and the design of the facilities also need to fulfil the objective of minimising impact on heritage structures. Station servicing facilities will be located at basement level to the west of the suburban platforms (see *Figure 2.3*) in a shared service yard constructed by Argent in the basement of block A1 of the King's Cross Central development. Immediately to the south of this shared service yard Network Rail will construct a new Plant Room Area, which will house much of the low and high voltage switch gear for the new station facilities. Access will also be provided from this service yard to the OBS facilities via a tunnel that will be retained in the basement of the Western Range (see Section on *OBS and Station Servicing* below). Access to the service yard will be from a new service road connecting with Pancras Road<sup>(2)</sup>.
- 2.5.29 Station servicing would take place through a bank of service lifts to the northwest of the concourse and via service lifts located in the Western Range, sharing basement-level horizontal distribution routes with OBS. The retained OBS catering accommodation will continue to connect to the Main Train Shed platforms through the existing platform access tunnel, which will need to be extended as described in the later section on *OBS and Station Servicing*. The existing tunnel under platforms 1-8 would be used to distribute goods up to the platforms. In addition to the basement service area, other servicing routes will

This refers to on-board train catering and the like, not maintenance of the trains themselves
 The King's Cross Central proposals include for this access to be from Goods Way, which would be achieved by amending the existing access road.

be required at ground level across the Southern Square for London Underground and station facilities. These will be restricted zones to prevent deliveries during peak passenger flow periods.

#### Taxi and Private Car Set Down and Pick Up

2.5.30 The design of the new taxi and private car set down and pick up facilities have been designed in accordance with *Transport for London's Best Practice Guidelines for Taxi Ranks at Major Interchanges.* A dedicated taxi and private car set down zone will be located outside the Western Concourse parallel to Pancras Road. The set down zone provides 10 set down spaces and three disabled parking bays with the walk distance to the station minimised to satisfy the *SRA Train and Station Services for Disabled Passengers, A Code of Practice 2002.* After set down private cars then exit onto Pancras Road and head in a northbound direction. Empty taxis can leave the set down area and rejoin the main carriageway, where they head southwards along Pancras Road to the taxi pick up area, located to the south of the Great Northern Hotel. The taxi arrangements are described in more detail in *Chapter 9: Transport and Pedestrians.* 

#### British Transport Police

2.5.31 A central facility is being provided within St Pancras station; however, local parking facilities for British Transport Police vehicles will be required within the King's Cross station forecourt. An allowance for 2-3 bays has been made. Access will be provided to British Transport Police reception at ground floor level and offices at first floor level in the Western Range.

## Design and Operation Platform Y

- 2.5.32 Platform Y is required to provide additional capacity at King's Cross Station to support increased capacity of trains on the East Coast Main Line (ECML), to meet both current and future demand. It will also provide a more robust performance to the route by provision of capacity for both long and additional train (interoperability) turn-rounds and recovery from disruptions and delays.
- 2.5.33 The Railways (Interoperability) (High-Speed) Regulations 2001 implement EU Directive 96/48/EC on the interoperability of the trans-European high-speed rail system. Under the Treaty of Rome the UK is obliged to implement the Directive in full. The main implication arising from interoperability is the requirement to provide 300 m long platforms. At King's Cross Station there are very limited possibilities to provide this apart from the Platform 'Y' proposal, which will result in two 300 m long platforms, 'Y' and '1'.
- 2.5.34 To enable the new platform to be constructed the East Sidings north of the Engineer's Bothy shown in *Figure 2.1* known colloquially as the 'Thunderbird Sidings' will need to be relocated. The provision of Platform Y under the Eastern Range introduces a new item of operational infrastructure into an area where none previously existed. To ensure safe operation of the new platform it will be necessary to upgrade the fire rating of the steel supports, soffit and the windows facing the train shed on the mezzanine level of the Eastern Range.

- 2.5.35 Platform Y will be brought into service to coincide with the 2009 timetable that will enable an uplifted train service to use the station. The number of additional trains will depend on how Platform Y is utilised. The current proposal is to use Platform Y to improve station flexibility only, which will allow for 322 train movements during the period 0700 to 1900. This is an increase of seven trains over the 315 in the 2006 timetable. However, should platform Y be used to increase the overall train capacity at the station, then 339 train movements will be possible; an increase of 24 trains over the current timetable.
- 2.5.36 There are no real options to consider in terms of alternative platform locations. The only possible alternative would be to move the entire station northwards, introduce additional sub-surface platforms, and a new 'bore' under the Regent's Canal. All these alternatives have been discounted due to prohibitive difficulty and cost of associated engineering works, and for operational reasons (integration of the platform with the main station).
- 2.5.37 The designers essentially had to consider alignment options that minimised intervention in the eastern range, while still providing fully operational track that meets relevant national and international standards.
- 2.5.38 There are a number of design constraints which determine the available options for the alignment of the proposed Platform Y. The alignment is fixed by the existing tandem turnout and the turnout for the proposed new East sidings: an existing signal gantry stanchion approximately 30 m north of the end of the existing Platform 1, the existing Portal for entry to the Cab Way, the position of existing sewer surge chambers and clearance at critical points along the Cab Way.
- 2.5.39 The proposed design for Platform Y avoids alterations to the existing portal. The track alignment achieves the minimum clearance to the Platform Y edge at the north end of the train shed and avoids the need to demolish part of the York Way platform. This meets the requirements of the relevant railway standards without affecting the building structure. In addition, passenger flow in this area will be reduced as the narrow area is towards the north end of the platform and passenger flow is likely to be lower, with an alternative route along Platform 1 available.
- 2.5.40 The drainage along the east side wall will be disturbed by the provision of the new track and impact wall. Because of the restricted space between the impact wall and existing mezzanine supports, the southern part of the drainage needs to run along the top of the impact wall and discharge into the existing outfall at the south end. Maintenance manholes along the inside of the east flank wall will be located between the piers.
- 2.5.41 To accommodate the forecast additional passengers, as a result of Platform Y, some interim mitigation measures will need to be provided within the existing station infrastructure, until the Western Concourse is operational. These measures will include providing additional space in the existing concourse. Further details of the effects of this early delivery of Platform Y and the mitigation measures required are provided in *Chapter 9: Transport and Pedestrians*.

- 2.5.42 To summarise, the proposed construction of the new track, retaining walls and Platform Y will require the following works:
  - demolition of the Engineer's Bothy and office building to which it is attached;
  - removal of a major portion of the cobbled Cab Road, stone flagged pavements and stone capped brick retaining walls;
  - modifications to the entrance to Site I off York Road;
  - renewal and modifications to services within the Cab Road; and
  - modifications to the mezzanine including replacing glazing onto Platform 1.

## Waste Collection

- 2.5.43 Currently King's Cross station has a varied profile of waste generated by retail, office, catering, OBS and waste from trains. Segregation of these waste streams is currently limited to paper only. All other wastes are placed unsegregated into a compactor.
- 2.5.44 Waste from trains, retail and offices is placed in wheeled bins, which when full are taken to a 30 m<sup>3</sup> compactor located in the ground floor service area. The routes used to move the wheeled bins conflict with public areas in a number of instances. At present waste segregation at King's Cross station is limited to paper only, with paper waste from the offices dealt with separately, by an external contractor. It is the responsibility of internal waste contractors to collect the waste at different parts of the station. Currently, there are 3 different internal waste contractors:
  - station/train cleaners;
  - shop & ticket office cleaners; and
  - main office cleaners.
- 2.5.45 Currently train waste is placed in plastic bags or wheeled bins on the platform. Platform waste accounts for about 50 m<sup>3</sup> of waste per day. Waste contractors take the waste to the compactors located in the car park, where it is compacted by a 4:1 ratio (amounting to approximately 13m<sup>3</sup> of compacted waste). Other non-recoverable station waste is also compacted. When the external waste contractor (London Borough of Camden) arrives to collect the 30 m<sup>3</sup> portable compactor from the car park area they leave an empty compactor and pick up the full one.
- 2.5.46 The largest interim waste area is on Platform 8, where 6-8 wheeled bins with 1,100 litre capacity are used to store retail waste from retail units located on Platform 8. This area also stores the waste (packaging, food and drinks) from the OBS area located in the basement prior to being taken to the compactor.
- 2.5.47 King's Cross station falls within the London Borough of Camden, and is therefore subject to its waste management requirements, which are primarily based on BS5906: 1980 (Storage and on site treatment of solid waste from

Buildings). As well as this standard, the London Borough of Camden Unitary Development Plan (UDP) states that in line with European Government policies and statutory targets, the levels of recycling must increase from current standards in existing developments.

2.5.48 Network Rail will therefore implement a waste collection strategy for the station that will allow a greater level of segregation and ensure waste is disposed of in a way that does not compromise health and the environment. The new proposals will provide a central waste area in the sub-basement area adjacent to the Loading Bay Area where segregation will be carried out for glass, cardboard, plastic, packaging material and metal. This area would be equipped with a baler for compacting paper, packaging and aluminium. Additionally, a number of interim waste rooms will be allocated on every floor, close to the areas that need to be serviced, in order to store wheeled bins locally during the day. By implementing this strategy it is anticipated that over 50% of the station generated waste will be recovered for recycling. Further details of the proposed waste management strategy are given in *Annex D. Table 2.3* provides a summary of the waste management facilities that will be provided.

Waste Storage Area	Level of Segregation and No of Wheeled Bins Stored	Equipment	Size of Storage Area
Central Waste Area			
Located in the basement with close proximity to the	Paper: 6x1100 litre	Baler	80 m <sup>2</sup>
loading bays, which can be accessed by the refuse	Packaging: 4x1100 litre	Baler	
vehicles.	Plastic: 2x1100 litre	Baler	
	Aluminium: 1x1100 litre	Baler	
	Glass: 5x330 litre	Stored in wheeled bin	
	Non-recoverable	30 m <sup>3</sup> compactor	
Interim Waste Rooms			
A number of interim waste rooms will be allocated on every floor, close to the	Non-recoverable: 1x1100 litre	Wheeled bin	Approx 10 m <sup>2</sup>
areas that need to be serviced in order to store wheeled bins locally during the day. Wheeled bins from the interim waste rooms will be taken to the Central Waste Area at suitable times.	Recoverable: 1x1100 litre	Wheeled bin	

## Table 2.3 Proposed Waste Management Arrangements

## Emergency Vehicle Access

2.5.49 The design has assumed that emergency vehicles will need to gain access as close as possible to the station facilities. The station forecourt, adjacent to Pancras Road, the Southern Square along Euston Road, and the Northern Square have been designed for fire appliance loadings and space requirements.

## OBS and Station Servicing

- 2.5.50 The primary objective is to minimise the conflict between passengers and goods delivery vehicles to and within the station, thereby improving passenger safety and operational efficiency. The location and the design also needed to fulfil the objective of minimising impact on heritage structures. The OBS facilities will therefore be retained in their current location in the basement of the Western Range. There will, however, be modifications made to bring the OBS up to modern standards, such as the upgrading of the service lifts.
- 2.5.51 These objectives will be achieved by providing a segregated access road from Battle Bridge Road down the access ramp to the basement Loading Bay and Plant Room Area. The access ramp and Loading Bay will be constructed by Argent as part of the King's Cross Central development. The Plant Room Area will be constructed by Network Rail adjacent and connected to the Loading Bay. The basement loading bay will be managed to distribute deliveries throughout the day.
- 2.5.52 The existing tunnel under platforms 1-8 will be upgraded and used to distribute goods up to the platforms allowing for removal of existing service bridges.
- 2.5.53 During construction, delivery vehicles will use a ground level temporary loading bay adjacent to the Suburban Train Shed. The deliveries will be taken to the tenants at ground level, as is currently the case.

## Second and Third Floors of Western Range

2.5.54 The station control room will be situated on the second floor next to the main central stair within the Western Range. There will be no public accessibility at first floor level across the top of the stair because of security issues. This stair will serve the station's operations control room at second floor level and is a protected fire fighting stair. Train operating company offices will be situated on the second and third floors of the Western Range.

## **Alterations to Existing Buildings**

## Overview

2.5.55 Effects on the historic fabric of the station will include a number of alterations to the Western Range. Within the Western Range, the chief alterations will be the provision of new ticket barriers at ground floor level in the southern area. The single greatest change to the Western Range itself will be the restoration and reinstatement of the Old Booking Hall to its original use as the new ticket office (involving the restoration of the original full-height space). Any 'harm' resulting from the internal alterations will be relatively minor when compared with the benefits arising from the reinstatement of the Old Booking Hall, the

structural strengthening of the Bomb Gap, and the general upgrading and regeneration of the original entrance point to the station.

- 2.5.56 The Western Range extends along the full length of the Main Train Shed. It is made up of seven components that, starting from the southern end, comprise of: the south wing: Old Booking Hall: the Bomb Gap (caused by Second World War bomb damage): the north wing: the Link Building: the northwest building and the northern building
- 2.5.57 The Western Range is largely part of the original construction of the early 1850s, and much of its plan form remains (and will continue to remain after the new concourse is constructed). Its partial devastation in the Second World War has never been fully repaired.

## South Wing

2.5.58 The ground floor structure in the southern end of the South Wing is to be demolished to accommodate the primary access to the Main Train Shed from the southern part of the new concourse building, and a new stair and lift core. These alterations will include the formation of new openings towards its southern end at ground floor level for the new ticket barriers and access to platforms 1 to 8. This area was significantly altered in1975 to accommodate a restaurant and works then included introduction of new steel frames supported on piled foundations. The internal structure of the basement underneath will also be altered to accommodate the ground floor framework structure and new piled foundation.

## Old Booking Hall

2.5.59 Within the old booking hall the plant installed in 1977 will be removed. Demolition is restricted to a central area of the ground floor and basement to house a new lift structure serving new first floor passenger accommodation. One simple bay of floor construction to the rear of the Old Booking Hall is to be removed at each level to accommodate a new goods lift core structure and foundation. The more recent staircase introduced to serve the basement, ground and first floor is to be removed, and floors in-filled with appropriate materials.

## Bomb Gap

2.5.60 The existing post war single storey construction is to be demolished. Extensive areas of the basement will be excavated to accommodate the new 'shell and core' LUL vent and associated superstructure to be constructed by Metronet under the separate LUL Northern Ticket hall Phase II works. The existing central basement corridor and eastern wall forming the Main Train Shed flank wall are to be retained. The Bomb Gap facade will be re-instated.

## North Wing

2.5.61 Bomb damage occurred to extensive areas of the North Wing, particularly to the gable end bay (immediately north of the Bomb Gap) and substantial wartime repairs remain evident. The gable end bay structure was weakened as a result of the destruction of stiff intermediate cross wall construction to the South. The reconstructed structure of the gable end bay would be monolithically connected to the new 'Bomb-Gap' structure. The existing eastern wall, which forms the main train shed flank wall will be retained and incorporated into the new structure, and the western façade rebuilt to match the existing façade.

- 2.5.62 The western basement area will be substantially reconfigured to accommodate the OBS link from the corridor within the Northern Ticket Hall serving the shared service yard areas.
- 2.5.63 A new structure and associated piled foundation will be introduced to accommodate the new platform, and the platform bridge link for departing passengers, (see *Figure 2.4*), between the Western Concourse and Main Train Shed. Works include some demolition to areas of floor to incorporate a link between the retained first floor to the south and the new (lowered) mezzanine bridge link. In addition, both the eastern and western facades will be altered to accommodate the link access route from the mezzanine to the Main Train Shed Platforms. The two northern bays' ground and first floor levels will be altered to provide level access to the platform bridge link.

## Link Building

2.5.64 The basement level is to be lowered to gain level access with the adjacent OLD Parcel's Tunnel OBS link, and to serve a new lift and stair core serving all levels of the link building. The new core will require the demolition of a small area of the floor at each level.

## North West Building

2.5.65 Minor demolition only will be undertaken to accommodate new passenger facilities at ground and first floor levels and to reveal the original features to the Old Parcels atria. Extensive strengthening and stiffening of the North West building is required. The works will be designed as 'reversible' to enable the existing timber structure to be retained in its original form.

## Northern Building

2.5.66 Alterations and demolition works to the existing building are limited and principally restricted in the provision of corridor openings through the western section of the masonry cross walls.

## Existing Footbridge

2.5.67 The existing footbridge spanning platforms 1 to 8 will be removed because it is incapable of being made Disability and Discrimination Act 2004 (DDA) compliant. A replacement footbridge will be provided as an important secondary access from the upper mezzanine level of the new concourse to the mainline platforms. This secondary access will help to alleviate potential congestion in the waiting areas and at the gate lines in the main western concourse. The replacement footbridge will itself be a light weight steel and glass structure, but has to incorporate escalators and lifts down to each platform (see Figure 2.4, Figure 2.9 and Figure 2.10). It will be sited approximately 10 m further away from the station front and will require the removal of an existing, unsightly, overhead line electrification (OLE) gantry. It may be possible to replace this with OLE fixings direct to the bridge. The

escalators will face north, unlike the existing stairs, which faced the station entrance.

## Great Northern Hotel

2.5.68 An arcade will be created through the eastern side of the Great Northern Hotel by demolishing approximately two thirds of the ground floor. This will be done by removing internal walls and making openings in the external façade. It will also be necessary to remove the kitchen and toilet block and the ground level basement roof lights (see *Figure 2.8*). These works to the Great Northern Hotel do not form part of the new Western Concourse planning application. The provision of the arcade will result in significant effects on cultural heritage, townscape and pedestrian movements. The effects of the arcade are for completeness therefore described in this ES at *Chapter 7: Cultural Heritage; Chapter 8: Townscape and Visual Impact; and Chapter 9: Transport and Pedestrian Movements.* 

#### Southern Concourse

- 2.5.69 There are several beneficial implications including removal of the 1970s concourse and enhancement of the setting of the south gable elevation and the reinstatement of the Old Booking Hall and the parcels office atria to their original form. The removal of the existing Southern Concourse will reveal the southern façade of the Main Train Shed. The current proposals make provision for a canopy to give weather protection for passengers making their way to the underground from the southern exit gates (*see Figure 8.3 and Figure 8.4*).
- 2.5.70 Existing building structural alterations primarily relate to the Western Range and include strengthening of the Northwestern Building, formation of new platform-access openings at its southern end, construction of the OBS linking tunnel, relocation of the London Underground vents in the Bomb Gap. Beyond the Western Range, construction of the new loading bay and plant room area at basement level will require underpinning of the existing Suburban Train Shed. The assessment of the significance of the effects on the historic fabric of the station is described in detail in *Chapter 7: Cultural Heritage*.

## Other Structures and Building Features

- 2.5.71 In addition to the Western Concourse works, the Porte-Cochère that was removed from the front of the Old Booking Hall to accommodate the London Underground works will not be reinstated. This is because the V-shaped funnel structure, which extends to the ground floor from the central roof light in front of the Old Booking Hall, will accommodate some of the space previously occupied by the Porte-Cochère.
- 2.5.72 Furthermore London Underground has removed some of the existing Great Northern Hotel infrastructure to accommodate its works on the new Northern Ticket Hall. The main entrance to the Great Northern Hotel was previously along the concave elevation, within the southern staircase bay. Sheltering this entrance was a small glazed canopy and enclosed porch of cast and wrought iron and timber. The canopy and porch were dismantled by London Underground and placed into storage. London Underground is under an

obligation to reinstate the canopy and porch upon completion of these works. However, the development of the new western concourse will prevent the reinstatement of this canopy and porch as the concourse roof touches the Great Northern Hotel and the areas will be used as the inner pedestrian route for both station and north-south pedestrian traffic to/from the Kings Cross Opportunity area.

- 2.5.73 Early decisions about the location of the new concourse lead to much thought about how it would best integrate with the Great Northern Hotel. The treatment of the public realm area around the Great Northern Hotel becomes very critical as with the new concourse design. The new concourse had to minimize the impact on the historical importance and distinctive character of the Great Northern Hotel.
- 2.5.74 A 14 m gap between the Great Northern Hotel and the Western Range creates a physical constraint at the point where a number of anticipated pedestrian movements converge. Analysis of anticipated pedestrian flows indicates that in the peak 3 hours, some 6,200 people will move between the new concourse, London Underground, buses and other destinations by foot through this 'gap'. Of these some 3,000 non-station related pedestrians will also wish to move between the Southern Square and the development lands. Key objectives for the regeneration of the area and for the enhancement of the interchange are to achieve high levels of connectivity and visibility between the interchange and the wider area.
- 2.5.75 The natural desire-line for pedestrians moving from the south of the Great Northern Hotel (via London Underground, bus and on foot) to the King's Cross Central development lands is predominantly between the Great Northern Hotel and the Western Range, complimented by a secondary route to the west between the GNH and Pancras Road.
- 2.5.76 The movement of pedestrians between the Great Northern Hotel and the Western Range is complicated further by the need to get passengers from the new concourse into the Main Shed. The main link between the two can only be located at the southern end of the Western Range, creating a third and conflicting movement of passengers in an east-west direction, to and from the taxi areas, crossing to St Pancras (or vice versa) or walking to Euston Road and the wider area. In essence, the entire area around the Great Northern Hotel will be needed to facilitate pedestrian movements in the least obstructive way possible.
- 2.5.77 The design of the concourse building provides a circular pedestrian route (5 m) around the perimeter of the concourse. This route will blend seamlessly in terms of level, with an arcade (5.8 m, narrowing in parts to 3.9 m) in the ground floor of the Great Northern Hotel. An application to carry out the arcading of the Great Northern Hotel will be lodged by Argent and is both complementary and integrated with the concourse design.
- 2.5.78 A key aim in the design of this area has been to create a world class public realm area that integrates with the listed stations of King's Cross and St Pancras, the Great Northern Hotel and with the public realm spaces to the north and south. Providing very clear and unobstructed pedestrian routes enhances the legibility of the area to meet these access needs.
- 2.5.79 In view of the scale of the pedestrian flows that will occur around the Great Northern Hotel, and through the concourse, it is considered that returning the porch to its previous location would create an obstruction to smooth flows and decrease the legibility of this area. As virtually all the areas at ground floor level adjacent to all the façades of the Great Northern Hotel are going to be heavily used by pedestrians, an alternative location would have similar negative effects. The environmental effects of these works are described in *Chapter 7: Cultural Heritage*.
- 2.5.80 A summary of the works to be carried out as part of the KXSE project is provided in *Table 2.4*. The table is presented under the following headings:
  - new architectural and structural works;
  - removal of listed building items;
  - remodelling and refurbishment of the existing infrastructure;
  - works required to link with other developments; and
  - related applications outside the scope of this application.

New Architectural and Structural Work	Removal of Listed	Remodelling and Refurbishment of Existing	Links to Other	Related Applications
Construction of New Weste	ern Concourse		Developments	
New western concourse building, including mezzanine, structures supporting new concourse building underground at GNH(roof foundation piles), under slab services and drainage, integration with GNH pavement works, shutters to new arcade (for fire purposes). Provision of ancillary directional signage.	Demolition of porte cochere to Western Range to accommodate new concourse. Removal of porch on GNH eastern façade.	None required.	Transfer structures (escalators/lifts) to LUL ticket halls. Connections with surface level transport; taxis, cycle ways, pedestrian, buses.	Argent application to remove accretions at Great Northern Hotel, creation of pedestrian colonnade via alterations to ground and 1st floor level of GNH. Creation of a northern square between the new concourse and the suburban train shed by Argent. Changes to St Pancras Road are being carried out, or required by other agencies including Argent, CTRL and Transport for London
Canopies to taxi area on western side of GNH.				Transport for London.
Works to Western Range a	nd Station			
Reinstate brick façade of bomb gap to match existing.	Remove existing pedestrian bridge connecting platforms	Reinstatement of old booking hall volume along with parcels office atria.	Structural strengthening to bomb gap to pin LUL vent.	Argent application for sub- surface service area and parking.
	Shed.	booking hall.		Construction of LUL vent in bomb gap.
		Reconstruction of north wing gable bay.		<u> </u>
		New lifts and elevators to cross- platform OBS tunnel, new OBS basement entrance, extension of old parcels tunnel to existing OBS route from Northern Ticket Hall, links to Argent basement services (alternative service area).		

# Table 2.4Summary of Key Project Components and Related Applications

New Architectural and Structural Work	Removal of Listed Building Items	Remodelling and Refurbishment of Existing Infrastructure	Links to Other Developments	Related Applications
		New water tanks and fire water supply facilities in basement, new fire detection, public address and customer information services.	`	
		Structural framing of basement area and ground floor of southern wing to accommodate new platform access from western concourse.		
		Refurbishment of the western range offices.		
		Temporary removal of the station's war memorial and its relocation to the southern façade.		
		New openings at southern end of ground floor of western range for new ticket barriers and from new concourse building to platforms.		
		Shortening of platforms 5-8 to accommodate new concourse level ticket gates in southern wing.		
		Modifications to site 1 entrance off York Way.		
		Renewal and modification of train services.		
New pedestrian bridge for movement of passengers from new concourse mezzanine building, connecting platforms 1-8 across train shed, new north facing escalator, lifts.	None required.	Extend Platform 1 by 300 metres. Openings at 1st floor to allow movement of passengers form mezzanine to platforms in Main train shed.	None required.	None required.
New Platform Y New OBS lift serving platform Y.	Remove engineer's 'bothy'. Remove major	None required.	None required.	Modifications to eastern range to provide for fire compliance as a result of platform Y will form part of the Renewals
	portion of cobbled surface of cab drive and retaining walls.			roof and platform application to eastern range.

New Architectural and Structural Work	Removal of Listed Building Items	Remodelling and Refurbishment of Existing Infrastructure	Links to Other Developments	Related Applications
Structural works to suburban train shed; including roof	Remove canopy outside suburban train shed.	None required.	None required.	None required.
	Demolish southern end of train shed.			
New Southern Square				
Development of new southern square, hard/soft landscaping, integration with LUL vents and streetscape.	Demolition of 1970's southern concourse building	None required.	None required.	None required.
			None required.	None required (details to be
New canopies to southern face of station.	None required.	None required.		submitted as reserved matters at a later date).
Servicing and Parking Area				
Ground level service and parking area off Pancras Road to the north of the suburban train shed.	None required.	None required.	None required.	Alternate to Argent sub- surface parking and service area.

### 2.6 CONSTRUCTION OF THE PROJECT

# **Principal Construction Activities**

2.6.1 This section describes the construction activities required to complete the new Western Concourse, construct Platform Y, refurbish the Western Range offices, demolish the Southern Concourse and construct the Southern Square. These activities, which are expected to be carried out from Spring 2007 to mid 2013, are summarised in the following section <sup>(1)</sup>. The expected timetable for these activities is shown in the construction programme in *Annex D*. This section does not provide any details on the construction activities of other projects that may be under construction at the same time. However, where it is considered that a cumulative effect may arise from parallel construction activities this is described in the relevant section later in this ES. It should be noted that all the dates presented in this section are the current estimates and are those that have been used to assess the likely significant environmental effects of the KXSE project.

Structural Modifications and Refurbishments to Existing Station Buildings: January 2008 – January 2011

2.6.2 Structural modifications and refurbishments will be undertaken to the Western Range and Suburban Train Shed. These will included the removal of internal partition walls and staircases, and the former booking hall volume will be reinstated along with the parcels office atria. Work will also be undertaken internally on the Eastern Range. During the period from March 2008 to March 2009, Argent will be carrying out the ground level modifications to the Great Northern Hotel to create the covered walkway for pedestrians. Although these alterations are part of the King's Cross Central project, through agreement between Network Rail and Argent, these works are described here. The significant environmental effects that may arise from these works are also described in the relevant Chapters later in this ES.

Services Diversions: May 2007 – July 2009

2.6.3 A number of services will need to be diverted to accommodate various components of the proposed project. Services will need to be diverted to make way for the new OBS lift that will service Platform Y. Drainage and water services will also need to be diverted from the Bomb Gap so that it can be completely demolished to make way for its structural strengthening. In order to accommodate the proposed arrangements for the loading bay and plant room area facilities all the main services including sewer, gas mains, water pipes, power and telecommunications cables will need to be diverted.

### Excavation: March 2007 - February 2009

2.6.4 The principal excavations to create the loading bay and the access ramp will be carried out by Argent, while constructing Block A1. Network Rail will continue this excavation to create the Plant Room Area through the period March 2007 to February 2009.

<sup>(1)</sup> Construction planning information has been provided by Arup Project Management in its report Station Enhancements GRIP 4/Stage D (Final 1 Issue) Section 9 - Construction Planning, January 2006.

Piling: November 2008 – April 2009

2.6.5 A number of piles for the Western Concourse have already been installed as part of the London Underground works. The remainder of the piling for the Western Concourse will be carried out over a 18 week period from November 2008 to April 2009. Piling will also be required during the same period in the Southern Wing and for other areas of the Western Range such as the foundations of the reinstated Old Booking Hall. Piles will be required in the Bomb Gap to support the base of the proposed London Underground vents and for the structural strengthening in this area.

New Structural Work: January 2008 – March 2011

- 2.6.6 The Bomb Gap currently consists of a basement and ground floor only. The proposal is to demolish the current ground floor and for London Underground to locate its vent shaft in the space provided. Network Rail will then carryout structural strengthening work to the structures adjacent to the remaining Bomb Gap New escalators will be installed in the Western Concourse and new openings will be formed at the southern end of the Western Range to accommodate the new ticket barriers as well as enhancing its overall setting.
- 2.6.7 Platform Y will be constructed adjacent to Platform 1 and under the Eastern Range. The buffer stops on Platforms 5 to 8 will be relocated further north towards the station throat to accommodate the new concourse level ticket gates in the Southern Wing.

Fit-out, Testing and Commissioning: January 2008 – April 2012

2.6.8 Fit out, testing and commissioning will be an ongoing activity throughout the whole construction period. The new concourse level ticket gates in the Southern Wing will open following a period of fit out and commissioning. Fit out and commissioning of the new Western Concourse will be carried out during the final stages of construction and will be completed by April 2012.

### **Construction Phasing**

2.6.9 The construction works will be carried out over five phases, and Platform Y, the first of which starts in Spring 2007 and the last finishes in mid 2013 with the completion of the new Southern Square. A summary of the main phases of the construction works is described in Table 2.5.

#### Table 2.5 Phasing of Construction Works

Activ	vity	Programme Dates	Total Duration (weeks)
Platf	orm Y (August 2007 - November 2008)		
i)	OHL Sectioning.	August to September 2007	5
ii)	Temporary relocation of Thunderbird sidings.	August 2007	4
iii)	Demolition of Engineer's 'Bothy'.	August to September 2007	2
iv)	Install switches and crossings to new turnout.	November 2007	4
v)	Excavate Cab Road, cast impact wall and base slab.	January to May 2008	16
vi)	New platform, architectural works and service diversions.	January to June 2008	20
vii)	Construct track work to platform road.	August to September 2008	3
ENVIRO	DNMENTAL RESOURCES MANAGEMENT JULY 2006		NETWORK RAIL

NETWORK RAIL

Activ	vity	Programme Dates	Total
			Duration
			(weeks)
viii)	Complete OHL track work to platform road.	August to September 2008	6
ix)	Construct retaining wall adjacent to sidings.	June to August 2008	12
x)	Complete works to new sidings.	September to October 2008	4
xi)	Site commissioning and hand back.	October to November 2008	1
xii)	Open new Thunderbird new sidings.	November 2008	-
,			
Phas	se 1 (April 2007- December 2007)		
i)	Plantroom Area South Ground Slab	March to May 2007	8
íi)	Divert services over new Plantroom slab	May to September 2007	20
iii)	Shared Service Yard construction to GL slab	October to December 2007	14
,	access (to be continued)		
iv)	Divert Pancras Road to permanent location	October 2007	0
v)	Construct new temporary NR Loading Bay	October 2007	2
- /	adjacent to German Gym.		
vi)	Construct SSY structure top down & ramp (to be	October to December 2007	14
,	continued).		
vii)	Relocate Service Yard off SSY footprint, to south	October 2007	0
,			
Phas	se 2 (January 2008 – September 2008)		
i)	Shared Service Yard construction to GL slab	January to September 2008	39
	access (continued)		
ii)	Construct SSY structure top down & ramp	January to September 2008	39
,	(continued)		
iii)	GNH structural works "require access Nth face"	March to September 2008	30
	(to be continued)		
iv)	Construct Plantroom & SSYd structure below	May to September 2008	19
	ground slab (to be continued).		
V)	Western Range Tenants relocated	August to September 2008	4
vi)	Refurbish OBS tunnel across Platforms 1-8 (to	September 2008	4
	be continued)		
vii)	Western Range Modifications (to be continued)	September 2008	2
viii)	Old Booking Hall (to be continued)	September 2008	2
Phas	se 3 (October 2008 – December 2009)		
i)	Shared Service Yard construction to GL slab	October to November 2008	8
	access (continued)		
ii)	Construct SSY structure top down & ramp	October 2008 to February	20
	(continued)	2009	
iii)	GNH structural works "require access Nth face"	October 2008 to March 2009	23
	(continued)		
iv)	Construct Plantroom & SSYd structure below	October 2008 to July 2009	43
	ground slab (continued).		
V)	Refurbish OBS tunnel across Platforms 1-8	October 2008 to December	67
	(continued)	2009	
vi)	Western Range Modifications (continued)	October 2008 to December	67
		2009	
vii)	Old Booking Hall	October 2008 to October	57
		2009	
viii)	Access over NTH roof for NR contractor	October 2008	0
ix)	Bomb Gap Structural works complete (NR) &	October 2008 to March 2009	20
	façade		
X)	Western Concourse foundations	October 2008 to May 2009	33
xi)	North Wing Gable end Bay GL 18.5-19.5	October 2008 to October	59
		2009	
xii)	Access over Shared Service Yard roof	November 2008	0
xiii)	Suburban Shed structural works	November 2008 to October	51
		2009	
xiv)	Relocate FCC ticket office to over SSY G. Slab	November 2008 to January	6
		2009	
xv)	Western Concourse piles r1, 2, 14-16	November 2008 to February	8
		2009	

Activity		Programme Dates	Total
			Duration
			(weeks)
xvi) MSSL handover escalator box area (2 NTH)	2 mo post	December 2008	0
xvii) Services Subway, Struct, Nth of Exist (to be continued)	ing Gents	January to December 2009	50
xviii) Western Concourse pilecaps & groun	d beams	February to April 2009	10
xix) Western Concourse superstructure & be continued)	fit out (to	March to December 2009	41
xx) Erect Western Concourse roof colum	ns r13-16	April to June 2009	8
xxi) Construct cross-platform bridge & sta escalators (to be continued)	irs /	April to December 2009	36
xxii) North Wing WConc/WRange Link GL	21-22	April to November 2009	31
xxiii) Canopies erected (to be continued)		June to December 2009	30
xxiv) Open new Gents & Ladies toilets (NW	/ block)	June 2009	0
xxv) Southern Wing Works (to be continue	d)	June to December 2009	30
xxvi) Fit out SSY & Plant Room to enable to	emporary	June to December 2009	29
use (to be continued)	emporary		20
xxvii) Complete Western Concourse Struc Cladding (to be continued)	ture &	June to December 2009	27
xxviii) North Wing N. Bay GL 22-23 (to be	continued)	November to December 2009	8
xxix) Services Subway Structure, through e	xistina	December 2009	2
Gents (to be continued).			
Phase 4 (January 2010 – March 2012)			
i) LUL NTH opens – target		January 2010	0
ii) Refurbish OBS tunnel across Platforn	าร 1-8	January 2010 to May 2011	72
iii) Western Range Modifications (continu	ued)	January 2010 to January 2012	105
iv) Services Subway Structure, Nth of Ex Gents (continued)	tisting	January to August 2010	30
<ul> <li>v) Western Concourse superstructure &amp; (continued)</li> </ul>	fit out	January 2010 to April 2012	120
vi) Construct cross-platform bridge & sta escalators (continued)	irs /	January to November 2010	50
vii) Canopies erected (continued)		January to September 2010	39
viii) Southern Wing Works (continued)		January 2010 to March 2011	65
ix) Fit out SSY & Plant Room to enable to	emporary	January to May 2010	21
use (continued)			
<ul> <li>x) Complete Western Concourse Structu Cladding (continued)</li> </ul>	ure &	January to October 2010	43
xi) North Wing N. Bay GL 22-23 (continu	ed)	January 2010 to January 2011	53
xii) Services Subway, Struct, through exis (continued)	sting Gents	January to May 2010	20
xiii) Link building GL 23-26.		May 2010 to July 2011	64
xiv) Complete SSY & Plantroom fit out (fo access)	r temporary	May 2010	0
xv) Northern building		May 2010 to June 2011	20
xvi) Western Concourse Fit Out		June 2010 to October 2011	75
xvii) Open OBS route through P. Tunnel e	xtension	January 2011	0
xviii) North West Block GL 27-28		March 2011 to January 2012	45
xix) Final Testing & Commissioning		September 2011 to January 2012	15
xx) Station Assurance (to be continued)		January to March 2012	11
Phase 5 (April 2012 – August 2013)			
i) Open New Western Concourse		April 2012	0
ii) Western Concourse superstructure & fi	t out	April 2012	3
(continued)		April 2012	2
			3
ENVIRONMENTAL RESOURCES MANAGEMENT	JULY 2006	Ν	ETWORK RAIL

Activity	Programme Dates	Total Duration (weeks)
iv) 2012 Olympics Start	June 2012	0
v) Southern Piazza works	August 2012 to August 2013	56
vi) Project Complete	August 2013	0

# **Working Hours**

Main Working Hours

- 2.6.10 Normal working hours during construction will be 0800 to 1800 hours Monday to Friday, 0800 to 1300 hours on Saturday, with no working on Sunday or on Bank Holidays. Quiet work (*eg* plant maintenance) may take place outside these hours.
- 2.6.11 In addition, certain works may be required outside of the normal working hours. For example, where works to the highway are required, these may be undertaken outside of 0800 to 1800 hours, in order to avoid peak rush-hour traffic and to minimise the effects of the works on road users.

# Night-Time Possessions

- 2.6.12 Inevitably when carrying out works at railway stations, night-time working will be necessary during a number of phases of construction. In particular where the works disrupt the normal operation of the station and night-time possessions to the railway are required. Listed below at *paragraphs 2.6.13* and 2.6.14 is an indication of the works which will require night-time and weekend possessions.
- 2.6.13 The following works for the construction of Platform Y will require night-time and weekend possessions:
  - de-wire East Sidings;
  - de-commission East Siding, signalling, OLE, permanent way;
  - extend Platform 1;
  - cable routing;
  - signalling alterations;
  - construct turnout to East Sidings;
  - construct platform wall;
  - complete OLE structures;
  - wiring OLE; and
  - lay permanent way in East Sidings.
- 2.6.14 The following works for the Suburban Shed and the new Western Concourse will require night-time and weekend possessions:
  - service and OHLE diversions for works to Suburban Shed;
  - construction of new southern portal frame;
  - demolition of the Suburban Shed's southern end;
  - construction of new Suburban Shed walls;
  - new roof works;

- shortening of Platforms 5 to 8;
- installation of OBS lifts on Platforms2/3, 4/5 and 6/7;
- construction of service subway; and
- replacement of bridge over platforms.
- 2.6.15 Details of the frequency and duration of this night-time and weekend working is provided in *Chapter 10: Noise* in *Tables 10.9, 10.10 and 10.13*.
- 2.6.16 The night-time and weekend work required will be agreed with the London Boroughs of Camden and Islington prior to the relevant works taking place, and will be subject to agreed noise control measures through the Control of Pollution Act 1974, Section 61 Prior Consent for Works process.

#### **Construction Plant**

2.6.17 Indicative details of the construction plant likely to be used are given in *Chapter 10: Noise.* An indicative summary of the typical heavy plant that is likely to be used during the works is given in *Table 2.6.* 

# Table 2.6Indicative Schedule of Heavy Plant and Equipment to be Used During<br/>Construction

Plant	Mai	n Activities
Tower Cranes	• • • •	Construction of Western Concourse roof and internal superstructure/heavy fit-out Reconstruction of Suburban Train Shed southern end Construction of OBS Preparation Area (past piling) Redevelopment of Western Range, especially Bomb Gap
Piling rigs: eg Bower BG36	•	Rotary piling rig for Loading Bay and OBS Preparation Area walls
Crawler cranes: <i>eg</i> 'Olympus' and 'Andes' crawler cranes	•	To support piling activity
Excavators <i>eg</i> Liebherr R904 Litronic	•	To excavate OBS Preparation Area and Loading Bay
Concrete Pumps: Lorry mounted	•	To pump concrete to 'inaccessible' areas throughout the works
Road Rollers	•	To construct road sections, eg taxi rank

# **Construction Worksite Areas**

# Overview

2.6.18 This section explains the working space required to construct the works and is divided into three key worksite phases. The worksites available extend along the Network Rail boundary to the west of King's Cross station from the Suburban Train Shed concourse in the south, to Goods Way in the north. These worksites will be shared by Network Rail and London Underground with their Management Contractor, Metronet. The figures at *Annex D* illustrate the extent of the worksites. The area with a Blue boarder will be occupied between September 2006 and the end of December 2010. The area with a Red boarder will be occupied between September 2011.

# Worksite Phase A (Q4 2006 to Q4 2007)

2.6.19 Site 'portacabin' accommodation will be established from September 2006, in the northern section of the King's Cross station car park. The accommodation will have a footprint of approximately 600m<sup>2</sup>, initially providing 1,200m<sup>2</sup> of office space over two floors and extending to 2,400m<sup>2</sup> of office space over four floors in December 2007. These offices will accommodate the Network Rail Team, Designers and Main Contractor, the London Underground Limited Team and their Management Contractor, Metronet. The remainder of the car park will remain a station facility. Access to the site will be via Battle Bridge Road.

# Worksite Phase B (Q1 2008 to Q4 2010)

2.6.20 In this phase the worksites will extend across the areas with a Blue and Red border shown in the figure at *Annex D*. The sites will be used to store materials and plant and will accommodate a Welfare Facility which will shared by the Network Rail and LUL/Metronet workforce. The site may accommodate a concrete batching plant specifically for the Network Rail works. The site will also accommodate the station's West Yard which accepts delivery vehicles, disabled parking and waste management. Access to the site will be via haul roads through the Argent site to the west.

# Worksite Phase C (Q1 2011 to Q4 2011)

2.6.21 In this phase the worksites will reduce and be housed within the area depicted by a red border in the figure at *Annex D*. The site will be used to store materials and plant and will accommodate a welfare facility for operatives on the Network Rail sites. The site may also accommodate a concrete batching plant specifically for the Network Rail works. Access to the site will be via haul roads through the Argent site to the west. At the end of this phase all worksites will be handed back to Argent so that development of the King's Cross Central proposals may continue.

# **Construction Workforce**

2.6.22 It is estimated that the combined workforce for the works on the western side of the station at any one time will peak at about 450 people. At other times, the workforce is expected to range from 100 to 400 people. In addition to these personnel a maximum workforce size of 20 people will be required to undertake the track works at Platform Y.

2.6.23 The construction workers will be expected to travel to site by public transport, as there will be little provision for the parking of private vehicles at the construction site.

# **Construction Traffic**

- 2.6.24 There will be Heavy Goods Vehicles (HGVs) entering and leaving site at all stages of the works. These will vary considerably in size and number depending on the activities that are being undertaken on the site at that time. The following points are worth noting:
  - Concrete wagons, which may originate from the concrete batching plant already on King's Cross Lands, are expected to number up to 30 deliveries per day (but typically between 5 and 15).
  - It is calculated that the number of muck-away lorries, removing excavated material, will not exceed 20 per day during the excavation of the loading bay and plant room area. Other areas of excavation are not anticipated to produce spoil at a faster rate.
  - There are likely to be a number of special deliveries or abnormal loads carrying 'extra long/wide/high/heavy' items such as Western Concourse structural roof members or cladding panels.
  - For the Platform Y works it has been calculated that approximately 14 muck-away lorries per day over a 60 day period will be required to remove the spoil from the excavation of the cab road. In addition 4 concrete lorry deliveries per day will be required over a 60 day period in order to construct the concrete slab for the new track in the platform. Spoil generated from the works in the station throat will be removed by rail.
- 2.6.25 *Table 2.7* provides a summary of the daily return trips of HGV and large van trips that will be generated during the five main phases of the KXSE project.
- 2.6.26 Routes for construction traffic involved in bringing materials to or from the site, particularly heavy vehicles, will be agreed with the London Borough of Camden and other necessary authorities prior to construction activity commencing. At this stage it is anticipated that such traffic will be required to use the strategic road network as far as possible. The routes are likely to be very similar to those currently used for the CTRL works.
- 2.6.27 The likely distribution of these vehicles is as follows:
  - York Way northbound 30 %;
  - York Way southbound 30 % (assumption is that 20 % of these vehicles would travel along Pentonville Road and 10 % would travel along Gray's Inn Road);
  - Pancras Road northbound 20 %; and
  - Pancras Road southbound 20 % (assumption is that all of these vehicles would travel westbound along Euston Road).

- 2.6.28 This allocation of vehicles is based on similar distributions for the CTRL and LUL station works which are currently under construction. These vehicles would be restricted to the strategic road network and therefore the impact on surrounding residential areas would be negligible. On the strategic roads surrounding the site, this level of hourly construction traffic represents a fraction of a percentage of typical peak hourly traffic flows on each of these roads (see Section 9.3 in Chapter 9: Transport and Pedestrian Movements). For example during the peak phases of the construction work (Phases 3 and 4) this will mean that the KXSE project will contribute between 1-3 additional vehicles on each of the identified roads in the local area or 11-33 vehicles per day. This assumes the distribution of the vehicles according to the percentage allocations in the bullet list above.
- 2.6.29 Therefore, there is unlikely to be any significant impact on the operation of these roads. Further assessment of the impact of construction vehicles has therefore been scoped out of the EIA.

Phase	Dates	Brief description of				Daily numb	per of retui	n lorry/ large	e van trips			
		works	Muck	k-away	Extra wide	e/ long/ high ads	Concret	e wagons	All othe mat	er plant & erials	All V	ehicles
			Max.	Typical	Max.	Typical	Max.	Typical	Max.	Typical	Max.	Typical
1	Apr 2007- Dec 2007	Divert W. Yard services & start SSY ramp piling	10	5	5	0	10	5	15	5	40	15
2	Jan 2008- Sep 2008	PRA & SSY below ground; W Range modifications	20	5	10	0	30	15	30	15	90	35
3	Oct 2008- Dec 2009	Majority of structural works to W. Concourse, Suburban Shed & W. Range. Start fit out	10	2	10	3	30	15	60	40	110	60
4	Jan 2010 – Mar 2012	Complete structural works (esp W. Range) and all fit out. Test & Comm.	10	0	5	0	20	10	80	50	115	60
5	Apr 2012– Aug 2013	Demolish S. Concourse & replace with Piazza	20	5	0	0	10	5	30	20	60	30

#### Table 2.7Construction Vehicles

2.6.30 Notwithstanding the fact that there will be no significant adverse effects from construction traffic, traffic management measures will be implemented in liaison with the highway authority, to minimise potential disruption that might arise from the presence of construction traffic. Specific routes will be agreed with the highway authority, aiming to avoid sensitive residential areas and unsuitable parts of the network wherever possible.

# Special Deliveries

2.6.31 Special deliveries will need to be brought onto and off the site, including certain large sections of plant, particularly for tower and crawler cranes, and steel sections for the Western Concourse roof (see *Table 2.7*). Regulations exist regarding transportation of such items (with reference to their length, width, height and weight) but these are not anticipated to be prohibitive particularly since the London Underground and CTRL projects have large cranes and piling rigs on site at present. Weekend and night-time road transport movements are likely to be required to avoid the peak periods of activity on the local road network.

# Alterations to Public Roads

2.6.32 No alterations to public roads are likely to be needed to enable the construction of the project. Any large load arriving at site by road is unlikely to be much larger (if at all) than crane sections which have already been delivered to the London Underground and CTRL construction sites. However, should road alterations prove to be needed, the relevant permissions will be obtained from the appropriate authority.

### Routes for Construction Traffic

- 2.6.33 It is envisaged that the majority of construction traffic will use the main roads around King's Cross, namely:
  - Euston Road;
  - York Way;
  - Pancras Road;
  - Goods Way;
  - Caledonian Road; and
  - Midland Road.
- 2.6.34 The KXSE project will seek to use the routes for construction traffic that are currently being used by the London Underground and CTRL projects. By using these well defined routes this should minimise any disruption caused by movements of construction vehicles.

# Code of Construction Practice and Environmental Management Plan

2.6.35 In order to minimise the impacts of construction, including construction traffic, an Environmental Management Plan (EMP) will be developed for the Contractor. Based on earlier rail related work in Camden (at Euston station) an Example Contractor's EMP is attached at *Annex E* to show the kind of coverage and successful delivery of construction mitigation that can be achieved. The production of an EMP will be the responsibility of the chosen construction contractor who will be required to advance the development of its EMP through discussions with the London Boroughs of Camden and Islington and other relevant statutory bodies. The Example Contractor's EMP is based on the *Network Rail Contract Requirements – Environment* (RT/LS/S/015, issue 5, April 2004), which acts as the Code of Construction Practice setting out the minimum environmental standards for these works.

- 2.6.36 The Example Contractor's EMP sets out how the Contractor could translate the mitigation identified during the EIA into a plan for delivery. The measures that are set out in the Example Contractor's EMP are not intended to constrain the Contractor in anyway but to ensure that it delivers a minimum standard of good site practice with regard to the environment. Indeed the Contractor will be encouraged to go beyond the measures described in the Example Contractor's EMP wherever this is practicable. It encapsulates relevant statutory codes, standards and Acts applicable to the regulation of construction practice and its effects on health and safety and the environment.
- 2.6.37 The requirement to produce an EMP will be included in the contractual arrangements between Network Rail and its selected Contractor. Adherence to the EMP will therefore be compulsory. It should be noted that compliance with the EMP will not discharge the Contractor, or its agents, from complying with any statutory requirements in force at the time.



























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# 3 APPROACH TO THE ENVIRONMENTAL IMPACT ASSESSMENT

#### 3.1 INTRODUCTION

3.1.1 This section describes the broad principles of the EIA methodology. In so doing, it describes the approach that has been used to identify and evaluate significant effects and avoid, remedy or mitigate adverse significant environmental effects, where practicable. It also defines the scope of the EIA.

#### 3.2 BASIS OF THE ASSESSMENT

#### Overview

- 3.2.1 The significant environmental effects of the project have been evaluated for each relevant environmental topic (*eg* cultural heritage, townscape, noise etc) by comparing baseline environmental conditions (*ie* the situation without the proposed project) with the conditions that would prevail were the project to be constructed and operated.
- 3.2.2 The environmental impacts of the project have been predicted in relation to environmental receptors, that is, people (*eg* residents of buildings, users of facilities, employees of businesses *etc*), built resources (*eg* a listed building) and natural resources (*eg* a protected species). The duration of the effect is also a key determinant in evaluating whether it leads to a significant effect. Each identified impact has been considered in relation to its duration before concluding whether or not it is significant.
- 3.2.3 Some examples of the potential key receptors in the vicinity of the project are described in *Table 3.1*.

### Table 3.1 Summary of the Potential Key Receptors in the Vicinity of the Project

Receptor Type	Receptor Name
People	<ul> <li>Residential properties and residents on York Way and Euston Road.</li> <li>Users of King's Cross Station.</li> <li>Employees of businesses at King's Cross Station and along Eustern Read and York Way.</li> </ul>
Built resources	<ul> <li>King's Cross Station.</li> <li>Great Northern Hotel.</li> <li>St Pancras Station.</li> <li>King's Cross Conservation Area.</li> </ul>
Natural resources	<ul> <li>Bats within buildings (Great Northern Hotel and King's Cross Station).</li> </ul>

#### **Definition of the Baseline**

3.2.4 A key element of the EIA is the description of the environmental conditions that would prevail in the absence of the project in order to provide a baseline against which changes to the environment resulting from the project can be assessed. For the purposes of the EIA, the project baseline year against which the significant environmental effects have been assessed varies between topics and also differs for construction and operation. The baseline against which significant effects have been assessed is described within each topic section.

#### 3.3 DEFINING THE SIGNIFICANCE OF ENVIRONMENTAL EFFECTS

- 3.3.1 The EIA Regulations require the ES to report the likely significant environmental effects only. While there is no statutory definition of what constitutes a significant effect, it is clear that the primary purpose of identifying the significant effects of a project is to inform the decision-maker, in this case the local planning authority, such that an informed decision can be reached on the planning application. On this basis, a significant effect has been defined as an effect that, either in isolation or combination with others, should - in the opinion of the EIA team - be taken into account in the decision-making process.
- 3.3.2 This definition has provided a common framework within which to predict the significance of effects for all environmental topics arising from the project. Within this framework, a set of criteria for each environmental topic has been used in order to predict any significant effects arising from the project. Following their identification, significant effects have been classified on the basis of their nature and duration, as shown in *Box 3.1*.

### Box 3.1 Classification of Significant Effects

- **Site-specific effects.** Effects that result from a geographically localised impact and which are significant primarily at a neighbourhood or district level.
- Wider effects. Effects that are individually significant at a regional level, but which are unlikely to be significant locally.
- **Positive effects**. Effects that have a beneficial influence on receptors and resources.
- Negative effects. Effects that have an adverse influence on receptors or resources.
- **Temporary effects**. Effects that persist for a limited period only, due for example to particular construction activities (*eg* noise from construction plant). Where possible, the likely duration of temporary effects is identified.
- **Permanent effects.** Effects that result from an irreversible change to the baseline environment (*eg* landtake) or which persist for the foreseeable future (*eg* noise from operation).
- **Direct effects**. Effects that arise from the impact of activities that form an integral part of the project (*eg* new infrastructure).
- **Indirect effects**. Effects that arise from the impact of activities not explicitly forming part of the project (*eg* increased road traffic in neighbouring boroughs due to changes in road layouts).
- **Secondary effects**. Effects that arise as a result of an initial effect of the project (*eg* reduced amenity of a community facility as a result of construction noise).
- **Cumulative effects**. Effects that arise from the combination of different effects at a specific location, the recurrence of effects of the same type at different locations and the interaction of different effects over time.

### 3.4 MITIGATION OF ENVIRONMENTAL EFFECTS

3.4.1 Part II of Schedule 4 to the EIA Regulations requires an ES to include:

'a description of the measures envisaged in order to avoid, reduce and, if possible, remedy significant adverse effects'.

3.4.2 For each significant adverse effect identified, therefore, the specialists undertaking the EIA have proposed mitigation measures consistent with good practice in their respective field, taking into account local constraints and characteristics. All of these mitigation measures have been agreed with NR and have been incorporated into the project. Residual effects (the effects remaining once mitigation is in place) have been classified as non-significant or still significant, albeit reduced, as appropriate.

#### 3.5 DETAILED SCOPE OF THE EIA

#### **Temporal Scope**

- 3.5.1 The temporal scope of the EIA is 2008 to 2020. This timeframe relates to construction taking place from January 2008 to mid 2012 with the Western Concourse opening in mid 2012 in time for the London Olympic Games. The Southern Concourse will then be demolished following the Olympic Games and the new southern square created by the autumn 2013. The timeframe for the assessment of operational impacts extends to 2020. This is because this is the earliest year that the King's Cross Central development will be at full capacity and the maximum number of pedestrian movements will be generated in and around King's Cross station. The new King's Cross station facilities will, however, be able to provide the full capacity from day one of opening in 2012, well before 2020.
- 3.5.2 The temporal scope also takes into account the time of day during which works are undertaken, notably whether they are undertaken during daytime or night-time periods.
- 3.5.3 For certain environmental topics, where effects are dependent on longer-term considerations such as passenger growth (which can affect, for example, operational noise) and future development (which can affect, for example, socio-economic outcomes), the operational phase extends beyond the project opening, to take account of the longer term nature of effects which might occur.
- 3.5.4 The existing environment relevant to each topic is described in the appropriate section of the ES from contemporary information prior to the completion of the CTRL and London Underground construction works, and at a point in early 2006.

#### **Spatial Scope**

- 3.5.5 The geographical coverage of the EIA takes into account the following factors:
  - the physical extent of the proposed works, defined by the limits of land to be acquired or used (temporarily or permanently);
  - the nature of the baseline environment and the manner in which environmental effects are likely to be propagated; and
  - the pattern of local government administrative boundaries, which provide the planning and policy context for the project.
- 3.5.6 The significance of effects can vary spatially. For example, any potential effects on archaeology would be likely to be confined to those areas physically disturbed by construction works, whilst the effects of noise or visual intrusion could be experienced at some distance. In addition, potential effects may only be significant locally (*eg* in the immediate vicinity of the site), whilst others may be significant at a wider level, as described above.

# **Technical Scope**

- 3.5.7 Schedule 4 of the EIA Regulations specifies a range of environmental issues that should be considered as part of an EIA. These issues potentially comprise effects on population (human beings), fauna, flora, soil, water, air, climatic factors, material assets (including the architectural and archaeological heritage), landscape and the interactions between these factors.
- 3.5.8 At the start of the EIA process, this list of generic issues was refined to account for the nature of this particular project, giving due consideration to guidance recently produced by the Environment Agency (EA) on the scoping of EIA projects, which includes specific guidance notes on a range of project types, including railway stations<sup>(1)</sup>. A scoping exercise was then carried out to seek the views of consultees on the technical scope of the EIA, based on a list of specific issues as follows:
  - planning and land use;
  - socio-economics;
  - traffic and transport;
  - noise and vibration;
  - air quality and dust;
  - landscape, townscape and visual effects;
  - ecology and nature conservation;
  - water resources;
  - archaeology and cultural heritage;
  - contaminated land and land quality;
  - non-hazardous waste;
  - micro-climate; and
  - climate change.

- 3.5.9 The findings of this exercise were reported in an Environmental Scoping Report<sup>(1)</sup>.
- 3.5.10 Following the scoping exercise, the issues that were considered to be unlikely to have significant effects were scoped out of the EIA. The issues that were scoped out and the rationale for this are described in *Box 3.2*.

#### Box 3.2 Topics Scoped Out of the EIA and Rationale for Their Exclusion

**Severance during Operation.** Traffic generated during operation is not expected to result in a significant change in the existing traffic flow on the local road network and potential severance effects have therefore been scoped out. Severance in relation to pedestrian movements resulting from other elements of the project are also considered to be unlikely.

**Severance from Construction Traffic.** Construction traffic is not expected to result in significant changes to the layout of the local road network or require new dedicated haul roads to be constructed and potential severance effects have therefore been scoped out. Due to the urban nature of the area, an increase in traffic due to construction activities is not expected to result in any significant severance effect.

**Construction Traffic.** Construction traffic is not expected to result in significant impacts on the capacity of the local road network and the detailed assessment of these effects has therefore been scoped out. (See Section 2.6 in Chapter 2: The Proposed Project for further details).

*Ecology (other than protected species)*. Due to the urban nature of the surrounding environment, the project will not impact on any ecological resources such as designated sites. Therefore, consideration of ecological issues, with the exception of potential effects on bats, has been scoped out.

*Vibration during Construction and Operation*. Percussive piling techniques are unlikely to be used during construction and significant vibration effects during construction have therefore been scoped out. Train movements are currently the only potential source of operational vibration and, given that the provision of the new platform will result in only two extra trains in the peak hour, this will not materially change existing levels of vibration and this issue has therefore been scoped out.

*Air Quality and Noise from Construction and Operational Traffic*. Traffic levels on the local road network are expected to change by less than 10% during both construction and operation and, in accordance with guidance issued by the former DTLR, these issues have therefore been scoped out.

**Dust from Construction Activities.** Although there may be nuisance caused by the deposition of dust generated by construction activities, it is considered that these activities are unlikely to result in increased exposure to respirable airborne dust that can give rise to significant health effects. This issue has therefore been scoped out and the assessment therefore focuses solely on nuisance dust.

**Contaminated Land during Operation**. There are no potential effects in relation to contaminated land during operation and this issue has therefore been scoped out.

*Climate Change*. The construction and operation of the project will not result in the generation of significant levels of greenhouse gases. This issue has, therefore, been scoped out.

*Micro-climate*. The microclimate around the Station will not change significantly as a result of the project and this issue has therefore been scoped out.

(1) ERM (Sept 2003) - King's Cross Station Enhancement Project - Environmental Scoping Report.

### 3.6 CUMULATIVE EFFECTS

# Introduction

- 3.6.1 Cumulative effects may be broadly defined as effects that result from the accumulation of a number of individual effects. They may result from various types of interaction, including:
  - a) a combination of different types of effects at a particular location (which may result from different elements of the proposed development);
  - b) the interaction of different effects over time;
  - c) a number of effects of the same type at different locations, which are not necessarily significant individually, but which collectively may constitute a significant effect; and
  - d) the interaction between effects from the proposed project and other projects in close proximity to the project.
- 3.6.2 Prediction and evaluation of cumulative effects is not straightforward as it is not always possible to directly combine different types of environmental effects on an objective basis. Nevertheless, Government guidance on evaluating environmental information for planning projects<sup>(1)</sup> notes that:

'an impact which has cumulative effects is likely to be a more serious concern and should be highlighted'.

- 3.6.3 In preparing this ES, attention has been paid to the identification of cumulative effects arising from interaction types a), b) and c) in the relevant topic chapters.
- 3.6.4 The following section deals with interaction type d) and describes the other committed developments in the area and provides a commentary on how their construction and operation may interact with the works at King's Cross station. Further details concerning the specific cumulative impacts are provided in the relevant topic chapters.

# **Other Committed Developments**

3.6.5 There are a number of key interfaces with other developments that may be occurring simultaneously or overlap for periods with the project, and any potential interactions are described below.

# Channel Tunnel Rail Link (CTRL)

3.6.6 The CTRL infrastructure at St Pancras Station is expected to be fully operational by 1st January 2007. There will therefore be no interactions between the construction of the CTRL and King's Cross Station Enhancement projects. The CTRL infrastructure therefore forms part of the 2007/2008 baseline against which the effects of the King's Cross Station Enhancement works will be assessed.

(1) Department of the Environment (1994) **Evaluation of Environmental Information for Planning Projects: A Good Practice Guide.** HMSO.

# London Underground

- 3.6.7 The upgrade of the London Underground station includes two new ticket halls, refurbishment of the existing ticket hall, new entrances and improvements to the public realm. The construction works for the new London Underground station at King's Cross will be substantially complete by Q2 2008 with some architectural finishes and fit out taking place until the end of 2008. Commissioning and testing of the new London Underground infrastructure will then take place from early 2008 to Q3 2008.
- 3.6.8 There will be a period of approximately 8 months (between January 2008 and August 2008) where the works to the southern end of the Suburban Shed will overlap with final stages of the London Underground construction works. The temporary haul roads currently used for the London Underground works, and previously used for the CTRL works, are assumed to be left in place. Potential cumulative effects have therefore been considered as described in the relevant topic sections of this ES.

# Other Network Rail Projects at King's Cross Station

- 3.6.9 Network Rail's King's Cross Station Renewals Team will be carrying out some refurbishment works at the station in conjunction with the Western Concourse works. The Eastern Ranges will be refurbished from Q3 2006 and will be complete during Q3 2008. These works will overlap with the KXSE works during Q1 to Q3 2008.
- 3.6.10 The Renewals Team will also be refurbishing both the east and west bore of the Main Train Shed roof from late 2008 until late 2012. During the period Q2 2009 until Q1 2011 the renewals to platforms 1 to 8 will take place. The works to the Suburban Shed roof and platforms will take place from Q3 2008 until Q2 2009.
- 3.6.11 These works are being carried out as permitted development and are not assessed as part of this EIA.

### St Pancras International and Domestic Station and Thameslink

- 3.6.12 The works to St Pancras station, the CTRL infrastructure, Thameslink Station Box and tunnels and associated site restoration, granted permission through the CTRL Act, are expected to be complete by 2007.
- 3.6.13 The £800 million Thameslink scheme would transform services using Thameslink through London. It was expected to be complete by 2006, however, January 2003 saw the Government reject the plans to upgrade the cross-London route, following a Public Inquiry. New plans were developed and the Planning Inspector's report from the second public inquiry was submitted to the Department for Transport in March 2006. The Secretary of State for Transport is expected to announce a decision on the future of the Thameslink programme later in 2006, deciding whether the Network Rail led programme should receive funding and authority to proceed. However, the only works for Thameslink that are scheduled for the King's Cross area are those to construct the new station box at St Pancras Station. This work is already being carried out by CTRL and will be completed prior to the
commencement of the King's Cross Station Enhancement Project. No other major Thameslink works are proposed for the Kings' Cross area, the nearest site being the works proposed at Farringdon. It is therefore, unlikely that the King's Cross Station Enhancement project will interact with the Thameslink construction.

## **Realignment of York Way**

3.6.14 The realignment of York Way is part of the CTRL works. Following the realignment, the Triangle Site, which forms part of the King's Cross Central site, will be to the east of York Way (the Triangle Site is partly in Camden and partly in Islington). The realignment of York Way is now complete and will form part of the baseline in 2007/2008.

# P & O Developments

3.6.15 P & O Developments and P & O Properties are presently undertaking a substantial regeneration of four blocks, A, B, C and D, to the east of York Way, opposite King's Cross station, known as Regent's Quarter. The regeneration proposals include housing, retail, office and leisure facilities and blocks B and C will be completed by 2007. The site is approximately 2.4 ha in size and falls under the control of both Camden and Islington. Blocks B and C are considered to form part of the 2007/2008 baseline against which the effects of the project have been assessed. Blocks A and D will however still be under construction.

# **Cross River Tram**

3.6.16 This scheme entails a tram route running from King's Cross (potentially running along Goods Way) and Camden via Euston and Waterloo, to Peckham and Brixton. However, route choices have not yet been finalised and the funding is unconfirmed. Furthermore construction would not commence until after the London Olympic Games in 2012.

# King's Place

- 3.6.17 The developer, Parabola Land, was granted planning permission by London Borough of Islington during 2005 for the development of King's Place at 82-96 York Way. The site covers approximately 0.6 ha (1.3 acre) and is located immediately to the east of the King's Cross Central site, on the other side of York Way and to the south of the Regent's Canal.
- 3.6.18 The development entails demolition of the existing buildings and redevelopment of a new arts complex, landmark office building of eight/nine storeys, concert hall and conference facility, restaurant and café and sculpture gallery and studios. Guardian Newspapers Limited intends to relocate to King's Place once it is complete during 2006. King's Place will form part of the baseline in 2007/2008.

# **Restoration of St Pancras Chambers**

3.6.19 A planning and listed building application for restoration of the chambers to provide hotel and residential uses was submitted on 30 July 2004 and consent for the scheme was granted by London Borough of Camden in March 2005.

3.6.20 The St Pancras Chambers refurbishment works will run alongside the construction of the second section of the CTRL, with completion in 2007. The St Pancras Chambers refurbishment will form part of the baseline in 2007/2008.

# King's Cross Central Development

3.6.21 The large area of land to the north of the Station will become available for the King's Cross Central developer (Argent) in January 2007 following the completion of the CTRL works. Argent submitted outline planning applications to the London Boroughs of Camden and Islington in May 2004 with updates and revisions in September 2005. The applications have been given approval as of April 2006. The development is proposed to be mixed use, with housing, hotels, retail, car parking and community and leisure facilities and is divided in two by the Regent's Canal. According to the ES for King's Cross Central, construction of the development to south of the canal is likely to start in late 2007 and run in parallel with the King's Cross Station Enhancement works until Q4 2010. The works to the north of the canal will follow on from this and be completed in 2020. Cumulative effects resulting from the overlapping construction of both projects are, therefore, considered as part of the EIA. Furthermore, consideration has been given to the townscape and visual effects of the combined presence of the two projects in the long term.

# Interaction with Other Committed Developments

# **King's Cross Central**

- 3.6.22 The construction phase of the King's Cross Station Enhancement project will overlap with that of the southern part of the King's Cross Central development project. An Environmental Statement has been prepared to accompany the recently-submitted planning applications, which shows that this period of overlap is likely to last from early 2008 to the end of 2010.
- 3.6.23 There are a number of environmental topics for which there could potentially be cumulative impacts from these two projects during the construction phase. However, significant cumulative impacts are not anticipated in relation to noise, air quality, archaeology, ecology, heritage and townscape, water resources, soils and contamination, socio-economics or archaeology.
- 3.6.24 The only aspect where there is a potential cumulative effect is in relation to road traffic. However, the Non-Technical Summary of the King's Cross Central ES states that *"predicted peak levels of construction traffic (35 vehicle movements in each direction in a typical hour) represents a very small percentage of typical hourly flows surrounding the site and would not significantly affect the highway capacity".* The peak hour flows of construction traffic resulting from the King's Cross Station Enhancement project are anticipated to be less than these flows, and no significant cumulative impacts are anticipated.
- 3.6.25 In relation to the possibility of cumulative impacts in general, the Non-Technical Summary of the King's Cross Central ES also states that there will be *"Relatively small increase in construction works and their environmental effects"* from the two projects in combination.

## 3.7 SUSTAINABILITY

## Introduction

3.7.1 A separate Sustainability Statement has been prepared for the King's Cross Station Enhancement project and has been submitted as one of the planning application documents. The key findings of the Sustainability Statement are, however, presented below.

# Overview

- 3.7.2 The sustainability performance of the King's Cross Station Enhancement project reflects the improved capacity to the station and its integration with local and international train services; the linkages with public transport modes such as bus and Underground services; the increased provision of cycle facilities, improved pedestrian movements, together with improved access for people with disabilities. In addition, the Station will serve as the primary transport node for the King's Cross Central mixed-use development currently under construction.
- 3.7.3 Employment opportunities that will be created from the construction of the King's Cross Station Enhancement project will be temporary; however the increase in retail space provision within the station will generate a number of permanent employment opportunities.
- 3.7.4 The location of the station within a mixed-use urban environment will not cause amenity conflict if the noise, vibration and impacts on air quality arising from the construction and operation of the facility are pro-actively managed.
- 3.7.5 Secondary benefits that will accrue from the King's Cross Station Enhancement project relate to the quality of the local area; including the provision of upgraded open space, improved pedestrian linkages through and within the site and improved security.
- 3.7.6 The sustainability performance of the project could be strengthened, and further consideration will be given to a strategy for the procurement of materials, including the specification of materials with a high recycled content for construction materials and fixtures and fittings. The use of water efficient technologies and monitoring of water consumption, and the opportunities for recycling of construction materials on site will also be investigated.
- 3.7.7 The opportunities for utilisation of energy generated by renewable sources will also be investigated; although it is acknowledged that opportunities may be limited due to the urban surroundings and the function of the station as a public space. The increase in recycling facilities and the quantities of waste recycled are a positive element of this aspect.
- 3.7.8 The environmental impact of the development proposals in a sustainability context is primarily in the constraints imposed on the options for surface water drainage. The intensification of the land use, the improvements to an intermodal public transport facility and the design of the Western Concourse such that it is primarily naturally ventilated, are all positive impacts on the environment.

# 4 PLANNING POLICY AND LAND USE

## 4.1 PLANNING POLICY CONTEXT

#### Introduction

- 4.1.1 The following section outlines the relevant national, regional and local planning policy guidance, which applies to the project. Key issues addressed include transport, noise, cultural heritage and archaeology. The section considers policy at three levels:
  - **National Level** as set out in the Transport White Papers, Transport 2010: The Ten Year Transport Plan and PPG13;
  - **Regional Level** as set out in the London Plan and the Mayor's Transport, Energy, Economic and Ambient Noise Strategies; and
  - **Local Level -** as formulated in the Unitary Development Plans (UDPs) of LB Camden and Islington and other supplementary policy statements.
- 4.1.2 In particular, the section assesses the degree to which the project conforms or conflicts with national, regional and development plan policy and the extent to which the project will offer positive benefits to the area.

#### Conformity of the Project with Planning Policy

- 4.1.3 There is a great deal of planning policy that is relevant to the scheme and for reasons of maintaining conciseness, it is not all presented here, but contained in *Annex F*. The annex sets out in full the details of the national, regional and local planning policy context for the project.
- 4.1.4 In overview, the assessment demonstrates that the project conforms with national, regional and local policy. At the national level the Government supports proposals that provide increasing opportunities to interchange with other modes of transport and to make transport more sustainable in its location and its relationships to other modes of travel. The Government's spending plan<sup>(1)</sup> seeks better track, better trains and better stations all of which the project conforms with.
- 4.1.5 The redevelopment at King's Cross station meets aspirations to improve the attractiveness, safety and efficiency of the interchange for public transport users. King's Cross station is identified at the regional and local level as requiring urgent improvement works to increase station capacity, interchange efficiency and network service improvements. The project will meet these objectives.
- 4.1.6 The redevelopment of King's Cross station offers opportunities to meet regional transport objectives by improving public transport capacity and accessibility, expanding national links and enhancing the integration of public transport. These improvements are combined with the potential to achieve

(1) Transport 2010 - The 10 Year Plan, DETR, 2000.

regeneration benefits in a manner that respects sustainable development objectives. By conforming with transport policies that seek to improve transport connections the project forms an integral part of wider integration and regeneration objectives for the area.

- 4.1.7 The redevelopment of King's Cross station is clearly anticipated and supported by Camden UDP, both as improvements to a public transport interchange but also in support of the regeneration intent for the area.
- 4.1.8 The project not only conforms with transport policy objectives but helps to deliver policy aspirations in respect of the enhancement of the historic environment and improvements to the public realm.

#### 4.2 LAND USE CONTEXT

#### Introduction

4.2.1 This section considers the impact resulting from the construction and operation of the project on current and future land uses. It focuses in particular on land use impacts arising from either temporary or permanent land take and changes in the character of the area. Impacts arising from, for example, noise or dust emissions are dealt with in the relevant chapter, unless the impacts are of a type and scale which might cause changes to land use, in which case, it is dealt with in this section.

#### Assumptions

4.2.2 The assumptions made in relation to construction work, programme and the scheme description are set out in *Chapter 2: The Proposed Project*.

#### **Assessment Methodology**

- 4.2.3 The potential effects on land use, which could arise from the construction and operation of the proposed development, have been evaluated within the context of existing land use conditions and the relevant planning policy framework.
- 4.2.4 The types of potential land use effects can be categorised as follows:
  - temporary effects on land use arising from construction activity;
  - permanent effects arising from direct occupation of land by the proposed development; and
  - indirect effects on land use in the surrounding area.
- 4.2.5 The geographical scope of the assessment in respect of land use extends up to a 500 m radius from the development site, to enable surrounding land use and resources to be considered.

# **Baseline Land Uses**

# Introduction

4.2.6 The baseline characteristics described, relate to 2007 and assume the conditions as set out in *Section 3.2* of *Chapter 3: Approach to the Environmental Impact Assessment*. The most likely baseline conditions include committed proposals and UDP allocations.

# King's Cross Station

- 4.2.7 King's Cross Station occupies an area of approximately 3.2 ha, comprising the Main Train Shed, a Suburban Train Shed to the west and the Southern Concourse. King's Cross Station, together with the adjacent St Pancras Station, form a transport hub of strategic importance at the national, regional and local level. The station currently provides linkages to the national and suburban rail network, London Underground, London Buses and pedestrian and cyclist networks and functions as key point of interchange. Its role will be shortly enhanced to that of an international gateway with the completion of the CTRL terminus at the adjacent St Pancras Station.
- 4.2.8 Currently, the station is comprised of eleven platforms; platforms 1-8 are contained within the Main Shed and platforms 9-11 within the Suburban Shed. Within the Southern Concourse, station facilities include a ticket hall, various retail outlets, public amenities and medical facilities, left luggage/lost property services and a bureau de change. In addition to connection with London Underground services, pedestrian tunnel links are also provided to the Thameslink station on Pentonville Road, which offers services to Brighton and Bedford.

# The Great Northern Hotel

4.2.9 The Great Northern Hotel lies between King's Cross and St Pancras Stations and was constructed in 1854 as a purpose built station hotel. Distinguished by its size and radial architecture, it is a landmark building. Works associated with the scheme will affect its setting. The Hotel is currently unoccupied having temporarily become operationally unviable due to its proximity to LUL construction activity. The King's Cross Central project is seeking ultimately to bring the hotel back into use. The cultural heritage and visual significance of this distinctive building are further discussed in *Chapter 7: Cultural Heritage* and *Chapter 8: Townscape and Visual* respectively.

# York Way and Euston Road

4.2.10 A mix of retail, commercial, office and residential uses occupy space along York Way and Euston Road. Residential uses are typically located at first or second level, with retail/commercial uses at ground level. A similar range of uses is expected to persist in 2007/2008.

# Land Between King's Cross and St Pancras

4.2.11 While King's Cross and St Pancras Stations effectively function as a combined transportation interchange underground, at surface level the area is segregated by Pancras Road and the construction works associated with the

London Underground Northern Ticket Hall. By 2007/2008 the present construction works associated with the London Underground Northern Ticket Hall and CTRL will have been substantially completed, and as described in *Chapter 3: Approach to the Environmental Impact Assessment*. The taxi pickup and drop-off area for King's Cross Station returned from its temporary location under the Eastern Range to a new location on Pancras Road to the west of the Great Northern Hotel.

## St Pancras Station

4.2.12 Redevelopment at St Pancras Station is currently underway, focussed on the construction of the CTRL terminus. The modern extension to the station will ultimately provide for high speed international and domestic services, enhanced Midland Main Line services and Thameslink connections. CTRL works are well underway, including the works on the international terminus at St Pancras Station. The work programme anticipates construction to be completed by 2006, with a permit to use issued in 2007.

# King's Cross Railway Lands

4.2.13 King's Cross Railway Lands, extending up to 750 m to the north, are currently occupied by derelict factories/warehouses and associated buildings (see *Figure 4.1*). These lands are subject to the King's Cross Central redevelopment project (see *Section 3.6.10*). Development details have been finalised and are currently under consideration by LB Camden. The latest information suggests that in 2007 the first stages of the King's Cross Railway Lands construction will run concurrently with the Western Concourse construction.

# Regent's Quarter

4.2.14 Regent's Quarter is a mixed-use development occupying the northeast corner of Euston Road and York Way. It incorporates residential units, retail and commercial floor space including shops, restaurants and bars, leisure facilities, office space and hotel. The development was completed in 2005 (see *Figure 4.1*)

#### Parabola Development – York Way

4.2.15 A planning application has been submitted for an eight storey office building to the East of York Way, bounded by the Regents Canal and Battlesbridge Basin. The scheme also includes an arts centre and gallery along with a conference centre, restaurant and café. The agents have confirmed that this should be built out by 2007.

# Effects on Land Use during Construction

#### Effects on King's Cross Station

4.2.16 Changes in land use associated with the construction phase of the project will be confined to the development site. The land take required for the construction will be within the development site with minor temporary exceptions.

- 4.2.17 King's Cross Station will continue to operate as normal during the construction works. With the exception of the construction of Platform Y and the movement of the buffers on Platforms 5 to 8, there are no large scale changes proposed to the train platforms and interruptions to train services will be minimised. Some commercial activities in the Western Range and Southern Concourse will be displaced during the construction of the project.
- 4.2.18 Users of the station will perceive a temporary change in land use character as parts of the site are demolished and redeveloped. The predominant land use will remain a railway station.
- 4.2.19 Impacts on land use during construction will not be significant and only likely to cause disruption to NR's own operation and a small number of retail/commercial interests within the station. Impacts will be negligible during the construction phase; with a low magnitude of land use change associated with construction activity. Effects on the overall townscape are discussed in *Chapter 8: Townscape and Visual.*

# Permanent Effects on Land Use

#### Intensification of Development

- 4.2.20 There is no overall change in the existing land use of the area. However, the development does result in a necessary intensification of use to meet increasing demands on the station, with the expansion of concourse size, circulation areas, station facilities and support facilities.
- 4.2.21 The concourse size will almost double in size and circulation areas will be increased over two levels. Core passenger accommodation will be diversified, with a new passenger lounge area to be introduced. Ancillary retail and catering uses will increase to meet increased passenger throughput, but remain ancillary to King's Cross role as a transport interchange.

# Changes of Land Use within the Development Site

- 4.2.22 Although there is no overall change in land use character of the site, there are small localised pockets of change within the development site, associated with:
  - creation of an additional platform, to be known as Platform Y;
  - relocation of the existing concourse, to the western side of the station; and
  - creation of new area of open space on the site of the existing Southern Concourse.
- 4.2.23 The construction of Platform Y will result in the change of the Cab Road (where the current taxi road is temporarily located) to station infrastructure.
- 4.2.24 The relocation of the concourse to the western side of the station (and associated removal of the Southern Concourse) will have a significant positive, though localised effect, on land use patterns within the station environs. The new Western Concourse will be developed on an area that in 2007 will have reverted back to the station taxi rank, introducing built development in what is an existing more open area. The creation of a new public realm along the Euston Road frontage will provide opportunities for new

public uses. The impacts of these changes in terms of the visual and townscape environment are discussed in detail in *Chapter 8: Townscape and Visual*.

#### Conclusion

4.2.25 There will be no significant impacts on the overall land use character of the area. There will be small scale positive impacts associated with the creation of a new area of public space and a modern concourse building.



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metres

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# 5 SOCIO-ECONOMIC AND URBAN REGENERATION EFFECTS

#### 5.1 INTRODUCTION

- 5.1.1 This chapter examines the core socio-economic and urban regeneration effects that are anticipated as a result of the redevelopment of King's Cross station. Effects are examined in the context of the socioeconomic characteristics of a defined study area, followed by an examination of the likely employment effects during construction and operation of the redevelopment proposal.
- 5.1.2 Likely socio-economic effects of the scheme have been considered in relation to:
  - increased employment opportunities;
  - tackling social exclusion by improving accessibility for all people, in particular the local population;
  - increased accessibility to existing employment centres and the expansion of the labour market catchments; and
  - regeneration and economic development benefits.

#### 5.2 METHODOLOGY

- 5.2.1 This section describes the socio-economic characteristics of the Primary Study Area. For the proposed redevelopment, this has been defined to include those wards that are anticipated to experience the regeneration effects of the project. The Primary Study Area (PSA), shown in *Figure 5.1,* incorporates the wards immediately adjoining the site, including King's Cross, St Pancras & Somers Town and Caledonian. King's Cross and St Pancras & Somers Town wards are contained within the London Borough of Camden, while Caledonian lies in the London Borough of Islington.
- 5.2.2 The following analyses clearly indicate the source and relevant date of the statistics used.

#### 5.3 BASELINE ENVIRONMENT

#### Socio-economic Profile

5.3.1 At the time of the 2001 Census, the age structure of the primary study area was characterised by very high proportions of young to middle aged adults, with almost 50 % of the total population aged between 20-44 years. Almost half of these were aged below 30 years (23 % of total population). These characteristics are reflective of the inner city location of the primary study area.

5.3.2 *Table 5.1* shows the characteristics of the resident population of the primary study area for the redevelopment of King's Cross station. The proportion of residents of working age in the primary study area is 71.7 %, slightly higher than that of the Camden and Islington populations of 70.0 % and 68.9 % respectively.

# Table 5.1Resident Population 2001

	Primary Study Area	LB Camden	LB Islington
Primary Study Area of which,	35,469	198,020	175,797
Total Working Age (1)	25,425	138,682	121,090
Share of Total Population	71.7 %	70.0 %	68.9 %
Notes			
(1) Population aged 16-59			
Sources: National Statistics -	- Census 2001 Age Struct	ure (National to Wa	rd Level) (2001)

# Deprivation

5.3.3 The Index of Multiple Deprivation 2004 measures deprivation for every Super Output Area (SOA) in England. The index is comprised of seven domain indices (income, employment, health deprivation and disability, education skills and training, barriers to housing and services, crime and disorder and living environment) which is combined into a single deprivation score for each SOA.

# Table 5.2Index of Multiple Deprivation 2004

Factor	Un-weighted Rank for the PSA*	
Income	4,947	
Employment	7,700	
Health and Disability	5,379	
Education, Skills and Training	12,180	
Housing and Services	949	
Crime and Disorder	7,273	
Living Environment	4,434	
Index of Multiple Deprivation	4,104	
Source: National Statistics – Index of Multiple Deprivation for Wards (2004)		

- 5.3.4 *Table 5.2* shows a summary of Index of Multiple Deprivation (IMD) (2004), which has combined the ranks of the individual SOA that comprise the PSA, to give an un-weighted ranking for the seven individual indices and the overall index of multiple deprivation.
- 5.3.5 There are 32,482 SOAs in England; where a SOA is ranked 1 it is the most deprived and 32,482 being the least deprived. The PSA has an overall IMD ranking of 4,104, which means based on its unweighted average the PSA is one of the 25 % most deprived areas in the country.

- 5.3.6 Within the PSA, the SOAs show particularly high levels of deprivation within all the factors with the exception of education, skills and training. For all other domains the PSA falls within at least the 25% most deprived areas in England. The PSA demonstrates even higher levels of deprivation in relation to barriers to housing and services, falling within the 5% most deprived areas in the country.
- 5.3.7 The proposed enhancement works at King's Cross station will contribute to the wider regeneration of the area and lead to improvements to the overall level of deprivation.

#### The Labour Market - Resident Economic Activity Rates

- 5.3.8 Economic activity rates are not available at ward level. *Table 5.3* shows that in the third quarter of 2005 resident economic activity for Camden and Islington are below that for London and further below the England averages.
- 5.3.9 *Table 5.3* shows that in the five years between 2000 and 2005, economic activity rates in Camden and Islington have decreased more significantly than the general trend in London and England which have remained relatively stable. Economic activity rates at a national level have remained stable. The decreases in economic activity in Camden and Islington have been experienced in both male and female economic activity rates, though there has been a smaller decrease in female economic activity in Islington.

# Table 5.3Economic Activity Rates of the Population of Working Age Third Quarter2000 and 2005

	LB Camden	LB Islington	London	England
2000 Economic Activity Pates		g.o		
2000 Economic Activity Nates				
Males	80.9	81.5	83.9	85.2
Females	64.6	64.4	70.5	73.3
TOTAL	73.6	73.0	77.2	79.4
2005 Economic Activity Rates				
Males	73.6	73.3	81.6	83.9
Females	58.7	61.2	67.5	73.4
TOTAL	67.0	67.1	74.7	78.8
Source: Nomis (2005) 'Labour Fo	rce Survey'			

5.3.10 In the first quarter of 2005 Camden had an unemployment level of 6.4 % and Islington recorded a rate of 6.8 %. These rates were marginally lower than the London rate of 7.1 % and considerably higher than the national rate of 4.7 %. It is important to note, however, that the unemployment rates for Camden and Islington have dropped dramatically since the first quarter of 2000 from 9.0 % and 11.3 % respectively. This is likely to be attributed to the gradual regeneration of the area, and is anticipated to improve further with the completion of current regeneration proposals including the enhancement of King's Cross station.

#### **Employment Composition of the Local Economy**

- 5.3.11 *Table 5.4* shows the industrial composition for the second quarter of 1995 and 2005. It clearly indicates that employment in the inner London local authority areas of Camden and Islington are dominated by the banking and finance and public administration sectors. The services and distribution sectors also make a significant contribution. In particular, the proportion of the population employed in the services and finance sectors is considerably higher when compared to the London and national averages.
- 5.3.12 *Table 5.4* shows that between 1995 and 2005 Camden experienced some changes in its employment structure that differed from the London and national trends, including a decrease in the service sector and a significant increase in the importance of the Banking and Finance sector, of some 15 percentage points.

# Table 5.4Industrial Composition of Workplace Based Employment Second Quarter1995 and 2005

	% of Workforce in Each Sector			
	LB Camden	LB Islington	London	England
1995				
Manufacturing	8.8	12.4	10.1	19.1
Construction			6.1	7.0
Other Services	16.9	9.8	8.5	5.9
Distribution	19.3	16.9	19.0	20.3
Transport and Communications	8.3	-	8.0	6.4
Banking and Finance	20.7	27.1	22.8	14.4
Public Administration	22.8	23.5	24.0	23.4
2005				
Manufacturing	-	8.3	6.9	13.5
Construction	-	-	6.5	7.8
Other Services	12.4	14.3	8.6	6.1
Distribution	16.0	10.4	17.9	19.7
Transport and Communications	-	-	7.7	6.8
Banking and Finance	36.1	28.4	24.8	16.2
Public Administration	23.4	28.1	26.6	27.6
Note: - denotes no data available				
Source: NOMIS (2005) 'Labour Fo	orce Survey'			

5.3.13 The inner city location of Camden and Islington is reflected in the dominance of the service/finance/public administration sectors in 2005.

## 5.4 ASSESSMENT OF ENVIRONMENTAL EFFECTS

#### **Employment Effects**

5.4.1 This section examines the net employment likely to be generated by the proposed redevelopment of King's Cross station in the London Boroughs of Camden and Islington. This assessment considers the following employment effects of the proposed redevelopment:

- *direct employment effects* resulting from the operation of the redeveloped station and employment created by additional commercial development proposed within the station;
- *indirect employment effects* arising from the expenditure on local goods and services of the companies occupying additional development floorspace as a consequence of the station enhancement;
- *induced employment effects* reflecting the spending in the local economy of incomes earned in both direct and indirect employment; and
- the *temporary jobs* created directly by the construction of the redevelopment of King's Cross station and, in addition, the temporary indirect and induced effects as construction companies and workers spend money in the local economy.

# Permanent Employment Effects

5.4.2 The current railway staff component of King's Cross station is set out in *Table 5.5.* These numbers are not anticipated to change during or after the station improvements.

# Table 5.5Permanent King's Cross Railway Staff

King's Cross Station	Staff Number
Station Team	35
GNER	45
FCC	26
TOTAL	106

5.4.3 Hence there will be no permanent direct, indirect or induced employment effects associated with the project.

#### Property Driven Employment Effects

- 5.4.4 There will be property driven employment effects associated with increased commercial floorspace within the scheme. This section translates those property effects into employment impacts.
- 5.4.5 The redevelopment of King's Cross station will result in a net increase of retail and catering floorspace of 1,665 m<sup>2</sup>. *Table 5.6* shows how this increase in floorspace translates into additional direct employment. The employment density ratio has been derived from the 2001 Arup's study for English Partnerships. This indicates that a density of 1 employee per 10 m<sup>2</sup> of floorspace in small retail outlets, such as found in railway stations, is appropriate.

#### Table 5.6 Property Driven Employment Effects

Additional Retail/Catering Floorspace	Floorspace/Employee Ratio m <sup>2</sup> net per FTE <sup>(1)</sup>	Direct Employment
1,665 m <sup>2</sup>	10	193
Note: <sup>(1)</sup> Arup's Study for Englis	h Partnerships 'Employment Dens	ities Study', 2001.

5.4.6 These directly generated jobs will also support further employment in the local economy through supply and income multiplier effects. By applying multiplier values to the net additional direct employment generated by the property market effects the total employment generated by the increase in floorspace can be derived as shown in *Table 5.7*.

# Table 5.7Secondary Property Driven Employment Effects

Direct Property Driven Employment	Indirect (direct x 0.05)	Induced (25% direct + 50% indirect) x 0.1	Total Full Time Equivalent
167	8	5	180

5.4.7 The overall gross employment associated with the increase in retail and catering floorspace is 180 jobs.

# Construction Employment Effects

- 5.4.8 Socioeconomic impacts arising during the construction phase will be temporary. They specifically relate to employment generated by the construction process, involving direct employment on site, plus indirect and induced employment effects and the effects on commercial interests within the local area. The effects include:
  - direct employment on site;
  - indirect employment relating to the supply of materials and services to the construction process; and
  - induced employment generated by the expenditure of incomes earned in direct and induced employment.

#### Direct Effects

- 5.4.9 The redevelopment of King's Cross station will create construction jobs both in the redevelopment itself and in the intensification of development in the area. The amount of employment created is a function of the scale and type of construction expenditure.
- 5.4.10 The assumptions are based on NR's capital cost estimates:
  - capital construction costs equate to £249 million (including Platform Y works);
  - the construction work will be completed by the year 2012, though demolition of the existing concourse will not take place until the third quarter of 2013; and
  - approximately £80,000 of capital construction expenditure supports one person-year of employment. This figure is derived from experience of major capital works expenditure elsewhere.

5.4.11 Based on this jobs/cost ratio, the project is expected to generate approximately 3,000 person years of employment as shown in *Table 5.8.* 

Table 5.8	Direct Construction Employment (person years) (2003 prices)
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Capital Cost (£M)	Job: Capital Ratio (Job:£'000 expenditure)	Jobs Created (Person Years)
249	1:80	3,113

- 5.4.12 Using a standard ratio of ten person years of construction work being treated as equivalent to one permanent job, this is equivalent to some 311 permanent jobs. Typically, on major civil engineering contracts, about one quarter of construction jobs are taken up by local residents, with the remainder being brought to the site from the contractor's base of operations. Thus, of the total 3,113 person years of construction employment for the proposed redevelopment, approximately 778 person years (or 78 permanent job equivalents) are likely to be taken up by residents of the surrounding boroughs.
- 5.4.13 The source of the workforce is anticipated by the developers to be largely drawn from London and the southeast of England. Some workers may transfer from existing transport works at King's Cross/St Pancras, such as the LU and CTRL projects. The vast majority of workers are expected to travel to the site by public transport.

#### Secondary Effects

- 5.4.14 These temporary jobs will support further employment in the local economy, through indirect or supply chain effects and induced or income multiplier effects. The magnitude of these effects will depend on many factors, including the availability of local supplies and the contractors' supply processes. While a proportion of construction services can be expected to be hired locally, more technical equipment will be purchased from national or global markets and this expenditure will not therefore enter the local economy.
- 5.4.15 Overall the gross temporary employment generated in the local economy is 3,355 years, which is considered to be equivalent to 336 full time permanent jobs, as shown in *Table 5.9*.

#### Table 5.9 Temporary Employment (person years) and Permanent Equivalent

Direct	Indirect (direct x 0.05)	Induced (25% direct + 50% indirect) x 0.1	Total Person Years	Permanent full time equivalent
3,113	156	86	3,355	336

#### **Retail Impact Assessment**

Overview

5.4.16 Network Rail commissioned a Retail Impact Assessment to identify the effect that the uplift in retail provision at King's Cross station would have on local

retailers. The complete assessment has been submitted with the main planning application and is summarised below.

#### Summary

- 5.4.17 There is a clear quantitative need for the scale of retailing proposed within the station. The quantitative assessment identifies an ample need to support the retail elements of both St Pancras and King's Cross stations and this is largely based on highly conservative assumptions.
- 5.4.18 The qualitative need assessment has identified a clear need for the scale of retailing proposed. The provision is fully consistent with the level of retail provision at other railway stations across London. In fact, *Table 5.10* shows that with the new level of retail provision proposed the station will still have a smaller provision of retail than the majority of other railway stations across London.

London Station	Approximate Total Retail Provision (m <sup>2</sup> gross)
Liverpool Street	7,486
Victoria	5,568
Paddington	5,369
Waterloo	4,181
Euston	3,499
London Bridge	1,692
King's Cross - current	1,630
King's Cross - proposed	3,295

#### Table 5.10 Retail Provision at London Stations

- 5.4.19 The station is in a position, with the level of passenger numbers passing through, to support new better quality retailing to relieve pressure on the concourse area and provide enhanced opportunities for eating and drinking. The proposed retail floorspace is therefore of an appropriate scale to coincide with the redevelopment and enhancement of King's Cross station's facilities.
- 5.4.20 As the proposal is consistent with identified quantitative and qualitative need, it is evident that the overall impact of the proposal will be positive by enhancing consumer choice in line with national policy. The localised retail provision surrounding King's Cross station is in good health with very few vacancies. The proposal will therefore not harm the current role and function of this provision as the proposed units will serve a market distinct from the existing centres. As a consequence, no risk to the long term viability of the other centres is envisaged.
- 5.4.21 Other schemes surrounding King's Cross station, including the King's Cross Central scheme, and The Regent Quarter will draw their catchment from local residents, the local workforce and from expenditure that is not currently captured by the existing local retail provision. The retail provision at King's Cross station is intended to serve solely the passengers using the station.

# Potential Contribution to Economic Development and Urban Regeneration

#### Overview

- 5.4.22 Transport links are frequently cited as one of the most important considerations for businesses and individual investors when making decisions about where to locate. In areas requiring regeneration, gaining investor confidence often proves more difficult on the basis of the weak economic history. Improvements to accessibility will assist in restoring this confidence while poor infrastructure is likely to drive potential businesses and investors away from a region. For designated regeneration areas, enhanced accessibility is integral to improving local economic and social prospects.
- 5.4.23 The advantages offered by the enhanced King's Cross station, plus other major infrastructure projects and proposals such as CTRL, Thameslink 2000 and Cross River Tram, have clearly been recognised by developers and investors. This section examines the likely effects the project will contribute to the overall regeneration benefits of the King's Cross area.

#### Increased Accessibility to Existing Employment Centres

5.4.24 The opening of Platform Y will provide for greater station flexibility and could accommodate an additional 24 trains over a 12 hour period, taking the station capacity from 315 trains in a twelve hour period to 339 trains. This will increase accessibility to central London (to meet a projected need identified by the Strategic Rail Authority) and help to accommodate economic and demographic growth. Enhanced public transport provision is seen to be key to meet increasing demands and to serve economic regeneration.

#### The Role of the Station Redevelopment in Regeneration

- 5.4.25 The proposed project is complementary to the major expansion at St Pancras station and together, will enhance the role of this key London transport interchange to one of the largest integrated transport hubs within Europe. Integration with the CTRL will be a key component of this, expanding the catchment area accessible to the station and enhancing the status of the station through improved links to an international gateway. Given the existing networks and services provided at the station, the project will complement a range of new route opportunities, within the country and those abroad provided by St Pancras station.
- 5.4.26 The enhanced accessibility at the station will complement surrounding redevelopment activities and will help achieve a range of key regeneration effects. The physical improvements to the surrounding area as a result of the project: the removal of the southern concourse; reinstatement of the station façade in the public realm; and the creation of a new or open space will help to raise the local image and improve market perceptions of the area. These effects will further contribute to the overall improvement of local economic and social prospects of the area.

5.4.27 Within the wider context, redevelopment of landmark locations within the King's Cross area (St Pancras and King's Cross stations) in combination with key development projects (King's Cross Central) will not only create valuable local economic, social and visual improvements following their completion, but will provide the impetus for ongoing small- and large- scale regeneration in the area.

#### 5.5 CONCLUSIONS

- 5.5.1 There will be no permanent direct, indirect or induced employment effects on railway staff as a result of the project. However, there will be an additional 180 permanent jobs and 3,355 person years of temporary employment generated in the local economy.
- 5.5.2 The project will provide greater station flexibility and will increase accessibility to central London, helping to accommodate economic and demographic growth. Since enhanced public transport provision is seen to be key to meet increasing demands and to serve economic regeneration, the project will complement surrounding redevelopment activities and will help achieve a range of key regeneration effects. These effects will further contribute to the overall improvement of local economic and social prospects of the area.



## 6 ARCHAEOLOGY

#### 6.1 INTRODUCTION

#### Overview

- 6.1.1 A desk based assessment of the archaeological potential of the King's Cross site has been carried out in accordance with the model brief published by the Greater London Archaeological Advisory Service, the standards specified by the Institute of Field Archaeologists<sup>(1)</sup> and the main thresholds of importance proposed in *Planning Policy Guidance Note 16: Planning and Archaeology (PPG16)*.
- 6.1.2 This chapter summarises the findings of the desk based assessment, with supporting information provided in *Annex G*.

#### Scope of the Assessment

#### Spatial Scope

6.1.3 This assessment is limited to below-ground resources in the areas of the proposed works. In order to predict the potential for archaeological resources, a study area of 600 m radius around the site centre has been used.

#### Temporal Scope

- 6.1.4 The temporal scope is February 2007 to September 2009 when it is proposed that construction that involves excavation will be undertaken. The archaeological baseline is taken as the resources that will be present at the start of the construction period in September 2006.
- 6.1.5 Consideration has been given to the immediate and permanent, effects during the design and construction phase, which includes preliminary works that may be required.
- 6.1.6 It is envisaged that there will be no significant effects on archaeology once the construction works have been completed and hence 'operational' effects are not considered.

#### Potential Effects

- 6.1.7 The proposed development has the potential for both positive and negative effects. Potential positive effects include:
  - an increase in knowledge resulting from the recording and analysis of archaeological remains, carried out as part of the mitigation strategy; and
  - the opportunity to involve and inform local communities and the wider public about their historic environment.

6.1.8 The key potential negative effect is the physical removal of, and damage to, archaeological resources resulting from construction work, such as excavation for new station infrastructure, ground reduction for the new Platform Y and associated temporary works.

#### Sources of Information

- 6.1.9 The baseline data has been assembled from a variety of published, written or graphical sources, a full bibliography of which is provided in *Section G.2* at *Annex G*, comprising the following:
  - lists, plans and information on Scheduled Ancient Monuments (SAMs) and listed historic parks and gardens held by English Heritage (EH);
  - records of Archaeological Priority Areas (APAs) or their equivalents designated by local authorities;
  - the Greater London Sites and Monuments Record (GLSMR);
  - the London Archaeological Archive & Research Centre (LAARC) records of archaeological fieldwork;
  - records of previous archaeological fieldwork on the site (held by MoLAS); and
  - geological mapping (provided by the British Geological Survey).

#### 6.2 METHODOLOGY

- 6.2.1 The assessment methodology is based upon:
  - establishing the **potential** for archaeological resources to remain in the ground at the site;
  - evaluating the **importance** of the potential remaining resources;
  - establishing the **extent** to which the proposed construction works will affect the potential remaining resources;
  - developing **mitigation** measures to avoid, reduce or compensate for negative effects and enhancing positive effects; and
  - assessing the **residual impacts** of the proposed construction works by comparing the severity of the predicted effect to the importance of the potential resource.
- 6.2.2 The potential for remaining archaeological resources was established by comparing the information in the reviewed records with the known extent of past or ongoing construction works in the area not associated with the project.

6.2.3 The importance of the potential remaining resources was evaluated on the basis of national, regional and local criteria and English Heritage guidance. The criteria are explained in detail in *Annex G*. The resulting categories used in this assessment are High, Medium and Low importance, defined as follows:

#### High importance: one or more of the following characteristics is exhibited:

- It/they forms part of or contains: a nationally protected resource, such as a Scheduled Ancient Monument; or an identified resource of notable and established significance.
- A demonstrable considerable historical potential measured against English Heritage criteria local research agenda.
- An extensive body of supporting data/sources, such as historic documentation.
- Resources with a considerable wider collective/comparative potential and group value. They can contribute significantly to regional or national Research Agendas and policy objectives.
- Resources that are notably rare, fragile or complex.
- Notable and well-established historic associations, eg with notable people, events, etc.
- Considerable amenity or social values associated with the site.

# Medium Importance: where the resource exhibits one or more of the following characteristics:

- a demonstrable historical potential measured against local or regional criteria, eg the local Research Agenda.
- Existence of supporting data/sources such as historic documentation.
- Resources that have a collective/comparative potential and group value, measurable against local Research Agendas and/or local policy objectives (*eg* UDPs).
- Multi-phase resources exhibiting evidence of continuity.
- Resources that are considered scarce or vulnerable.

# Low Importance: where the resource does not have any of the characteristics listed under Moderate or High importance.

- 6.2.4 Where potential negative effects on archaeological resources were identified, mitigation measures have been established based upon:
  - geophysical survey;
  - archaeological monitoring of geotechnical test pits conducted primarily for engineering purposes;
  - archaeological field evaluation (test pits or trial trenches); and
  - geoarchaeological survey (including palaeo-environmental sampling and boreholes).
- 6.2.5 The severity of effect was established by considering the extent of the effect, the physical proportion of the resource affected and the predicted fragility and vulnerability of the resource.
- 6.2.6 Where appropriate, a series of significant and even non-significant effects were grouped together if cumulatively they are of greater significance than individually.

#### 6.3 BASELINE ENVIRONMENT

#### Introduction

- 6.3.1 The baseline archaeological information is presented in detail in *Annex G*. This section summarises the archaeological potential, that is, the potential resources remaining in situ or undisturbed by previous or ongoing construction works.
- 6.3.2 The timescales that are referred to within this section are as follows:

Prehistoric <sup>(1)</sup> :	450 000 BC-AD 43
Roman:	AD 43-410
Saxon (early-medieval):	AD 410-1066
Medieval:	AD 1066-1485
Post-medieval:	AD 1485-present

#### The Potential for Prehistoric Archaeology

- 6.3.3 The lack of prehistoric finds from the search area, and the extensive 19<sup>th</sup> Century disturbance, indicate that the site has a low potential for prehistoric remains sealed beneath or within the alluvium of the former River Fleet. Such remains would only be present within former channels of the Fleet. The extent of the channel either side of the centre line shown in *Figure 6.1*. The courses of earlier channels of the Fleet are unknown.
- 6.3.4 Such remains that are present would probably be of moderate importance, because the rarity of prehistoric finds in this locality that would have potential to add to the understanding of prehistoric activity, and also because of the likelihood of good preservation conditions within alluvial deposits.

# The Potential for Roman, Saxon, Medieval, and the 16<sup>th</sup> to early 19<sup>th</sup> Centuries Archaeology

- 6.3.5 Given the extensive mid 19<sup>th</sup> Century construction works and excavations (*ie* 'disturbance') to levels below the surface of the natural geological deposits (London Clay), the low density of historic remains in the surrounding area, and the fact that the medieval to late 18<sup>th</sup> Century land use on the site appears to have been limited to water meadows or fields, there is no evidence to suggest that the majority of the site has any archaeological potential for the Roman, Saxon, and medieval periods, nor for post-medieval remains up to the mid-19<sup>th</sup> Century.
- 6.3.6 Surviving remains from the pre-railway occupation, *eg* that shown on maps of 1812 to 1832, would probably be of low importance, or moderate importance if they were able to contribute significantly to the local research objective 'understanding the creation of London suburbs'<sup>(2)</sup>.

# (1) The Prehistoric period refers collectively to the Palaeolithic, Mesolithic, Neolithic, Bronze Age and Iron Age.(2) Museum of London (2002) A research framework for London archaeology 2002, 69.

# Potential for Mid and Late 19<sup>th</sup> Century Archaeology

- 6.3.7 The extensive mid 19<sup>th</sup> Century disturbance demonstrated by previous fieldwork at King's Cross suggests that only deep cut features such as basements or the early ice houses and associated tunnel from the Great Northern Hotel already found on the site (Site 1 on *Figure 6.1*) might survive. These resources may include sections of the Hotel Curve Tunnel, thought to survive to the north of a point approximately level with the Western Range of the main Station building. These finds from the site demonstrate that it has a high potential for such late post-medieval remains.
- 6.3.8 Significant remains that could be identified with documented buildings or the Victorian railways (such as the 1794 London Smallpox Hospital, the standing Great Northern Hotel, remains from the 19<sup>th</sup> Century railway layouts, the gas works and canal basin), would probably be of moderate importance. Less significant remains would probably be of low importance only.

# 6.4 ASSESSMENT OF ENVIRONMENTAL EFFECTS

# **Potential Effects**

6.4.1 The potential effects of the proposed below ground works for the main construction areas and the archaeological importance of the potential archaeology in each area are outlined below.

#### Concourse

- 6.4.2 The proposed concourse floor, where it is outside the boundary of London Underground's proposed Northern Ticket Hall, will be founded at 16.0 m above Ordnance Datum (AOD), around 0.5 m below existing ground level. Previous fieldwork (Site 1 in *Figure 6.1*) indicates disturbance from former construction activity to be a minimum of 0.2 m below ground level for mid 19<sup>th</sup> Century structures, and 2.0 to 3.5 m for earlier remains. The construction of the concourse floor level will remove a maximum of around 0.3 m of mid 19<sup>th</sup> Century or later potential remains. There will be no effect on potential earlier remains from the works associated with the concourse floor.
- 6.4.3 The roof support columns on the western side of the concourse will be supported on groups of six 900 mm diameter piles, founded at a depth of approximately 28 m below ground on the London Clay, and topped by a 1.5 m thick pile cap of approximately 6.9 m x 3.9 m. There will also be a ground beam running between each of the columns approximately 1,000 mm wide and 500 mm deep. The canopy support columns on the western side of the concourse will be supported on pairs of 600 mm diameter piles, topped by a 0.9 m thick pile cap measuring approximately 2.7 m x 0.9 m. The effect of the support columns will be:
  - to remove a maximum of around 0.3 m of mid 19<sup>th</sup> Century or later potential remains in the footprints of the ground beams;
  - to remove a maximum of around 1.3 m of similar remains in the footprints of the pile caps two other pile caps, on the eastern side of the concourse adjacent to the London Underground ticket office, will be 1.0 m deep;

- to remove potential archaeological remains within the footprints of the individual piles; and
- if 'pile probing' (obstruction removal) is carried out in advance of piling, it would remove archaeological remains within the area probed around the pile locations.
- 6.4.4 Effects in the area between the Great Northern Hotel and the underground London Underground ticket office will mainly be on the former vaults of the Great Northern Hotel, which will themselves have removed earlier archaeological deposits, except for any within former channels of the River Fleet.
- 6.4.5 It is understood that services are likely to be routed through existing service routes, and/or those of the LU structures, in which case these would have no additional effects.

# Loading Bay and Plant Room Area

- 6.4.6 Network Rail is applying for planning permission to construct the Plant Room Area only. The other sub-surface infrastructure, namely the Loading Bay Area and the Access Road, have already obtained the necessary permission through previous applications. Therefore, the potential impacts on archaeological resources that may arise from the construction of the Loading Bay Area and access road have already been assessed through these previous applications.
- 6.4.7 Network Rail will construct a new Plant Room Area adjacent and connected to the Loading Bay. Network Rail will utilise some of the space created in these basements for electrical services plant and equipment. The Plant Room Area will have a floor level of approximately 7.8 m AOD with a 1.3 m thick floor slab and blinding. Its construction will therefore cause ground disturbance to around 6.5 m AOD.
- 6.4.8 The effect of the ground disturbance from the construction of the new Plant Room Area by Network Rail will be to remove surviving potential archaeological deposits down to levels below the surface of the London clay (estimated at around 12.94 to 14.2 m AOD). The depth of the deposits within the former channel(s) of the River Fleet is unknown, but they are likely to be either partially or completely disturbed by these basements. Part of the area has been disturbed previously by the construction of the Hotel Curve Tunnel, the surviving sections of which, themselves, form an industrial archaeological resource.
- 6.4.9 *Figure 6.2* shows the extent of the excavations being carried out by Network Rail and the King's Cross Central development and the area of the Hotel Curve Tunnel.

#### Platform Y and Relocation of Thunderbird Sidings

6.4.10 Construction works in this area will involve reduction of the former Cab Road under the Eastern Range to the level of the existing tracks, approximately 1 m, and further ground reduction over the whole length of the new tracks to a depth of approximately 0.6 m below track level to form the base of the new permanent way.

6.4.11 Mid 19<sup>th</sup> Century disturbance is expected, by comparison with a trench outside of the train shed, to be at least 2 m deep across the southern half of the site and to increase to the north where the Station is cut below the ground level on York Way. Assuming that this is the case, then this work would have no effect on potential archaeological remains.

#### 6.5 MITIGATION MEASURES

- 6.5.1 As set out in *Section 6.4*, it is predicted that the potential archaeological remains, if present, would be of low and/or moderate importance. It is considered that there is currently no evidence to suggest that the potential remains are of sufficient importance to warrant preservation *in situ*.
- 6.5.2 Therefore, based on previous work at the site undertaken for the co-located London Underground works, a mitigation strategy comprising the following elements will be adopted:
  - Geotechnical boreholes or test pits carried out for engineering purposes in those areas not already disturbed by the London Underground works or Hotel Curve Tunnel will be monitored by a suitable archaeological organisation, in order to refine the prediction of potential and provide early information on whether specific areas of the proposed works do or do not require further archaeological intervention.
  - Archaeological field evaluation will be carried out for areas of excavation that require more than 1m ground level reduction. Assessment of the results and confirmation regarding archaeological strategy for further work.
  - Ground reduction, including 'pile probing', outside of the areas truncated by London Underground construction and the Hotel Curve Tunnel, will be monitored by means of an archaeological watching brief.
  - If either geotechnical boreholes or test pits, or archaeological field evaluation, demonstrate that extensive important archaeological deposits survive beneath the service access road, archaeological excavation will be undertaken in advance of construction.
  - Archaeological excavation and recording in advance of construction of significant archaeological remains identified during the evaluation, geotechnical investigations and ground reduction for basements. Adequate provision and timetabling should be made for this, where warranted.
  - A standing 'building' assessment will be undertaken for notable surviving sections of the Hotel Curve Tunnel in the basement excavation areas.

- Suitable post-excavation analysis, publication and dissemination of the results of the above work will be carried out by a suitable archaeological organisation.
- 6.5.3 These mitigation measures will be subject to approval from the Greater London Archaeological Advisory Service as advisors to London Borough of Camden.

#### 6.6 RESIDUAL IMPACTS

- 6.6.1 The mitigation strategy will ensure that surviving remains are preserved by record, principally by means of an archaeological watching brief.
- 6.6.2 Taking into account the survival and importance of the resources, the magnitude of the change caused by the project, and the mitigation measures outlined, there will be no significant residual negative effects.
- 6.6.3 There will be a slight positive effect in terms of an increase in the knowledge of the surviving archaeology at the site resulting from the recording and analysis of surviving archaeological remains, and the opportunity to involve and inform the public and local communities about their historic environment.





# 7 CULTURAL HERITAGE

# 7.1 INTRODUCTION

#### Background

7.1.1 This chapter presents an assessment of the potential effects on historic buildings and conservation areas at and near King's Cross station, and sets it within the context of government guidance and planning policy.

#### Legislation and Policy Context

7.1.2 The legislation and policy context in relation to cultural heritage issues is described in *Chapter 4: Land Use and Planning* and in its supporting *Annex F*.

#### Scope of the Assessment

- 7.1.3 The scope of this assessment extends to the effects on the character, appearance and setting of listed buildings, the effects on the character and appearance of conservation areas, including views within those areas, and views into and out of those areas and their setting.
- 7.1.4 This assessment addresses those works for which listed building consent and planning permission are being sought by Network Rail. It does not assess works that are currently planned as part of other projects associated with King's Cross and St Pancras stations or the King's Cross Central development, but where there are direct interfaces with these projects the likely effects have been addressed as far as is reasonably possible (*eg* the creation of the arcade in the ground floor of the Great Northern Hotel). In particular, the background to the proposed and ongoing developments referred to earlier in *Chapter 3: Approach to the Environmental Impact Assessment* is considered where necessary.

#### **Sources of Information**

7.1.5 Numerous sources of information were consulted, including legislation, unitary development plans and other planning policy guidance, and background documents produced at earlier stages of this project and other related projects in the vicinity. A full list of data sources is shown in *Box H1.1* in *Annex H*.

#### 7.2 METHODOLOGY

#### Introduction

- 7.2.1 The assessment of the built historic environment is based on the following methodology:
  - The identification of nationally important (listed) buildings and designated conservation areas within 250 m of the proposed project (locally important unlisted buildings are also a material consideration in the planning process).

- The determination of the likely effects of the project on those listed buildings and conservation areas, including:
- the extent to which those buildings and conservation areas may be affected during the construction phase of the proposed development;
- the extent to which those buildings and conservation areas may be affected by the operation of the project;
- the significance of secondary effects such as settlement, vibration and visual effects during both construction and operational phases; and
- any residual effects that will persist despite implementation of mitigation strategies.

# Identification of Nationally and Locally Important Historic Buildings and Areas

7.2.2 The following historic buildings and areas were identified as falling within the scope of this assessment, and are shown in *Figure 7.1*:

# Nationally Important Historic Buildings:

- King's Cross station (1852) Listed grade I.
- St Pancras station and St Pancras Chambers (1868-76) Listed grade I.
- The Great Northern Hotel (1854) Listed grade II.
- The German Gymnasium (1864-5) Listed grade II.
- Stanley Buildings (1864-5) Listed grade II.
- Gasholder No. 8 (1883) Listed Grade II.

# Nationally Important Historic Areas:

- King's Cross Conservation Area Designated by London Borough of Camden; and
- King's Cross Conservation Area Designated by London Borough of Islington.

# Locally Important Unlisted Buildings

7.2.3 In addition, there are several locally important unlisted historic buildings, identified in the King's Cross Conservation Area Statement, adjacent to the King's Cross Central development site, notably Culross Buildings (1891-2). The Culross Buildings are scheduled for demolition during early 2007 as preparation for the King's Cross Central proposals. These are considered to be of significance for their local historical or architectural interest, their value as local landmarks, or as particularly good examples of the local building tradition. These include a number of properties within Camden along Euston Road (Nos. 1-11) and the Bank building designed by Edward Gabriel (Nos. 23-27), and in Islington at York Way (Nos. 2-22, 24, 28-34, 34b, 36-40, 52-60, and 80), and Wharfdale Road (Nos. 48, 57-63).

#### **Evaluation Criteria**

- 7.2.4 The significance of archaeological and cultural heritage effects is determined by two variables:
  - the sensitivity of the receptor; and
  - the magnitude of change upon the receptor.
- 7.2.5 The determination of the sensitivity of the receptor (site importance) is based mainly on existing designations but allows for professional judgements, where features are found that do not have any formal national or local designation (see *Table 7.1*).

#### Table 7.1 Criteria Used to Determine the Sensitivity of the Receptor

Sensitivity of Receptor	Equivalent to:
High	Sites of National or International Importance; Scheduled Monuments; Grade I and II* Listed Buildings; World Heritage Sites. (Including groups of buildings and sites).
Moderate	English Heritage Registered Park and Garden; Conservation Area; Sites of Regional or County Importance; Grade II Listed Buildings. (Including groups of buildings and sites).
Low	Locally Important Sites; Sites with a local value for education or cultural appreciation; Sites that are so badly damaged that too little remains to justify inclusion into a higher grade. (Including groups of buildings and sites).
Negligible	Sites or features with no value or interest; Sites that are so badly damaged that too little remains to justify inclusion into a higher grade. (Including groups of buildings and sites).

7.2.6 The determination of the magnitude of change is based on the level of change and the current state of survival/condition of the receptor (see *Table 7.2*). The survival of archaeological deposits within any given area is often uncertain, as is their exact extent. The magnitude of change can therefore be difficult to predict with any certainty. It should be noted that in some situations, change might have a positive environmental effect.

# Table 7.2 Criteria Used to Determine the Magnitude of Change

Magnitude of Change	Description of change
High	Complete destruction of the site or feature. Change to the site or feature resulting in a fundamental change in our ability to understand and appreciate the resource and its historical context and setting.
Moderate	Change to the site or feature resulting in an appreciable change in our ability to understand and appreciate the resource and its historical context and setting.
Low	Change to the site or feature resulting in a small change in our ability to understand and appreciate the resource and its historical context and setting.
None	Negligible change or no material changes to the site or feature. No real change in our ability to understand and appreciate the resource and its historical context and setting.

#### Determination of Significant Effects

7.2.7 *Table 7.3* provides general guidelines on determining the significance of environmental effect based on the sensitivity of the receptor and the magnitude of change that the proposed project would have upon that receptor.

Magnitude of	Sensitivity of Receptor				
Change	High	Moderate	Low	Negligible	
High	Significant	Significant	Significant/ Not Significant	Not Significant	
Moderate	Significant	Significant	Significant/Not Significant	Not Significant	
Low	Significant	Significant/Not Significant	Not Significant	Not Significant	
None	Not Significant	Not Significant	Not Significant	Not Significant	

#### Table 7.3The Significance of Environmental Effects

- 7.2.8 A significant effect will arise where a receptor of high sensitivity (including much of the historic environment in the vicinity of King's Cross) is affected even at a low level by a magnitude of change. The key point here is that not all the significant effects are adverse. Some will be open to subjective interpretation, and some will be undeniably positive.
- 7.2.9 Effects can be divided into two main categories, namely construction (temporary) effects and operational (permanent) effects that endure after the completion of the project. For the historic built environment, it is normally the permanent effects on fabric, setting, character and appearance that are those of greatest significance. However, it is acknowledged that construction effects, although temporary, may last for a number of years. This is given due consideration at the appropriate point in the assessment. Where effects are both significant and negative it may be possible to mitigate them to some degree. These considerations are outlined in more detail below.

#### 7.3 BASELINE ENVIRONMENT

#### Introduction

- 7.3.1 This section describes the physical state of the historic built environment (*ie* the 'baseline') insofar as it is relevant to this topic. Because of the time-span that is likely to occur between the date of the submission of the planning application and the completion of the works, and because of the complexity of the various other projects associated with King's Cross and St Pancras stations, the baseline is continually shifting. In order to take account of these ongoing changes a baseline as it will be at the end of 2007 has been chosen. By this time, it is anticipated that the CTRL and London Underground infrastructure will be substantially complete, with only architectural finishes and fit out left to complete.
- 7.3.2 King's Cross station has a long and complex history. A descriptive summary of the historical development of the area, including the design of the station

and its various components, and other relevant buildings in the vicinity such as the Great Northern Hotel and German Gymnasium, appears at *Annex H*.

## 2007 Baseline

- 7.3.3 The baseline year of the end of 2007 assumes that new London Underground ticket halls will be substantially constructed below ground to the west of King's Cross station and to the south of St Pancras Chambers, with a direct underground link to the St Pancras station extension. All that will remain for London underground to complete will be the architectural finishes and fit out works. There will also be an expansion of the existing ticket hall. There will be two new underground entrances immediately south of Euston Road, an enlarged underground entrance on the southwest side of King's Cross station, and two London Underground ventilation shafts. A ventilation shaft will be constructed by London Underground in the Bomb Gap within the Western Range of King's Cross station, projecting above the parapet.
- 7.3.4 Planning and listed building consent for the conversion of St Pancras Chambers to hotel and residential use was granted by London Borough of Camden in July 2004. These works are due to be completed in 2007. The forecourt to Euston Road will be reinstated after the London Underground western ticket hall works underneath are completed. The refurbishment of St Pancras station is also expected to be complete, which provides platforms and associated passenger facilities for Eurostar trains. Amongst other works, this will involve the completion of an extension to the Main Train Shed (the Barlow Shed) at St Pancras station, a structure of approximately 19 m in height and 100 m x 240 m in plan form, and further demolition of the undercroft structures and bridges to the north.
- 7.3.5 The large area of land to the north of the station will become available for the King's Cross Central developer (Argent) in January 2007 following the completion of the CTRL works. Argent submitted an outline planning applications to the London Boroughs of Camden and Islington in May 2004 with updates and revisions in September 2005. The applications are currently under consideration by the London Boroughs of Camden and Islington. The development is proposed to be mixed use, with housing, hotels, retail, car parking and community and leisure facilities and is divided in two by the Regent's Canal. According to the ES for King's Cross Central, construction of the development to south of the canal is likely to start in 2006/7 and run in parallel with the King's Cross Station Enhancement works until Q4 2010. The works to the north of the canal will follow on from this and be completed in 2020 (the Design Year). The 2007 (pre-King's Cross Central) condition of the site and its surroundings will therefore be the starting point to a baseline for assessment purposes.

#### Listed Buildings: Character, Appearance and Setting

#### Introduction

7.3.6 The following section of the assessment has identified the key aspects of the character, appearance and setting of each of the listed buildings affected by the King's Cross Station Enhancement project. Further details are provided in *Annex H*.
#### King's Cross Station

7.3.7 King's Cross station is a monumental train shed in the Italianate style that has a significant presence in Euston Road, York Way, and in the areas westward to St Pancras station and northwards to Goods Way. Each elevation presents a different character to its surroundings, the Western Range being commercial, the Eastern Range being functional, and the south elevation (in its original form at least) representing the confidence of the Great Northern Railway. Its mass and bulk can be seen from further afield, but its primary setting is defined by the roads and structures described above.

### St Pancras Station

7.3.8 St Pancras station is also monumental in scale, with a Gothic revival theme that contrasts with King's Cross station. The towers of St Pancras Chambers can be seen for long distances in all directions – particularly to the north – and this part of the building has a particularly strong influence on Euston Road. The Barlow Shed also has a presence on the land to the north, and on the area to the east as far as the Western Range and Suburban Train Shed of King's Cross station.

### Great Northern Hotel

7.3.9 The Great Northern Hotel is a much smaller building than either of the train stations, and it is less dominant than St Pancras station. It has a much stronger relationship with King's Cross station, and for this reason its setting is primarily related to the inner arc focusing on the Western Range. Nevertheless, it is visually prominent from Euston Road, and can also be seen from further afield.

### The German Gymnasium

7.3.10 The German Gymnasium has become more prominent in recent years because of changes to the environment in the vicinity of King's Cross station. It is a solid building with an industrial and somewhat medieval character, closely grouped with Stanley Buildings, and significant as an element of the Victorian townscape surviving in the space between the two train sheds.

### Stanley Buildings

7.3.11 Stanley Buildings is of interest as an example of 19<sup>th</sup> Century working class housing, and it has a close physical relationship with the German Gymnasium. It is prominent in the area, south of the Regents Canal, between the two train sheds.

### Gasholder No. 8

7.3.12 Gasholder No. 8 has an industrial character, and it is visible from York Way and Goods Way.

### **Conservation Areas**

#### Introduction

7.3.13 The proposed works fall within the King's Cross Conservation Area, which straddles the boundary between the London Boroughs of Camden and

Islington. A detailed character appraisal for this conservation area was produced by London Borough of Camden in September 2003, and a shorter appraisal with design guidelines was produced by Islington in January 2002. This section of the assessment describes the character and appearance of the conservation area and provides comment on the interpretations of others.

### Character and appearance

- 7.3.14 The King's Cross Conservation Area contains an important assemblage of early and mid 19<sup>th</sup> Century railway industrial, commercial and residential buildings, as well as a complex of railway goods handling facilities and warehouses. It is characterised by railway uses, business and residential uses, and a variety of building types and robust streetscapes, and is currently undergoing significant redevelopment and change. King's Cross and St Pancras stations are major landmarks in the urban fabric of London, and contrast with the scale and grain of the streets to the south of Euston Road and to the north and west of St Pancras Garden.
- 7.3.15 London Borough of Camden has identified the following sub-areas as having distinctive and definable characters and this assessment has given due consideration to these interpretations:
  - 1) St Pancras Gardens, the area bounded by Cheney's Place Charrington Street, College Grove and the CTRL Lines to the north of St Pancras;
  - 2) King's Cross/St Pancras: The stations and the area between them extending to Goods Way and Camley Street;
  - 3) Euston Road: The buildings on the southern side of Euston Road and the junction with Pentonville and Gray's Inn roads; and,
  - Gray's Inn Road: The remaining area of the conservation area south of the Euston Road bounded by Pentonville Road, King's Cross Road, Swinton Street and Argyle Street.
- 7.3.16 Sub-area 2, as identified by London Borough of Camden, forms the heart of the King's Cross Conservation Area. It includes the stations and extends to Midland Road to the west and York Way to the east, Goods Way to the north and Euston Road to the south. The southern part of Camley Street to the north of Goods Way is also included in this sub-area. The London Borough of Camden considers that the sub-area has four main components:
  - (i) monumental Victorian engineering and architecture;
  - (ii) buildings and structures associated with the railways;
  - (iii) Victorian workers' housing, now vacant; and
  - (iv) a temporary construction works site.
- 7.3.17 It is considered that the two railway stations form a part of the nation's architectural and historical heritage and are of national importance. Together with the Great Northern Hotel the stations reflect the power of the railway age and are the most important groups of railway buildings in Britain.
- 7.3.18 The main building materials include red and yellow London stock brick, dark blue engineering brick, slate roofs, limestone and sandstone (for lintels, sills

and copings), sandstone (for bridge abutments and tunnel portals), cast and wrought iron, steel, concrete, and glass.

- 7.3.19 St Pancras Chambers is described in the London Borough of Camden King's Cross Conservation Area Statement<sup>(1)</sup> as having 'a flamboyant and towering appearance,' and is a 'testament to the area's former and current significance, and serves as one of the greatest monuments to London's power and affluence during the Victorian period.' A significant length (200 m) of the Barlow Shed forms the western edge to the space between the stations. Facing Midland Road is the Gothic revival booking hall (part of Barlow House) of 1869 that has a lower roof than the main buildings.
- 7.3.20 King's Cross station dominates the junction with York Way, Pentonville Road and Gray's Inn Road. The façade of the station addresses Euston Road and is set at an angle to it, and its Italianate character differs from that of St Pancras Chambers. The London Borough of Camden conservation area appraisal notes that the façade reflects the internal plan of the station and its roof structure of the Main Train Shed at King's Cross station, unlike the Barlow Shed which is concealed by St Pancras Chambers.
- 7.3.21 York Way forms the eastern edge of sub-area 2, next to the monumental Eastern Range of King's Cross station. Just to the north of the Eastern Range are ramps providing access to the Eastern Range, and a late 20<sup>th</sup> Century brick signal box to the north. Adjacent to the ramp is a two-storey engineer's bothy. The upper storey of this building is evident from the east and it forms a modest determination to the east west view along Wharfdale Road in Islington. An eye level stock brick wall forms a boundary to the railway.
- 7.3.22 Sub-area 3 of the King's Cross Conservation Area, as identified by London Borough of Camden, is south of Euston Road and includes adjoining streets and buildings that have a visual and/or physical connection to the road. It is partly dominated by King's Cross station and St Pancras Chambers, and includes many retail and hotel premises fronting the main roads as well as Camden Town Hall and associated offices.

### **Views of Buildings**

#### Introduction

- 7.3.23 The effect of the proposals on views of historic buildings is an important part of the assessment. Views can be relevant to the setting of listed buildings, as well as to the character and appearance within conservation areas, and to views into and out of conservation areas, including the setting of the conservation area. Views from both private and public land are relevant to effects upon the historic environment.
- 7.3.24 A considerable number of viewpoints have been identified in published documents such as the King's Cross Conservation Area Statement and the development brief for the opportunity area. To some extent these overlap with each other, or are variations on similar themes. Long distance views have also been identified from north of Goods Way (*eg* In the Argent King's Cross Central Environmental Statement), as well as two strategic viewing corridors

across the site, from Kenwood to St Paul's Cathedral and from Parliament Hill to St Paul's Cathedral (statutory policy RPG3A). However, the current assessment does not consider these long distance views to be material to the project for the following reasons:

- (i) The distances involved are considerable, and are primarily of general skylines rather than details.
- (ii) There are numerous intervening structures and features that break up the continuity of these views.
- (iii) There are no material effects on these views.
- 7.3.25 Therefore, this assessment considers views affecting the built historic environment from and within the envelope of Euston Road, York Way, Goods Way and St Pancras station.

#### Material views

- 7.3.26 The following views are described in the King's Cross Conservation Area Statement<sup>(1)</sup> and the King's Cross Opportunity Area Planning and Development Brief<sup>(2)</sup> and are therefore considered to be material to this assessment:
  - A series of views from the proposed location of the Western Concourse towards King's Cross station, the Great Northern Hotel, St Pancras Chambers and the Barlow Shed.
  - (ii) The Great Northern Hotel, St Pancras station and King's Cross station from Grays' Inn Road Euston Road and Pentonville Road.
  - (iii) A newly-opened view from beside the German Gymnasium towards King's Cross station and Great Northern Hotel.
  - (iii) From the Western Range of King's Cross station to the Great Northern Hotel, and vice-versa (including internal views from windows).
  - (v) The bothy in views along Wharfdale Road (Islington).
  - (vi) Views from York Way south of Wharfdale Road looking southwest to King's Cross station.
  - (vii) The views from the King's Cross station platforms to the portals of gasworks tunnels.
  - (viii) From Goods Way, York Way and Maiden Lane Bridge to the two stations.

### 7.4 ASSESSMENT OF ENVIRONMENTAL EFFECTS

### Introduction

- 7.4.1 Effects arising from the proposed project have been divided into the following main categories, tabulated in summary form in *Table H1.2* to *Table H1.5a* at *Annex H:* 
  - physical changes to buildings;
  - changes to setting of listed buildings;
  - changes to the character and appearance of views (and setting) within conservation areas; and
  - changes to spaces, surfacing and landscaping.

## **Assessment of Effects**

## Physical Changes

- 7.4.2 This assessment has identified that a large number of physical effects will be significant. These range from 'negative' effects such as the removal of the bothy on York Way and removal of the existing footbridge across platforms 1 to 8, to 'positive' effects such as the restoration of the Old Booking Hall and the removal of the Southern Concourse. These effects are described in detail in *Table H1.2* and *Table H1.2a* in *Annex H*. It is within the Western Range, however, that many cumulative changes (see *Table H1.2a*) will take place, and the assessment of this particular part of the structure of the station is important. In considering whether a particular effect on the Western Range is or is not significant, its cumulative effect has been taken into consideration.
- 7.4.3 The Western Range is largely part of the original construction of the early 1850s, and much of its plan form remains (and will continue to remain after the new concourse is constructed). Its partial devastation in the Second World War has never been fully repaired. Any 'harm' resulting from the internal alterations will be relatively minor when compared with the benefits arising from the reinstatement of the Old Booking Hall, the structural strengthening of the Bomb Gap, and the general upgrading and restoration of the original entrance point to the station.
- 7.4.4 The main physical changes are limited to King's Cross station and the Great Northern Hotel. In the case of the station, the effects will be greatest within and around the Western Range, associated with the new Western Concourse. In the case of the Great Northern Hotel, the Western Concourse will be physically attached to the listed building, triggering proposals for consequential works including the formation of a pedestrian arcade at street level. Within the Western Range, the chief alterations will be the provision of new ticket barriers at ground floor level in the southern area and the provision of a link through the Western Range from the new concourse mezzanine to the new link bridge across the platforms. The single greatest change to the Western Range itself will be the restoration and reinstatement of the Old Booking Hall to its original use as the new ticket office (involving the restoration of the original full-height space). These will be significant positive effects.
- 7.4.5 However, the Porte-Cochère that was removed from the front of the Old Booking Hall to accommodate the London Underground works will not be

reinstated, resulting in a significant negative effect. This is because the V-shaped funnel structure that extends to the ground floor from the central roof light in front of the Old Booking Hall will accommodate some of the space previously occupied by the Porte-Cochère.

- 7.4.6 The Bomb Gap will be retained in order to house the London Underground vent shaft. This will, however, require some additional strengthening of the existing structures around the shaft and will approve the overall appearance. This moderate improvement will result in a significant positive effect.
- 7.4.7 A number of new and reconfigured uses will be accommodated in the Western Range, including (at ground floor) office and reception facilities, retail, British Transport Police, left luggage, toilets, and ticket machines. The first floor will contain a business centre in the principal rooms at the southern end of the Western Range, first and standard class lounges, a pub (around the old parcels office area), offices, and a medical centre, as well as the restored void in the Old Booking Hall. The second and third floors will contain offices, and the area above the Old Booking Hall in the central block will be restored to its original proportions.
- 7.4.8 The existing footbridge provides a significant visual interruption in views along the main train shed and this is exacerbated by the later infilling of the lattice parapet. The clock and the stairs at the western end are a virtually unaltered example of these features, which make a distinctive contribution to the station. The removal of the footbridge will therefore result in a significant negative effect.
- 7.4.9 The existing footbridge will be replaced with a light weight steel and glass structure, which will incorporate escalators and lifts down to each platform. It will be sited approximately 10 m further away from the station front and will require the removal of an existing, unsightly, OLE gantry. The escalators will face north, unlike the existing stairs, which faced the station entrance. The escalators apparently require extended level landings, which will increase the visual impact of the structure.
- 7.4.10 Overall, viewed along the train shed, the new bridge will have less visual impact than the existing bridge and can be judged as slightly beneficial. However, it will have a significant moderate adverse impact on views across the train shed from points halfway along the platforms. A glazed footbridge would provide users with an exceptional overhead view of the trains and the train shed, not permitted by the present bridge.
- 7.4.11 Overall the impacts of the removal of the existing footbridge and replacement with the new structure, in visual and conservation terms, can be assessed as slightly adverse.
- 7.4.12 The existing Southern Concourse provides a significant visual interruption to the views of the southern façade of the Main Train Shed. The removal of the Southern Concourse will therefore result in a significant positive effect.
- 7.4.13 A canopy will be provided across the front of the southern façade of the Main Train Shed to provide weather protection for passengers exiting the station and heading to the Southern Stair at the southwest corner of the station. The

canopy will a light weight steel and glass structure designed to minimise the interruption of the views of the newly revealed southern façade.

- 7.4.14 Overall the new canopy will have much less visual impact than the existing Southern Concourse, the removal of which can be judged as significantly beneficial. However, the canopy will have a significant moderate adverse impact on views of the newly revealed southern facade.
- 7.4.15 Overall the impacts in visual and conservation terms can be assessed as a significant and positive.
- 7.4.16 Physical effects will also occur at the southern end of the Suburban Shed, and on the roof of the Western Range. Outside of this project as part of the King's Cross station renewals programme, changes will also be made within the Eastern Range, where provision will be made for the insertion of a new Platform Y. For completeness these changes are discussed below. The realignment of railway tracks will involve the removal of some 19<sup>th</sup> Century structures including a bothy on the west side of York Way, which fall within the curtilage of King's Cross station.
- 7.4.17 Below ground level, alterations in association with the Loading Bay Area, being constructed as part of the King's Cross Central proposals, and links with London Underground services will have effects on basement structures of various dates.
- 7.4.18 The removal of the bothy and other alterations to structures within the curtilage of King's Cross station on the western side of York Way will have relatively little effect when considered as components of the overall project. Even taken in isolation, the 19<sup>th</sup> Century structures in question are of little intrinsic merit and have been much altered. Their removal is a material consideration, but the nature of the buildings does not in itself give rise to a presumption in favour of their preservation. No significant impacts will therefore arise from the removal of this particular infrastructure.
- 7.4.19 The King's Cross Central developer will be making structural changes to the Great Northern Hotel by creating an arcade through the ground floor of the hotel. This will enable non-station related pedestrians to move more easily from Euston Road to the King's Cross Central development during periods of station closure and disruption.
- 7.4.20 The King's Cross Central development application (as revised in September 2005) seeks consent for two refurbishment and re-use options for the Great Northern Hotel, namely B1 business and employment uses or hotel (C1)/serviced apartments. In each case some shopping/food and drink uses (A1, A2, A3, A4, A5) were also possibilities for the ground floor.
- 7.4.21 Furthermore London Underground has removed some of the existing Great Northern Hotel infrastructure to accommodate its works on the new Northern Ticket Hall. The main entrance to the Great Northern Hotel was previously along the concave elevation, within the southern staircase bay. Sheltering this entrance was a small glazed canopy and enclosed porch of cast and wrought iron and timber. The canopy and porch were dismantled by London Underground and placed into storage. London Underground is under an

obligation to reinstate the canopy and porch upon completion of these works. However, the development of the new Western Concourse will prevent the reinstatement of this canopy and porch resulting in a permanent significant negative impact.

- 7.4.22 Outside of the King's Cross Station Enhancement works, the King's Cross Station Renewals Team will be upgrading the first floor of the Eastern Range with new offices. These works will involve re-fenestration and fire-proofing as part of safety measures in association with the creation of Platform Y underneath.
- 7.4.23 The works will involve a degree of alteration, including new lifts, changes to partitions and staircases, and changes to windows. These changes relate to a large degree to more recent alterations and inserted partitions, additional to the existing infrastructure. There will also be works in association with new services, and all other aspects that would be expected in what is effectively a conversion of the building.

### Changes to the Setting of Listed Buildings

- 7.4.24 The potential effects of changes to the setting of listed buildings are summarised in Table H1.3 and Table H1.3a in Annex H. The main changes to the setting of listed buildings will occur in the vicinity of the proposed Western Concourse and the (to be demolished) Southern Concourse, affecting King's Cross and St Pancras stations and the Great Northern Hotel, and, to a lesser extent, the German Gymnasium and Stanley Buildings. The addition of the Western Concourse will change the character of this setting from an open one, to one of enclosure. This is because the view out of some of the windows in the Western Range will now be into the internal space of the new Western Concourse instead of across an open area towards St Pancras station. The removal of the Southern Concourse will, however, provide the positive effect of opening up views from Euston Road, and will restore much of the original setting of the south elevation of King's Cross station. When viewed as a whole, these changes will result in a significant positive impact to the setting of the listed buildings.
- 7.4.25 The Western Concourse will change the visual relationship between King's Cross station and the Great Northern Hotel, but it will also have the effect of uniting the two buildings and reinforcing the original focus on the entrance point in the Western Range. It will not dominate either building or rise above the Western Range, but it will have the 'dramatic presence' referred to by London Borough of Camden in the planning and development brief for the opportunity area.
- 7.4.26 The shape of the new concourse will relate to the form of the existing open setting of the area between King's Cross station and the Great Northern Hotel. In detail, there will be close-up impacts on the Western Range, including the visual impact of the supporting 'lattice column' or 'funnel' near the middle of the central block (see *Figure 2.4* in *Chapter 2: The Proposed Project*). This will affect views towards the elevation, as well as views and natural light levels from the windows looking into the concourse.
- 7.4.27 There will also be visual effects arising from the fact that the curving roofline of the Western Concourse will cross the level of some of the windows in the

Western Range, and the attachment of the concourse to the Great Northern Hotel. This will result in an 'above' and 'below' appreciation of views from windows in both the Great Northern Hotel and Western Range towards King's Cross station. In the case of the views above the concourse, the domed roof will be a strong and influential feature.

- 7.4.28 The concourse canopy incorporates a glazed perimeter canopy that will provide weather protection for pedestrians immediately outside the concourse (see *Figure 8.5*), and external canopies will be provided by Network Rail at the taxi drop off zone. The canopies will be light weight steel and glass structures designed to minimise the interruption of the views of the Great Northern Hotal and the new Western Concourse. The external walls of the concourse will be made of glass panels, which will provide some external illumination from lighting within the concourse. There will however need to be some additional lighting provided for the waiting areas outside the concourse, under the perimeter of the roof canopy, for the benefit of those passengers waiting for taxis.
- 7.4.29 Overall the new canopies will have a significant moderate adverse impact on views of the Great Northern Hotel, but will complement the modern design of the new Western Concourse.

Changes to the Character and Appearance of Views (and Setting) Within Conservation Areas

- 7.4.30 In many respects the changes to views within the King's Cross Conservation Area have similarities with the changes to the setting of listed buildings. However, the setting of listed buildings is to do with their presence and character within their surroundings, whereas conservation areas are to do with the broad character of an area including several buildings. While long distance views of the station complex can be identified within the conservation area (for example, from north of Goods Way) the materially significant views are those nearer to hand, particularly from Euston road and in the area between King's Cross and St Pancras stations.
- 7.4.31 The potential effects arising from the changes to the character and appearance of views (and setting) within conservation areas are summarised in *Table H1.4* and *Table H1.4a* in *Annex H*.
- 7.4.32 There will be significant positive effects arising from the removal of the Southern Concourse and the opening up of Cubitt's original south elevation of King's Cross station to views from Euston Road and adjoining streets. The presence of the new Western Concourse will also have an effect on the character of Pancras Road and the spaces in between the two railway stations. While part of this presence could be seen in one sense as being negative because it hides the Western Range from external view, it is also positive in that it links the station and the Great Northern Hotel by a stimulating example of modern railway architecture. Connectivity with the hotel is also further enhanced by the creation of the eastern arcade, within the hotel's footprint, which provides a new operational function. Furthermore, the King's Cross Central proposals for the future uses of the hotel can be viewed as positive when balanced against the current redundant use of the hotel.

- 7.4.33 There will also be physical effects on the Great Northern Hotel and the Western Range of King's Cross station arising from the attachment of the proposed Western Concourse. In themselves, these effects are not considered to be negative. The permanent removal of structures from the ground floor of the Great Northern Hotel and the lowering of the existing ground floor to street level to allow pedestrian movements (together with other alterations on the upper floors), are of significance. However, these effects are not considered to be significantly negative to the character and appearance of the listed building within the context of the project as a whole.
- 7.4.34 When the negative effects are balanced against the positive effects, the effect of the new Western Concourse on the character and appearance of the conservation area is one of regeneration, re-use, and renaissance all of which are positive rather than negative attributes. Furthermore, when the combined effects of the removal of the Southern Concourse and the addition of the Western Concourse are taken into account, together with the overall upgrading of the building and its facilities, there will be considerable benefits to the vitality of this focal point within the conservation area. Overall this results in a significant positive effect on the character and appearance of the conservation area.
- 7.4.35 Effects on the character and appearance of the conservation area in York Way and Wharfdale Road will be less dramatic, but even here the realignment of the tracks into Platform Y will have some effects, including the removal of the bothy and the cobbled entrance ramp. In the context of the project as a whole, however, the changes to these features will have little effect on the character and appearance of the conservation area.

## Changes to Spaces, Surfaces and Landscaping

7.4.36 Potential effects on spaces, surfaces and landscaping are summarised in *Table H1.5* and *Table H1.5a* in *Annex H.* In this context, spaces have been interpreted as 'important open spaces' in the sense usually understood within conservation areas, and there is by definition a strong connection with the setting of listed buildings and the views that cross the spaces between them. Details such as surfacing and landscaping will not be constructed on site for a considerable period of time, and proposals at this stage are to a large extent indicative. Spaces such as the Southern Square, which will come into being after the demolition of the Southern Concourse, will also be affected by existing London Underground structures that do not form part of the KXSE project.

## 7.5 MITIGATION MEASURES

7.5.1 The King's Cross Station Enhancement Project proposals have aimed to make mitigation measures inherent in the design. The Project has set out to achieve this by taking account of the aspirations of the London Borough of Camden stated in the King's Cross Opportunity Area, Planning and Development Brief. Although the proposals result in an overall significant positive effect on the cultural heritage resources there are some resources that will be permanently lost to the development. The mitigation that will be implemented to deal with these losses will be to collate a detailed record of these resources prior to their removal or demolition.

### 7.6 RESIDUAL EFFECTS

7.6.1 There will be some residual effects following the implementation of mitigation. These relate to the removal of some structural elements, such as the front end of the Suburban Shed, the roof over the central block of the Western Range, and the 'bothy' on the west side of York Way. Although the details of these lost resources will be preserved by record, it is considered that this will still result in an unavoidable negative effect. However, it is considered that these will not result in significant negative residual effects on the character and appearance of the listed building within the context of the overall project. This is because the project as a whole must be considered to have a positive effect on this part of the King's Cross Conservation Area, by opening up the views of the Grade I listed King's Cross station and making better use of the historic infrastructure that is available.



### 8 TOWNSCAPE AND VISUAL

#### 8.1 INTRODUCTION

- 8.1.1 The King's Cross Station Enhancement Project is located within London's urban setting and has the potential to create both positive and negative effects on the townscape and visual environment.
- 8.1.2 The townscape and visual assessment has informed the design process to enable mitigation measures to be incorporated into the proposals in order to minimise the potential negative effect and maximise the positive effects. The resultant residual impacts have been assessed and are summarised in this chapter with additional supporting information provided in *Annex I*.

#### 8.2 METHODOLOGY

#### Introduction

- 8.2.1 The methodology has been based on published guidelines including Guidelines for Landscape and Visual Impact Assessment: Second Edition (2002)<sup>(1)</sup> and Landscape Character Assessment: Guidance for England and Scotland (2002)<sup>(2)</sup>.
- 8.2.2 The assessment comprised a desk study and field surveys with subsequent impact assessment.
- 8.2.3 Effects on townscape character and effects on visual amenity are defined as:
  - townscape character relates to the physical and other characteristics of the townscape and its resulting character and quality; and
  - visual amenity relates to the views from visual receptors (*eg* residents, workers, motorists) and on the amenity experienced by those people.
- 8.2.4 This section does not specifically assess effects on conservation area issues, listed buildings or the setting of listed buildings as these are described in *Section 7: Cultural Heritage*.

### Establishment of the Study Area

8.2.5 The study area was defined following initial inspections of the potential visibility of the development. This is limited by constraints on inter visibility within the dense urban fabric. The study area is the 1 km x 1 km area shown in *Figure 8.1*. The site is located within this study area and refers to the area within the planning application boundary as shown in *Figure 1.1*.

The Landscape Institute and the Institute for Environmental Management and Assessment (2002( Guidelines for Landscape and Visual Impact Assessment: Second Edition, Spon Press, London
 Swanick, C. Department of Landscape, University of Sheffield and Land Use Consultants (2002) Landscape Character Assessment: Guidance for England and Scotland (2002) Countryside Agency Publications, Wetherby

#### Methodology for Definition of Baseline

- 8.2.6 The site surveys and photographs of representative viewpoints were completed in the Autumn of 2003. At that time the character of the site and adjoining land was influenced by construction associated with the CTRL, LU's Tube Ticket and Northern Ticket Halls, and the Regent's Quarter development. These projects have various effects including opening up views, removing views, creating visual clutter and generally causing changes in the townscape character. These projects still exert a significant influence over the character and appearance of the existing site. Furthermore, the changes to these areas during the intervening period are such that the character and appearance of the area is not significantly different. Therefore these photographs are still considered representative.
- 8.2.7 Construction of the King's Cross Station Enhancement project is due to commence in January 2008, hence for the purposes of this assessment a baseline of the end of 2007 was used that included the completed developments that are currently under construction in 2006.
- 8.2.8 At the time of the assessment the applications for the King's Cross Central project were under consideration by the London Borough of Camden and construction could be underway during 2007. However, none of the permanent infrastructure of the King's Cross Central project will be in place during 2007 and hence it has not been included in the 2007 baseline.
- 8.2.9 The King's Cross Central project has been granted planning permission. Therefore the assumption has been that it will be under construction in 2007 and that it will alter the townscape in the longer term, for example the Culross Buildings will be demolished. Therefore, as part of this assessment additional comments have been made, where appropriate, as to the change in townscape and visual effects that will occur as the King's Cross Central project proceed.
- 8.2.10 The townscape character can be described at national, district and local levels. The national character is derived from the Countryside Agency's publication, Countryside Character. The district character is derived from the London Borough of Camden's UDP and Conservation Area Statement<sup>(1)</sup>. The local townscape character is based on the field studies undertaken during this assessment. The study area was subdivided into 12 character sub-areas, however, character areas 1, 2 and 3 are of key relevance to this assessment. King's Cross Station is located in Character Area 1: King's Cross St Pancras, as shown in *Figure 8.1*.
- 8.2.11 Areas and locations that may be sensitive to visual changes have been identified by reference to specific strategic views identified in relevant policy documents and other important local views identified during the field surveys.
- 8.2.12 The overall condition and value of character areas and visual receptors has been identified, based on criteria that all range from high to low, from *Guidelines for Landscape and Visual Impact Assessment* as shown in *Tables 11.1* and *11.2*, in *Annex I*.

(1) London Borough of Camden, Conservation Area Statement 22: King's Cross, Adopted June 2004

- 8.2.13 The sensitivity of character areas and visual receptors to changes caused by the development proposals has been established using the criteria shown in *Table 11.3* in *Annex I*.
- 8.2.14 Selected views have been identified as representative of the range of viewing opportunities available in the study area as agreed with the London Borough of Camden. These views are represented by viewpoints 1, 3, 4 and 9 as described in *Table 8.1*.

#### Methodology for Assessment of Effects

- 8.2.15 The townscape and visual effects of the proposals have been identified in relation to:
  - temporary construction effects;
  - permanent operational effects; and
  - cumulative effects.
- 8.2.16 The mitigation measures used within the project to reduce negative townscape and visual effects are intrinsic to the design. Townscape and visual effects have therefore been assessed with mitigation measures in place and the effects identified in this section are therefore residual impacts. The magnitude of change caused by the proposals has been identified, based on the criteria in *Table 11.4* in *Annex I*. The criteria used to assess the significance of effects are included in *Table 8.1*.

### Table 8.1Criteria for Evaluation of Impact Significance

	High Magnitude of Townscape or Visual Change	Moderate Magnitude of Townscape or Visual Change	Low Magnitude of Townscape or Visual Change	No Townscape or Visual Change
High Townscape or Viewer Sensitivity	Significant	Significant	Significant / Not Significant	Not Significant
Moderate Townscape or Viewer Sensitivity	Significant	Significant	Significant / Not Significant	Not Significant
Low Townscape or Viewer Sensitivity	Significant / Not Significant	Significant / Not Significant	Not Significant	Not Significant
Not Sensitive	Not Significant	Not Significant	Not Significant	Not Significant

#### 8.3 BASELINE ENVIRONMENT

#### **Townscape Policies and Designations**

8.3.1 *Chapter 4: Planning and Land Use* and *Annex F* identify policies and designations of general relevance to the proposals, including national and local policies.

- 8.3.2 Local townscape designations and relevant policies are identified in the London Borough of Camden's Unitary Development Plan and include:
  - Conservation Area;
  - King's Cross Opportunity Area;
  - Strategic Views;
  - Local Views;
  - Metropolitan Walk Potential Connection or Alternative Route;
  - Archaeological Priority Area;
  - Transport Proposal Site;
  - Rail Safeguarding; and
  - Land Use Proposal Site.
- 8.3.3 The policies and designations listed above are addressed in *Chapter 4: Planning and Land Use*, with the exception of Strategic Views and Local Views. Strategic Views and Local Views are of particular relevance to the visual assessment and are addressed in *Annex F*.

#### **Baseline Townscape Character**

- 8.3.4 The following townscape character areas were identified for the assessment as shown on *Figure 8.1*, with detail provided in *Annex I*:
  - King's Cross St Pancras (Character Area 1);
  - Euston Road (Character Area 2);
  - Regent's Quarter and York Way (Character Area 3);
  - St Pancras Gardens (Character Area 4);
  - Regent's Canal (Character Area 5);
  - Bagley's Industrial Estate (Character Area 6);
  - Upper York Way Residential (Character Area 7);
  - Caledonia Road Residential (Character Area 8);
  - Western Road Residential (Character Area 9);
  - British Library and Lands North (Character Area 10);
  - Pentonville Road and Grays Inn Road (Character Area 11); and
  - Argyle Square and Southern Residential (Character Area 12).
- 8.3.5 The site's local setting is not a homogeneous townscape but consists of a mosaic of varied townscape character areas that are somewhat isolated from each other. The sensitivity of the King's Cross St Pancras Character Area to changes caused by the development proposals is high. This is a result of being a townscape of particularly distinctive character that is highly valued for its heritage. Adjoining character areas are not sensitive to townscape effects. The general features of the character areas are illustrated by photographs in *Annex I.* Although taken during 2003 the changes to these areas during the intervening period are such that the character and appearance of the area is not significantly different.

### King's Cross St Pancras (Character Area 1)

8.3.6 The Conservation Area Statement notes that, despite the changes that have occurred, the area retains a robust industrial character, mostly Victorian. It states that the area incorporates monumental Victorian engineering and architecture and buildings and structures associated with the railways.

- 8.3.7 The topography of the character area is generally flat with a few local variations in the north. The character area is generally at an elevation of approximately 16 m to 20 m Above Ordnance Datum (AOD), making it approximately the same elevation as adjoining character areas.
- 8.3.8 In comparison to surrounding character areas, there are few streets within the King's Cross St Pancras Character Area. The street pattern consists of streets that act as boundaries to the character area.
- 8.3.9 Building heights within the character area vary. The height of the CTRL train shed is approximately 19 m high. The Great Northern Hotel is six storeys high excluding its basement level, being approximately 26 m to the roof hip. The King's Cross Mainline Station southern façade is approximately 23 m high. Its clock tower is approximately 32 m high. The East Side Buildings of St Pancras Station, on Pancras Road, are approximately 13 m high. The St Pancras Station train shed (Barlow Shed) is approximately 37 m high. St Pancras Chambers varies in height from approximately 42 m to 58 m. The spire on St Pancras Chambers is approximately 76 m high. These details demonstrate the large scale of buildings within the character area.
- 8.3.10 The overall condition of the character area is moderate, as a result of its mix of features. For example, there are some detracting features, such as the railway land to the north and ageing railway infrastructure. Conversely, the character area has a sense of place derived from its Victorian heritage and there are features worthy of conservation, such as the Grade I listed buildings.
- 8.3.11 The sensitivity of the character area to change caused by the development proposals is high. This is a result of being a townscape of particularly distinctive character that is highly valued for its heritage.

### Euston Road (Character Area 2)

- 8.3.12 A portion of Euston Road, from Judd Street to York Way, is within the King's Cross Conservation Area as designated in the Camden UDP.
- 8.3.13 The topography of the character area falls from approximately 24 m in the west to approximately 16 m in the east, over a distance of 700 m. This creates a slight undulation in the character of the topography.
- 8.3.14 Building heights along Euston Road are varied but are predominantly four to eight storeys. Tall commercial buildings and hotels dominate the western portion of the character area. Towards the east, the character area incorporates large-scale buildings for institutional and public transport infrastructure. The architectural styles of buildings along Euston Road are mixed and include buildings from approximately 1910 through to the 1970s.
- 8.3.15 While the Euston Road Character Area shares a boundary with the King's Cross St Pancras Character Area there are no proposals within the Euston Road Character Area. Therefore, the Euston Road Character Area is not sensitive to the development proposals.

### Regent's Quarter and York Way (Character Area 3)

8.3.16 The topography of the character area is slightly undulating and York Way rises gradually in the north to pass over the canal. The character area is generally

at an elevation of approximately 16 m AOD in the south to 20 m AOD in the north.

- 8.3.17 The Regents Quarter Development is a 5.8 hectare site incorporating 63,000 square feet of office, residential, retail, restaurant and leisure facilities to the south of Wharfdale Road. The character area has a dense urban structure, which is predominantly residential. Commercial premises are located to the north of Wharfdale Road.
- 8.3.18 The Regents Quarter and York Way Character Area lies beside the King's Cross Character area but is separated by York Way. However, there are no proposals within the Regents Quarter and York Way Character Area. Therefore, the Regents Quarter and York Way Character Area is not sensitive to the development proposals.

#### **Baseline Visibility**

- 8.3.19 There are many potential visual receptors in the study area. The types of receptors are mixed and include residential, open space, tourist, hotels, pedestrians, rail commuters, motorists and commercial. The majority of views from potential visual receptors are close, and in some cases are adjoining or within the site. The nature of views varies, although most of the views are unobstructed and direct. The sensitivity of potential visual receptors is also varied, but predominantly falls within the Moderate to Low categories.
- 8.3.20 *Table 8.2* identifies the main areas from which the site may be visible, and their distance from the site. It identifies the main receptor types present, the nature of the view, whether the areas are characterised as Main or Secondary views by the London Borough of Camden, and the resulting sensitivity of the receptor area. Where the area is represented by a viewpoint used in the visual assessment this is indicated by reference to the relevant representative viewpoint as identified in *Table 8.3*.

### Representative Viewpoints

- 8.3.21 A number of representative views were chosen to provide an indication as to the nature of the visibility of the site from a selection of the potential visual receptors. Photographs from the representative viewpoints were taken in November 2003, and are presented in *Annex I*.
- 8.3.22 *Figure 8.2* identifies the locations of the representative viewpoints, and *Table 8.3* identifies the location of the view and the approximate distance of the viewpoint from both the site and from the diagrid shell at the Western Concourse. It also identifies whether the view is included in the London Borough of Camden's important local views as identified in the King's Cross Opportunity Area: Planning and Development Brief: January 2004.

# Table 8.2Potential Visual Receptor Areas

Potential Visual Receptor	Approximate Distance from Site	Predominant Receptor Type	Nature of View	London Borough of Camden (LBC) Views	Predicted Sensitivity
Euston Road. (Figure 8.2 (1))	Close Views (Adjoining the site - 200m)	Pedestrians, Motorists, Commercial and Institutional.	Pedestrians: Unobstructed, Direct, Dynamic. Motorists: Unobstructed, Direct, Dynamic. Commercial: Unobstructed, Direct, Static. Institutional: Unobstructed, Direct, Static.	<b>LBC Main Views</b> are up Pancras Road. <b>LBC Secondary View</b> with views to the stations and Great Northern Hotel.	Ranges from Moderate to Low.
Regent's Quarter and York Way. ( <i>Figure 8.2 (7</i> ))	Close Views (Adjoining the site - 200m)	<b>Residential</b> , Pedestrians and Motorists.	Residential: Unobstructed, Direct, Static. Pedestrians: Unobstructed, Direct, Dynamic. Motorists: Unobstructed, Direct, Dynamic.	<b>LBC Main View</b> ( <i>ie</i> York Way, south of Wharfdale Road).	Ranges from <b>High</b> to Low.
Pancras Road. (Figure 8.2 (2))	Close Views (Adjoining the site - 200m)	Pedestrians and Motorists.	Pedestrians: Unobstructed, Direct, Dynamic. Motorists: Unobstructed, Direct, Dynamic.	LBC Secondary View immediately northeast of the German Gymnasium.	Ranges from Moderate to Low.
Pentonville Road. ( <i>Figure 8.2 (9))</i>	Close to Middle Distance Views (10m to 500m+)	Pedestrians, Motorists, Commercial and Institutional.	Pedestrians: Unobstructed, Direct, Dynamic. Motorists: Unobstructed, Direct, Dynamic. Commercial: Unobstructed/Filtered, Oblique, Static. Institutional: Unobstructed/Filtered, Oblique, Static.	<b>LBC Secondary View</b> from the intersection of Grays Inn Road and the 'Lighthouse' block area.	Ranges from Moderate to Low.
Grays Inn Road. ( <i>Figure 8.2 (9))</i>	Close Views (40m to 150m)	Pedestrians, Motorists, Commercial and Institutional.	Pedestrians: Unobstructed, Direct, Dynamic. Motorists: Unobstructed, Direct, Dynamic. Commercial: Unobstructed, Oblique, Static. Institutional: Unobstructed, Oblique, Static.	<b>LBC Secondary View</b> from the intersection of Pentonville Road and the 'Lighthouse' block area.	Ranges from Moderate to Low.
Birkenhead Street. <i>(Figure 8.2 (10))</i>	Close Views (25m to 140m)	<b>Residential</b> , Pedestrians, Institutional and Motorists.	Residential: Unobstructed, Oblique, Static. Pedestrians: Unobstructed, Direct, Dynamic. Institutional: Unobstructed, Oblique, Static. Motorists: Unobstructed, Direct, Dynamic.	-	Ranges from <b>High</b> to Low.
Crestfield Street. (Figure 8.2 (11))	Close Views (30m to 110m)	<b>Residential</b> , Pedestrians, Commercial and Motorists.	Residential: Unobstructed, Oblique, Static. Pedestrians: Unobstructed, Direct, Dynamic. Commercial: Unobstructed, Oblique, Static. Motorists: Unobstructed, Direct, Dynamic.	-	Ranges from <b>High</b> to Low.
Belgrove Street. ( <i>Figure 8.2 (near</i> 1))	Close to Middle Distance Views (30m to 300m)	<b>Residential</b> , Pedestrians, Commercial and Motorists.	Residential: Unobstructed, Oblique, Static. Pedestrians: Unobstructed, Direct, Dynamic. Commercial: Unobstructed, Oblique, Static. Motorists: Unobstructed, Direct, Dynamic.	Potential visual receptors do not gain a LBC Important View.	Ranges from <b>High</b> to Low.

Potential Visual Receptor	Approximate Distance from Site	Predominant Receptor Type	Nature of View	London Borough of Camden (LBC) Views	Predicted Sensitivity
Argyle Street. (Figure 8.2 (12))	Close Views (80m to 170m)	<b>Residential</b> , Institutional and Pedestrians.	Residential: Unobstructed, Oblique, Static Institutional: Unobstructed, Oblique, Static. Pedestrians: Unobstructed, Direct, Dynamic.	Potential visual receptors do not gain a LBC Important View.	Ranges from <b>High</b> to Moderate.
Argyle Square. <i>(Figure 8.2 (11))</i>	Close to Middle Distance Views (130m to 220m)	<b>Open Space,</b> <b>Residential</b> , Pedestrians.	Open Space: Unobstructed, Direct, Static. Residential: Unobstructed, Oblique, Static. Pedestrians: Unobstructed, Direct, Dynamic.	Potential visual receptors do not gain a LBC Important View.	Ranges from <b>High</b> to Moderate.
St Pancras Chambers. <i>(Figure 8.2 (2))</i>	Close Views (30m to 140m)	Commercial and Hotel.	Unobstructed, Direct, Static.	Potential visual receptors do not gain a LBC Important View.	Ranges from Moderate to Low.
St Pancras Station (Eastern Buildings). ( <i>Figure 8.2 (2))</i>	Close Views (30m to 60m)	Commercial.	Unobstructed, Direct, Static.	Potential visual receptors do not gain a LBC Important View.	Low.
Goods Way. (Figure 8.2 (5))	Close to Middle Distance Views (150m to 400m)	Pedestrians, Motorists and Commercial.	Pedestrians: Filtered/Glimpsed, Direct, Dynamic. Motorists: Filtered/Glimpsed, Direct, Dynamic. Commercial: Obstructed, Oblique, Static.	These potential visual receptors fall within a <b>LBC Secondary View</b> .	Ranges from Moderate to Low.
Goods Yard Bridge. ( <i>Figure 8.2 (6))</i>	Middle Distance Views (200m to 400m)	Pedestrians and Motorists.	Pedestrians: Unobstructed, Direct, Dynamic. Motorists: Unobstructed, Direct, Dynamic.	These potential visual receptors fall within a <b>LBC Secondary View</b> .	Ranges from Moderate to Low.
East Coast Main Line. ( <i>Figure 8.2 (8))</i>	Close Views (Adjoining the site - 150m)	Rail Commuters.	Unobstructed, Direct, Dynamic.	These potential visual receptors fall within a <b>LBC Secondary View</b> , where views are directed to the gasworks tunnels.	Low.
CTRL Train Shed (St Pancras Extension). ( <i>Figure 8.2 (west</i> of 4))	Close to Middle Distance Views (55m to 230m)	Tourist, Rail Commuters and Commercial.	Tourist: Unobstructed, Direct, Dynamic. Rail Commuters: Unobstructed, Direct, Dynamic. Commercial: Unobstructed, Direct, Static.	Potential visual receptors do not gain a LBC Important View.	Ranges from Moderate to Low.
CTRL Exit / Forecourt on Pancras Road. (Figure 8.2 (west of 2))	Close to Middle Distance Views (55m to 230m)	Pedestrians, Tourist, Rail Commuters.	Pedestrians: Unobstructed, Direct, Dynamic. Tourist: Unobstructed, Direct, Dynamic. Rail Commuters: Unobstructed, Direct, Dynamic.	Potential visual receptors do not gain a LBC Important View.	Ranges from Moderate to Low.

Potential Visual Receptor	Approximate Distance from Site	Predominant Receptor Type	Nature of View	London Borough of Camden (LBC) Views	Predicted Sensitivity
Internal Spaces within King's Cross Mainline Station. ( <i>Figure 8.2 (13 &amp;</i> 14))	Close Views (Within & adjoining the site - 200m)	Tourist, Rail Commuters and Commercial.	Tourist: Unobstructed, Direct, Dynamic. Rail Commuters: Unobstructed, Direct, Dynamic. Commercial: Unobstructed, Direct, Static.	These potential visual receptors fall within a <b>LBC Secondary View</b> , where views are directed to the gasworks tunnels.	Ranges from Moderate to Low.
King's Cross Mainline Station Southern concourse: External Areas. ( <i>Figure 8.2</i> ( <i>north of 1</i> ))	Close Views (Within & adjoining the site - 100m)	<b>Open Space</b> , Pedestrians, Tourists, Rail Commuters.	Open Space: Unobstructed, Direct, Static. Pedestrians: Unobstructed, Direct, Dynamic. Tourist: Unobstructed, Direct, Dynamic. Rail Commuters: Unobstructed, Direct, Dynamic.	Potential visual receptors do not gain a LBC Important View.	Ranges from <b>High</b> to Low.
King's Cross Mainline Station Western Concourse. ( <i>Figure 8.2 (2))</i>	Close Views (Within & adjoining the site - 150m)	<b>Open Space</b> , Pedestrians, Tourists, Rail Commuters.	Open Space: Unobstructed, Direct, Static. Pedestrians: Unobstructed, Direct, Dynamic. Tourist: Unobstructed, Direct, Dynamic. Rail Commuters: Unobstructed, Direct, Dynamic.	The potential visual receptors fall within a <b>LBC Main View</b> .	Ranges from <b>High</b> to Low.
Camley Street. ( <i>Figure 8.2 (4)</i> )	Middle Distance Views (200m to 600m)	Pedestrians and Motorists.	Pedestrians: Glimpsed, Direct, Dynamic. Motorists: Glimpsed, Direct, Dynamic.	Potential visual receptors do not gain a LBC Important View.	Ranges from Moderate to Low.
Camley Street Natural Park. ( <i>Figure 8.2 (4))</i>	Middle Distance Views (230m to 430m)	Open Space.	Glimpsed, Direct, Static.	Potential visual receptors do not gain a LBC Important View.	High.

Potential Visual Receptor	Approximate Distance from Site	Predominant Receptor Type	Nature of View	London Borough of Camden (LBC) Views	Predicted Sensitivity
Tall Buildings within the Study Area: The Novatel Hotel (corner of Ossulston & Euston Streets). Evergreen House (150 Euston Rd). 200 Pentonville Rd. ( <i>Figure 8.2 (9)</i> )	Middle Distance Views Novatel: (320m to 450m) Evergreen House: (500m to 630m) 200 Pentonville Rd: (330m to 440m)	Commercial.	Unobstructed, Direct, Static.	Potential visual receptors do not gain a LBC Important View.	Low.
King's Cross Central Construction Site. ( <i>Figure 8.2 (3</i> & 5))	Close to Middle Distance Views (Adjoining the site - 350m)	Commercial and Industrial.	Glimpsed, Direct, Dynamic.	Some of these potential visual receptors fall within a <b>LBC Main View</b> .	Low

## Table 8.3Representative Viewpoints

Photograph	Location	Approximate Distance from Site Boundary	Approximate Distance from Diagrid Shell at Western Concourse	London Borough of Camden (LBC) Views.
1 (Agreed with LBC)	Views from Euston Road looking north up Pancras Road to the side elevation of Barlow shed. Views from Euston Road towards the stations, St Pancras Chambers and Great Northern Hotel.	to the side 47m 130m rds the		LBC Main View.
2	Views from the proposed King's Cross Western Concourse towards King's Cross Station front façade, Great Northern Hotel, St Pancras Chambers and the Barlow shed.	The photograph was taken from within the site.	The photograph was taken from within the footprint of the diagrid shell.	LBC Main View.
3 (Agreed with LBC)	A newly opened view from immediately northeast of the German Gymnasium towards the stations and Great Northern Hotel.	46m	65m	LBC Secondary View.
4 (Agreed with LBC)	Camley Street Natural Park.	220m	300m	Not a LBC View.
5	Glimpsed views from middle and eastern parts of Goods Way to King's Cross Station.	120m	265m	LBC Secondary View.
6	Glimpsed views of local landmarks from viewpoints in the Goods Yard complex (including Wharf Road, Granary Open Space and the upper level of the Coal Drops).	120m	390m	LBC Main View.
7	Views from York Way south of Wharfdale Road, looking southwest to King's Cross Station train shed and over the tracks to new development.	14m	N/A (the diagrid shell will not be visible from the viewpoint).	LBC Main View.
8	The views from King's Cross Station platforms and from trains to the portals of gasworks tunnels.	The photograph was taken from within the site.	N/A (the diagrid shell will not be visible from the viewpoint).	LBC Secondary View.
9 (Agreed with LBC)	Views from Pentonville Road, the Lighthouse Block area and Grays Inn Road, towards the stations.	36m	140m	LBC Secondary View.
10	Birkenhead Street (corner of St Chad's Street).	110m	N/A (the diagrid shell will not be visible from the viewpoint).	Not a LBC View.
11	Argyle Square (corner of St Chad's Street).	125m	210m	Not a LBC View.

Photograph	Location	Approximate Distance from Site Boundary	Approximate Distance from Diagrid Shell at Western Concourse	London Borough of Camden (LBC) Views.
12	Argyle Square (corner of Argyle Street).	210m	N/A (the diagrid shell will not be visible from the viewpoint).	Not a LBC View.
13	King's Cross Station – Platform 1.	The photograph was taken from within the site.	N/A (the diagrid shell will not be visible from the viewpoint).	Not a LBC View.
14	King's Cross Station – Platform 4.	The photograph was taken from within the site.	N/A (the diagrid shell will not be visible from the viewpoint).	Not a LBC View.

#### Summary: Baseline Visibility

- 8.3.23 In summary, the site and study area are relatively flat and therefore views to and from the site are principally controlled by the height and mass of buildings and structures and the orientation of the street pattern. The result is that the site is relatively obscured from most parts of the study area.
- 8.3.24 Consequently, where views of the site are available, they tend to be close views with potential visual receptors mainly within 200 m of the site. Additionally, views of the site are available from the north, including from Camley Street and the Camley Street Natural Park. As a result of the density of development in proximity to the proposals, there are a large number of people potentially affected, mainly consisting of pedestrians and motorists. The sensitivity of viewpoints ranges from High to Low, but generally fall within the Moderate to Low categories.

#### 8.4 ASSESSMENT OF ENVIRONMENTAL EFFECTS

#### Overview

- 8.4.1 The townscape and visual effects have been identified in relation to:
  - temporary construction effects;
  - permanent operational effects; and
  - cumulative effects.
- 8.4.2 The mitigation measures used within the project to reduce negative townscape and visual effects are intrinsic to the design. Townscape and visual effects have therefore been assessed with the mitigation measures in place and the effects identified in this section are therefore residual impacts
- 8.4.3 The criteria used to assess magnitude of change are included in *Table I1.4* in *Annex I. Table 8.1* outlines the criteria used to assess the significance of effects. The criteria shown in *Table I1.10* in *Annex I* were also used to assess effects on visual receptors.

### **Temporary Short Term Construction Effects**

#### Townscape Effects

- 8.4.4 In summary, the townscape effects will be confined to Character Area 1 and will be significant. *Table 11.11* in *Annex I* outlines the temporary construction effects of the proposal on the townscape within the study area. Effects on Character Area 1 will be negative and short term. The significant effects will primarily be the result of a moderate magnitude of change and high receptor sensitivity.
- 8.4.5 If the King's Cross Central project is under construction at the same time as the proposed development then the construction effects will be reduced and will not be significant. They would be confined to Character Area 1 and would be negative and short term.

#### Visual Effects

#### Strategic Views

- 8.4.6 Effects on strategic views will be negative but not significant.
- 8.4.7 During construction, cranes may be visible breaking the skyline of strategic views. As a result of their limited mass and temporary nature, the effect of the cranes will not be significant.
- 8.4.8 As a result of their siting and height, the proposed permanent structures will not break the skyline of strategic views and will not be visible in the middle ground of such views during construction.
- 8.4.9 There would be no significant change in effect if the King's Cross Central project were to be under construction at the same time as the proposed development.

### Important Local Views

- 8.4.10 The effects of the proposals on important local views are identified in *Table 11.12* in *Annex I*. In summary, the majority of effects on important local views will not be significant, with the exception of the three receptors listed below. The 'not significant' effect will be the result of the limited sensitivity of receptors and the limited magnitude of change. All effects on important local views will be negative and short term.
- 8.4.11 The following three important local views, as defined in London Borough of Camden Development Brief, will undergo a significant negative effect:
  - King's Cross Mainline Station: Western Concourse (LBC Main View);
  - Pancras Road (LBC Secondary View); and
  - Internal spaces within King's Cross Mainline Station (LBC Secondary View).
- 8.4.12 Significant effects on the three visual receptors will be short term and will be the result of the proximity of the receptor to the proposals and the large portion of view occupied by construction elements. Two of these three receptors will be located within the King's Cross Station Enhancement Project and will benefit from the project in the long term.
- 8.4.13 There would be no significant change in effect if the King's Cross Central project was under construction at the same time as the proposed development.

### Potential Visual Receptors

8.4.14 In summary, the majority of effects will not be significant. This will be the result of limited receptor sensitivity and limited magnitude of change. All effects will be negative and short term. *Table 11.12* in *Annex I* outlines the temporary construction effects of the proposal on the visual receptors within the study area.

- 8.4.15 There will be limited visibility to the construction site from the highly sensitive visual receptors within the study area, namely residential properties, the towpath and the majority of open space. Where the construction site will be visible, it will predominantly occupy a limited portion of views. Therefore, in most cases, the magnitude of change will be low, with the exception of close views. The following close visual receptors will experience a significant negative effect:
  - Pancras Road;
  - CTRL exit / forecourt on Pancras Road;
  - Internal spaces within King's Cross Mainline Station;
  - King's Cross Mainline Station: Southern Concourse external areas; and
  - King's Cross Mainline Station: Western Concourse.
- 8.4.16 All of the significant effects will be short term and will be the result of the proximity of the receptor to the proposals and the large portion of view occupied by construction elements. Three of these five receptors will be located within the project and will benefit from the project in the long term.
- 8.4.17 For visual receptors located north of the site, the proposed construction site will be visible from the majority of locations. The Culross buildings, which currently shield views to the proposed construction site from the north, will be demolished as part of the King's Cross Central project. This will open up the site and therefore much of the proposed structure will be visible.

### Long Term Operational Effects

#### Photomontages

- 8.4.18 Photomontages have been prepared to illustrate the main visual effects of the project from three viewpoints and these are presented in *Figures 8.3 to 8.5*.
- 8.4.19 These three viewpoints were agreed with London Borough of Camden Officers and correspond with some of the main and secondary views identified in the King's Cross Opportunity Area, Planning and Development Brief. A description of the viewpoints and the purpose of their selection are provided below. The numbering of these viewpoints corresponds to those described in *Table 8.2*.

<b>Viewpoint 1</b> : Taken from either the southeast corner of St Pancras Station looking north northeast encapsulating the southern façade of King's Cross Station, the new southern plaza, the new western concourse and the Great Northern Hotel.	The purpose of this view is to ensure that the southern façade of KX Station, Great Northern Hotel and the New Western Concourse feature in the view. The choice of location aimed to reflect the experience that viewers would have when approaching the station from the west along Euston Road.
<b>Viewpoint 9</b> : Taken from the corner of Grays Inn Road and Birkenhead Street to take in the newly revealed southern façade of King's Cross Station and the newly created plaza, where the southern concourse once stood, with the backdrop of St Pancras Station and Chambers.	The purpose of this view is to ensure that the southern façade of KX Station, Great Northern Hotel and the New Southern Plaza and St Pancras Station and Chambers feature in the view. The choice of location aimed to reflect the experience that viewers would have when approaching the station from the east.

Viewpoint 3: View taken from the new CTRL	The purpose of this view is to ensure that the
St Pancras Station exit adjacent to the German	Western Range of KX Station, Great Northern
Gym on Pancras Road.	Hotel and the New Western Concourse feature
	in the view. The choice of location aimed to
	reflect the experience that viewers would have
	when looking at the station from one of the key
	features of the King's Cross Conservation
	Area, the German Gymnasium.

8.4.20 A fourth viewpoint (viewpoint 4) was also agreed with London Borough of Camden Officers. However, the assessment showed that views of the development will not be received from this location. This viewpoint will therefore not be subject to significant impacts and hence a photomontage has not been prepared.

#### Townscape Effects

- 8.4.21 *Table 11.13* in *Annex I* outlines the long term operational effects of the proposal on the townscape within the study area. In summary, the townscape effects will be confined to Character Area 1 and will be positive, long term and significant.
- 8.4.22 There would be no significant change in long term effects if the King's Cross Central project was also developed.

#### Visual Effects

#### Strategic Views

- 8.4.23 During operation, there will be no effect on strategic views and there would be no additional effects if the King's Cross Central project were developed.
- 8.4.24 As a result of their siting and height, the proposed permanent structures will not break the skyline of strategic views and will not be visible in the middle ground of such views. The proposals therefore fulfil the two key requirements of polices relating to strategic views. The proposals will not be visible from Parliament Hill, Kenwood or St Paul's Cathedral and will therefore have no effect on adopted or proposed strategic views.

### Important Local Views

- 8.4.25 The effects of the proposals on important local views are identified in *Table 11.14 Annex I*. In summary, effects will be a mix of significant and not significant. However, all effects will be positive and long term. The following important local views will undergo a significant positive effect as a result of the proposals:
  - Euston Road (LBC Main and Secondary View);
  - Pancras Road (LBC Secondary View);
  - King's Cross Mainline Station: Western Concourse (LBC Main View); and
  - internal spaces within King's Cross Mainline Station (LBC Secondary View).

- 8.4.26 All of the significant effects will be the result of the proximity of the receptor to the proposals and the large portion of view occupied by the proposals.
- 8.4.27 There would be no significant change in long term effects if the King's Cross Central project was also developed.

### Potential Visual Receptors

- 8.4.28 *Table 11.14* in *Annex I* outlines the long term operational effects of the proposal on visual receptors. In summary, effects will be a mix of significant and not significant, but they would all be positive. The following visual receptors will experience a significant positive effect:
  - Euston Road;
  - Pancras Road;
  - CTRL Exit / Forecourt on Pancras Road;
  - internal spaces within King's Cross Mainline Station;
  - King's Cross Mainline Station: Southern concourse External Areas; and
  - King's Cross Mainline Station: Western Concourse.
- 8.4.29 This demonstrates that the most significant positive effects will be upon visual receptors in close proximity to the site.
- 8.4.30 There would only be minor differences in effects on visual receptors if the King's Cross Central project were developed. The exceptions relate to the following visual receptors located north of the site:
  - Goods Way;
  - Goods Yard Bridge;
  - Camley Street;
  - Camley Street Natural Park; and
  - northern portions of Character Area 1 (King's Cross Central Site).
- 8.4.31 Although there will be minor differences, the overall effects for the two projects together would be the same, that is, effects will be positive and will include a mix of effects that will be significant and not significant.

### 8.5 MITIGATION MEASURES

### Construction

8.5.1 The project will be phased in a way that will reduce effects on the townscape character and visual resources during construction. Where possible, construction elements will be located in the least visible locations. This will include elements such as parking, haulage and access roads, site compound, stockpiles and material storage. Where it is practicable, potentially unsightly elements will be screened by hoardings.

### Operation

- 8.5.2 Mitigation of potential negative effects of the project has been implemented by virtue of the high quality of the design of the new structures. In particular, the following mitigation measures have been incorporated into the design to reduce townscape and visual effects:
  - The proposed Western Concourse and diagrid shell will adjoin the Western Range, allowing the creation of a public space between the station and Euston Road. This will reduce the visibility of the diagrid shell from a number of visual receptors, notably along Euston Road, and allow the station's southern facade to dominate views. The station's southern façade will be set within the forecourt of the proposed Southern Square. As such, the design has been developed to maintain and enhance baseline views, notably the viewpoints as defined in *Table 8.3*.
  - The proposals will retain and enhance positive heritage elements and character. The external appearance of listed buildings will be enhanced. Proposals include structural strengthening of the bomb gap and reinstatement of the Old Booking Hall in the Western Range and the refurbishment of façades.
  - The 1970s temporary ticket hall buildings are of poor architectural quality and will be removed from between the station and Euston Road.
  - A new high quality public space will be developed as the Southern Square, which will incorporate predominantly hard landscaping.
  - The creation of the Southern Square will improve the way the station addresses Euston Road.
  - The station's southern façade will become more visible, notably the lower elements and their interface with the ground plane.
  - The project will incorporate high quality architecture associated with the Western Concourse and diagrid shell. The contemporary character of the diagrid shell will relate to the contemporary character of the nearby CRTL train shed.
  - The diagrid shell will have regard to the height and scale of the listed buildings. Notably, the roofline of the diagrid shell will be lower than adjoining listed buildings.
  - The diagrid shell will have regard to the character of the area. Notably, the diagrid shell will be a visually 'light' structure that will allow the listed buildings to dominate.

#### 8.6 RESIDUAL EFFECTS

8.6.1 *Table 8.4* provides a summary of the residual impacts of the proposed development on the townscape character and visual resources.

### Table 8.4 Summary of Residual Townscape and Visual Impacts

#### Phase

**Overall Significance** 

Temporary Short Term	
Construction Effects	
Townscape Effects	Significant: Negative.
Strategic Views	Not Significant: Negative.
Important Local Views	Not Significant: Negative.
Potential Visual Receptors	Not Significant: Negative.
Long Term Operational Effects	
Townscape Effects	Significant: Positive.
Strategic Views	No Effect
Important Local Views	Mix of Significant & Not Significant: Positive.
Potential Visual Receptors	Mix of Significant & Not Significant: Positive.

- 8.6.2 In summary, effects during construction will be temporary, short term and negative, the majority of which will not be significant. All long term operational effects will be positive, with the exception of strategic views, which will not be affected.
- 8.6.3 The only significant negative effect will occur in the construction phase, as a short-term effect. This will be a significant negative effect on townscape character.
- 8.6.4 Notably, the proposals will cause significant positive effects during operation on the townscape character and a number of close visual receptors. A number of important local views, as defined by the London Borough of Camden, will experience a significant positive effect as a result of the proposals. In contrast to the negative effects, these positive effects will be long term.
- 8.6.5 When assessed in combination with the King's Cross Central Project, construction effects on townscape character, important local views and potential visual receptors will be significant and negative. However, these negative effects will be short term.
- 8.6.6 The combined effects of the proposed development and the King's Cross Central project during operation would be positive, both in relation to townscape and visual effects.



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# 9 TRANSPORT AND PEDESTRIAN MOVEMENTS

### 9.1 INTRODUCTION

- 9.1.1 As described in *Chapter 2: The Proposed Project*, the King's Cross area is currently undergoing significant change due to the construction of the new CTRL terminal at St Pancras and the associated LU enhancements at King's Cross Station. In addition to the Station works, Argent is proposing to undertake major redevelopment of the lands to the north of the Station. The proposed King's Cross Central development is expected to place considerable demands on the public transport network, require new public realm for pedestrian movement, and change the vehicle flows on the local road network.
- 9.1.2 This chapter of the ES identifies adverse and beneficial effects of the changes in transport and pedestrian movements brought about by the proposed project and the proposed new developments to the north of King's Cross Station. Construction traffic is described in Chapter 2, but due to the low numbers of vehicles that are predicted to be generated through construction activities, the assessment of their impact has been scoped out of the EIA.

#### 9.2 METHODOLOGY

#### **General Approach to the Assessment**

- 9.2.1 Three scenarios have been developed for the purposes of the assessment, as follows:
  - 2007/8 Baseline Case defined as the situation with King's Cross Station as it stands today (2006), plus the completed CTRL and LU Northern Ticket Hall works in place. Passenger movements for the 2007/8 year of opening are presented with a peak hour six intercity, nine suburban (6/9) train service operation;
  - Future Case without the King's Cross Central Development (the Stand Alone Case) – defined as the situation in 2020 with the new Western Concourse and no King's Cross Central Development; and
  - Future Case with the King's Cross Central Development (the Cumulative Case) defined as the situation with the new Western Concourse and the King's Cross Central Development 100 % complete and fully occupied. This is based on the future PM maximum train service option of seven intercity, twelve suburban (known as a 7/12 service pattern) capacity based assessment. This has been tested for normal and perturbated conditions but only for the proposed Western Concourse design.
- 9.2.2 Further details of this assessment methodology are presented in Annex J.
- 9.2.3 Cumulative transport effects of the King's Cross Central development are considered for the future year identifying the expected changes in pedestrian movement and how the proposed project has been designed to accommodate this adjacent development. Reference is also made to the London Borough of

Camden's King's Cross Opportunity Area Planning and Development Brief January 2004.

#### Consultation

- 9.2.4 The evolution of the proposed project has involved extensive consultation on the Station operation, its interface with adjacent interchange modes and coordination with Argent who is promoting the King's Cross Central development. The consultation process on transportation issues has included meetings with:
  - Network Rail to review the operational requirements of the new Station concourse;
  - GNER and FCC with regard to concourse and passenger facilities;
  - London Borough of Camden on compatibility with the UDP and improvements to public realm and highways;
  - Transport for London on facilities for bus, taxi, and highway operations;
  - London Underground on passenger flow and capacity effects on the new underground network currently being built and longer term issues; and
  - Argent regarding the King's Cross Central requirements in and around the Station.
- 9.2.5 This consultation process has achieved a means to progress the form of the new Western Concourse, the passenger flow requirements within the Station, interchange with taxi and private car, and accommodate alignment and cross sectional details of Pancras Road, and definition of the new public realm.

#### 9.3 BASELINE CONDITIONS

#### Introduction

- 9.3.1 The project baseline assumes that only those projects that already have planning permission are included. The baseline incorporates the following project and infrastructure conditions which will be completed in 2007/8:
  - King's Cross Station will have the basic layout as it is today (2006) with 11 platforms;
  - CTRL works are assumed to be completed;
  - LU works are assumed to be completed;
  - Pancras Road will have the layout as proposed under the CTRL works;
  - bus interchange facilities on Euston Road and Pancras Road will be as proposed under the CTRL works;
  - cycle parking provision will remain at 80 spaces;
  - deliveries to Station facilities and On Board Services will operate from an area in front of the suburban shed; and
  - taxi facilities will be located at the western side of the Station.

- 9.3.2 Passenger and vehicle flow conditions for this baseline are presented as:
  - King's Cross Station flows forecast for 2007/8; and
  - background passenger flows to street destinations and St Pancras derived from:
    - o 2002 survey data with growth for the 2007/8 (6/9 train operations)
    - o 2011 capacity flows for St Pancras International; and
    - St Pancras Station Domestic services as defined by CTRL for 2018.

#### **Baseline 2007/8 Passenger Flows**

#### Assessment Period

9.3.3 Station planning is typically based upon the peak departure condition when the greatest passenger accumulation is expected on the concourse. This will occur during the evening period. Station planning has concentrated on assessing the most onerous passenger accumulation conditions, which occur when six Intercity and nine Suburban services depart the Station (See *Table 9.1*). (This service pattern is known as a 6/9 operation). During this period the Intercity services comprise of 9-car formations. The suburban services typically operate with six 8-car services, one 6-car, two 4-car and one 3-car formations.

# Table 9.1 Mainline Rail Passenger Arrivals and Departures (Evening Peak Hours)

		Trains	
	Intercity	Suburban	Total Trains
1700-1800	6	9	15
1800-1900	5	10	15

# Passenger Movements

- 9.3.4 Passenger movement data was collected at King's Cross Station between June 2000 and June 2002. Passenger demand to and from the mainline rail services has been factored up from 2002 to 2007/8 using an agreed Network Rail growth factor of 2.5%. This factor has been generally applied to all 2002 train patronage data throughout the peak periods.
- 9.3.5 The key predicted two-way passenger movements for the 2007/8 peak periods are identified in *Table 9.2* and shown on Figures 9.1 and 9.2.

# Table 9.2Base Case 2007/8 Key Station Passenger Flows (3 Hr periods)

	AM	PM
Southern Concourse		
Platforms 1-8 (Main Line)	14,770	19,230
Street Connections and Southern LUL	12,320	20,440
LUL (Western Range)	9,910	9,510
Suburban Shed		
Platforms 9-11 (Main Line)	7,575	10,150
Street Connections	1,770	3,570
LUL (NE Stair)	3,220	2,700
Total Main Line	22,345	29,380

9.3.6 From this table it can be seen that of the total morning and evening platform movements (22,345 and 29,380 respectively), the Main Train Shed attracts the highest flow with some 66% of main line passengers using these eight platforms.

# Figure 9.1 King's Cross Station 2007/8 AM 6/9 Operation with LU Northern Ticket Hall (0700-1000 hours)



### Figure 9.2 King's Cross Station 2007/8 Evening 6/9 Operations with LU Northern Ticket Hall (1600-1900 Hours)



#### 2007 Baseline Road Traffic Flows

- 9.3.7 The baseline traffic flows have been developed from information provided by the CTRL project, LU, surveys at King's Cross Station and through joint working with the King's Cross Central team.
- 9.3.8 The traffic flows along Pancras Road have a significant taxi content with high potential for taxi drivers to choose where they pick up passengers. This choice has been reflected in the assignment of empty taxis following set down of passengers. Additionally, the passenger pick up at both Stations is defined as a combined system with management<sup>(1)</sup>, in order to reduce passenger wait times and to reduce the empty journey distances.
- 9.3.9 The operation of a combined system on Pancras Road ensures that taxis can drop passengers off at St Pancras International Station and then proceed to the pick up points at either St Pancras or King's Cross Stations. Management is provided by a marshal directing passengers to one of two taxi queues, one for passengers willing to share a taxi and another for those who wish to travel individually. This system also allows some of the empty taxis from St Pancras International set down to move across to the King's Cross pick-up at times when demand requires. However, it is recognised that additional empty taxis that will arrive from Euston Road are still required to serve the Stations.
- 9.3.10 At King's Cross Station there are some 165 and 524 vehicle movements setting down passengers during the morning and evening peak hours

respectively. The numbers of taxis picking up passengers are 311 and 101 for the same periods.

9.3.11 Vehicle flows on Pancras Road are divided into a southern and a northern section. On the southern two-way section, between Euston Road and the Great Northern Hotel, flows of 1628 and 1606 vehicles are predicted during the morning and evening peak hours. On the northern one-way section the northbound flow is 1378 for the morning peak hour, and 1710 for the evening peak hour.

# 9.4 ASSESSMENT OF ENVIRONMENTAL EFFECTS

# Future Case without King's Cross Central Development (the Stand Alone Case).

- 9.4.1 The provision of a new Western Concourse will see the following changes to the 2007/8 baseline infrastructure:
  - the Southern Concourse will be removed;
  - CTRL works will be complete;
  - London Underground works will be complete;
  - Pancras Road will have the CTRL layout;
  - there will be a new high level connection from the Mezzanine waiting area to the Main Shed platforms;
  - King's Cross Station taxis will be located at the western side of the Station, but moved away from the Western Range adjacent to Pancras Road itself;
  - A new OBS building and Station service area will be operational with access from Pancras Road via Battlebridge Road.
- 9.4.2 The environmental effects resulting from these changes to the infrastructure are likely to be associated with the following issues:
  - movement and accumulation of passengers within the Western Concourse;
  - movement of taxis and private cars on Pancras Road;
  - servicing of the new OBS facilities and Station; and
  - highway capacity on Pancras Road.
- 9.4.3 The potential effects are described in the following sections.

Effects on Movement and Accumulation of Passengers within the New Western Concourse

9.4.4 The concourse design parameters are based on Network Rail Design Standards and the Fruin Levels of Service. For accumulation areas under normal conditions a Level of Service B (1.0 to 1.2 m<sup>2</sup> per person) should be achieved. However, the available space in the concourse will be placed under greatest demand during train delay conditions. During these conditions the acceptable standard is reduced to Level of Service C (0.65 to 0.9 m<sup>2</sup> per person). For concourse planning the critical period is the evening peak experiencing 15-minute train delay conditions. This is because this represents the situation when the maximum number of passengers has to be accommodated awaiting departure from the Station.

9.4.5 Passenger volumes for the worst case PM capacity assessment have therefore been based on a projected peak hour service of seven Intercity, eight suburban 8-car services, and four suburban 12-car services as this represents a worst case demand scenario for the available space in the new Western Concourse.

#### Area Requirements for Normal 7/12 Operations

- 9.4.6 Normal train operations during the worst case 7/12 PM peak period show that the proposed Western Concourse operates at a peak Level of Service D if all passengers remain on the concourse, *ie* a maximum accumulation of 5130 people.
- 9.4.7 Assuming that some 20% move into adjacent station facilities this reduces the central concourse area demand to some 4,100 passengers for normal conditions.
- 9.4.8 This requires a concourse area of some 4,100 m<sup>2</sup> to satisfy the normal design standard of mid Level of Service B. The total waiting area available in the Western Concourse is 3,300 m<sup>2</sup> and this is calculated to operate at Mid Level of Service C, as shown in Figure 9.3, which is outside the standard.
- 9.4.9 Whilst this is outside the standard this is a significant improvement on passenger conditions when compared to the existing station concourse for all passengers. Existing passengers in the Suburban Shed concourse experience up to Level of Service E and F, with those in the Southern Concourse experiencing Level of Service D.

# Figure 9.3 Western Concourse Accumulation and Performance



Area Requirements for Disrupted 7/12 Operations.

- 9.4.10 Perturbated train operations during the worst case 7/12 PM peak period show that the proposed Western Concourse becomes more congested than under normal conditions, with greater numbers of passengers waiting in the southern and northern accumulation areas. These Levels of Service are expected to be unacceptably high.
- 9.4.11 For passenger accumulation levels during 7/12 PM perturbated train operations, some 5,900 passengers need to be accommodated on the concourse, excluding 20% using other station facilities. Assuming that some 20% move into adjacent station facilities this reduces the central concourse area demand to some 4,730 passengers for perturbated conditions.
- 9.4.12 This requires a concourse area of some 3,780 m<sup>2</sup> to satisfy the perturbated design standard of mid Level of Service C. The total waiting area available in the Western Concourse is 3,300 m<sup>2</sup> and this is calculated to operate at Level of Service C, as shown in *Figure 9.4*.
- 9.4.13 Where conditions exceed the specified design standard as presented for the future 7/12 PM perturbated condition, it is expected that a greater number of passengers will naturally utilise other Station facilities, or some would have to be held outside the main concourse area in the newly created southern and northern squares.

### Figure 9.4 King's Cross Station Levels of Service for Peak Evening Perturbated Operations





# Set Down and Pick Up for Private Cars and Taxis

9.4.14 As described above, on completion of the new Western Concourse the set down and pick up points for private cars and taxis will be moved from in front of the Western Range to a location on Pancras Road. These modifications are necessary to accommodate the Western Concourse. The set down zone has been designed to satisfy the Strategic Rail Authority's Train and Station Services for Disabled Passengers, A Code of Practice 2002. The set down zone will have 10 bays for drop off and three disabled parking bays. Of the 10 bays, eight will be for taxis (as discussed below). Pick up for private cars will be in short term car park in order to minimise conflicts with taxi movements.

- 9.4.15 These modifications to the facilities will slightly modify the baseline CTRL Pancras Road layout, but will still operate the combined taxi system described in *Section 9.3*. However, the functionality of the CTRL Pancras Road layout will be maintained.
- 9.4.16 The taxi facilities for the new Western Concourse, as shown on *Figure 9.5*, have been incorporated within those proposed for St. Pancras Station. The design of the new provision is in accordance with Transport for London's *Best Practice Guidelines for Taxi Ranks at Major Interchanges*.

# Figure 9.5 King's Cross and St Pancras Stations Taxi Set Down and Pick Up System in 2020



9.4.17 To identify the taxi pick up requirements for the future design condition in 2020, the Arup/TfL Taxi Pick Up Model (Improving the Operation of Taxi Ranks at Major Interchanges, Feb 2002) has been run for the expected peak passenger flows in the peak hour.

- 9.4.18 Under standard (non-perturbated) operations and good taxi supply, eight bays are required at the pick up. However, passenger wait times and queues can become excessive when taxi supply falls and therefore high levels of active management, such as taxi share, will be required to maintain passenger throughput. Under taxi share six bays are required.
- 9.4.19 Passenger queues under standard operations could range from some 46 passengers with 100 % taxi supply and taxi sharing, up to some 269 passengers when supply reduces to 65 %.
- 9.4.20 To ensure that taxi supply is maintained at high levels a combined system, as described in *Section 9.3*, will be operated. This system enables empty taxis to move directly south from the King's Cross set down area to join the head of the King's Cross taxi rank at the pick up area by passing along Pancras Road to the west of the Hotel. An alternative is to make a U-turn onto Pancras Road to drive north to join the extended section of the taxi rank. At the pick up area, taxis would filter from the single lane into two lanes feeding two pick-up zones serving standard and taxi sharing queues. Taxis exit onto Euston Road promoting good distribution for both central London destinations and northern destinations via York Way. The operation of this system will ensure a high throughput of passengers and minimise empty taxi journeys.
- 9.4.21 The combined taxi movements for both King's Cross and St Pancras stations will place a significant demand on the current available taxi supply. From experience at Paddington Station following the introduction of Heathrow Express, the increase during the peak hours, whilst high, was lower than expected. However, the daily movements were significantly increased.
- 9.4.22 At King's Cross it is expected that a similar trend will be experienced. Firstly the St Pancras rail operations will trigger a significant increase in taxi movements followed by a modest annual growth to account for growth in general traffic at both Stations. Hence the traffic flows presented assume that taxi sharing will need to be considered during the morning period for King's Cross Station at least. This increases taxi occupancy and has the additional benefit of reducing the demands on the highway network.
- 9.4.23 Further information on the taxi arrangements for the new Western Concourse is given in *Annex J*.

# Effects of Servicing the New OBS Facilities and Station

- 9.4.24 The effects of servicing the new OBS and other Station facilities will be minimised through the implementation of a servicing strategy that reduces the conflict between passengers and delivery vehicle access and distribution of goods within the Station. This will in turn improve passenger safety.
- 9.4.25 The conflicts between passengers and delivery access has been achieved by providing a segregated access road from Pancras Road via Battlebridge Road down to the basement services area. This basement facility will be managed to distribute deliveries throughout the day. In addition to this central facility other servicing routes will be required at grade across the Southern Square for LU and Station facilities. These will be restricted zones to exclude deliveries from peak passenger flow periods.

- 9.4.26 In order to service the facilities in the Station once the new Western Concourse is in place, it is estimated that:
  - at the basement service area around 43 vehicles will arrive during 12 hours (0700-1900) with 67 vehicles arriving per day (24 hours). Of the 67 deliveries over 24 hours, 14 are classified as HGVs; and
  - around 14 vehicles per day will use the on-street York Way service bay.
- 9.4.27 The application of a managed delivery operation for Station operations and improved storage operations will reduce the number of daily deliveries at the Station. Currently 106 vehicles make deliveries to the Suburban Shed area of the Station over a 12-hour period. The proposed management arrangements will ensure that only 43 deliveries will be made to the new OBS facilities over the same period. This is considered to be a positive effect of the proposed project.

# Highway Capacity on Pancras Road

- 9.4.28 The assessment of effects on traffic conditions draws on guidance contained in the *Institution of Highways and Transportation (IHT) Traffic Impact Assessment Guidelines.* These guidelines indicate that there is a potential for significant traffic impacts during both construction and operation if the predicted traffic levels were to meet the following conditions:
  - generated traffic levels exceed 10 % of the baseline two-way traffic on the adjoining highway, or 5 % where the adjoining highway is already congested; or
  - the development generates over 100 vehicle movements (a return journey is two movements) in a peak hour.

In addition, an assessment has been made of whether the ratio of traffic flow to capacity and queue length in the immediate area during the future Station operation are within recommended limits set out in the *IHT Traffic Impact Assessment Guidelines*.

- 9.4.29 The change in vehicle flows along Pancras Road due to the uplift in rail capacity creates an increase of some 90 to 145 vehicles during the morning and evening peak hours respectively at the southern two-way section of Pancras Road. This equates to a 5.4 % and 9.1 % increase respectively when compared to the Base Case traffic flows. For the one-way sections of Pancras Road the change varies between 6.4 % and 9.0 % during the morning peak hour, and between 1.0 % and 3.6 % during the evening peak hour. *Table 4.2* in *Annex J* compares the changes in road traffic flows from 2007 to 2020. These increases in road traffic volumes are below the thresholds of significance identified in the *IHT Traffic Impact Assessment Guidelines* and are therefore not significant.
- 9.4.30 The change in vehicle flows along Pancras Road will not exceed the 10% significance criterion described in the *IHT Traffic Impact Assessment Guidelines*. Therefore, no significant impact is predicted on traffic flows. However, due to the strategic nature of the King's Cross Station Enhancement

project and the taxi flow interfaces between King's Cross and St Pancras Stations a traffic signal analysis of the Pancras Road highway operations was carried out. The results of the assessment indicated that the junctions along Pancras Road will operate within acceptable levels. Further details of this assessment are provided in *Section 4.9* at *Annex J*.

#### Cyclists

9.4.31 The London Cycle Network will run along Pancras Road and Euston Road. Connections between the Station and these routes will be provided across the Northern and Southern Squares. Also in accordance with NR Standards<sup>(1)</sup>, bicycle parking provision at the Station will be increased from 80 to 150 spaces.

#### Buses

9.4.32 The CTRL Pancras Road layout will provide bus stops at the southern end of the road close to the junction with Euston Road. With the provision of the new Western Concourse an additional pedestrian crossing is provided on Pancras Road to improve accessibility to the bus stops. The King's Cross Station Enhancement project will provide improved connections with bus services on both Euston Road and Pancras Road by improving the public realm and pedestrian connections to the stops.

# Future Case with King's Cross Central Development (the Cumulative Case)

#### Introduction

- 9.4.33 With the introduction of the King's Cross Central development, and expected full occupation by 2020, new pedestrian movements will be generated within the Western Concourse and public realm areas. These people will utilise some of the newly available rail and Station capacity created by the King's Cross Station Enhancement project. Pedestrian movements will be to and from the main station entrance and the boulevard to the north. Pedestrian movements will cross the Northern Square and use the walkways adjacent to and through the Great Northern Hotel.
- 9.4.34 The King's Cross Central project proposes the following infrastructure changes:
  - Pancras Road will be realigned requiring a modified set down for the Station that will enable the taxi rank to be increased to some 50 bays;
  - the Station servicing entry and exit ramp is to be extended to a new junction on Goods Way;
  - a new LU entrance will be provided on the new boulevard; and
  - the Northern Square will be enlarged.

(1) Network Rail Managed Stations Design Guide. Final Draft. 2002.

#### Effects of King's Cross Central Passengers

9.4.35 The number of passenger trips to and from the King's Cross Central development for the evening peak period has been supplied by Argent. The number of King's Cross Central passenger trips using King's Cross Station is dependent on train operations at the mainline Station. *Table 9.3* shows the King's Cross Central passenger trips at full occupancy in 2020.

		Peak hour	Peak 3 hours <sup>(2)</sup>
MORNING <sup>(1)</sup>	King's Cross Central to Mainline Rail	320	700
	Mainline Rail to King's Cross Central	1120	2480
EVENING	King's Cross Central to Mainline Rail	950	2100
	Mainline Rail to King's Cross Central	480	1050

### Table 9.3King's Cross Central Mainline Passenger Flows

(1). Evening outbound flows assumed to be same as morning inbound flows and evening inbound flows the same as morning outbound flows.(2). Factored 3 hour flows.

#### Effects on Concourse and Public Realm Movements

- 9.4.36 The Station design accommodates the passenger accumulation areas and mainline interchange movements with the other transport modes including LU, buses and taxis. The pedestrian/passenger movements are significantly increased above the Base Case by the introduction of the King's Cross Central development. However, the Station provides acceptable operations during normal and train delay conditions through concourse design and the segregation of pedestrian movements relating to other development.
- 9.4.37 *Table 9.4* provides a comparative summary of the Base Case flows and enhanced 7/12 train operation with King's Cross Central.

# Table 9.4Comparison of Key Passenger Movements for 2007 Base Case with 2020Cumulative Case for the Morning and Evening Peak Periods

	0700-10	)00 hours	1600-1	900 hours
	2007/8 Base Case 6/9 Operation	7/12 Operation with Western Concourse	Base Case 2007/8 6/9 Operation	7/12 Operation with Western Concourse
Main Shed Movements	14,934	Not Modelled	19,230	21,025
Suburban Shed Movements	10,282	Not Modelled	10,150	12,930
Total Main Line	25,216	Not Modelled	29,380	33,955
King's Cross Central to Mainline Rail	NA	Not Modelled	NA	3,167

- 9.4.38 During the evening period the forecast passenger flow in the Station (for rail related trips and assuming 7/12 operation with King's Cross Central) has increased by 4575 (16%) when compared with the 2007/8 6/9 scenario.
- 9.4.39 For the evening peak periods the newly generated King's Cross Central trips are some 9 % of the total forecast. The King's Cross trips represent 70% of the general increase in demand between the Base Case and the 7/12 scenario.
- 9.4.40 In addition to movements to and from the Western Concourse, there are a significant number of pedestrian movements within the public realm areas adjacent to King's Cross Station. During the morning some 10,965 pedestrians are expected to pass between King's Cross Central / St Pancras Station and Euston Road / Southern LUL access points. For the evening 3-hour peak, some 11,840 pedestrians are expected.
- 9.4.41 The concourse design and arcade through the Great Northern Hotel accommodates the flows of passengers and pedestrians generated by the King's Cross Central development. There will therefore be no significant effects on concourse and public realm movements. The directions of movement of passengers and pedestrians for the peak evening period in 2020 are shown in Figure 9.6.
- 9.4.42 During the evening, some pedestrians are expected to walk around the perimeter of the Western Concourse between King's Cross Station / St. Pancras station and Euston Road/ Southern LUL access points.





### 9.5 SUMMARY AND CONCLUSIONS

# **Operational Summary**

9.5.1 The King's Cross Station Enhancement design has allowed for an uplift in main line operations from the current 15 trains an hour to 19 trains an hour. This increase in Station capacity supports continued passenger growth including the predicted requirements of the King's Cross Central development if it goes ahead and when it reaches full occupation. The maximum 7/12 main line passenger capacity within the Station will increase by some 4,575 in the evening when compared with the 2007/8 operation. The King's Cross Central development would account for some 9 % of the future total Station passenger flows in 2020 assuming the capacity based 7/12 peak hour operation. The project is shown to accommodate the operational requirements described below.

# Concourse and Public Realm

9.5.2 The design allows for the segregation of external pedestrian flows from concourse operations during perturbated conditions whilst providing clear circulation routes between the Northern and Southern Squares.

# Bus Interchange

9.5.3 With the demolition of the existing Southern Concourse, improved connections with bus services on both Euston Road and Pancras Road are provided through the new public realm and pedestrian connections.

# Station Forecourt

- 9.5.4 The Station forecourt for the new King's Cross Station with a Western Concourse and the Great Northern Hotel retained has been designed to function with Pancras Road as the CTRL Pancras Road alignment that runs to the east of the German Gym, and also with it realigned to the west of the German Gym as planned by King's Cross Central. Pancras Road has been maintained as a distributor road for all classes of traffic and is shown to operate to acceptable levels in the future assessment year.
- 9.5.5 The taxi operations have been designed to operate as a combined system for both the King's Cross and St Pancras Stations. This will reduce the empty taxi distances travelled in this area.
- 9.5.6 The 10 set down bays for taxis and private cars are aligned adjacent to the Station entrance.
- 9.5.7 Under standard operations and good taxi supply, eight bays are provided at the pick up. However, passenger wait times and queues can become excessive when taxi supply falls and therefore high levels of active management will be provided to maintain passenger throughput. Taxi share operations will also be considered during peak periods when taxi flows cannot be maintained. Under taxi share six bays are required.
- 9.5.8 In 2002, a taxi rank of some 27 spaces was provided on the west side of the Station. A similar rank is provided for the proposed project with CTRL

Pancras Road alignment. The rank can be increased to some 50 bays with the King's Cross Central realignment of Pancras Road.

#### Cycle facilities

9.5.9 Cycle parking is to increase from the current 80 spaces to some 150 spaces within the Station. This supply respects the expected increase in passenger numbers using the Station. These parking facilities will then be linked into the on-street cycle lanes planned by London Borough of Camden on the surrounding streets.

#### Station Servicing Strategy

- 9.5.10 Conflict between passengers and delivery vehicles is reduced by providing a segregated access road initially from Battlebridge Road, and if King's Cross Central should proceed, from Goods Way down to a new basement services area. The Goods Way access road will also provide access to Argent development areas. This basement facility will be managed to distribute deliveries throughout the day and to share facilities where possible. In addition to this central facility, other servicing routes will be required at grade across the Southern Square for LU and Station facilities. These will be restricted zones to exclude deliveries from peak passenger flow periods. Onstreet Station servicing along York Way will also be maintained for links with the Eastern Range.
- 9.5.11 The application of a managed delivery operation for Station operations and improved storage operations will reduce the number of daily deliveries at the Station. This is expected to reduce the number of vehicles making deliveries over a 12-hour period from 106 in 2002 to 43 in 2020.

#### Pancras Road Operations

- 9.5.12 The change in vehicle flows along Pancras Road, due to the uplift in rail capacity at King's Cross, creates an increase of less than 10 % in the numbers of vehicles both during the morning and evening peak hours. This represents a change in the traffic flows below the relevant thresholds of significance.
- 9.5.13 Results of modelling indicate that pressure is placed on the Euston Road signalled right turn into Pancras Road with it operating at capacity in all cases. The final setting of these signals will therefore need to be discussed in detail with the London Borough of Camden.

# King's Cross Opportunity Area (Camden Planning and Development Brief) Review

9.5.14 The King's Cross Station Enhancement Project conforms to the London Borough of Camden Planning and Development Brief (January 2004) for the King's Cross Opportunity Area, as noted previously in Chapter 4: Planning Policy and Land Use. In the context of this chapter the project supports the transport objectives and facilitates new developments because it:

- removes the existing Southern Concourse which enables good integration with public transport links and enhances the public realm along Euston Road;
- enhances the existing LU connections by providing with direct connections within and immediately adjacent to the new Western Concourse;
- enhances street level interchange with St Pancras Station;
- improves facilities for interchange with taxi operation at King's Cross for future demand and supports the taxi operations that are combined with those at St Pancras Station;
- provides a segregated Station servicing strategy that reduces conflict with passengers within the Station and also reduces conflict with pedestrians in the enhanced public realm between Euston Road and Goods Way;
- increases Station cycle parking facilities and connects with the on-street highway facilities developed by London Borough of Camden;
- reduces the need for private cars by enhancing other modal interchanges;
- provides facilities for mobility impaired people in the Station forecourt close to the Station entrances; and
- provides good north-south connections for adjacent development enhancing the public realm and pedestrian connections.

# Conclusion

9.5.15 The King's Cross Station Enhancement Project has been shown to support future growth in passenger movement by providing a new Western Concourse, improving interchange facilities and improving the adjacent public realm. This also accommodates the expected long-term increase in passenger pedestrian flows generated by the King's Cross Central Development and other local and central London development. The project also satisfies the objectives established by the London Borough of Camden in their development brief for the King's Cross Opportunity Area.

#### 10.1 INTRODUCTION

- 10.1.1 This section considers the potential noise effects of the project. The assessment includes:
  - identification of assessment methodology and criteria;
  - identification of noise sensitive receptors;
  - results of baseline noise surveys carried out by ERM in October 2003 and February 2006;
  - prediction and assessment of noise levels for construction work;
  - discussion of noise levels from the operation of the new Platform Y;
  - · identification of mitigation measures; and
  - identification of any residual effects.
- 10.1.2 The project is not anticipated to cause any significant effects with regards to vibration during either construction or operation, due to the distances separating the sensitive receptors from the site. This issue has not therefore been considered further.

#### 10.2 ASSESSMENT METHODOLOGY

#### **Construction Noise**

- 10.2.1 During the construction of both the Western Concourse and Platform Y there will be a number of potential sources of noise including demolition and construction activity. Prior to the chosen contractors fully detailing their methods of working and compiling their own inventories of plant required at the work site, it is only possible to give indicative figures of anticipated noise levels adjacent to above-ground construction activities. Any construction activities below ground level will give rise to much lower noise levels and are not therefore considered further in this assessment. Additionally, refurbishment of the offices in the Western Range will take place as part of the project. However, these works do not involve major construction activities and they will not result in significant levels of external noise.
- 10.2.2 Noise levels have been predicted at the nearest sensitive locations using the methodology set out in BS 5228 <sup>(1)</sup>. The methodology sets out indicative noise level outputs for a wide range of construction plant items.
- 10.2.3 The approach taken is to determine the sound power level of the equipment and then calculate the equivalent continuous noise level (L<sub>Aeq</sub>) (see *Section K2.1* in *Annex K*) at a standard distance. The noise level at a particular façade is then determined by applying corrections to account for:
  - the periods of operation of processes and plant;
  - the distances from sources to receiver;
  - reflection from the facade; and

(1) British Standard BS 5228 Noise control on construction and open sites: Code of practice for noise and vibration control applicable to piling operations.

- the presence of screening by barriers.
- 10.2.4 Other factors, such as meteorological conditions (particularly wind speed and direction) and atmospheric absorption can affect the received noise levels. However, the quantification of such effects is difficult, particularly due to the interaction between each effect. In any case, over short distances (*eg* up to 50 m) the combined effect of these factors is negligible. Over greater distances there will be a tendency towards greater sound reduction from these factors. Ignoring these effects will, therefore, tend to over-estimate noise levels.
- 10.2.5 The assumed plant associated with the construction activities and their sound power levels are listed in *Annex K*. This should be considered to be indicative of the activities that are likely to occur and may change as more detailed construction information becomes available.
- 10.2.6 It should be noted that construction works on the King's Cross Station Enhancement Project are scheduled to commence in January 2008, whilst other developments in the local area such as London Underground Northern Ticket Hall and the first phase of King's Cross Central are under construction. This assessment refers specifically to construction work as part of the King's Cross Station Enhancement Project and not to other redevelopment in the local area.

#### **Operational Noise**

- 10.2.7 The introduction of a new platform will increase the number of train movements to and from the station, and this may contribute to an increase in noise levels.
- 10.2.8 An assessment has been undertaken, with reference to the methodology set out in CRN <sup>(1)</sup>, to determine the expected increase in noise levels at noise sensitive locations, from the operation of the Station with the new platform.
- 10.2.9 The predicted change in noise levels has been assessed against relevant criteria. This prediction indicates whether the increase in noise will be significant and also identifies the potential need for noise insulation under the Railway Noise Insulation Regulations <sup>(2)</sup>.
- 10.2.10 Other aspects of operational noise such as mechanical ventilation will be addressed in accordance with local authority criteria during the detailed design stage.

# 10.3 ASSESSMENT CRITERIA

#### Introduction

- 10.3.1 Criteria have been developed by reference to:
  - Advisory Leaflet AL 72 <sup>(3)</sup>;
  - British Standard BS 5228;

(2) The Noise Insulation (Railways and Other Guided Transport Systems) Regulations 1996.

(3) Department for the Environment (DoE). Advisory Leaflet 72, 1976. Noise Control on Building Sites.

<sup>(1)</sup> Calculation of Railway Noise 1995: Department of Transport.

- Planning Policy Guidance Note PPG24;
- British Standard BS 4142 <sup>(1)</sup>;
- Railway Noise Insulation Regulations;
- Calculation of Railway Noise; and
- World Health Organisation documents and studies.

#### **Construction Noise**

- 10.3.2 Hours of on site working are to be from 0800 to 1800, Monday to Friday and 0800 to 1300 on Saturdays. A number of activities will be required outside of these hours, particularly where works affect railway operations. These are addressed below. The procedures to be adopted when work is required outside normal hours will be discussed with the local authorities.
- 10.3.3 In the UK, no fixed limits apply to construction site noise. However, AL 72 suggests that an external noise level of 75 dB L<sub>Aeq</sub> (at 1 m from the facades of neighbouring residential and commercial properties) may be appropriate to limit interference with speech in urban areas. The basis for this recommendation is to avoid speech interference within a building and it can therefore be considered applicable to commercial and residential buildings. An assessment criterion of L<sub>Aeq,period (façade)</sub> 75 dB has therefore been adopted for the purposes of this assessment.
- 10.3.4 Further guidance given in BS 5228 suggests that acceptable noise levels in the evening may need to be 10 dB(A) lower than daytime levels. Ambient noise levels are also relevant. In this case ambient noise levels are high at neighbouring receptors, and providing construction noise does not increase ambient noise significantly impacts are unlikely.
- 10.3.5 Various guidelines refer to noise levels which avoid the onset of possible sleep disturbance effects at night. However, in this case, ambient noise levels are already higher than this at neighbouring receptors (see below), and providing construction noise does not increase ambient noise significantly impacts are unlikely.
- 10.3.6 It should also be noted that the local authorities have powers under the Control of Pollution Act 1974 to control noise from construction sites. These powers can be used to ensure that the best practicable means (BPM) <sup>(2)</sup> are used to reduce or counteract the effects of the noise.
- 10.3.7 The criteria for the assessment of construction noise are summarised in *Table 10.1*.

(2) Defined in Section 72 of the Control of Pollution Act 1974.

<sup>(1)</sup> British Standard BS 4142. Method for rating industrial noise affecting mixed use residential and industrial areas (1997) BSI.

# Table 10.1 Criteria for Evaluating the Effects of Noise During Construction

Period	Building/Location Criterion f		n for Purpose nent L <sub>Aeq,</sub>				
Dav	Dwollings/Offices	period	To maintain analash				
(0700-1900 hours)	(facade)	75 UD	intelligibility				
Evening (1900-2300 hours)	Dwellings (facade)	65 dB <sup>(a)</sup>	To avoid disturbance				
Night (2300-0700 hours)	Dwellings (facade)	45 dB or Ambient noise level <sup>(a)</sup>	To avoid sleep disturbance				
(a) If the ambient is a Due to the high night considered acceptable	bove the proposed criter -time noise levels in the H le.	ion, the ambient level is Kings Cross area this as	taken to be the criterion. sessment criteria is				

10.3.8 It should be noted that the noise levels set out in Table 10.1 are not aimed at providing noise limits for construction activities, but are put forward as threshold criteria for the assessment of noise effects associated with the construction programme. Any exceedance of these criteria, unless brief in duration, is considered to be significant.

#### **Operational Noise**

- 10.3.9 The operation of King's Cross Station with the new Platform Y has been investigated in terms of the change in noise levels at nearby noise sensitive receptors in accordance with the Noise Insulation Regulations <sup>(1)</sup>. These regulations state that if alterations to an existing railway produce an increase in noise level of over 1.0dB over the daytime or night-time periods, some properties may be eligible for noise insulation. Fixed threshold noise levels must also be exceeded and there are other qualifying criteria which would be investigated if an increase of greater than 1.0dB were expected
- 10.3.10 The baseline noise climate from all other, non-railway noise sources at the identified noise sensitive receptors is also important. If the level of train noise is below the prevailing ambient noise, train noise will be less noticeable, there would be no impact and the Noise Insulation Regulations' requirement for noise insulation would not be triggered.
- 10.3.11 Information received from Network Rail regarding the current (2006) and future (2009 with Platform Y) King's Cross railway timetables has been used to predict the change in noise at the nearest noise sensitive receptor, due to railway operations. Corrections have been applied to account for the frequency of movements on each of the incoming railway lines along with the horizontal distance separating the tracks from the receptor.

#### 10.4 BASELINE CONDITIONS

#### **Sensitive Receptors**

10.4.1 The surrounding area is predominantly of a commercial character although there are some residential properties and businesses that are considered to be sensitive to noise due to their proximity to proposed works. 10.4.2 The receptors identified and are described in *Table 10.2* below and shown in *Figure 10.1*.

Receptor Number	Title	Description
1	Camden Town Hall	Offices
2	7 Argyle Street	Hotel on Euston Road side street
3	Northumberland House	Hotel fronting Euston Road
4	10 York Way	Residential property now part of Regent's Quarter development
5	Railway Street	Residential property now part of Regent's Quarter development
6	70 York Way	York Centre – Mixed commercial and residential
7	German Gymnasium	Commercial
8	St Pancras Hotel	Residential

#### Table 10.2Noise Sensitive Receptors

- 10.4.3 The residential/hotel receptors are generally first floor level or above and it has been assumed that there will be a line of sight view from the receiver to the works. This is despite the fact that hoardings erected along the site boundaries will act as noise barriers. This therefore provides a worst case assessment of the potential noise effects.
- 10.4.4 It is assumed that the Great Northern Hotel is to remain unoccupied for the duration of the construction work.

# **Baseline Noise Levels**

- 10.4.5 Noise measurements were carried out at the receptors detailed above. No noise measurement or assessment position has been identified to the west of King's Cross towards St Pancras due to the area being under complete redevelopment.
- 10.4.6 Ambient noise levels were measured during the day of 13<sup>th</sup> October 2003 and on the evening and night-time of 29<sup>th</sup> October 2003. Measurement durations were no less than ten minutes. Weather conditions during the survey periods were fine and dry with only light winds. Extraneous sounds were omitted as far as reasonably possible and therefore each measurement is considered to be representative of the hour in which it was taken. The results of the surveys (summarised in Table 10.3) have been compared with previously undertaken measurements in the area, as provided by London Borough of Camden. The 2003 measured data is considered to be comparable with previously undertaken survey results.
- 10.4.7 An additional baseline noise assessment was carried out during March 2006 in order to update the previous assessment to current levels. This new assessment was focused on the night hours, as this is the period of greatest sensitivity to noise, and because the updated construction schedule proposes more night-time works.

Location	Time	L <sub>A10</sub>	L <sub>A90</sub>	L <sub>Aeq</sub>	LAMax	Comment
1- Camden Town	1130	80.0	69.0	76.8	87.3	Heavy traffic on Euston
Hall	1920	76.4	65.8	73.4	84.4	Rd. Buses, cars, taxis,
	1610*	72.9	68.1	71.2	87	HGVs
2-7 Argyle Street	1145	69.0	59.8	66.1	78.1	Traffic on Euston Road,
	1935	65.4	56.6	62.6	84.4	occasional movements on
	0100	64.4	50.7	62.1	71.4	Argyle Street
	1623*	67.4	62.1	65.7	85	
	2338*	65.1	55.2	62.1	86.7	
	0147*	62	48.6	58.5	74.5	
3- Northumberland	1150	78.0	68.6	77.9	93.0	Heavy traffic on Euston
House	1955	75.2	65.2	71.3	85.6	Road. Buses, cars, taxis,
	0115	73.3	59.9	72.4	85.7	HGVs and pedestrians
	1648*	72.6	65.2	70.6	89.8	
	2356*	67.2	56.7	64.8	85.4	
	0153*	62.8	51.3	59	69.7	
4-10 York Way	1205	76.6	68.6	74.0	87.4	Busy, free flowing traffic
	2010	75.0	62.4	72.1	82.8	on York Way. Buses
	0130	69.3	58.0	68.0	83.1	idling. Pedestrians.
	1712*	74.4	66.9	71.9	86.5	
	0010*	69.8	58.1	66.2	78.6	
	0211*	67.6	52.6	67.7	98.4	
5- Railway Street	1215	75.8	68.2	73.0	82.5	Busy, free flowing traffic
	2025	74.6	60.9	71.7	82.2	on York Way. Buses
	0145	68.0	57.2	67.6	81.1	idling. Pedestrians.
	1726*	74.3	66.4	72	93.7	
	0028*	72.7	61.5	68.6	79.6	
	0229*	69.3	57.8	64.6	77.1	
6- 70 York Way	1230	77.0	66.2	73.6	85.6	Consistently busy traffic
	2040	72.0	61.2	70.6	83.0	on York Way.
	1739*	76.6	63.3	74.9	98.6	
	0043*	72.5	49.8	68	87.2	
	0244*	70	44.6	65.2	80	
7 – German	1757*	66 7	58 5	63.9	77 3	
Gymnasium	0059*	60.5	48.6	58.1	49.5	
	0303*	51.9	42.8	51.7	71.1	
8 – St Pancras Hotel	2324*	69.1	55.5	67	87	
	0116*	60.9	50.8	58.4	78.7	
	0321*	62.6	51.3	59.1	71.9	

# Table 10.3 Baseline Noise Levels (dB)

10.4.8 The noise climate was dominated by traffic at all measurement positions. During the daytime, the traffic along Euston Road is heavily congested. Although the flow is less during the evening and night, it remains consistently busy, giving rise to high noise levels. The traffic on Euston Road also dominates noise levels on Argyle Street. Any construction noise from the CTRL and LUL works was inaudible above the level of road traffic during the time of monitoring. The measured noise levels are therefore considered typical. 10.4.9 Measurement positions along York Way were also dominated by road traffic at all times. The traffic was consistently busy and free flowing and there was also noise from buses idling at the various stops along York Way. Noise from trains approaching and leaving the Station and construction noise from the Regent's Quarter development were judged to be insignificant above the ambient traffic, and measurements are therefore considered to be typical. Because ambient noise levels are dominated by road traffic, they are not expected to have changed significantly since the surveys were completed.

### 10.5 PREDICTED EFFECTS

#### **The Western Concourse - Construction**

- 10.5.1 Construction noise levels associated with the King's Cross Station Enhancement Project have been predicted at the noise sensitive receptors detailed in Table 10.1 during each of the five construction phases of the King's Cross Station Enhancement Project from April 2007 to August 2013, during the daytime period. A more detailed description of the phases of construction is given in *Chapter 2*. Noise levels have been predicted and are shown in *Annex K*, with a summary being provided in *Tables 10.4 to Table 10.13*.
- 10.5.2 Noise levels have been predicted at the receptors closest to each work site and therefore represent a worst case. The noise level predictions are for the most exposed floors of buildings. Due to the existence of numerous buildings in the vicinity of the proposed works, a degree of screening has been incorporated into noise predictions to account for cases where there is no line of sight between construction activities and the receptor. Advice from BS5228 on screening from structures has been used to estimate an appropriate screening correction. A correction of 10dB has been used for predictions at receptors 2 and 3, and a correction of 20dB for receptors 4 - 6, on the far side of the King's Cross Station building.
- 10.5.3 Excavation of the new Plant Room Area will take place beneath a concrete slab base structure installed during Phase 2. Due to the presence of this structure, noise from this excavation work will be screened and will not impact any receptors.

#### Table 10.4 Predicted Construction Noise Effects: April 2007 to December 2007

Phase 1:			In	npact at	Recepto	r		
January 2008 to August 2008	1	2	3	4	5	6	7	8
Structural modifications to existing buildings	None	None	None	None	None	None	Impact	None
Utility diversions	None	None	None	None	None	None	None	None
Demolition	None	None	None	None	None	None	None	None

# Table 10.5 Predicted Construction Noise Effects: January 2008 to September 2008

Phase 2:		Impact at Receptor								
September 2008 to March 2009	1	2	3	4	5	6	7	8		
Structural modifications to existing buildings	None	None	None	None	None	None	None	Impact		
Utility Diversions	None	None	None	None	None	None	None	None		
New structural work	None	None	None	None	None	None	None	None		

# Table 10.6 Predicted Construction Noise Effects: October 2008 to December 2009

Phase 3:			I	mpact at	Recept	or		
April 2009 to September 2009	1	2	3	4	5	6	7	8
Structural modifications to existing buildings	None	None	None	None	None	None	None	Impact
Piling	None	None	None	None	None	None	None	None
New structural work	None	None	None	None	None	None	None	None

#### Table 10.7Predicted Construction Noise Effects: January 2010 to March 2012

Phase 4:				mpact a	t Recept	or		
September 2009 to August 2010	1	2	3	4	5	6	7	8
New structural work	None	None	None	None	None	None	Impact	None

#### Table 10.8 Predicted Construction Noise Effects: April 2012 to August 2013

Phase 5:				mpact a	t Recept	or		
September 2010 to June 2011	1	2	3	4	5	6	7	8
New structural work	None	None	None	None	None	None	None	None

- 10.5.4 Predicted noise levels exceed the daytime criterion of 75 L<sub>Aeq</sub>, <sub>period</sub> at 2 locations during the 5 main phases of work. Construction noise impacts are expected at Receptor 7, the German Gymnasium, during Phases 1 and 4, and at Receptor 8, the St Pancras Hotel during Phases 2 and 3. The maximum exceedance (5dB) of the daytime criterion occurs at Receptor 7 during the first phase of work.
- 10.5.5 At the other receptors, construction noise levels are predicted to be comparable to current ambient noise levels at receptors. Although some peak construction noise events are likely to be audible at these receptors, most of the daytime works will not be significantly audible above ambient noise levels.
- 10.5.6 Mitigation measures as discussed in *Section 10.6* below will be incorporated in order to reduce the effects identified and to ensure disruption as a whole is kept to a minimum.

#### Night-time Possessions

- 10.5.7 Night-time working will be necessary during a number of phases of construction, in particular where the works disrupt the normal operation of the station and night-time possessions to the railway are required. Listed below is an indication of the works required during night-time and weekend possessions for construction of the Suburban Shed and Main Shed.
  - Service and OLE diversions for works to suburban shed
  - Construction of new southern portal frame
  - Demolition of the shed's southern end
  - Construction of new shed walls
  - New roof works
  - Platform Shortening 5 to 8
  - Installation of OBS lifts on Platforms2/3, 4/5 and 6/7
  - Construction of service subway

- Replacement of bridge over platforms
- 10.5.8 Activities such as wiring and de-wiring are not considered to be particularly noisy and have therefore been omitted from noise predictions. The remaining construction works have been assessed in terms of the type of work to be undertaken (*eg* construction, track work *etc*) and the use of the appropriate plant as reported in *Annex K*. The results are detailed in *Table 10.9* and *Table 10.10*.
- 10.5.9 As with daytime construction noise predictions, a worst-case situation has been considered, for the times during the identified tasks when individual activities may occur concurrently.

#### Table 10.9 Night-time Possessions: Predicted Effects – Suburban Shed

Associated Phase of	Estimated Total Duration (Non-consecutive Nights – including weekends)	Impact at Receptor					
Night-time Working		2	3	4	5	6	8
Services Diversions	15	None	None	None	None	None	Impact
New Structural Works, Piling and Demolition	45	None	None	None	None	None	Impact
Demolition	15	None	None	None	None	None	Impact

#### Table 10.10 Night-time Possessions: Predicted Effects – Main Shed

Associated Phase of	Estimated Total	Impact at Receptor					
Night-time Working	Duration (Non-consecutive nights – including weekends)	2	3	4	5	6	8
Relocation of Buffers 5 – 8	40	None	None	Impact	None	None	None
Replacement of Cross-Platform Bridge (Utilities Diversions and Removal of Old Bridge(	12 Weeks	None	None	None	None	None	None
Replacement of Cross-Platform Bridge (Piling and Installation of New Bridge)	52 Weeks	None	None	None	None	None	None

- 10.5.10 Predicted noise levels exceed the associated night-time ambient noise criterion at 2 locations during the 2 phases of night-time works. Construction noise impacts are expected at Receptor 8, the St Pancras Hotel, during works at the suburban shed, and at Receptor 4, 10 York Way, during re-location of buffers 5 8. The maximum exceedance (8dB) of the night-time ambient level criterion occurs at Receptor 8 during night-time works at the Suburban Shed.
- 10.5.11 At the other night-time sensitive receptors, construction noise levels are predicted to be comparable to or below current ambient noise levels at receptors. Although some peak construction noise events are likely to be audible, most of the night-time works will not significantly raise ambient noise levels.

10.5.12 Mitigation measures, and possible residual impacts, are discussed in *Section 10.6* below and will be incorporated in order to reduce the effects identified and to ensure disruption as a whole is kept to a minimum.

### **Platform Y - Construction**

- 10.5.13 Construction noise levels associated with the Platform Y and East Sidings construction phases have been predicted at the noise sensitive receptors detailed in *Table 10.2*. Noise levels have been predicted based on the plant inventory and operating assumptions given in *Annex K* and impacts are detailed in *Table 10.11* and *Table 10.12*.
- 10.5.14 The eastern wall of the Station is likely to provide some screening of the construction work to the York Way receptors. The wall does not provide complete screening due to the decorative archways that provide gaps in the construction. The attenuation performance of this structure is therefore uncertain and as a result a worst case scenario has been calculated assuming no screening for receptors opposite the opening.
- 10.5.15 Works during the Platform Y and East Sidings construction phase have been assumed to be completely screened by the Station's existing and new structures at receptors along Euston Road. Therefore receptors 1, 2 and 3 have not been included in this part of the assessment. The predicted noise levels are given in Annex K and summarised below.

# Table 10.11 Predicted Construction Noise Effects: Platform Y

Phase	Impact at Receptor				
	4	5	6		
Services Diversions and Drainage	None	None	None		
Excavation	None	None	None		
Platform Y Construction / Platform 1 Extension	None	None	None		
Signalling / OLE Structures	None	None	None		
Replacement / Relaying of Track	None	None	None		
Demolition	None	None	None		

# Table 10.12 Predicted Construction Noise Effects: East Sidings

Phase	Impact at Receptor				
	4	5	6		
Replacement / Relaying of Track	None	None	None		
Signalling / OLE Structures	None	None	None		
Excavation	None	None	None		

- 10.5.16 The predictions account for screening of the work from existing structures.
- 10.5.17 There are no predicted effects during the daytime at any receptors a result of construction works on Platform Y or at the East Sidings.

#### Night-time Possessions

10.5.18 Night-time working will be necessary during a number of phases of construction, in particular where the works disrupt the normal operation of the station and night-time possessions to the railway are required. Listed below is an indication of the works required during night-time and weekend possessions for construction of Platform Y.

- de-wire East Sidings;
- de-commission East Siding, signalling, OLE, permanent way;
- extend Platform 1;
- cable routing;
- signalling alterations;
- construct turnout to East Sidings;
- construct platform wall;
- complete OLE structures;
- wiring OLE; and
- lay permanent way in East Sidings.
- 10.5.19 Activities such as wiring and de-wiring are not considered to be particularly noisy and have therefore been omitted from noise predictions. The remaining construction works have been assessed in terms of the type of work to be undertaken (*eg* construction, track work *etc*) and the use of the appropriate plant as reported in *Annex K*. The results are detailed in *Table 10.13*.

# Table 10.13 Night-time Possessions: Predicted Effects

Associated Phase of Night-time Working	Estimated	Impact at Receptor			
	Total Duration (Nights)	4	5	6	
Platform Y Construction / Platform 1	27	Impact	None	Impact	
Extension					
Services Diversions	7	None	None	None	
Signalling / OLE Structures	15	None	None	Impact	
Replacement / Relaying of Track	1	Impact	None	Impact	

- 10.5.20 At 10 York Way (Receptor 4) and 70 York Way (Receptor 6), construction noise levels have been calculated to be 1 to 4 dB above the night-time criteria detailed in *Table 10.1*. Without mitigation, night-time construction work could exceed ambient noise levels by up to about 4 dB, so as a result, these potential significant effects during night-time from unmitigated construction works are identified.
- 10.5.21 Mitigation measures, as discussed in *Section 10.6* below, will be incorporated in order to reduce this impact and to ensure disruption as a whole is kept to a minimum.

# Tamping Operations

- 10.5.22 Tamping is a standard maintenance operation carried out in order to correct small changes in rail alignment. It is an activity that already regularly occurs in the station during routine maintenance operations of the existing track. Additional tamping is likely to be required along the new section of track in the station throat and will be a noisy phase of the programme. The new track within the platform will not require tamping as it will be attached to a concrete slab, instead of being laid on top of ballast.
- 10.5.23 The machinery itself is self-propelled by a diesel engine which travels at a rate of approximately 1 to 2 mph. As a result, noise sensitive receptors will not be subject to noise for more than a few hours.

10.5.24 Typically, tamping machinery of this nature gives rise to noise levels of around 85dB(A) at 30 m, and therefore will affect those receptors close to the railway tracks, along York Way.

### Platform Y - Operation

- 10.5.25 As discussed previously, the construction of Platform Y has the potential to increase the number of trains operating at King's Cross Station. Platform Y will be brought into service to coincide with the 2009 timetable that will enable an uplifted train service to use the station. The number of additional trains will depend on how Platform Y is utilised. The current proposal is to use Platform Y to improve station flexibility only, which will allow for 322 train movements during the period 0700 to 1900. This is an increase of seven trains over the 315 in the 2006 timetable. However, should platform Y be used to increase the overall train capacity at the station, then 339 train movements will be possible; an increase of 24 trains over the current timetable.
- 10.5.26 The number of train movements on each line has been used, along with a horizontal distance correction, to calculate the change in  $L_{Aeq}$  noise level at the York Way receptors (referenced 4 6). This method accounts for the slight shift in railway operation closer to the York Way receptors.
- 10.5.27 The resulting change in noise level is less than 1dB and is likely to be imperceptible and it is unlikely the triggers in the Railway Noise Insulation Regulations would be exceeded.

# **Plant Room Area**

10.5.28 Fixed plant for the continued operation of King's Cross services will be incorporated into the below-ground Plant Room Area, located adjacent to the Loading Bay and passenger accumulation area. Locating the Plant Room Area below ground in a purpose built structure will be effective in screening nearby receptors from the noise generated by plant and no impacts are expected at noise sensitive receptors. It is expected that a planning condition will be applied to this facility to limit the allowable noise level at the boundary of the premises to 5 dB below the current background noise level. This limit will form the basis of the design for any acoustic attenuation measures that may be needed within the new Plant Room Area.

# 10.6 MITIGATION MEASURES

# Construction

10.6.1 Noise effects will be mitigated through the implementation of the noise mitigation measures that will form part of the Contractor's EMP. Prior to work beginning on site, the Contractor will be required to make an application to the London Borough of Camden for Prior Agreement for Construction Works, under Section 61 of the Control of Pollution Act 1974. This will describe how the Contractor will ensure that the construction works are carried out using Best Practicable Means (BPM). Section 61 agreements often include noise limits set by the local authority. Because of the high ambient noise levels in the area, if noise limits were to be set they are likely to relate, so some extent, to the relevant ambient noise levels at the time of the works, particularly for night works. The London Borough of Camden have indicated that the noise limits may be up to 5dB above the normal impacts assessment standards if ambient noise levels are sufficiently high.

- 10.6.2 During construction, the following mitigation measures will be adopted:
  - Site hoardings will be designed, and if necessary upgraded, so they can act as effective noise barriers to protect Station users and the general public from excessive noise. During night working in the main shed, a noise barrier should be used to close the opening in the station facade on York Way. (The barriers will have a minimum superficial density of 10 kg.m<sup>-2</sup> and minimum height of 2 m. Holes and other air gaps will be kept to an absolute minimum since even a small hole can seriously limit performance).
  - As far as is practicable, working hours will be restricted to daytime only.
  - Plant will be used in an appropriate manner with respect to minimising noise emissions, including regular maintenance.
  - Well maintained, modern quiet plant will be selected where appropriate.
  - The usage time of noisy plant will be minimised where practicable.
  - Noisy plant and equipment will be located as far as is practicable from sensitive receptors.
  - A telephone hotline will be set up for complaints, the telephone number for which will be displayed on the site notice board.
  - Construction contractors will be required to adhere to the codes of practice for construction working and piling given in British Standard BS 5228, and the guidance given therein, for minimising noise emissions from the site.

# 10.7 RESIDUAL EFFECTS

- 10.7.1 The construction noise effects detailed in *Table 10.4* to *Table 10.13* have been predicted incorporating the screening effect of intervening buildings but include no other forms of mitigation. Mitigation measures, to be enforced through the Contractor's EMP, will ensure that these noise levels are reduced. It is anticipated that the application of these mitigation measures will reduce noise levels sufficiently to be within daytime noise limits at all noise sensitive receivers. The existing high levels of ambient noise, in some cases above L<sub>Aeq</sub> 75dB, may also lessen the relative effect of construction noise.
- 10.7.2 The requirement for night-time works in the Suburban Shed could result in significant impacts at receptors at the St Pancras Hotel. As a modern development in a high ambient noise environment, the St Pancras Hotel is assumed to incorporate a considerable degree of noise insulation for its residential apartments. The effect of construction noise at this receptor is therefore expected to be minimal.
- 10.7.3 The requirement for night-time possessions for the construction in the Main Train Shed and for Platform Y (and associated works) could potentially result in significant impacts at receptors on York Way. The contractor will, through a Section 61 agreement with the local authority, be required to adhere to BPM to

reduce effects to a minimum, including the consideration of alternative construction methods where appropriate. These measures, including those outlined above in *Section 10.6.2*, are predicted to reduce construction noise levels to below night-time ambient noise levels, which should avoid major disturbance in these areas.

10.7.4 No residual noise effects are predicted for the operational phase of the development.

#### 10.8 SUMMARY AND CONCLUSIONS

- 10.8.1 Unmitigated day-time noise levels during construction of the King's Cross Station Enhancement Project are predicted to exceed the recommended noise limits and cause significant impacts at two locations. The exceedance of this limit is predicted for a 'worst case' situation, where all the construction plant is operating concurrently, and as such, is expected to have a limited duration. However, the Contractors will be required to adopt BPM to mitigate these effects, and therefore no significant residual day-time noise impacts are expected.
- 10.8.2 Unmitigated night-time noise levels during night-time possession works to the King's Cross Suburban Shed and Main Train Shed are predicted to exceed the recommended noise limits and cause significant impacts at two locations. The exceedance of this limit is predicted for a 'worst case' situation, where all the construction plant is operating concurrently, and as such, is expected to have a limited duration. However, the Contractors will be required to adopt BPM to mitigate these effects, and therefore no significant residual night-time noise impacts are expected from the works within the King's Cross Suburban Shed and Main Train Shed.
- 10.8.3 Significant effects due to unmitigated construction noise levels are predicted at 2 receptors during night-time possessions for the construction of Platform Y. Noise will be audible at night at the newly built residential properties at Regents Quarter along York Way, although these will last for the duration of construction only and for only a few days at a time. Work will progress through a Section 61 agreement with the local authority, and contractors will be required to adopt BPM to reduce and/or mitigate these effects. However, even with the implementation of BPM during the construction of Platform Y, which will reduce the predicted noise impacts, significant night-time noise impacts are likely to remain for short periods.
- 10.8.4 The change in noise due to the increased train services that will be able to use King's Cross Station with the implementation of Platform Y has been assessed. The predicted change in train noise at receptors is less than 1dB, which is likely to be imperceptible, and therefore no significant impacts will occur.



# 11 AIR QUALITY AND DUST

#### 11.1 INTRODUCTION

#### General

- 11.1.1 As noted in *Chapter* 3, the potential effects on air quality from construction and operation of the project are limited to dust from construction.
- 11.1.2 This potential effect is described, assessed and any residual effects summarised below. Emissions from changes in road traffic brought about by the project are considered in light of the traffic figures presented in *Chapter 9: Transport and Pedestrians*.

#### Air Quality Objectives and Standards

- 11.1.3 Directives set by the European Commission (EC) and adopted into UK law via the *Air Quality (England) Regulations 2000* and *Air Quality Limit Values Regulations 2003*. As previously noted, the only air quality issues of concern are related to dust <sup>(1)</sup>, and the relevant criteria as set out in the *UK Air Quality Strategy* are shown in *Table 11.1* (which incorporates updated objectives announced in 2003).
- 11.1.4 These criteria relating to dust concentrations are not statutory, and the assessment of the effects from construction dust is therefore based on a risk evaluation matrix (see *Table 11.2*).

Pollutant	Concentration	Measured as	Date to be
			achieved by
Particulate	50 µg m <sup>-3</sup>	24 hour mean	Dec 31, 2004
Matter		not to be exceeded more than 35 times a year	
(PM <sub>10</sub> )		(90.41%ile)	Dec 31, 2010
(,		not to be exceeded more than 7 times a year (98.08%ile)	
	50 µg m⁻³ (provisional)	<b>London</b> : 24 hour mean with a max. of 10-14 exceedances allowed per year	Dec 31, 2010
	40 µg m <sup>-3</sup>	Annual mean	Dec 31, 2004
	23 µg m <sup>-3</sup>	London: Annual mean	Dec 31, 2010
	20 µg m <sup>-3</sup>		2015
	(provisional)		
NB: Object	tives for the prote	ction of vegetation and ecosystems have not been	included in this

# Table 11.1UK Air Quality Strategy Objectives

NB: Objectives for the protection of vegetation and ecosystems have not been included in this Table as these objectives are not applicable in urban areas.

(1) For the purposes of this study dust, in connection with construction activity, is taken to mean the particles released that have the capacity to cause annoyance to neighbours, through soiling of surfaces, such as windows and cars. It is visible and affects amenity. Dust particles are of sufficient size that they are visible. It is this that leads to the annoyance and their settling on surfaces close to the point of release.

### 11.2 METHODOLOGY

#### **Dust from Construction**

- 11.2.1 The effects on air quality that may arise during construction of the project are principally associated with emissions of dust and the potential for these emissions to cause soiling at nearby residential properties. There are no legal standards relating to acceptable levels of deposited dust, although monthly mean deposition rates in excess of 200 mg m<sup>-2</sup> day<sup>-1</sup> are considered likely to cause a nuisance<sup>(1)</sup>.
- 11.2.2 The emission of dust from construction activities is, by its nature, very variable, depending as it does on the type of activity, the state of the ground and the prevailing wind speed. For this reason, a qualitative assessment of the potential for nuisance from dust emissions has been carried out.

# Emissions from Construction and Operational Traffic and Train Movements

- 11.2.3 A critical level of 10 % change in vehicle flow is defined by the former DTLR<sup>(2)</sup> as a useful indicator for identifying if there is potential for significant changes in air quality to arise from changes in vehicle movements. Vehicle movements generated by the construction and operational phases of the King's Cross Station Enhancement Project will result in a less than 10 % change in the traffic on the surrounding road network. Air quality effects from road traffic movements are therefore unlikely to be significant and no further assessment has been made.
- 11.2.4 Emissions from the operation of the additional trains using the Station are also not considered in this assessment. This is because there will be an increase of only 2 % on current train movements. Most of these additional trains are likely to be electric, given that Platform Y will be for electric trains only. The small increase in diesel trains will not result in a significant increase in atmospheric emissions.

# 11.3 BASELINE ENVIRONMENT

# Introduction

11.3.1 This section draws on existing monitoring data in order to establish the background air quality in the study area. Data from the National Air Quality Information Archive (NAQIA)<sup>(3)</sup> has been used to plot maps of estimated and predicted pollutant concentrations. This data are produced through a complex modelling exercise that takes into account emissions inventories and measurements of ambient air pollution from both automated and non-automated sites. Pollutant concentrations within the study area have been compared with the assessment criteria set out in the following section.

Schofield C and Shillito D (1990) Guide to the Handling of Dusty Materials in Ports, Materials Handling Board.
 DTLR (2000) Guidance on the Methodology for Multi-Modal Studies, Volume 2, DETR, London, 2002.
 NAQIA: www.airquality.co.uk

11.3.2 This assessment considers Local Air Quality Management, and any Air Quality Management Areas (AQMAs) designated within or in the vicinity of the project have been identified.

#### **Background Concentrations**

11.3.3 *Figures 11.1* to *11.3* show estimated PM<sub>10</sub> concentrations in the vicinity of the project site for 2001, 2004 and 2010.

# Figure 11.1 Map of Estimated Particulate Matter Concentrations in 2001 (μg m<sup>-3</sup>) (Data Source: NAQIA)



Figure 11.2 Map of Predicted Particulate Matter Concentrations in 2004 (µg m<sup>-3</sup>) (Data Source: NAQIA)



# Figure 11.3 Map of Predicted Particulate Matter Concentrations in 2010 (µg m<sup>-3</sup>) (Data Source: NAQIA)



11.3.4 It can be seen that pollutant concentrations are predicted to decrease with time, with concentrations of PM<sub>10</sub> predicted to be within the relevant objectives. This is mainly due to improvements in vehicle engine and fuel technology. The main source of air pollution in both Camden and Islington is road traffic.

# Local Air Quality Management

- 11.3.5 As a requirement of *Part IV* of the *1995 Environment Act,* local authorities are to complete a review and assessment of air quality to determine whether air quality objectives are likely to be met in future years, and where necessary designate Air Quality Management Areas (AQMAs).
- 11.3.6 Both the London Borough of Camden and the London Borough of Islington have declared AQMAs across their whole borough. Both of the AQMAs have been declared based on the predicted non-compliance with NO<sub>2</sub> and PM<sub>10</sub> objectives.
- 11.3.7 The geographical extent of the two boroughs and hence the AQMAs can be seen in *Figure 5.1* in *Chapter 5: Socio-economic and Urban Regeneration Effects.*
## 11.4 ASSESSMENT OF ENVIRONMENTAL EFFECTS

## Introduction

- 11.4.1 The air quality effects associated with construction are limited to releases of dust. The potential for dust to be emitted during construction is strongly dependent on the type of activities taking place, on wind speed and on whether winds carry emitted particles towards sensitive receptors, such as hospitals or schools and residential property.
- 11.4.2 Dust becomes airborne due to the action of winds on material stockpiles and other dusty surfaces, or when thrown up by mechanical action, for example the movement of tyres on a dusty road or activities such as drilling. Certain activities, such as demolition, will have higher emissions of dust. General construction will cause occasional rather than continuous emissions of dust, as only certain activities (such as grinding and cutting) will result in dust emissions.
- 11.4.3 The quantity of dust released during construction depends on a number of factors, including:
  - the type of construction activities occurring (eg crushing and grinding);
  - the volume of material being moved;
  - the moisture and silt content of the materials;
  - the distance travelled on unpaved roads;
  - the mitigation measures employed; and
  - the area of exposed materials.
- 11.4.4 The significance of the effect of dust also depends on the wind direction and the relative location of the dust source and receptor. When considering significance, it is also important to consider whether the dust has been generated through the exposure of contaminated ground.
- 11.4.5 In addition to the above issues that relate specifically to dust, tarmac laying and the associated use of hot bitumen can generate significant amounts of black smoke particles.

### **Assessment of Effects**

11.4.6 There are no established criteria for the assessment of dust deposition arising from construction sites. A risk-based approach has therefore been developed to identify construction activities with the potential to generate significant quantities of dust near to sensitive receptors. Construction sites are a temporary operation and some degree of nuisance would normally be tolerated if the activity lasts for no more than a few months. Recent studies by the Building Research Establishment also suggest that nuisance is unlikely to occur at distances greater than 50 m from a construction site boundary<sup>(1)</sup>. One particular study<sup>(2)</sup> has also shown that at least half the people living within 50 m of the site boundary of a road construction scheme were seriously

<sup>(1)</sup> BRE. (2003). Control of dust from construction and demolition activities.

<sup>(2)</sup> Baughan CJ (1980) Nuisance from road construction : a study at the A31 Poulner Lane Diversion, Ringwood: TRRL Supplementary Report 562. From: Design Manual for Roads and Bridges, 1994.

bothered by construction nuisance due to dust, but that beyond 100 m less than 20 % of the people were seriously bothered.

11.4.7 On this basis, a risk evaluation matrix has been devised and is presented in *Table 11.2* below. This has been used to determine the significance of effects arising from construction dust deposition.

# Table 11.2Evaluation of Potential Significant Effects of Dust Deposition

Duration of on-site	Distance from Site Boundary to Sensitive <sup>(a)</sup> Receptors (m)			
dust raising activity	< 50 m	50 – 100 m	> 100 m	
> 12 months	Significant	Significant	Potentially Significant	
6 – 12 months	Significant	Potentially Significant	Not Significant	
< 6 months	Potentially Significant	Not Significant	Not Significant	
(a) Sensitive receptors defined as: residential, commercial office, hospital, surgery etc				

11.4.8 *Figure 11.4* shows the boundary of the construction site and two buffers, at 50 m and 100 m from the site boundary. The site boundary has been used as the point from which to measure the buffers because it is not possible at this stage to pinpoint the actual locations of potential dust generating activities on the site. In reality the actual project worksites are likely to be much more limited in extent than to the project boundary. *Table 11.3* below summarises the potential receptors that are within 100 m of the construction site, which have been categorised into residential, offices and commercial properties.

# Table 11.3 Summary of Potential Receptors to Construction Dust

<b>Distance from Site</b>	Residential	Offices	Commercial
Boundary (m)	Properties		Properties
> 50m	<ul> <li>1-16 Wharfdale Yard Flats</li> <li>67 Wharfdale</li> <li>2a, 6, 8a York Way</li> <li>Northumberland House Hotel</li> </ul>	<ul> <li>York Centre</li> <li>Shaw House</li> <li>Jahn Court</li> <li>Cottam House</li> <li>Laundry Buildings</li> <li>Times House</li> <li>Bravington House</li> <li>Lighthouse Offices</li> <li>Offices between Argyle St. and Tonbridge St.</li> </ul>	<ul> <li>York Gallery</li> <li>The Brassworks</li> <li>McDonalds Restaurant</li> <li>2b, 8, 54-58, 60 York Way</li> </ul>
50 –100 m	<ul> <li>Balfe Yard</li> <li>1-3 Railway St.</li> <li>39-53a Wharfdale Rd.</li> <li>The Copperworks</li> <li>1-10 Albion Yard</li> <li>2a Albion Walk</li> <li>Albion Buildings</li> <li>Joiners Yard Flats 1-15</li> <li>7a Caledonian Rd.</li> <li>The Yard</li> <li>Northumberland House Hotel</li> <li>Bed and Breakfasts behind Burger King on Tonbridge St.</li> </ul>	<ul> <li>Shaw House</li> <li>Stable Studios</li> <li>Swift House</li> <li>8 Albion Yard</li> <li>Security Office</li> <li>Focus Point</li> <li>Times House</li> <li>7 Caledonian Rd.</li> <li>The Varnish Works</li> <li><i>King's</i> Gate</li> <li>Lighthouse Offices</li> <li>Offices between Argyle St. and Tonbridge St.</li> </ul>	<ul> <li>Burger King</li> <li>Wharfdale Bar</li> <li>Swift Café</li> <li>The Copperworks bar</li> <li>Focus Point</li> <li>8 Caledonia St.</li> <li>Kiosk</li> <li>2 restaurants</li> <li>3, 13, 15-17 Caledonian Rd.</li> <li>Lighthouse Restaurant</li> <li>Lighthouse Kiosk</li> <li>292-286, 284, 282, 280, 278 Pentonville Rd.</li> <li>Library</li> </ul>

Distance from Site	Residential	Offices	Commercial	
Boundary (m)	Properties		Properties	
			•	Pub by Regent's Canal Commercial Centre

- 11.4.9 *Table 2.5* in *Chapter 2* describes the construction activities and their duration. Due to their duration and nature the following construction activities listed below are considered likely to give rise to construction dust. It should be noted that the works identified below are not all inherently generate dust. In some case it is the case that there are certain activities within the works that could generate dust if not well managed. Such activities may include the breaking out of pile caps or the cutting of metal work to remove the existing platform overbridge.
  - Platform Y, stages iii and v;
  - Phase 1, stages i, iii, iv, v and vii;
  - Phase 2, stages i, ii and vi; and
  - Phase 3, stage i, ii, iv, ix, x, xv and xviii.
- 11.4.10 There are no works anticipated during Phases 4 and 5 that are anticipated to generate significant quantities of dust.
- 11.4.11 Unmitigated, these construction activities are likely to cause a significant effect at properties identified in *Table 11.3* within 100 m of the construction site boundary. These activities could also cause potentially significant effects to properties up to 150 m away from the construction site.
- 11.4.12 Other construction activities are either unlikely to generate significant quantities of dust (eg they are carried out within buildings) or are expected to last less than six months. They are not predicted, therefore, to have a significant effect on receptors.

# 11.5 MITIGATION MEASURES

- 11.5.1 It is not possible to eliminate completely the emissions of dust from the construction site. However, the construction process incorporates certain measures that will assist in minimising particle emissions.
- 11.5.2 The EMP outlined in *Chapter 2* incorporates the following good site practices that will reduce the risk of dust effects arising during construction:
  - water suppression or dust extraction will be fitted to drilling and grinding equipment;
  - drilling and excavation surfaces will be wetted, where appropriate;
  - surfaces will be damped down prior to clearing;
  - debris piles will be kept watered or sheeted as necessary so that no dust nuisance may be caused to receptors;

- all containers will be totally enclosed or covered by tarpaulins or nets to prevent escape of dust or waste materials during loading and transfer from site; and
- lorries will be sheeted during transportation of construction materials and spoil export.
- 11.5.3 Tarmac laying and the associated use of hot bitumen can generate significant amounts of black smoke particles. This will be minimised by the application of the following measures suggested by the Building Research Establishment (BRE)<sup>(1)</sup>:
  - bitumen will not be overheated;
  - pots and tanks containing hot bitumen will be covered to minimise fume production;
  - spillages will be minimised; and
  - where possible, bitumen will not be heated with open flame burners.
- 11.5.4 The contractor will be required to adhere to the EMP that will be included in the contractual arrangements between NR and its selected contractor.
- 11.5.5 There is only a small potential that contaminated land will be encountered during construction works (see *Chapter 12*). However, depending on the nature and extent of any contamination, additional measures to prevent spread of contaminants through the air may need to be addressed in the Waste Management Plan developed by the contractor for the construction of the scheme. The plan will set out measures to avoid remobilisation of contaminants via surface waters, groundwater and the air (*ie* in the form of dust). Appropriate site treatment will then ensure that no contaminated dust is released into the air.

### 11.6 RESIDUAL EFFECTS

11.6.1 The application of the mitigation measures described in this section and the application of the Contractor's EMP will ensure that construction activities will not result in significant effects on air quality or create significant nuisance effects from construction dust.



# 12 CONTAMINATED LAND AND CONSTRUCTION WASTE

### 12.1 INTRODUCTION

- 12.1.1 Disturbance of contaminated land during construction works presents a risk of remobilising contaminants and causing additional contamination through drainage (*ie* surface waters and groundwater) and to the air, unless appropriate mitigation measures are applied. In addition, contaminated material can potentially present a health risk to those in its immediate vicinity.
- 12.1.2 A broad categorisation of the potentially contaminative land uses within the general area of the project has been undertaken. The desktop review includes information regarding the environmental setting, current and historical land use, geological conditions and groundwater vulnerability and sensitivity (see also *Chapter 15 Water Resources*).

## 12.2 METHODOLOGY

## **Definition of Spatial Scope**

12.2.1 Land contamination effects have been considered within an area of 250 m from potential land-take or disturbance, whether for temporary construction or permanent use.

### **Definition of Temporal Scope**

12.2.2 It is anticipated that effects associated with contaminated land will only occur during the construction phase of the project, between 2007 and 2012.

# **Data Collection**

12.2.3 The assessment is based upon information obtained from the sources described in *Box 12.1*.

# Box 12.1 Sources of Information

- data gathered by the design team during the design phase;
- historical Ordnance Survey mapping, records of sites;
- Development Plans (UDPs);
- data collected by the King's Cross Station Enhancement Project while undertaking previous studies of the historical uses in the study area;
- relevant data obtained as a result of the site investigation works and any previous environmental intrusive investigations where the data is held by the project.
- British Geological Survey Map of North London, England and Wales Sheet 256, solid and drift edition;
- Sitescope Technical Report No. 684813 produced for ERM, May 2003;
- Environment Agency Source Protection Zones (SPZs);
- Environment Agency Groundwater Vulnerability map, sheet 40, Thames Estuary;
- Environment Agency Surface Water Classifications; and
- relevant data obtained from other organisations, such as NR and London Underground.

### Method of Assessment

- 12.2.4 In broad terms, Part IIa of the Environmental Protection Act 1990 stipulates that land can only be classified as contaminated if there is a source of contamination and a pathway exists for it to reach a receptor. A qualitative risk assessment has been carried to see if any source-pathway-receptor linkages exist using the methodology described in DETR Circular 02/2000<sup>(1)</sup>. The methodology consists of the following:
  - identification of sources and hazards the contaminant source was characterised in terms of the nature of the hazard which could be realised;
  - pathway and exposure assessment the exposure pathway was characterised and potentially affected receptors (or resources) have been identified; and
  - the risk was then characterised on the basis of the potential harm to a receptor within a given source-pathway-receptor combination or pollutant linkage and graded with a level of magnitude.
- 12.2.5 The risks have been graded high, medium or low and the results are presented in *Table 12.4* in *Section 12.4*.

## 12.3 BASELINE ENVIRONMENT

### Introduction

12.3.1 The potential for areas to be contaminated has been established through review of maps of current and historic land uses. Baseline conditions are assumed to be those prevailing at the start of construction, and were established using source-pathway-receptor characterisation to assess the possible risks resulting from the historical and current land uses.

# **Description of the Current Site**

### Overview

12.3.2 The area of the proposed works is located to the west of King's Cross Station and the footprint of the likely areas of excavation is shown on *Figure 6.2* in *Chapter 6: Archaeology.* There have been major changes to the appearance and the land uses in this area in recent years, due primarily to the construction works associated with the London Underground Northern Ticket Hall and the CTRL at St Pancras Station. The figure shows that the area under the proposed new concourse has already been excavated to provide the new London Underground Northern Ticket Hall. It is likely that any material that could potentially have been contaminated from past uses of the site has already been removed from this area. However, the areas that will need to be excavated to create the infrastructure for the OBS facilities are outside of this area and would cut through or border sites previously occupied by potentially contaminative uses.

(1) DETR Circular 02/2000 Contaminated Land: Implementation of Part IIA of the Environmental Protection Act 1990. 20th March 2000.

### Hazardous Materials within Existing Buildings

12.3.3 Materials containing asbestos and anthrax may be encountered during the refurbishment of existing buildings. Both are known to exist in certain of the building materials at King's Cross station and will require special advance investigation and removal. This is a highly regulated activity and will be carried out under licence by suitably qualified personnel.

## **Historical Development**

### Introduction

12.3.4 The historic development of the site is described in detail in *Chapter 6: Archaeology. Table 12.1* sets out a brief summary of the historical development that has taken place in the King's Cross area that may provide an indication of the potential for ground contamination.

## Table 12.1Summary of Historical Development at King's Cross

Period	Historic Development
Pre-1800	Rural area with Battle Bridge across the River Fleet.
	Medieval Hamlet around Battle Bridge
	<ul> <li>London refuse collection site at Smith's Dust Heap.</li> </ul>
	<ul> <li>Sand and gravel extraction on site of current St Pancras Station.</li> </ul>
	<ul> <li>Brick and tile making at Brick Field on site where St Pancras Station now stands on Caledonia Street.</li> </ul>
1800s	<ul> <li>The Regent's Canal and the King's Cross Basin constructed between 1812 and 1820.</li> </ul>
	<ul> <li>Imperial Gas Light Company town gas works constructed in 1823 and occupied the whole of the triangular area bounded by Battle Bridge Road, Goods Way and the King's Cross Station throat.</li> <li>The River Fleet was culverted in 1825</li> </ul>
	<ul> <li>Between 1859 and 1865 a network of modern sewers was constructed.</li> <li>King's Cross Station was constructed on land that had been occupied by the Small Pox and Fever Hospitals on King's Road.</li> </ul>
	<ul> <li>King's Cross Station was completed and connected to the Great Northern Railway in 1852.</li> </ul>
	<ul> <li>The Great Northern Hotel was added in 1854.</li> </ul>
	<ul> <li>Metropolitan Railway (now LU) lines constructed in 1863.</li> </ul>
	<ul> <li>Housing demolished to make way for the additional Milk Dock Sidings constructed in 1870s and 1880s to the west of the station.</li> </ul>
	<ul> <li>South of the former printing works on Weller's Court there was an ammunition factory producing cartridges and percussion caps. By 1916, it was converted into a garage that was subsequently demolished sometime after 1979.</li> <li>St. Pancras Station completed in 1868.</li> </ul>
	<ul> <li>The Midland Grand Hotel was completed by 1877 and closed to business in 1935.</li> </ul>
	<ul> <li>Culross Hall and Culross Building constructed in 1891-92.</li> <li>Battle Bridge built across the railway to link Wharfdale Road and Battle Bridge Road in 1890s.</li> </ul>

Period	Historic Development
1900s	<ul> <li>Between 1920 and 1938, Goods Way constructed to link York Way and Camley Street.</li> </ul>
	<ul> <li>Battle Bridge demolished between 1949 and 1953.</li> </ul>
	<ul> <li>Between 1923 and 1953, a 70-foot steam locomotive turntable including tracks (formerly known as the Engine Depot), was constructed.</li> </ul>
	• The Engine Depot was located between the railway and the former gas works. The depot was demolished between 1979 and 1981 and the area currently forms the Train Station Car Park.
	<ul> <li>During World War II the King's Cross area was bombed</li> </ul>
	<ul> <li>The Motor Maintenance Depot was constructed between 1957 and 1966. This is located in the former gas works site.</li> </ul>

## **Geology and Potential for Ground Contamination**

### Introduction

12.3.5 The general description of ground conditions in the vicinity of King's Cross Station has been ascertained from published geological maps and information.

# Made Ground

12.3.6 The Made Ground varies between 0.9 m and 4 m in thickness across the site. Generally, it is a composite of soft to very stiff dark brown mottled red clay, fine to coarse sand, sub-angular to rounded fine to coarse gravel, brick, flint, ash, with some clinker and concrete. It has a variety of engineering properties and has variable permeability.

### London Clay

- 12.3.7 The thickness of London Clay across the site is unknown due to boreholes of insufficient depth on the site. However, the geology map of the area indicates that the top of the stratum is weathered with a thickness ranging from 2.3 m to 6.7 m, which is generally described as a firm fissure brown mottled blue grey clay.
- 12.3.8 The thickness of the underlying un-weathered London Clay in the southern part of the site ranges between 10.9 m and 18.5 m. The London Clay is generally described as a firm to stiff fissured dark grey clay. The site investigation for the London Underground's King's Cross station redevelopment project revealed that at the bottom 5 m of the London Clay stratum the clay is distinctly sandy.

### Lambeth Group

- 12.3.9 The Lambeth Group averages 20 m in thickness across the site and comprises the following units:
  - Lambeth Clay, consisting of:
    - Upper Reading Formation;
    - Woolwich Formation;
    - Lower Reading Formation; and
  - Upnor Formation.

- 12.3.10 The Lambeth Clay consists of the Upper Reading Formation, the Woolwich Formation and the Lower Reading Formation. The Lower Reading Formation was deposited first and consists of mottled clay. The Woolwich Formation was deposited next and was formed in a lagoon environment. The Upper Reading Formation comprises mottled blue and red clay similar to the Lower Reading Formation, but contains no calcrete <sup>(1)</sup>.
- 12.3.11 The Upnor Formation at the base of the Lambeth Group was deposited in an in-shore marine environment. It comprises material eroded from the Thanet Sand and the Chalk, of which only the flints are preserved. Previous boreholes revealed that the clean sand layer, which is water bearing and non-cohesive might exist in some areas.

## Thanet Sand

12.3.12 The thickness of the Thanet Sands layer is approximately 2.4 m in the vicinity of the works. It is generally described as very dense dark grey fine to medium sand. At the base of the Thanet Sand is a layer of black flint, known as Bullhead Beds. This layer is described as black and green, slightly clayey angular to sub-angular fine to coarse flint gravel.

## Ground Contamination

- 12.3.13 Ground contamination investigations undertaken for the CTRL works identified major areas of contamination on the Old Imperial Gas Works site, which lies to the northwest of the site. Elsewhere, contamination was found to be at a generally low level, with occasionally elevated levels of metals with low leachability. Any contamination is confined to the Made Ground, with the impermeable London Clay acting as a barrier to vertical migration of contamination.
- 12.3.14 There is no reported evidence for any burials at the site of the former smallpox hospital that was located to the west of the Western Range. At the site of the former cartridge factory (see OS Map of 1871 shown previously in *Figure 5* in *Annex G*) built on the smallpox hospital site, which was later used as an LNER store department, the Made Ground was found to contain raised levels of metals.
- 12.3.15 The Milk Dock site was located to the west of the Suburban Train Shed, as shown on OS maps from 1894 to 1976, and was used for locomotive maintenance. The Made Ground underlying this area is known to include ash, clinker and slag. Spillages and leaks of lubricating oils, sludges and other maintenance compounds are likely to have occurred in this area and the ground is likely to be locally contaminated with these types of materials. A railway engine shed was built on the site now occupied by the northern building and an extensive layout of tracks served the area occupied by the present suburban shed. Contamination of the ground resulting from this past use is likely.

<sup>(1)</sup> A layer of cemented carbonate accumulation. The material must be hard to be termed calcrete and is usually more porous than the surrounding material.

12.3.16 Land use for railway station buildings and platforms would not normally be associated with contamination, although local contamination below track beds is likely. No significant ground contamination was identified from the investigations carried out for the Platform Y works.

# Hydrogeology

12.3.17 There are two distinct water tables in the vicinity of the site. These are an upper water table in the Made Ground and a lower water table within the Chalk. The water in the deep chalk aquifer was reported at 35.6 m below Ordnance Datum in January 2002.

# Identification of Sources, Pathways and Receptors

# Sources

- 12.3.18 The sources of contamination in the area to be occupied by the proposed project will arise from the historic uses of the site and surrounding area along with hazardous materials in existing buildings. The main potential sources of contamination identified from the desk-based study of historical maps and from information gained from previous site investigations are as follows:
  - Imperial Gas Works Site;
  - Cartridge Factory;
  - Milk Dock;
  - railway land under suburban train shed;
  - contaminated material encountered during the excavation to create the Plant Room Area;
  - contaminated material encountered during the construction of the new Platform Y; and
  - building materials containing hazardous materials, such as anthrax spores and asbestos, removed during refurbishment of the Western Range and demolition of the Southern Concourse.

# Pathways

- 12.3.19 The desk-based examination of resources in the area has identified the following potential pathways:
  - groundwater;
  - permeable geological strata;
  - ambient air (inhalation and deposition);
  - direct handling of contaminated materials; and
  - deep piled foundations.

### Receptors

- 12.3.20 The following have been identified as potential receptors should contaminated materials escape from the work site:
  - groundwater;
  - Regent's Canal;
  - construction workforce;
  - users of the site;
  - visitors to the site;
  - inhabitants of adjacent properties; and
  - consumers of abstracted groundwater.

### 12.4 ASSESSMENT OF ENVIRONMENTAL EFFECTS

### Introduction

- 12.4.1 Contaminated land and construction waste effects will principally arise where the works break ground or where the ground is disturbed (*eg* through removal of existing railway track and ballast and excavations of deep basements) or exposed (*eg* through demolition works).
- 12.4.2 The construction works will give rise to spoil arising from deep excavations during the construction of the Plant Room Area and Platform Y. The principal excavation volumes and their sources are shown in *Table 12.1*. Based on experience gained from similar projects, it is likely that approximately 10 % of this excavated material will be contaminated with materials associated with former uses of the site.

# Table 12.2 Principal Excavation Volumes

Area to be Excavated	Volumes (m <sup>3</sup> )
Plant Room Area	7,000
Platform Y	7,700

- 12.4.3 It is estimated <sup>(1)</sup> that over the period of excavation for the Plant Room Area, a maximum of 20 lorries per day (typically 5 lorries per day) will be required to remove the excavated material from the work site on the western side of the station. This assumes that all of the excavated material will need to be moved off-site to either a registered site or for use on another project. For the Platform Y works estimates indicate that up to 14 lorries per day will be required to remove excavated material. The effects that these additional vehicle movements will have on traffic and air quality will be insignificant and has been scoped out of this EIA (see *Chapter 2: paragraphs 2.6.24 to 2.6.30* for further details).
- 12.4.4 Waste and contaminated materials will also be generated during the demolition of the existing southern concourse.

(1) Estimates are based on each 6-wheeler lorry being able to carry 15m<sup>3</sup> of material.

- 12.4.5 Other sources of waste will include domestic waste from site accommodation and effluent from portable toilets provided during the construction phase.
- 12.4.6 Each of these other waste streams will have a specific means of disposal. A summary of the main sources of these wastes and their likely method of disposal is shown in *Table 12.3*.

## Table 12.3 Other Types of Waste and Methods of Waste Disposal

Source of Waste	Method of disposal
Demolished masonry	Removed or demolished masonry will be retained and stored temporarily off site if it has potential for re-use in rebuilding elements of the station – <i>eg</i> the Bomb Gap. If the removed/demolished masonry is of poor quality it will be removed to landfill, however not before other opportunities for reclamation and re-use are investigated.
Redundant pipes and cables	Cables will may have their core material reclaimed if it is of sufficient volume or quality ( <i>eg</i> copper), then they will be removed to landfill together with any pipes.
Timber (from demolition and temporary works	Waste timber will be relatively plentiful, but is likely to be contaminated from concrete shuttering and other temporary works. Timber will also arise from demolition and permanent works <i>eg</i> window and doorframes. These are likely to be removed to landfill, however not before opportunities for reclamation are investigated.
Concrete (especially excess from new pours)	Concrete waste will come from breakout of existing works and excess quantity from new concrete pours. There may be some waste pre- cast elements such as manhole rings. These are likely to be removed to landfill, however not before other opportunities for reclamation and re-use are investigated.
Steel ( <i>eg</i> reinforcement bars not used)	Waste steel will be largely un-required reinforcement bars – either incorrectly bent or incorrectly ordered. Some temporary works steel may also be included, and possibly out-of-specification roof steel work. The majority will be removed for reclaiming.
Anthrax and asbestos containing materials	Materials containing asbestos and anthrax may be encountered. Both are known to exist in some of the building materials at King's Cross and will require special advance investigation and removal. This is a highly regulated activity which will be carried out under licence. The materials will be removed to a facility licensed to receive these materials.

# **Evaluation of Effects**

- 12.4.7 *Table 12.4* summarises the effects that could potentially arise through encountering contaminated land during construction works.
- 12.4.8 The table shows that although a number of sources, pathways and receptors are present there are only a few linkages that exist that would result in a significant effect.
- 12.4.9 These significant effects are likely to arise where construction workers and users of the site come into direct contact with the potential contamination. This is, however, only likely to happen where mitigation measures have not been suitably applied.

Receptors and Resources	Pathway	Effect on Receptors and Resources	Degree of Severity	Likelihood	Potentially Significant (Yes / No)
Former Gas Works Site phosphates, cyanides, c	<ul> <li>potential contaminants include hydrocarbo etc).</li> </ul>	ons, acids and alkalis, metals and other i	norganic compour	nds (sulphates	s, sulphides,
Users of the site.	Inhalation, dermal contact.	Health effects.	Low.	Moderate.	No.
Construction workers.	Inhalation, dermal contact.	Health effects.	Low.	High.	Yes.
Consumers of groundwater (deep aquifer).	Ingestion.	Health effects.	Moderate.	Low.	No.
Shallow aquifer.	Passage through porous strata.	Pollution of groundwater.	Low.	Moderate.	No.
Deep aquifer.	Man-made <i>eg</i> bored piling. (Piling into London Clay only)	Pollution of groundwater, EA may require remediation.	High.	Low.	No.
Regent's Canal.	Ambient air. Deposition on surface of water.	Pollution of water resource.	Moderate.	Low.	No.
Inhabitants of adjacent properties.	Ambient air. Dermal contact, inhalation.	Health effects.	Low.	Low.	No.
Former Cartridge Facto	ry – potential contaminants include metals.				
Users of the site.	Inhalation, dermal contact.	Health effects.	Low.	Moderate.	No.
Construction workers.	Inhalation, dermal contact.	Health effects.	Low.	High.	Yes.
Consumers of groundwater (deep aquifer).	Ingestion.	Health effects.	Moderate.	Low.	No.
Shallow aquifer.	Passage through porous strata.	Pollution of groundwater.	Low.	Moderate.	No.
Deep aquifer.	Man-made <i>eg</i> bored piling. (Piling into London Clay only).	Pollution of groundwater, EA may require remediation.	High.	Low.	No.

# Table 12.4 Qualitative Risk Assessment of Identified Pollutant Linkages

Receptors and Resources	Pathway	Effect on Receptors and Resources	Degree of Severity	Likelihood	Potentially Significant (Yes / No)
Regent's Canal.	Ambient air. Deposition on surface of water.	Pollution of water resource.	Moderate.	Low.	No.
Inhabitants of adjacent properties.	Ambient air. Dermal contact, inhalation.	Health effects.	Low.	Low.	No.
Milk Dock - potential co	ntaminants include ash, clinker and slag.				
Users of the site.	Inhalation, dermal contact.	Health effects.	Low.	Moderate.	No.
Construction workers.	Inhalation, dermal contact.	Health effects.	Low.	High.	Yes.
Consumers of groundwater (deep aquifer).	Ingestion.	Health effects.	Moderate.	Low.	No.
Shallow aquifer.	Passage through porous strata.	Pollution of groundwater.	Low.	Moderate.	No.
Deep aquifer	Man-made <i>eg</i> bored piling.	Pollution of groundwater, EA may require remediation.	High.	Low.	No.
Regent's Canal.	Ambient air. Deposition on surface of water.	Pollution of water resource.	Moderate.	Low.	No.
Inhabitants of adjacent properties.	Ambient air. Dermal contact, inhalation.	Health effects.	Low.	Low.	No.
Land under suburban sh	ed – potential contaminants include hydroca	arbons, metals, asbestos, ash, clinker and	d slag.		
Users of the site.	Inhalation, dermal contact.	Health effects.	Low.	Moderate.	No.
Construction workers.	Inhalation, dermal contact.	Health effects.	Low.	High.	Yes.
Consumers of groundwater (deep aquifer).	Ingestion.	Health effects.	Moderate.	Low.	No.
Shallow aquifer.	Passage through porous strata.	Pollution of groundwater.	Low.	Moderate.	No.
Deep aquifer.	Man-made <i>eg</i> bored piling.	Pollution of groundwater, EA may require remediation.	High.	Low.	No.

Receptors and Resources	Pathway		Effect on Receptors and Resources	Degree of Severity	Likelihood	Potentially Significant (Yes / No)
Regent's Canal.	Ambient air. water.	Deposition on surface of	Pollution of water resource.	Moderate.	Low.	No.
Inhabitants of adjacent properties.	Ambient air.	Dermal contact, inhalation.	Health effects.	Low.	Low.	No.
Hazardous Building Mat	erials – anthra	ax.				
Users of the site, including rail	Ambient air.	Inhalation, dermal contact.	Health effects.	High.	High.	Yes.
passengers. Construction workers.	Ambient air.	Inhalation, dermal contact.	Health effects.	High.	High.	Yes.
Hazardous Building Mat	erials – asbes	otos.				
Users of the site, including rail passengers.	Ambient air.	Inhalation, dermal contact.	Health effects.	High.	High.	Yes.
Construction workers.	Ambient air.	Inhalation, dermal contact.	Health Effects.	High.	High.	Yes.

# 12.5 MITIGATION MEASURES

- 12.5.1 A relatively large quantity of waste will be generated during construction works. However, the potential for significant adverse effects will be limited by the implementation of good management practices on site, and any waste requiring disposal will be sent to appropriately licensed and controlled disposal sites.
- 12.5.2 A management plan will be prepared in order to comply with all the relevant handling and disposal legislation relevant to contaminated land. The plan will set out measures to avoid the remobilisation of contaminants via surface waters, groundwater and the ambient air, and will also contain procedures for protecting the construction workforce from any risks associated with contaminated material.
- 12.5.3 The management plan will also require site personnel to wear appropriate personal protective equipment. This equipment will provide a high level of protection against any contaminants that may potentially be encountered, either during the excavation of spoil or when removing materials that potentially contain asbestos or anthrax.
- 12.5.4 When handling the excavated spoil it will be split into two categories for handling: 'contaminated' and 'uncontaminated'. This distinction will be determined from the results of samples taken from trial pits and other prior investigations to show the quality and quantity of excavated material. The physical division between the two categories of spoil will be made before it is removed from site. Hazardous Waste and excavated spoil and materials that are classified as giving rise to an environmental hazard will be disposed of at a suitably licensed waste disposal site. All parties will discharge their statutory obligations in relation to the Waste Management Duty of Care, imposed by Section 34 of the Environmental Protection Act (1990) and the Hazardous Waste Regulations (2005).
- 12.5.5 Where spoil is not contaminated, the approach will be to adopt a disposal hierarchy, with the first choice option being to reuse spoil on site as part of the project wherever possible. The second choice would be to reuse spoil in other projects within the area, with the final choice being disposal to a registered site.

# 12.6 RESIDUAL EFFECTS

12.6.1 Implementation of the mitigation measures identified will ensure that no significant residual effects will arise from the excavation and handling of any contaminated land. Compliance with the appropriate licence conditions will also ensure that no significant residual effects will arise from the removal of materials containing anthrax and asbestos during the refurbishment of buildings.

# 13 PROTECTED SPECIES

## 13.1 INTRODUCTION

13.1.1 This section presents a description of the existing ecological environment and protected species located within the area to be affected by the project. It includes a description of relevant designated sites and protected species identified through consultations and a review of existing information. In addition, a description of the surveys that have been undertaken as part of the assessment, the survey methodologies and the criteria used to establish the nature conservation importance of the species identified, are also provided.

## 13.2 METHODOLOGY

### Scope of the Assessment

- 13.2.1 The ecological assessment has included the following:
  - a review of any relevant existing ecological information for the site and its immediate surrounds;
  - determining any statutory and non-statutory designations of nature conservation value on or near to the site which may be directly or indirectly affected;
  - determining views of consultees, including English Nature and London Wildlife Trust, on the significance of the existing ecological resources; and
  - obtaining any information on any habitats or species of importance, including a bat survey of any buildings or other structures which will be affected by the project.
- 13.2.2 However, as discussed in *Chapter 3*, all ecological issues other than potential effects on protected species have been scoped out of the assessment. Some information on designated sites and general ecological context is given in this section for completeness.

# **Bat Survey Methodology**

13.2.3 A bat survey was undertaken on 20<sup>th</sup> August 2003, carried out from publicly accessible areas of the station and surrounding areas. It involved an assessment of all buildings and structures affected by the project for suitability as potential roost sites. There are no trees within the survey area. The methodology for the bat survey was adapted from the methodologies of Mitchell-Jones & McLeish (1999), the Bat Workers Manual<sup>(1)</sup>, and Hutson (1993), Bats in Houses<sup>(2)</sup>.

Mitchell-Jones & McLeish (1999) The Bat Workers Manual JNCC, UK.
 Hutson A (1993) Bats in Houses BCT, London

- 13.2.4 The survey was carried out in order to assess if the works could affect bats as a result of disturbance to or removal of habitats. At the time of the survey, extensive development works for LU and CTRL were underway in a large area immediately to the west of the site.
- 13.2.5 Descriptions were made of the buildings, with particular attention being paid, for example, to missing tiles and cracks and crevices in both brick work and mortar. Suitability was assessed according to a number of criteria including the following:
  - temperature stability;
  - protection from the elements;
  - foraging potential;
  - construction detail; and
  - potential access points.
- 13.2.6 The station layout and locations of the buildings surveyed along with photographs taken during the survey are shown in *Figure 13.1* and *Figure 13.2*.

# Assessment Criteria

- 13.2.7 In order to predict and evaluate the likely effects of the proposed project, the design proposals have been compared with the identified nature conservation interest on the site and its environs.
- 13.2.8 The primary criteria for the evaluation of ecological effects will include:
  - the spatial extent, intensity and duration of effects;
  - the extent and quality of affected habitats and the importance of affected species, taking account of any designations for nature conservation importance and amenity value; and
  - the ability of new habitat to recover from temporary effects.
- 13.2.9 For the purposes of this assessment, whenever bats and/or their habitat are identified any effect on them will be considered to be significant.

# 13.3 BASELINE ENVIRONMENT

### **General Ecological Context**

13.3.1 The site itself comprises the brick built Victorian station with several more modern additions. It is situated in a highly built-up area of north central London, with no natural areas and very little vegetation. There are no habitats or species of note within the survey area other than some potential for bats.

### **Designated Sites**

13.3.2 English Nature has highlighted that Camley Street Natural Park (CSNP) and Barnsbury Wood are both statutory Local Nature Reserves (LNR), although the latter is approximately 600 m east of the project area and will not be affected by any of the proposed works. CSNP comprises two unique acres of wild green space in the heart of London. It is described by London Wildlife Trust as an innovative and internationally acclaimed reserve, created on the banks of the Regent's Canal. It has a number of special features including a pond, meadow and woodland, providing a natural environment for birds, bees, butterflies, amphibians and a rich variety of plant life.

# Bats

# Bat Species Known in the Region

13.3.3 Southeast England in general has a relatively high diversity of bat species, and at least half of the UK's 16 resident bat species are recorded in the region (Richardson 2000<sup>(1)</sup>). However, the site is situated in central London, and the urban landscape greatly reduces the population size and species diversity of bats. During surveys at 23 urban sites during the summer of 1999, approximately 81% of bats recorded were pipistrelles (*Pipistrellus* spp.) with very occasional records of other species, mostly *Nyctalus* spp. or Daubenton's bat (Guest *et al* 2000<sup>(2)</sup>).

# Legal Protection of Bats

- 13.3.4 All species of British bat are listed on Schedule 5 of the Wildlife and Countryside Act 1981 (as amended), and receive full protection under Section 9. The Countryside and Rights of Way Act 2000 extends this protection. They are also listed as 'European Protected Species' on Schedule 2 of the Conservation (Natural Habitats, etc.) Regulations 1994 which gives them full protection under Regulation 39.
- 13.3.5 Under the above legislation it is an offence to intentionally or recklessly:
  - kill, injure or take any bat;
  - possess any part of a bat either alive or dead;
  - damage, destroy or obstruct access to any place or structure used by bats for shelter, rest protection or breeding;
  - disturb such a species whilst it is using any place of shelter or protection; or
  - sell or attempt to sell any such species.

Richardson P. (2000) Distribution atlas of bats in Britain and Ireland 1980-1999). Bat Conservation Trust, London.
 Guest P., Jones K. & Tovey J. (2000) Bats in Greater London; Unique evidence of a decline over 15 years *British Wildlife*, **14:1**, 1-6.

13.3.6 Where it is necessary to carry out an action that could result in an offence, it is possible to apply for a licence from the Department for Environment, Food and Rural Affairs (DEFRA). Such licences are only issued where DEFRA are satisfied that works are unavoidable and that all reasonable steps have been taken to ensure that effects on bats are minimised.

# Bat Life Cycle

13.3.7 Bats hibernate in winter, followed by increasing activity throughout the spring. In early summer, females give birth and rear young in maternity roosts. The young are weaned in late summer, after which time bats mate and build up fat reserves in preparation for hibernation in the winter months. Bats are at their most vulnerable during the winter hibernation period and in early summer in their maternity roosts. Most species of bat use different roosts at different times of the year, and all bat roosting sites receive legal protection when bats are not present.

# 13.4 ASSESSMENT OF ENVIRONMENTAL EFFECTS

# **Construction Effects**

# Introduction

13.4.1 This section discusses the temporary impacts that are predicted to arise as a result of the construction works, particularly in relation to the disturbance of habitats occupied by bats.

# Effects on Designated Sites

- 13.4.2 Due to the nature of the existing townscape environment, the footprint of the project will not affect any ecological resources, such as designated sites.
- 13.4.3 CSNP is situated to the north west of the site. The closest construction activity to the CSNP will be a contractor compound area for plant and materials, 100 m south of the park. Demolition of the Southern Concourse and construction of the Western Concourse will be 450 m and 300 m respectively to the south of the park.
- 13.4.4 The possible alternative compound if King's Cross Central proceeds during the construction phase of the project will be to the north of the Western Concourse, extending along the western side of the site; the northern end of the compound will be 25 m from Regent's Canal and 100 m from the park.
- 13.4.5 No significant effects on CSNP are therefore predicted.

# Effects on Bat Habitats

- 13.4.6 The bat survey incorporated the following elements of the site and surrounding areas:
  - the Southern Concourse, which is to be demolished, and the Main Station Shed;

- to the west, the Great Northern Hotel, Suburban Train Shed and external areas of the Western Range, as well as the publicly accessible internal areas of the range;
- to the east, the external walls of the Eastern Range, as well as the publicly accessible internal areas of the range and the taxi road; and
- to the north, the tunnel portals and the buildings (including the engineer's bothy and office building to which it is attached) and walls adjacent to the station throat.
- 13.4.7 The Southern Concourse offers very limited potential for bat roosting, and the buildings associated with the Western and Eastern Ranges offer limited potential, as do the platform areas themselves. Only the Great Northern Hotel (*Target Note 14*) offered possible roost potential in the roof space, but the walls were all solid with no potential entry points for bats.
- 13.4.8 The survey of the three buildings adjacent to the station throat to the north identified that two of them appeared more suitable for bats. One is a wooden walled building with pitched roof that has gaps in the eaves that houses a gas-fired boiler room (*Target Note 10*). The second building that includes the engineer's bothy is a brick built building with a pitched roof and some loose tiles and bare-board gaps (*Target Note 11*). This building is currently used by GNER for staff welfare facilities. Both offered potential entry points for bats. However, given that the local area provides very little opportunity for bats to forage it is unlikely that these buildings are utilised for roosts.
- 13.4.9 The tunnel portals are brick built and in good condition, but there is bat roost potential within the tunnels themselves. However, no works are planned to take place to the tunnels and they are already in constant use by trains using King's Cross Station.
- 13.4.10 In relation to the construction and demolition involved in the project, the most intensive areas of work (*ie* the Southern Concourse demolition and the Western Concourse construction) offer very limited or limited potential for bat roosts.

# **Operational Effects**

13.4.11 No significant effects on ecological resources are predicted to occur during operation of the project.

# 13.5 MITIGATION MEASURES

13.5.1 The urban nature of the site and surroundings offer very limited potential for foraging bats and therefore the presence of roosting bats on the site is considered unlikely, even in the buildings that were identified as being more suitable. No mitigation measures will therefore be required. Notwithstanding that there are no significant effects anticipated to occur on bats, it will be a requirement of the acceptance of the Contractor's EMP, by Network Rail, that they will undertake a bat survey prior to works beginning.

# 13.6 RESIDUAL EFFECTS

13.6.1 The urban nature of the site and surroundings offer very limited potential for foraging bats and therefore the presence of roosting bats on the site is considered unlikely, even in the buildings that were identified as being more suitable. No evidence of bat activity was recorded in any of the surveyed buildings. No significant residual effects will therefore occur.















Not to scale. For illustration only

# 14 WATER RESOURCES

## 14.1 INTRODUCTION

- 14.1.1 This section assesses the potential for impacts to water resources. In so doing, the main objectives of this section are as follows:
  - To provide an overview of existing surface and ground water resources in the project area. Surface water aspects include water quality, water use, flood risk and fisheries issues. Groundwater aspects relate to hydrology and aquifer status.
  - To examine the potential for significant effects on water resources arising from the construction and operational activities.
  - To identify mitigation measures where appropriate in order to minimise significant adverse effects on water resources.

## 14.2 ASSESSMENT METHODOLOGY

## **Definition of Spatial Scope**

Spatial Scope

14.2.1 Surface water data was collected within a 250 m radius of the site. Data on groundwater protection zones and abstraction licenses was collected within a radius of 1,000 m and 2,000 m respectively from the site.

# **Data Collection**

- 14.2.2 Baseline data has been collected with respect to hydrology, hydrogeology, flood records, surface and groundwater quality, fisheries, aquatic fauna and flora, water abstraction licenses and land drainage. The main sources comprise:
  - Environment Agency records;
  - local authorities;
  - water service and supply companies;
  - Institute of Hydrology;
  - British Geological Survey;
  - British Waterways;
  - major abstractors; and
  - user groups such as angling societies and recreational clubs.
- 14.2.3 The assessment of effects on water resources is based on a desktop study. Potential effects have been identified as a result of consideration of:
  - the existing water quality and hydrological data; and
  - design, construction and operational activities.

## 14.3 BASELINE ENVIRONMENT

# **Surface Water**

Overview

- 14.3.1 The only watercourse within 1000 m of the site is the Regent's Canal. The canal lies approximately 300 m to the north of the Western Concourse, but lies within 30 m of the Station throat. The Regent's Canal begins at Limehouse Basin in London's docklands and passes through central London towards Paddington. Rising from Docklands through a number of locks, the canal passes through Mile End, Hackney, Islington, King's Cross and Camden and thence to Little Venice.
- 14.3.2 The Regent's Canal is classified as having chemical quality of fairly good (Grade C)<sup>(1)</sup>. Therefore, this is only moderately sensitive.

## Abstractions

14.3.3 Abstraction licence information within 1000 m of the site has been obtained from the Environment Agency through Sitescope <sup>(2)</sup> and is presented in *Table 14.1*. There are no abstractions for drinking water purposes within 1000 m of the site.

# Table 14.1 Abstraction Licences within 1 km Radius of the Site

Licence Number	Location	Source	Purpose
28/39/39/0172	Camley Street Nature Park, London	Thames surface water – non-tidal	Non-remedial river/wetland support make up or top up water
28/39/39/0172	Information not available	Non-remedial river/wetland support make up or top up water	Non-remedial river/wetland support make up or top up water
28/39/39/0172	Grand Union canal at Camley Street Nature Reserve, London	Thames surface water – non-tidal	Non-remedial river/wetland support make up or top up water
28/39/39/0164	Maiden Lane Bridge, London	Thames surface water – non tidal	Non-evaporative cooling.

# Discharges

14.3.4 Information concerning discharges located within 1000 m of the site has been obtained from the Environment Agency through Sitescope. The only discharge that is within 500 m to 1000 m of the site is into the Grand Union Canal and is associated with cooling water discharged from premises owned by the National Grid Company plc.

(1) Numerical grading relates to the Environment Agency's GQA (General Quality Assessment) Chemical Grading for Rivers and Canals (NRA, 1994).

(2) Sitescope. (2003). Technical Report No. 684813. Produced for ERM. May 2003.

## Groundwater

### Groundwater Vulnerability

14.3.5 For regional aquifer protection purposes, a series of groundwater vulnerability maps have been published by the Environment Agency covering the whole of England and Wales. Groundwater vulnerability maps indicate the underlying hydrogeology and soil types. The groundwater vulnerability map for the Thames Estuary<sup>(1)</sup> that covers the vicinity of the proposed project shows that the King's Cross area lies above a non-aquifer, which therefore has a low sensitivity.

# Geology and Hydrogeology

- 14.3.6 Detailed information concerning the geology of the study area is presented in *Chapter 12: Contaminated Land*. The British Geological Survey map of North London<sup>(2)</sup> shows that the site is underlain by Made Ground, overlying London Clay, Lambeth Group, Thanet Sands and Chalk. The Lambeth Group has been classified into Upper Reading Formation, Woolwich Formation, Lower Reading Formation and Upnor Formation.
- 14.3.7 The groundwater vulnerability map for the Thames Estuary indicates that there are two distinct water tables in the vicinity of the site<sup>(3)</sup>. A shallow perched water table in the Made Ground and a deeper one, within the Chalk. The water in the deep aquifer was at 35.6 m below ordnance datum in January 2002. The groundwater condition in each stratum is discussed in *Table 14.2*.

# Table 14.2Groundwater Conditions

Stratum	Groundwater Conditions
Made Ground	Groundwater level in the Made Ground will vary across the site at different seasons. Near surface groundwater will also be influenced by leaking services, although the sewers may also tend to locally reduce the water levels in the vicinity of the site.
London Clay	Water bearing layers are expected in the presence of claystones that exist randomly in the stratum.
Lambeth Group	Water bearing sand layer might exist in this stratum. In a nearby development water seepage was encountered in the borehole and pile construction in the Woolwich Formation.
Chalk	Water was encountered in the Upper Chalk layer at between 62 m ATD and 64 m ATD.

Ground Contamination Issues

14.3.8 Ground contamination issues are addressed in *Chapter 12: Contaminated Land and Construction Waste*.

Environment Agency. Groundwater Vulnerability Map. Sheet 40. Thames Estuary.
 British Geological Survey. England and Wales Sheet 256. North London.
 Op. Cit.

## Flooding

14.3.9 Information obtained from the Environment Agency<sup>(1)</sup> shows that the proposed project does not lie within a fluvial or a tidal floodplain.

## Fisheries

14.3.10 The Regent's Canal supports a diverse population of fish such as roach, bream, gudgeon, tench, carp, perch and pike.

### 14.4 ASSESSMENT OF ENVIRONMENTAL EFFECTS

### Overview

- 14.4.1 In assessing the potential effects of the construction works on surface and groundwater, the following issues have been taken into account:
  - direct discharges to ground and surface waters from run-off during the construction phase, possibly containing increased loads of suspended solids and/or contaminants;
  - accidental spillage or leakage resulting from storage of potentially polluting substances during construction, affecting groundwater and surface waters;
  - pollution to groundwater arising from infiltration during construction (particularly suspended solids);
  - pollution of surface and/or groundwater arising from disturbance of contaminated land during construction; and
  - drawdown of groundwater caused by dewatering operations during excavation.
- 14.4.2 The potential for contaminated land to be encountered during the construction of the project is discussed in *Chapter 12: Contaminated Land and Construction Waste.*

# **Construction Effects**

### Introduction

- 14.4.3 In carrying out the assessment of environmental effects on water resources, the following sources have been used to derive the evaluation criteria summarised in *Table 14.3*:
  - relevant EC legislation (where appropriate);
  - national policy in respect of surface and groundwater standards and objectives;

<sup>(1)</sup> http://www.environment-agency.gov.uk/subjects/flood/

- relevant State of the Environment Report objectives relating to water resources in the area; and
- the Environment Agency's Aquifer Protection policy.

# Policy Relating to Surface and Groundwater Use

- 14.4.4 In England and Wales, the Environment Agency is responsible for the protection of 'controlled waters' from pollution under the Water Resources Act 1991<sup>(1)</sup>. It is an offence to cause pollution of controlled water, either deliberately or accidentally. In addition, the formal consent of the Agency is required for many discharges to controlled waters, including both direct and indirect discharges to soakaway. Such consents are granted subject to conditions and are not issued automatically. The Environment Agency also has a responsibility for the flood defence and maintenance issues for all 'main rivers' under the *Water Resources Act 1991*.
- 14.4.5 *Planning Policy Guidance Notes* (PPGs) are prepared by the Department of the Environment, Transport and the Regions (DETR)<sup>(2)</sup> and provide guidance for developers under different circumstances. PPG25 promotes the use of *Sustainable Urban Drainage Systems* (SUDS) that provide more natural approaches to runoff management and, when incorporated into developments, helps to prevent increases in flood or water pollution risk downstream of the development.

# State of the Environment Report for London 2001 Objectives

- 14.4.6 State of the Environment Reports supersede the Local Environment Agency Plans (LEAPS). The report for London aims to identify those aspects for which the Environment Agency has a responsibility and which is considered to be important in terms of contributing to a better quality of life in the capital.
- 14.4.7 The State of the Environment Report for London 2003 sets out the baseline conditions and recent and likely future trends that can be identified and quantified on how the state of the environment is changing.

# Assessment Criteria

14.4.8 The water quality of the UK's watercourses is classified by the Environment Agency under the General Quality Assessment (GQA) Scheme. Each watercourse is assessed and given a grade between A and B (good) through C and D (fair) to E and F (poor). The GQA uses biochemical oxygen demand, ammonia and dissolved oxygen to assess water quality. These are the three parameters that best indicate the extent to which waters are affected by wastewater discharges and rural land use run-off.

- 14.4.9 The vulnerability of groundwater pollution is dependant on the presence and nature of overlying soils and drift deposits, the geology and the depth to the water table. This will determine the rate at which a contaminant can migrate into the water. Consequently, groundwater abstractions in the UK have designated inner and outer protection zones, defined according to the above criteria. The Environment Agency's approach to controlling and preventing the pollution of groundwater is set out in *Policy and Practice for the Protection of Groundwater* (Environment Agency, 1992).
- 14.4.10 Taking into account the above policy, significance will be determined in each case taking account of:
  - the severity of potential change (duration, volume of discharge, concentration of contaminants etc.);
  - the value and sensitivity of the resource, *eg* in terms of protected aquifers, water quality objectives and EC Directive on surface water quality; and
  - the number, type and sensitivity of receptors (*eg* importance of a public water supply source, designated fishery, availability of alternative sources).
- 14.4.11 The threshold criteria are set out in *Table 14.3* below.

Table 14.3	Evalı	uation C	criteria	- Wate	er Res	ourc	es	
								(

Type of Effect	Project Phase	Site Specific Threshold of Significance	Level of Severity	Severity Threshold
Pollution to watercourses.	Construction and Operation	No minimum threshold; deterioration of	Low	Any Class D or unclassified watercourse. (Note 1).
		water quality in any watercourse	Moderate	Any Class C watercourse.
		is considered to be significant.	High	Any Class A or B watercourse.
Causing or exacerbating	Construction and Operation	No minimum threshold;	Low	Flooding affecting agricultural land.
flooding.		flooding of any land is	Moderate	Flooding affecting roads and infrastructure.
		considered to be significant.	High	Flooding affecting buildings.
Deterioration in quality of	Construction and Operation	Causing disturbance in	Low	Within <6m thickness of strata overlying aquifer.
either a major or minor		ground within <6m thickness	Moderate	Within unsaturated zone of aquifer.
aquifer.		of strata overlying an aquifer.	High	Within saturated zone of aquifer.
Deterioration in quality of any natural discharge or	Construction and Operation	No minimum threshold.	Low	Reduction of any natural discharge (stream baseflows or spring/seepage zones).
abstraction for water supply.			Moderate	Any public or private source abstracting <1MI/day.
			High	Any public or private source abstracting >1MI/day.
Note 1: Numerica	I grading relates to	o the Environment A	gency's GQA	(General Quality

Note 1: Numerical grading relates to the Environment Agency's GQA (General Quality Assessment) Chemical Grading for Rivers and Canals (NRA, 1994).

# Effects on Groundwater

- 14.4.12 Construction activity has the potential to affect the quality of groundwater as a result of the following:
  - contamination through accidental spillage;
  - draw down of groundwater from dewatering excavations; and
  - release of contaminants through disturbance of historically contaminated land.

# Accidental Spills

- 14.4.13 There is the potential for accidental spills of chemicals, oils and fuels during construction, although good practice measures will be adopted through the use of a site EMP in order to minimise such incidents. In the event of a spill, the contaminant could percolate through the ground and enter the existing groundwater, thus causing potential effects to groundwater quality. However, the geology underlying the site is London Clay, which is up to 13-25 m thick and impermeable to liquid contaminants. The London Clay is in turn underlain by the impermeable Woolwich and Reading Beds, which are up to 20 m thick. It will therefore be unlikely that contaminants will be able to enter the groundwater lying in the Chalk through this pathway.
- 14.4.14 Accidental spills (oil or chemical) or potentially contaminated liquids released through the disturbance of contaminated soils will be contained on site. Any contamination from spills will be removed and disposed of at a licensed waste management site. Impacts from accidental spillage will therefore not result in significant environmental effects.
- 14.4.15 With reference to the evaluation criteria in *Table 14.3*, there is a low risk of significant effects on a major aquifer due to the thickness of the geological formations lying above the Chalk. Deterioration of either a major or minor aquifer will therefore not occur.

# Dewatering

- 14.4.16 Dewatering associated with excavations and piling works has the potential to cause groundwater draw down. However, there is unlikely to be much groundwater entering excavations on the site. This is because the major groundwater aquifer is recorded as being over 50 m below ground level within the chalk strata and none of the on-site excavations will be this deep.
- 14.4.17 Pockets of water may be encountered, however, within the Thanet Sands, though the small volumes and depth of this groundwater means that this is likely to be an infrequent occurrence. Where pockets of water are encountered, the water will be pumped out of the excavation to the foul drainage, with suitable consent, at ground level.
- 14.4.18 The low occurrence of groundwater within the underlying geological strata means that it is unlikely that piling activities will have an effect on groundwater flow. Also the groundwater held within the Thanet Sands formation does not provide a water resource for groundwater abstractions nor does it contribute

the base flow of other water resources in the area. Deterioration of an aquifer or of any natural discharge or abstraction for water supply will not occur.

# Contaminated Land

- 14.4.19 The potential for the contamination of groundwater as a result of the disturbance to contaminated land will depend on the nature of construction activities, the vulnerability of the groundwater resource and the ground condition at the proposed development. The risk of contamination to groundwater from contiguous piling works is considered small since the piles will not penetrate into the water bearing strata. It is therefore unlikely that a pathway will be created for contaminants to reach the water table. Local pockets of groundwater, in the Thanet Sands layer, may experience some contamination but the scale of this is not considered significant.
- 14.4.20 The areas considered to be most vulnerable from ground contamination are described in *Chapter 12: Contaminated Land*.

# Effects on Surface Water

# Water Quality

- 14.4.21 General construction activities have the potential to lead to increased suspended solids in site run-off. In order to eliminate the potential effects, all surface water discharges generated during construction will pass through sediment traps in order to reduce suspended solids prior to discharge. In addition, decontaminating filters, oil separators or similar will be incorporated into the site drainage systems in order to minimise risk of contamination to surface waters (*Environment Agency PPG1: General Guide to the Prevention of Water Pollution*).
- 14.4.22 Surface water runoff reaching the Regent's Canal would cause a moderate impact to the water quality in the canal. However, due to the distance from the site to the Regent's Canal and working with good site management practices it is unlikely that surface water runoff will reach the water courses. No significant effect on surface water flows or quality will occur during construction.

# Accidental Spills

14.4.23 Any contaminated accidental spills (oil or chemical) or potentially contaminated liquids released through the disturbance of contaminated soils will be contained. Any contamination from spills will be removed (and disposed of at a licensed waste management site) and the water quality of any residual water will be monitored. No significant impacts will occur on water resources from accidental spills.

# Wash Down Water

- 14.4.24 With the exception of wheel washes, vehicle and plant washing and cleaning will be a prohibited activity on the KXSE Project worksites.
- 14.4.25 Wheel washes will be set up on site to clean the wheels of vehicles before they leave the work site to prevent mud build up on the local roads. Water

from the wheel washes will be discharged under consent to the foul sewer. The washing out of concrete lorries and chutes will be a prohibited activity on the KXSE Project worksites. No significant environmental impacts will therefore occur from the handling of wash down water.

## Foul Water and Sewerage

- 14.4.26 The application of the measures set out in the Contractor's EMP to control and manage site drainage and foul sewerage will ensure that groundwater and the Regent's Canal are protected and are not affected by construction activities. In addition, discharges to sewers require consent/agreement from the sewerage authority that will impose conditions on the volume and quality of the discharges. No significant impacts will therefore occur on water resources from foul water and drainage discharges.
- 14.4.27 Surface rainwater from the site will be collected by the existing drainage system in operation at the start of the works. In certain areas, such as the Plant Room Area, drainage will be removed as part of the early works, in which case rainwater will either be diverted elsewhere into the general drainage system or collected and disposed of off-site under suitable licence. No significant impacts will therefore occur on surface water resources from the management of rainwater.

# **Operational Effects**

#### Overview

- 14.4.28 In assessing the potential effects of the project during operation, the following issues have been taken into account:
  - potential impacts to surface water and groundwater quality from spillage or potentially contaminated drainage generated during operation; and
  - potential impacts to surface and/or ground water as a result of increased run-off due to the creation of new areas of hard standing.

### Potential Effects on Surface Water and Groundwater Quality

- 14.4.29 There is no perceived risk to the Regent's Canal during operation and there will be no additional run-off as a result of the project. The drainage strategy includes the following components in order to avoid such effects:
  - rainwater collected from the site is likely to be ultimately routed into the foul sewer; and
  - ultimate discharges to watercourse are subject to control from the Environment Agency and will require consent under the Water Resources Act 1991. These regulatory measures will ensure that there are no significant negative effects on the aquatic environment.

## Potential Effects on Groundwater Flow

14.4.30 Piled foundations will be designed to avoid any significant effects on groundwater. However, due to the low occurrence of groundwater within the underlying geological strata it is unlikely that piled foundations will affect groundwater flow. Also the groundwater held within the Thanet Sands does not provide a water resource for groundwater abstractions nor does it contribute to the base flow of other water resources in the area.

# 14.5 MITIGATION MEASURES

# Construction

- 14.5.1 An example Contractor's EMP has been developed for the project (see *Annex E*) to demonstrate how the Contractor will be required to manage environmental issues during construction. The example Contractor's EMP contains a range of measures for the protection of surface and groundwater, which are also summarised below.
- 14.5.2 All surface water discharges during construction will pass through sediment traps in order to reduce suspended solids prior to discharge. Similarly decontaminating filters, oil separators or similar will be incorporated into the site drainage systems in order to minimise the risk of contamination to surface waters (*PPG 1 General Guide to the Prevention of Water Pollution*).
- 14.5.3 Where contaminated groundwater is encountered it will be pumped from excavations and discharged to stilling ponds where it can be stored to allow pollutants and suspended solids to settle out prior to discharge of the water to the foul sewer. The settled solids would then be collected for disposal to a licensed waste management site.
- 14.5.4 All construction site works will be undertaken in accordance with the Environment Agency's *Pollution Prevention Guidelines* and in particular *PPG6* – *Working at Construction and Demolition Sites*. Construction vehicles will be maintained to reduce the risk of hydrocarbon contamination and will only be active when required. The Contractor will be required to ensure that all plant and equipment is suitable for purpose and adequately maintained through a planned preventative maintenance (PPM) scheme. Any plant and equipment that is found to be poorly maintained will be immediately shut down and removed from the site. No maintenance will take place on the KXSE Project worksites. Other construction materials will be managed in such a way as to effectively minimise the risk posed to the aquatic environment.
- 14.5.5 Storage areas for fuels, oils or chemicals will be sited on impervious bases and surrounded by impervious bund walls. The volume of the bunded compound will be at least equivalent to 110 % of the capacity of the largest tank or 25 % of the compound capacity of all tanks, whichever is greater. All filling points, vents, gauges and sight glasses will be located within the bund. The drainage system of the bund will be sealed with no discharge to any watercourse, land or underground strata. Associated pipework will be located above ground and protected from accidental damage. All filling points and tank overflow pipe outlets will be detailed to discharge downwards into the bund.

- 14.5.6 Additional mitigation measures will be incorporated into the project as follows:
  - The Environment Agency will be invited to a pre-construction meeting at the KXSE Project worksite, to discuss the planned works and show them the site. This will involve discussions about pollution prevention and emergency procedures (*PPG21: Pollution Incident Response Planning*).
  - Pumps for dewatering will be sized appropriately and discharges will not be made without the prior agreement of the Environment Agency and/or sewerage undertaker.
  - All surface water from hard standings will be passed through trapped gullies or an oil interceptor suitable to drain the site as outlined in *PPG3:* Use and Design of Oil Separators In Surface water Drainage systems.
  - Adequate provision for the collection, treatment and disposal of sewage from site offices and accommodation will be provided outlined in *PPG4: Disposal of Sewage where no Mains Drainage is Available.*
  - Spillages of liquids on site, other than water, will generally be soaked up using sand or absorbent granules. These will subsequently be taken to designated skips for disposals of site. The Environment Agency and/or sewerage undertaker will be informed if the spillage is sufficiently large.

# Operation

14.5.7 Consultation will be undertaken with the Environment Agency and Thames Water Limited in developing the detailed design of the proposed development with respect to drainage measures.

# 14.6 RESIDUAL EFFECTS

14.6.1 The residual effects on the aquatic environment from the construction and operation of the proposed development are likely to be negligible once mitigation measures have been incorporated. The combination of the low sensitivity of the local water resources and the application of the mitigation measures described will ensure that no adverse significant impacts will occur.
## 15 OVERALL SUMMARY OF IMPACTS

15.1.1 This section of the ES sets out the conclusions of the EIA and summarises the main impacts resulting from the King's Cross Station Enhancement Project. It describes the key mitigation measures that will be applied, confirms the means by which this mitigation will be delivered and identifies the significant residual effects persisting after mitigation. This summary is set out in *Table 15.1* overleaf.

## Table 15.1 Impacts, Mitigation and Significant Residual Effects

Impact Type	Key Potential Impacts (without mitigation)	Mitigation	Residual Effects	Means by which Mitigation will be Delivered
Permanent / Long	Term			
Permanent / Long Term         Socio-economics       There will be an additional 180 permanent jobs generated in the local economy.         The project will:       •         •       provide greater station flexibility and will increase accessibility to central London;         •       will help to accommodate economic and demographic growth, by providing enhanced public transport provision;         •       complement surrounding redevelopment activities and will help achieve a range of key regeneration effects; and         •       contribute to the overall improvement of local economic and social prospects of the area.		In most instances the control measures introduced by the design details will be effective in preventing significant adverse impacts arising and ensuring that the positive impacts are delivered. These measures are taken as being inherent to the project design and implementation and are, therefore, not presented in the ES as mitigation measures.	Significant positive residual effects on employment and accessibility to employment opportunities are predicted.	Planning condition requiring the applicant to construct the project in general accordance with the submitted plans and drawings.
Archaeology Potential impact on mid-19 <sup>th</sup> century or later remains.		Monitoring, field evaluation, standing building assessment, analysis and publication of results and excavation if necessary.	No significant residual effects are predicted.	Planning condition requiring the Applicant to submit for prior approval an Archaeological watching brief
Cultural Heritage	<ul><li>Various physical effects on Kings Cross Station (a grade I listed building) and the Great Northern Hotel (grade II listed).</li><li>Changes to the setting of individual and groups of listed buildings that overall will result in a significant positive impact to the setting of the listed buildings.</li></ul>	In most instances the control measures introduced by the design details will be effective in preventing significant adverse impacts arising and ensuring that the positive impacts are delivered. These measures are taken as being inherent to the project design and implementation and are, therefore, not presented in the ES as mitigation measures.	Removal of some structural elements such as front of Suburban Shed, roof over Western Range and 'Bothy' will result in a negative effect, even after preservation by record. However, these are not significant in the context of the project and the project as a	Planning condition requiring the Applicant to construct the project in general accordance with the submitted plans and drawings.
	Overall significant positive effect on the character and appearance of the conservation area.	Where cultural heritage resources will be permanently lost, a detailed record will be collated prior to removal.	whole result in significant positive residual effects on the setting and appearance of the listed buildings and conservation area.	

Impact Type	Key Potential Impacts (without mitigation)	Mitigation	Residual Effects	Means by which
				Mitigation will be Delivered
Townscape	The townscape effects will be confined to Character Area 1 and will be positive, long term and significant.	In most instances the control measures introduced by the design details will be effective in preventing significant adverse impacts arising and ensuring that the positive impacts are delivered. These measures are taken as being inherent to the project design and implementation and are, therefore, not presented in the ES as mitigation measures.	Significant positive residual effects on townscape are predicted.	Planning condition requiring the Applicant to construct the project in general accordance with the submitted plans and drawings.
Visual	<ul> <li>During operation, there will be no significant effect on strategic views.</li> <li>Effects on local views will be a mix of significant and not significant. However, all effects will be positive and long term.</li> <li>Effects on visual receptors will be a mix of significant and not significant. However, all</li> </ul>	In most instances the control measures introduced by the design details will be effective in preventing significant adverse impacts arising and ensuring that the positive impacts are delivered. These measures are taken as being inherent to the project design and implementation and are, therefore, not presented in the ES as mitigation measures.	Significant positive residual effects on employment and accessibility to employment opportunities are predicted.	Planning condition requiring the Applicant to construct the project in general accordance with the submitted plans and drawings.
Transport	<ul> <li>A significant positive effect on the movement and accumulation of passengers within the King's Cross station from the provision of the Western Concourse.</li> <li>Significant positive effects on the movement of taxis and private cars on Pancras Road;</li> <li>Significant positive effects on the servicing of the new OBS facilities and Station.</li> <li>No significant effects on highway capacity on</li> </ul>	In most instances the control measures introduced by the design details will be effective in preventing significant adverse impacts arising and ensuring that the positive impacts are delivered. These measures are taken as being inherent to the project design and implementation and are, therefore, not presented in the ES as mitigation measures.	Significant positive residual effects are predicted.	Planning condition requiring the Applicant to construct the project in general accordance with the submitted plans and drawings.
	Pancras Road.			

Impact Type	Key Potential Impacts (without mitigation) Mitigation		Residual Effects Mea Miti Del	
Noise	Non significant changes in operational noise levels of less than 1dB as a result of increased train movements. Fixed plant for the continued operation of King's Cross services will be incorporated into the below-ground Plant Room Area, located adjacent to the Loading Bay and passenger accumulation area. Locating the Plant Room Area below ground in a purpose built structure will be effective in screening nearby receptors from the noise generated by plant and no significant impacts are expected at noise sensitive receptors.	In most instances the control measures introduced by the design details will be effective in preventing significant adverse impacts arising and ensuring that the positive impacts are delivered. These measures are taken as being inherent to the project design and implementation and are, therefore, not presented in the ES as mitigation measures. Limitation of the allowable noise level at the boundary of the premises to 5 dB below the current background noise level. This limit will form the basis of the design for any acoustic attenuation measures that may be needed within the new Plant Room Area.	No significant residual effects are predicted	Planning condition requiring the Applicant to construct the project in general accordance with the submitted plans and drawings. Planning condition limiting the allowable noise level form fixed plant and equipment at the boundary of the premises to 5 dB below the current background noise level.
Air Quality	There will be no significant long-term effects on air quality.	None required.	None.	None required.
Contaminated Land	There will be no significant long-term effects on contaminated land.	None required.	None.	None required.
Protected Species	There will be no significant long-term effects on protected species.	None required.	None.	None required.
Water Resources	There will be no significant long-term effects on protected species.	None required.	None	None required.
Short-term Socio-economics	term >conomics There will be an additional 3,355 person years of temporary employment generated in the local economy. Significant adverse impacts arising and ensuring that the positive impacts are delivered. These measures are taken as being inherent to the project design and implementation and are, therefore, not presented in the ES as mitigation measures.		Significant positive residual effects on employment opportunities are predicted.	Planning condition requiring the Applicant to construct the project in general accordance with the submitted plans and drawings.

Impact Type	Key Potential Impacts (without mitigation)	Mitigation	Residual Effects	Means by which Mitigation will be Delivered
Archaeology	All the significant effects on archaeological resources will be long-term effects. There will, therefore, be no significant short-term effects on archaeological resources.	None required.	No significant residual effects are predicted	None required.
Cultural Heritage	All the significant effects on cultural heritage resources will be long-term effects. There will, therefore, be no significant short-term effects on cultural heritage resources.	None required.	No significant residual effects are predicted	None required.
Townscape	Significant townscape impacts on Character Area I (King's Cross St Pancras) due to a moderate magnitude of change.	Appropriate phasing of project, locating construction elements in least visible locations and screening.	Significant negative residual effects on townscapes	Planning condition requiring the Applicant to submit for prior approval a Contractor's Environmental Management Plan.
Visual	<ul> <li>Short term significant on 5 close visual receptors.</li> <li>The following three important local views, as defined in London Borough of Camden Development Brief, will undergo a significant negative effect:</li> <li>King's Cross Mainline Station: Western Concourse (LBC Main View);</li> <li>Pancras Road (LBC Secondary View); and</li> <li>Internal spaces within King's Cross Mainline Station (LBC Secondary View).</li> </ul>	Appropriate phasing of project, locating construction elements in least visible locations and screening.	Significant negative residual effects on townscapes	Planning condition requiring the Applicant to submit for prior approval a Contractor's Environmental Management Plan.
Transport	There will be no significant short-term effects from construction traffic movements.	Notwithstanding the fact that there will be no significant adverse effects from construction traffic, traffic management measures will be implemented in liaison with the highway authority.	No significant residual effects are predicted	Planning condition requiring the Applicant to submit for prior approval a Contractor's Environmental Management Plan.

Impact Type	Key Potential Impacts (without mitigation)	Mitigation	Residual Effects	Means by which
				Mitigation will be Delivered
Noise	Western Concourse and Platform Y construction will cause some noise disturbance during daytime. Platform Y construction will cause significant impacts on receptors during the night	Contractor will be required to apply for a Section 61 consent, develop an Environmental Management Plan and implement Best Practical Means to control construction noise.	Mitigation will reduce daytime noise levels to within acceptable limits. Significant night-time effects are likely although these will only last for the duration of construction and for a few days at a time.	Planning condition requiring the Applicant to submit for prior approval a Contractor's Environmental Management Plan.
Air Quality	Nuisance from deposition of dust at sensitive receptors less than 150 m from construction works.	Construction work must be in carried out in accordance with the EMP, which incorporates good site practices to control dust emissions.	The application of mitigation measures and the EMP will ensure there are no significant effects on air quality.	Planning condition requiring the Applicant to submit for prior approval a Contractor's Environmental Management Plan.
Contaminated Land	Potential for construction workers to be exposed to contaminants from former gas works site, cartridge factory, milk dock, suburban shed and hazardous building materials. Also potential impact from the latter to rail passengers.	Management plan will be prepared when contaminated land is likely to be encountered, covering handling and disposal. Compliance with appropriate licence conditions relating to the removal of materials containing anthrax and asbestos.	No significant impacts are predicted.	Planning condition requiring the Applicant to submit for prior approval a Contractor's Environmental Management Plan.
Protected Species	There may be bat roost sites in the construction site, which may be disturbed.	Surveys will be undertaken before demolition commences and if bats are found they will be moved in accordance with English Nature Guidelines and under license to DEFRA. The Environmental Management Plan states that work will stop if bats are found.	No significant residual effects are predicted.	Planning condition requiring the Applicant to submit for prior approval a Contractor's Environmental Management Plan.
Water Resources	Potential pollution impacts on watercourses and groundwater from site run-off and discharges.	The EMP will be prepared and adhered to in order to minimise pollution from surface water runoff. This will follow guidelines from PPG1 and PPG 6.	The application of the mitigation measures and the low sensitivity of the local water resources will mean that no significant adverse impacts are predicted.	Planning condition requiring the Applicant to submit for prior approval a Contractor's Environmental Management Plan.

Annex A

Schedule 4: Requirements for Environmental Statements

Requirement	Where located in ES
Information for Inclusion in Environmental Statements -	
Revised Schedule 4	
1. A description of the project including in particular:	Chapter 2 provides a description of the project including its construction and operation. Chapter 4 also provides a description of the land use requirements.
<ul> <li>a) a description of the physical characteristics of the whole project and the land-use requirements during the construction and operational phases;</li> </ul>	Chapter 2 provides a description of the key characteristics of the project, including information on the construction of the project.
<ul> <li>b) a description of the main characteristics of the production processes, for instance, nature and quantity of the materials used;</li> </ul>	Chapter 2: Project Description.
c) an estimate, by type and quantity, of expected residues and emissions (water, air and soil pollution, noise, vibration, light, heat, heat radiation, etc) resulting from the operation of the proposed project.	Chapters 6 to 14.
2. An outline of the main alternatives studied by the developer and an indication of the main reason for this choice, taking into account the environmental effects.	Chapter 2: Project Description.
3. A description of the aspects of the environment likely to be	
<ul> <li>significantly affected by the proposed project, including:</li> <li>population;</li> </ul>	Chapters 5, 8, 9 10, 11 and 12.
• fauna;	Chapter13: Protected Species
• flora;	Effects on Flora have been scoped out of this EIA. See Chapter 3.
• soil;	Chapter 12: Contaminated Land and Construction Waste.
• water;	Chapter 14: Water Resources.
• air;	Chapter 11: Air Quality and Dust.
climatic factors;	Climatic factors have been scoped out of this EIA. See Chapter 3.
<ul> <li>material assets including the architectural and archaeological heritage, landscape; and</li> </ul>	Chapters 6, 7 and 8.
• the inter-relationship between the above factors.	Chapters 4 to 15.

Requirement	Where located in ES
4. A description of the likely significant effects of the proposed project on the environment, which should cover the direct effects and any indirect, secondary, cumulative, short, medium and long-term, permanent and temporary, positive and negative effects of the project, resulting from:	Chapters 4 to 14. Where appropriate, identified in specialist studies undertaken as part of the EIA.
a) the existence of the project;	Chapters 4 to 14
b) the use of natural resources;	Chapter 2
<ul> <li>c) the emission of pollutants, the creation of nuisances and the elimination of waste,</li> </ul>	Chapters 2, 10, 11, 12 and 14.
And the description by the developer of the forecasting methods used to assess the effects on the environment.	Chapters 3 to 14
5. A description of the measures envisaged to prevent, reduce and where possible remedy any significant adverse effects on the environment.	Chapters 4 to 14
<ol> <li>A non-technical summary of the information provided under paragraphs 1 to 5 above.</li> </ol>	Provided as a stand alone document as part of the overall ES.
7. An indication of any difficulties (technical deficiencies or lack of know-how) encountered by the developer in compiling the required information.	Where appropriate, identified in specialist studies undertaken as part of the EIA. However, no significant difficulties have been encountered in compiling the ES.

Annex B

## Chronology of Stakeholder Consultation Meetings

		Meeting	Present	Date	Main Purpose
	1.	Urban Framework Workshop I	London Borough of Camden (LBC) officers, AStG, LCS&P	9/4/03	<ul> <li>identification of key issues/problems</li> <li>review possible concourse options</li> </ul>
	2.	Transport Workshop	LBC	15/4/03	<ul> <li>discuss passenger/pedestr ian movements</li> <li>identify other key transport issues</li> </ul>
	3.	Transport Workshop	LBC	29/4/03	<ul> <li>identify option evaluation issues</li> <li>agree base case for Pancras Rd</li> </ul>
	4.	Urban Framework Workshop II	LBC, AStG, LCS&P	1/5/03	<ul> <li>assessment of broad concourse options</li> </ul>
lions	5.	English Heritage Workshop	English Heritage, AStG, LCS&P, DfT	14/5/03	<ul> <li>assessment of broad concourse options</li> </ul>
ONSULTA	6.	Victorian Society	Victorian Society, AStG, LCS&P	18/6/03	<ul> <li>assessment of broad concourse options</li> </ul>
STAGE 1 C	7.	English Heritage and LB Camden	English Heritage, LBC, AStG, LCS&P	19/6/03	<ul> <li>assessment of options with GNH retained</li> </ul>
ŝ	8.	TfL	TfL, AStG	1/7/03	<ul> <li>further identification of transport issues relating to GNH- retained options</li> <li>Pancras Road functionality</li> </ul>
	9.	English Heritage and LB Camden	LBC, English Heritage	4/8/03	<ul> <li>sizing and operability of western concourse (GNH- retained options)</li> </ul>
	10.	Urban Framework Workshop III	English Heritage, LBC, AStG, LCS&P	2/9/03	<ul> <li>assessment of options</li> <li>preferred design – GNH-Retained, abutting concourse and with pedestrian arcade through hotel</li> <li>discussion of GNH</li> </ul>

 Table B1.1
 Chronology of Stakeholder Consultation Meetings

					treatment
	11.	Victorian Society	Victorian Society, AStG	4/9/03	<ul> <li>discussion of preferred design</li> <li>discussion of GNH troatmont</li> </ul>
	12.	GLA	GLA, TfL, AStG	19/9/03	<ul> <li>discussion of preferred design</li> </ul>
	13.	TOCs	GNER, Hull Trains	3/5/05	<ul> <li>design update &amp; review</li> </ul>
	14.	LB Islington Officers	LB Islington (LBI)	16/5/05	<ul> <li>design update &amp; review</li> <li>York Way improvement</li> </ul>
	15.	TOCs	WAGN	17/5/05	<ul> <li>design update &amp; review</li> </ul>
	16.	Police Briefing	British Transport Police, Metropolitan Police	22/6/05	<ul> <li>design update &amp; review</li> </ul>
	17.	GLA	GLA, TfL, LB Camden	12/7/05	<ul> <li>design update &amp; review</li> </ul>
	18.	TOCs	WAGN, GNER	18/7/05	<ul> <li>design update &amp; review</li> </ul>
	19.	TOCs	WAGN	10/8/05	<ul> <li>design update &amp; review</li> </ul>
	20.	LBC & EH	LBC, English Heritage	11/8/05	<ul> <li>design update &amp; review</li> </ul>
SULTATIONS	21.	LAC	London Advisory Committee, English Heritage	19/9/05	<ul> <li>design update &amp; review</li> </ul>
TAGE 2 CON	22.	Station Masterplan Working Group (SMWG)	LBC, LBI, TfL, AKC, LCR	4/11/05	<ul> <li>design update &amp; review</li> <li>transport issues</li> <li>NR planning application</li> </ul>
S	23.	English Heritage	English Heritage	7/11/05	<ul> <li>passenger footbridge</li> </ul>
	24.	CABE	CABE Design Review Committee	9/11/05	<ul> <li>design update &amp; review</li> </ul>
	25.	TOCs	GNER, EWS, WAGN	10/11/05	<ul> <li>design update &amp; review</li> </ul>
	26.	King's Cross/St Pancras Strategic Forum	GLA, LDA, TfL, DfT, LBC, LBI, AKC, LCR	15/11/05	<ul> <li>design update &amp; review</li> </ul>
	27.	Police	British Transport Police and Metropolitan Police	18/11/05	<ul> <li>security issues</li> <li>accommodation issues</li> </ul>
	28.	SMWG	English Heritage, LBC, TfL	22/11/05	<ul> <li>design update &amp; review</li> <li>transport issues</li> </ul>

				<ul> <li>Great Northern Hotel</li> <li>NR planning application</li> </ul>
29.	GoL	Government Office for London	23/11/05	<ul> <li>background to design, design solutions and current issues</li> </ul>
30.	London TravelWatch	Rail & Underground Sub- Committee	24/11/05	<ul> <li>background to design, design solutions and current issues</li> </ul>
31.	Victorian Society	Victorian Society	24/11/05	<ul> <li>design update &amp; review</li> </ul>
32.	Adjoining Developers/Landowners	AKC, EXL, LCR	25/11/05	<ul> <li>design update &amp; review</li> <li>current implementation and integration issues</li> </ul>
33.	Railway Heritage Trust	Railway Heritage Trust	28/11/05	<ul> <li>background to design, design solutions and current issues</li> </ul>
34.	Office of the Rail Regulator	- presentation disc sent to ORR	2/12/05	<ul> <li>background to design, design solutions and current issues</li> </ul>
35.	LAC	LAC, English Heritage	5/12/05	<ul> <li>heritage issues relating to external canopies and internal passenger footbridge</li> </ul>
36.	GLA	GLA, TfL, LDA, English Heritage	6/12/05	<ul> <li>design update &amp; review</li> <li>transport modelling output</li> </ul>
37.	TOCs	TOCs Directors	6/12/05	<ul> <li>background to design, design solutions and current issues</li> </ul>
38.	Victorian Society	Victorian Society	14/12/05	<ul> <li>detailed design issues – new concourse</li> </ul>
39.	The Mayor	The Mayor, GLA, TfL, LDA	15/12/05	<ul> <li>background to design, design solutions and current issues</li> <li>transport modelling output</li> </ul>
40.	HMRI	HMRI	23/1/06	<ul> <li>background to design, design solutions and current issues</li> </ul>

Annex C

## Summary of Kings Cross EIA Consultation Responses