

# **London Underground Ltd**

## **York Road Station Re-opening**

**Volume 2**  
Business Case Analysis  
March 2005



**Halcrow Group Limited**

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## **York Road Station Re-opening**

### **Volume 2**

#### **Business Case Analysis**

#### **Contents Amendment Record**

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## **Key**

LUL	London Underground Ltd
PT	Public Transport
KCC	King's Cross Central
MCL	Metropolitan and Circle Lines
PPP	Public Private Partnership
NPV	Net Present Value
PV	Present Value
BCR	Benefit to Cost Ratio
AM Peak	0700 hours to 1000 hours
PM Peak	1600 hours to 1900 hours

# 1 Description

## 1.1 *Introduction*

1.1.1 The proposed re-opening of York Road Station on the Piccadilly Line is part of the backdrop to the re-development of the King's Cross Railway Lands. The King's Cross Central (KCC) development is a £3 billion mixed development regeneration plan of the 29 hectare brownfield site. The developers Argent have currently sought planning permission only in terms of total maximum floor space of 750,000 sqm and, as such, the full extent of the development remains unclear.

1.1.2 At its maximum potential the proposed development will result in large-scale increases in future public transport trips to and from the area. Consultants Arups carried out an assessment of the various KCC development options in 2004 and estimated that around 82,500 trips will be generated on a typical weekday. Of these some 95% are forecast to be public transport based trips.

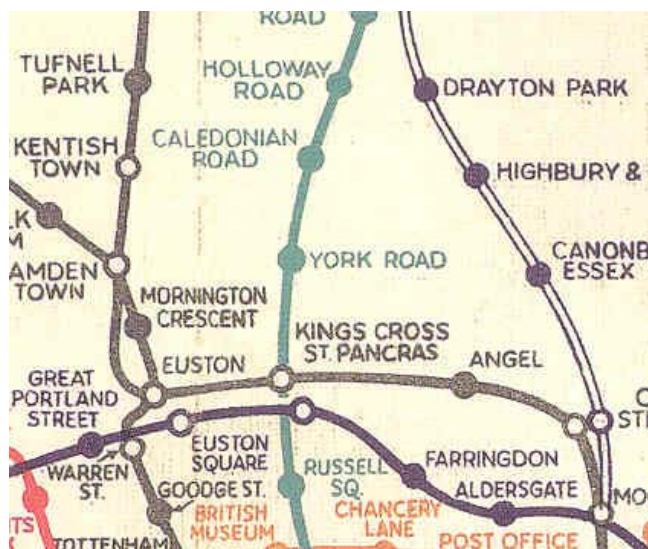
1.1.3 By 2016 the extensive re-development of King's Cross and St Pancras stations to accommodate the new international Eurostar terminal will have been completed. The project includes wholesale alterations to the Underground station, including a new northern ticket hall. Whilst King's Cross St Pancras is currently heavily congested the improvements are expected to significantly improve passenger movements throughout the station. However, the additional trips generated from the KCC development, along with the increased volume of interchange from the international station may mean that congestion remains an issue in peak periods.

1.1.4 The original York Road Station was closed in 1932 due, in part, to a lack of demand from a sparsely populated, primarily industrial area that surrounds the station. Since then the platforms have been removed as well as the signal box but the general shell of the building remains. The ground level infrastructure has been used for alternative office ventures. Internally, the original design was similar to that of the current Caledonian Road Underground Station.

1.1.5 Given the availability of this existing station infrastructure it has been advocated that the station should be assessed as part of the potential public transport solutions for the area. An outline assessment has therefore been commissioned to investigate the potential to re-open York Road Station to improve public transport options in the local area and provide congestion relief to King's Cross St Pancras.

**Figure 1.1**

Location of station on Piccadilly Line (extract from Stingemore map supplied by LUL)



**1.2**

***Proposed scheme***

**1.2.1**

The initial proposal for the study was to assess two scheme options. The first would be to re-open the station with, essentially, a similar operating capability to original design and to that of stations such as Caledonian Road Station. This scheme is referred to as Scenario One.

**1.2.2**

It was acknowledged however that Scenario One would be unlikely to meet all current health and safety station planning guidelines. As such, a second scheme, Scenario Two, would also be designed so as to be fully compliant with all current health and safety regulations.

**1.2.3**

However, as part of the initial scheme design process it became clear that to produce a scheme that would be compliant with all current health and safety regulations would require extensive capital infrastructure works. The constraints of the site, both at ground level but more importantly sub-surface where there are a number of rail lines in the vicinity, would make it a substantial engineering project. As such, it was agreed with London Underground Ltd that for the purposes of the initial outline assessment only the less capital intensive scheme, Scenario One, should be assessed.

**1.2.4**

Section 4 details the Scenario One option and highlights the areas in which the design might be considered as non-compliant in relation to current health and safety criteria. It also provides brief details of Scenario Two and summarises the engineering difficulties of this scheme.

### 1.3

#### ***Assessment of scheme***

#### 1.3.1

The re-opening of York Road Station could provide a valuable alternative public transport option. It will thereby, first and foremost, be assessed upon the number of passengers who might use the facility. This in turn will lead to an assessment of what alternative modes or routes these passengers would use without York Road Station. In particular, the amount of abstraction from King's Cross St Pancras Station will be assessed with the potential for congestion relief at this station.

#### 1.3.2

The scheme will potentially have some negative impacts to existing public transport users. Specifically the addition of a station stop on the Piccadilly Line would increase journey times on this route. The impact upon all existing public transport users will therefore also be assessed.

#### 1.3.3

The capital costs involved in the scheme may be substantial, particularly if significant infrastructure works are required sub-surface. The scheme will therefore also ultimately be assessed upon economic criteria.

### 1.4

#### ***Structure of document***

#### 1.4.1

This document represents the second volume of the report for the scheme. The first volume presents the technical aspects of the station re-opening proposition. It examines the original building configuration and its existing condition before examining the design options. It also assesses the services, signals and tunnel works.

#### 1.4.2

This document, volume 2, presents the business case appraisal of the scheme. The structure of the document is as follows:

**Sections 1 and 2** provide a description of the scheme context and its overriding objectives;

**Section 3** discusses the methodology undertaken to assess the CRT;

**Section 4** reviews the York Road Station options and presents the scheme in more detail;

**Section 5** outlines the 2016 do-minimum case without York Road, assessing the level of crowding at King's Cross St Pancras Station.

**Section 6** highlights the predicted impact of re-opening York Road Station on public transport trips and crowding at King's Cross St Pancras Station;

**Section 7** sets out the capital and operational costs of the York Road scheme, the costs avoided and the revenue impacts;

**Section 8** assesses the monetised benefits of the York Road scheme including changes in journey time and crowding relief.

**Section 9** assesses the impact of the scheme in relation to TfL strategic priorities, NATA objectives and other Mayoral or Government Strategies;

**Section 10** presents the quantified economic analysis for the Central Case as well as a series of sensitivity tests;

**Section 11** identifies uncertainties and risk surrounding costs, revenues and benefits; and

**Section 12** presents a summary of the scheme performance against the objectives.

## 2 Objectives

### 2.1 *Background*

2.1.1 The King's Cross Central (KCC) development has been proposed as mixed development scheme. The current application is for a maximum total floor space of 750,000 sqm, but the individual development types are not fixed. It is anticipated that a substantial proportion will be high rise commercial development but there will also be significant residential and retail plots.

2.1.2 Consultants Arups carried out a complete assessment of potential trips generation from the proposed development and the potential public transport requirements. Due to the potential variation in development scale and type a number of scenarios were assessed. The study forecast maximum weekday development trips of round 82,500, with around 95% of these public transport based.

2.1.3 An extensive assessment of mode choice was undertaken. This highlighted the fact that around 80% of all public transport trips would be via the Underground or heavy rail, and, in effect, would be via King's Cross St Pancras Station. This represents a significant increase in access and egress to the station on top of what would already be the busiest public transport interchange in London by 2016.

2.1.4 The Arups study highlighted the requirement to assess potential other public transport solutions for the development site. Some alternate schemes have been assessed. In particular, an outline feasibility for opening a station on the North London Line (NLL) at Maiden Lane has been considered. The NLL runs along the north of the development site. The patronage forecasts for this station were high, reflecting the size of the KCC development, with potential volumes of boardings and alightings that would make it the busiest station on the NLL.

2.1.5 In addition, it was also proposed that the Cross River Tram scheme should penetrate the development site. However, this design was rejected by the developer Argent and so alternative routes have been proposed with the tram terminating at King's Cross St Pancras Station.

### 2.2 *Objectives of the York Road Station scheme*

2.2.1 The key objective of the York Road Station scheme is to improve the range of public transport options within the local area in order to reflect the new demand

generators. The objective would be to ensure that public transport users travelling from the KCC development would benefit from travelling via York Road Station rather than using King's Cross St Pancras Station. This in turn leads to the sub-objective of providing congestion relief for King's Cross St Pancras Station.

### 2.2.2

More broadly, under the criteria of a TfL assessment, the scheme must also have the objective of supporting the following items:

- TfL Strategic priorities:
  - Maintain existing priorities
  - Improve safety and security
  - Reduce crowding and congestion
  - Promote sustainable development
  - Promote equality and inclusion
  - Expand network capacity
- The Mayor's Spatial Development Strategy, The London Plan, which is designed to enable London to accommodate population growth, economic growth, environmental issues, lifestyle changes and technological change (see Section 2.3.6),
- Policies to promote social inclusion (see Section 2.3.3), and
- The Mayor's Air Quality Strategy

### 2.2.3

In addition the scheme should also attain the following key elements:

- ***Economy*** – the scheme is required to be delivered in an economically efficient package. As such a fundamental aim of the appraisal is to assess its net economic impact. This has been done following TfL guidelines. For the project to be considered worthwhile, positive benefit cost ratios are required. A benefit cost ratio of 1.5:1 (assuming no other extenuating factors) is the passmark for this type of scheme.
- ***Health & Safety*** – detailed consideration of safety impacts is for a later stage when further design work has been undertaken. However, at this stage it is important that an initial assessment is made of the compliance of each scheme option to relevant health and safety standards

2.2.4 For completeness the scheme should also be assessed against the NATA sub-objectives of: integration; regeneration; noise; local air quality; reduction in green house gases; townscape; physical fitness; and journey ambience.

2.2.5 Table 2.1 below provides a summary of the objectives of the scheme along with measures by which the scheme will be assessed to have met the objective.

**Table 2.1 York Road Station Scheme Objectives - Summary**

Category	Objective	Measure	
I	Integration with public transport	Improve public transport options available to area around York Road Station	Railplan outputs: boardings data; journey times data
		Provide congestion relief at King's Cross St Pancras Station	Pedroute model outputs: crowding; social cost
II	Accessibility	Improve accessibility to/from the King's Cross Central development lands and the surrounding areas	Accessibility improvements in relevant areas
III	Integration with Policies & Strategies	Support Mayor's Spatial Strategy by serving Major Centres, Opportunity Areas, Areas for Intensification and Areas for Regeneration	Accessibility improvements in relevant areas
		Support policies to promote social inclusion	Benefits to target groups
IV	Economy	Meet all the objectives in an economically efficient and deliverable package	Net Present Value Benefit Cost ratio
V	Environment	Provide environmental benefits	Qualitative assessment of impact
VI	Safety	Provide safety benefits	Qualitative assessment of impact at York Road and King's Cross St Pancras Stations

## 2.3 **Context of the scheme**

### **Congestion relief**

2.3.1 As is documented in Section 2.1 the KCC development is forecast to generate significant demand for public transport trips. An overwhelming proportion of this demand will be directed towards public transport options at King's Cross St Pancras Station. Significant redevelopment of this station is currently being undertaken in order to make provision for the new international Eurostar terminal at St. Pancras and to generally improve passenger movements. However, even with this additional capacity the volumes of trips that may be developed by 2020 may still result in issues with peak period crowding.

2.3.2 A potential benefit from the re-opening York Road Station is therefore to provide crowding relief at King's Cross St Pancras Station. By diverting passengers to access the Piccadilly Line at York Road this may reduce the levels of crowding at King's Cross St Pancras, in particular within the ticket hall and gateline areas.

### **Equality and social inclusion**

2.3.3 The promotion of equality and social inclusion is an important aspect of the scheme. A measure of any public transport scheme, particularly in London, is to assess the areas that it serves and determine the social benefits that it will provide.

2.3.4 The area around King's Cross St Pancras, encompassed within the King's Cross St Pancras and York Road Station catchment areas, is recognised as being socially deprived. Within the Office of the Deputy Prime Minister's published data on Multiple Deprivation, the King's Cross 'Super Output Area' is designated as being in the 10% most deprived areas in the country. Other statistics include:

- In excess of 40% of the resident population are non-white in comparison to 29% across the GLA area;
- between 40% and 50% of residents are economically inactive in comparison to 32% across the GLA area; and
- between 40% and 50% of residents have either no qualifications or Level 1 qualifications in comparison to 37% across the GLA area.

### **Accessibility**

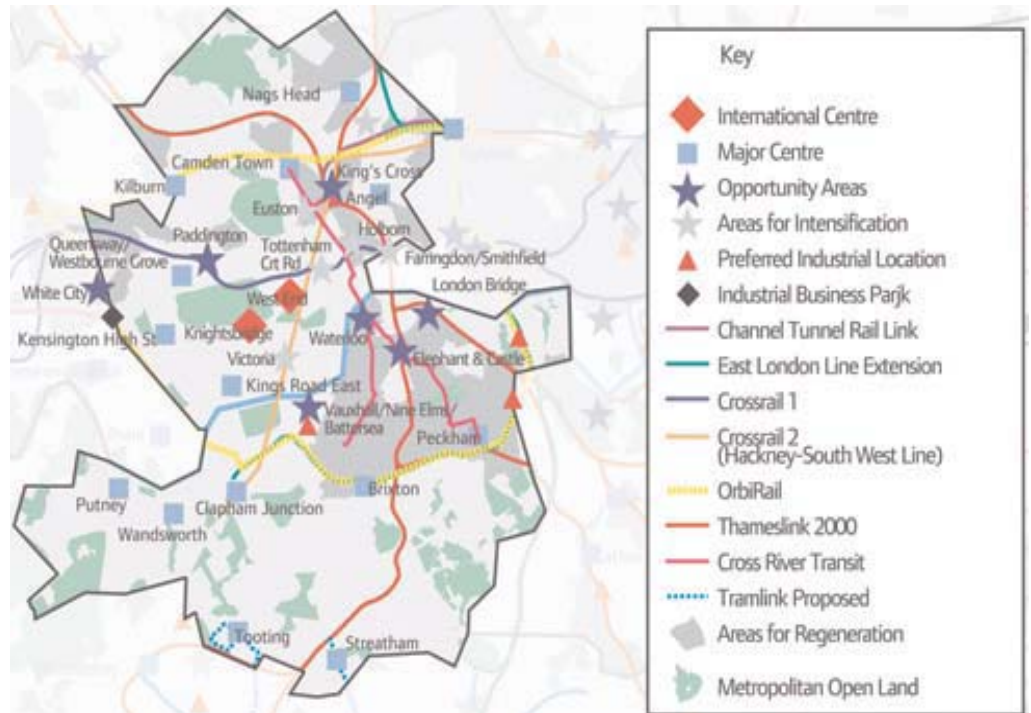
- 2.3.5 The York Road Station scheme offers the potential to increase the range of public transport options surrounding the King's Cross Central Development and thus improve the levels of accessibility to the area as a whole. However, adding an additional station stop to the Piccadilly Line will also affect journey times for all existing users who travel between King's Cross St Pancras and Caledonian Road. This could be interpreted as reducing the level of accessibility.

### **Mayoral Spatial Strategy**

- 2.3.6 The Mayor's responsibility for strategic planning in London requires him to produce a Spatial Development Strategy for London – which he has called the London Plan – and to keep it under review. The spatial strategy, as with other strategies, has to take account of three crosscutting themes: the health of Londoners; equality of opportunity; and its contribution to sustainable development in the UK.

- 2.3.7 The approved London Plan strategy aims to accommodate growth of population and jobs in sustainable patterns of development, based on an improved and expanded public transport network. London has to become a more densely populated, intensively used city; and at the same time more open, accessible and better designed. It needs a massively improved transport infrastructure to function effectively and to allow Londoners – and those who work in London – to travel efficiently and safely. Development has to be directed towards areas of social and economic deprivation, brownfield sites, areas of historic neglect and future opportunity. Sustainable growth requires that all of London's diverse communities be supported, strengthened and recreated.

- 2.3.8 The plan for the Central London sub-region is summarised in Figure 2.8 of The London Plan: A Summary, published by the Mayor in February 2004 is reproduced below. Within the plan the King's Cross area is identified as both an 'Opportunity area' as well as a designated area for regeneration.



## 3 Appraisal Methodology

### 3.1 *Introduction*

3.1.1 The Re-opening of York Road Station business case analysis has been conducted in line with procedures set out in the Transport for London (TfL) Business Case Development Manual (BCDM).

### 3.2 *Methodology*

Economic evaluation and whether the scheme provides good value for money is the cornerstone of the methodology. The TfL BCDM has been used as the basis for the appraisal. The appraisal process requires the following steps:

- (a) Definition of objectives against which the project can be monitored. These have been established in Section 2;
- (b) Definition of a base case. Examination of the costs and effects of doing nothing i.e. in this case, not re-opening York Road Station. Section 5 examines transport provision under the do-minimum scenario;
- (c) Development of options. This process has been carried out by the study team, with preliminary designs produced. Section 4 provides a brief summary but a more detailed description is provided in Volume 1 of the report. Section 6 examines transport provision under the do-something scenario;
- (d) Identification of all costs and benefits, quantification where feasible, and presentation of an economic appraisal. Sections 7 to 10 present this analysis.

3.2.2 For the appraisal, a number of separate assessments have been undertaken:

- Stakeholder consultation;
- Train service modelling;
- Demand forecasting;
- Station renewal design options;
- Pedestrian modelling; and
- Station renewal design feasibility.

3.2.3 All these elements are summarised within this business case document however more detailed assessments of the scope of the works is provided in the 'York Road

Re-opening Volume 1' document (Technical Pre-Feasibility Report). In addition, a 'Railplan Demand Forecasting Technical Note' and a 'Pedroute Modelling Technical Note' are attached as appendices A and B, respectively, to this report.

### 3.3

#### ***Demand Forecasting***

#### 3.3.1

The passenger demand forecasts for the scheme have been derived using TfL's Railplan model. This is a public transport forecasting tool that assigns passengers to modes based upon the weighted generalised cost of travelling by each available route. A description of the demand forecasting analysis is presented in Appendix A, with the key principles and outputs summarised below.

#### 3.3.2

The intention at the outset of the study was to build upon previous Railplan modelling carried out by consultants Scott Wilson that had incorporated the impacts of the KKC development within the analysis. However, upon detailed assessment of this model it was determined to be inappropriate for the requirements of this study.

#### 3.3.3

A revised Railplan model, building upon the Scott Wilson work, was therefore established and calibrated against existing RODS data, as recommended within the LUL station demand forecasting guidelines. A full description of this process is reported within the accompanying demand forecasting technical note.

#### 3.3.4

The Railplan modelling required a number of key assumptions to be made about the nature of the development. The first related to the trip distribution of journeys originating or terminating within the development zones. The model has retained those trip distributions applied within the Scott Wilson Railplan model, although the source is unknown. Halcrow acknowledge that within Arups assessment of public transport demand at the site a different trip distribution was applied that related to an office development at London Bridge. It is unclear however which trip distribution is more accurate and it is beyond the scope of this study to assess this issue in more detail. It should be noted however that the assumed trip distribution could impact upon the model results.

#### 3.3.5

The second assumption relates to the spread of the KCC development across the site. Within the Railplan model the site encompasses three zones. As such a proportion of the development trips have been assigned to each of the three zones. The critical zone is to the north of the development which has direct access to York Road Station. Based upon the outline development designs it was

originally assumed that around 45% of the commercial and retail plots and 80% of the residential plots would be within the northern zone.

3.3.6 In terms of the public transport network the model assumed only those schemes that are currently committed by TfL.

3.3.7 Based upon these assumptions an initial Railplan model run was undertaken. This produced the following AM Peak (0700 to 1000) passenger demand forecast for York Road Station presented in Table 3.1. This new demand at York Road represents transfers from other modes rather than entirely new trips.

**Table 3.1 Initial Railplan Model Outputs – York Road Station passenger demand forecasts, AM Peak (2016)**

Platform	Boarding	Alighting	Total
Eastbound	623	5,694	6,317
Westbound	5,725	1,248	6,973
<b>Total</b>	<b>6,348</b>	<b>6,942</b>	<b>13,290</b>

*Source: Railplan (Halcrow 2005)*

3.3.8 These forecasts were significantly higher than anticipated for York Road Station. In particular they appear high when benchmarked against similar station developments.

3.3.9 Detailed analysis of the model highlighted the sensitivity of the forecasts to the assumed site spread of the KCC development and to the representation of walk distances within the model. The analysis concluded that this initial Railplan forecast should be treated as a high demand scenario.

3.3.10 To generate a central forecast a number of factors were applied to allow for a better representation of walk distance within the model. In addition, the spread of the development across the site was altered to assume that one third of the commercial and retail plots and 60% of the residential plots were in the northern zone.

3.3.11 This provided a central case forecast passenger demand for York Road Station of around 9,200 trips in the AM peak period, detailed in Table 3.2. The initial Railplan

model outputs (presented in Table 3.1) have been retained as a high demand scenario forecast.

Table 3.2

Forecast passenger demand at York Road – CENTRAL CASE, AM Peak 2016

Platform	Boarding	Alighting	Total
Eastbound	440	3,878	4,319
Westbound	4,407	850	4,728
<b>Total</b>	<b>4,448</b>	<b>4,728</b>	<b>9,216</b>

Source: Railplan (Halcrow 2005)

### 3.4

#### **Pedestrian Modelling**

##### **York Road Station**

#### 3.4.1

A PEDROUTE model of the station was created which represents the proposed layout of the York Road Station. The station has a simple two level structure, a concourse and an island platform. The main vertical circulation systems are the two lifts located in the centre of the station. There is a staircase which serves only for emergency purpose. A total of seven ticket gates are provided within the layout, three in gates and four out gates in the AM peak and vice versa for the PM peak hours.

#### 3.4.2

The demand matrixes for York Road Station are extracted from AM Peak Railplan matrix in 2016. There are two demand scenarios produced for the forecasting year 2016, the ‘central case’ scenario and the ‘high’ scenario.

#### 3.4.3

The PM Peak hours matrix was generated from the AM Peak hour one by following the guideline stated in LUL “Station Demand Modelling” Guideline Document (September 2004)

#### 3.4.4

The other key assumptions within the Pedroute model are detailed within the accompanying technical note in Appendix B.

##### **King’s Cross St Pancras Station**

#### 3.4.5

The King’s Cross St Pancras Pedroute model is adopted directly from the former King’s Cross St Pancras CTRL project which was undertaken by Halcrow for LUL in August 2004.

#### 3.4.6

The demand matrices for King’s Cross St Pancras Station are extracted from the AM peak Railplan matrix in 2016.

#### 3.4.7

Like York Road Station, the PM Peak hours matrices for King’s Cross St Pancras Station are also generated from the AM Peak hour data.

## 4 Options

### 4.1 *Introduction*

4.1.1 For the purpose of this outline feasibility study a single preferred option has been considered for the re-opening of York Road Station. This involves the reinstatement and enhancement of the existing station infrastructure to allow similar operation to the original station design and stations such as Caledonian Road. It is not intended that the design will meet all current health and safety station planning guidelines, although maximum compliance has been obtained without the requirement for extensive capital investment

### 4.2 *Scenario 1 - preferred scheme design*

4.2.1 At an early stage of the study, it was advised that the preferred option was a scheme which did not allow for extensive large scale excavation of new shafts. This is a costly element of works, and would have major impacts on existing infrastructure.

4.2.2 The preferred scheme for the station reutilisation is the option described in the volume 1 technical report as option 1.

4.2.3 The main design issue relating to this scheme are that the layout relates to the existing subterranean structures at the station and the capacities they can accommodate without major civil engineering works.

4.2.4 At ground floor level, the existing building is retained, as it forms an important example of Piccadilly line architecture. The concourse is extended out of the front of the station, enabling a larger run off between the lifts, automatic gates and main entrance. The glazed curved façade will also allow for the station to be rejuvenated while retaining the existing arches internally.

4.2.5 The original lift shafts will be reactivated into use, with one being used for an escape staircase from the platforms, and the other utilised for 2no. 50 person capacity lifts. The third existing shaft, used originally for a staircase, will be utilised as a ventilation shaft from platform level.

4.2.6 At platform level, the 2 original platforms will be rebuilt and the general areas refurbished and brought up to modern day standards. Some additional tunnelling works will be required around the ventilation requirements.

4.2.7 It is anticipated that the proposed 2 no. lifts could accommodate approx. 4200 people per hour, which although the platforms would be below current standards, could accommodate the central forecast throughput of demand.

4.3 ***Scenario 2***

4.3.1 Within the volume 1 technical report, an additional scheme looks at an additional shaft and 2 no. lifts. This would be required to accommodate the forecast high level of passenger demand. However, the greater throughput provided by 4 no. lifts would prove problematic at platform level, and would in theory require the complete rebuilding of the station at both levels, which would have a major impact on the Piccadilly Line upgrade works and probably involve temporary closure of the line.

## 5 2016 Base Case

### 5.1 *Introduction*

5.1.1 This section examines the anticipated level of public transport trips utilising King's Cross St. Pancras in 2016 in the absence of York Road Station. King's Cross and St Pancras Railway Stations are currently undergoing extensive re-development as part of the scheme to operate Eurostar services out of St Pancras by 2006. This re-development includes substantial works to the Underground station, including a new northern ticket hall.

5.1.2 However, demand for travel is expected to increase substantially from current day levels, putting increased pressure on the King's Cross St Pancras Interchange, which is already has the busiest Underground station on the network. These increases in demand result from both the opening of the international Eurostar terminal at St Pancras, general background growth but also from demand generated by new KCC development.

### 5.2 *Forecast patronage on Piccadilly Line in 2016*

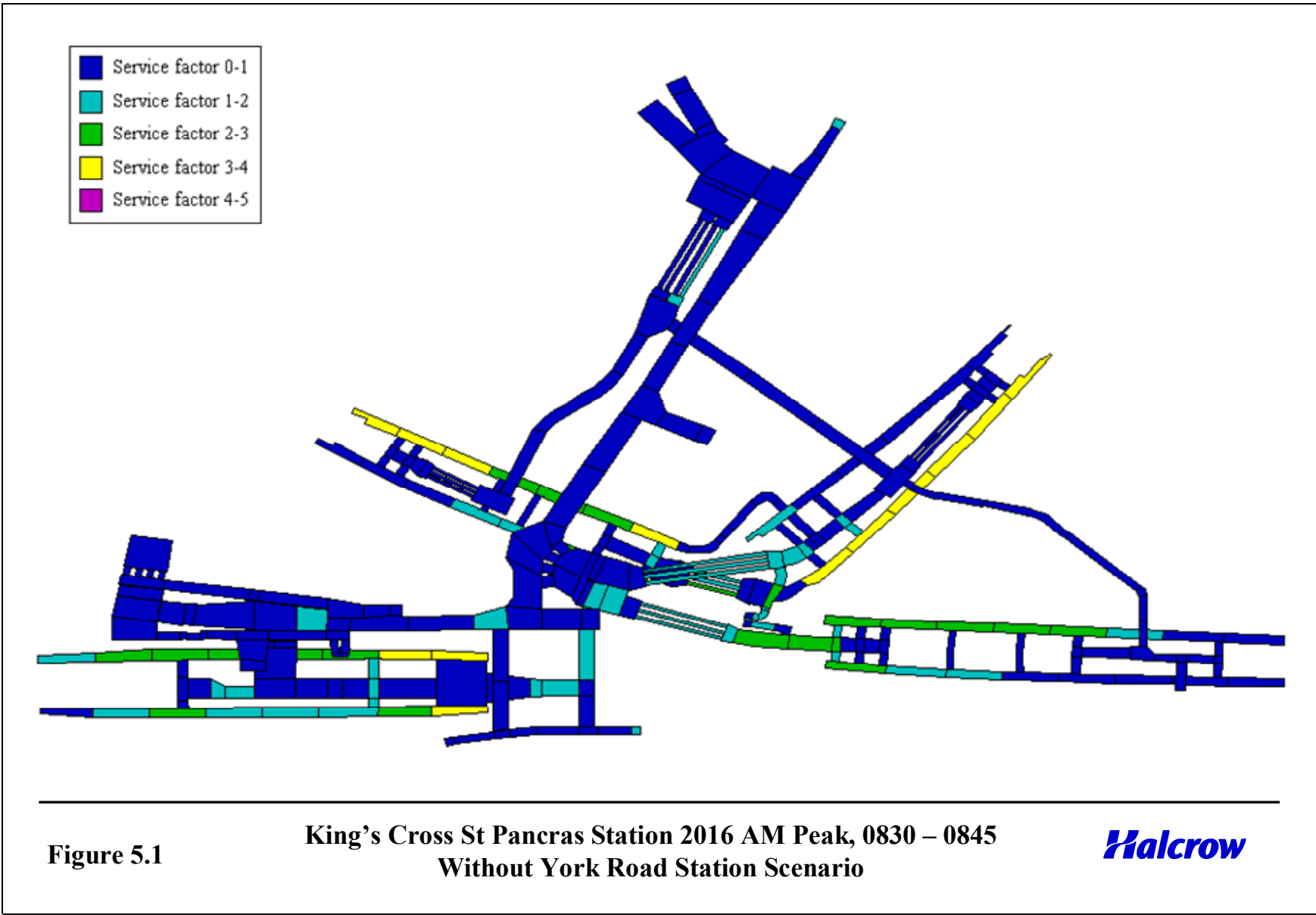
5.2.1 The forecast level of trips between King's Cross St Pancras and Caledonian Road Stations (without York Road Station) are 8,200 trips eastbound and 39,300 trips westbound.

5.2.2 The analysis of the Railplan forecast passenger hours indicates that 26% of hours travelled on the Piccadilly Line are designated to be 'crowded' in 2016.

### 5.3 *Forecast operation of King's Cross St Pancras Station in 2016*

5.3.1 Total passenger movements in King's Cross St Pancras Station, including interchange trips, during the AM peak period are forecast to be 81,170.

5.3.2 A 2016 Pedroute model of King's Cross St Pancras Station has been run under the 'without York Road Station' scenario. This revealed that the Western, Northern and Tube ticket halls and other areas of circulation, including vertical circulation, are anticipated to operate under congestion-free conditions during both the AM and PM peak periods.



- 5.3.3 During the AM peak, as indicated in Figure 5.1, congestion is anticipated to occur at the following locations:
- intermittent congestion in excess of acceptable levels on all platforms but in particular the westbound Piccadilly Line platform and the southbound Northern Line platform; and
  - congestion on the MCL platforms but with less severity and only for short durations.
- 5.3.4 During the PM peak congestion is anticipated to occur at the following locations:
- unacceptable levels of congestion on the eastbound Piccadilly Line platform; and
  - some congestion on the northbound Victoria Line platform.
- 5.3.5 Within the Pedroute modelling it is possible to produce a measure of the overall social cost associated with passenger movements through the station. This measure provides a proxy for the level of congestion within a station and is a standard value used by LUL to assess the monetary benefits from schemes designed to provide congestion relief.
- 5.3.6 The social cost value produced for King's Cross St Pancras under the 'without York Road Station' scenario is around £25.2 million.



## 6 2016 With York Road Station

### 6.1 *Introduction*

6.1.1 This section outlines the impact that re-opening York Road would have upon Public Transport trips to and from the surrounding area. It looks at the forecast passenger volumes that would use York Road Station and how the proposed scenario 1 layout would cope with these passenger volumes in terms of vertical circulation, crowding, station facilities and safety.

6.1.2 In addition this section also analyses the impact of re-opening York Road Station on the King's Cross St Pancras Interchange, in terms of crowding relief.

### 6.2 *Passenger Demand at York Road (2016)*

6.2.1 The central case forecasts of passenger demand at York Road Station are presented in Table 6.1.

Table 6.1 Forecast passenger demand at York Road – CENTRAL CASE, AM Peak 2016

Platform	Boarding	Alighting	Total
Eastbound	440	3,878	4,319
Westbound	4,407	850	4,728
<b>Total</b>	<b>4,448</b>	<b>4,728</b>	<b>9,216</b>

Source: Railplan (Halcrow 2005)

6.2.2 The results indicate that there is a relatively even distribution between boarding and alighting trips reflecting the mixed nature of the development at King's Cross Central (KCC).

6.2.3 Just over 50% of the boarding trips are forecast to originate within the KCC development, with a further 40% the existing residential area to the east of York Road. The majority of the remaining trips originate from north of York Road Station.

6.2.4 Around 85% of alighting trips have a destination within the KCC development, highlighting this area as the main commercial centre within the catchment area of the station.

### 6.3 ***York Road Station Operation (2016)***

#### **Gateline**

6.3.1 The York Road station design offers automatic ticket gates, each with a theoretical throughput of 25 persons per minute. The analysis indicates that this is more than sufficient to cope with the forecast peak period passenger flows at the station.

#### **Vertical circulation**

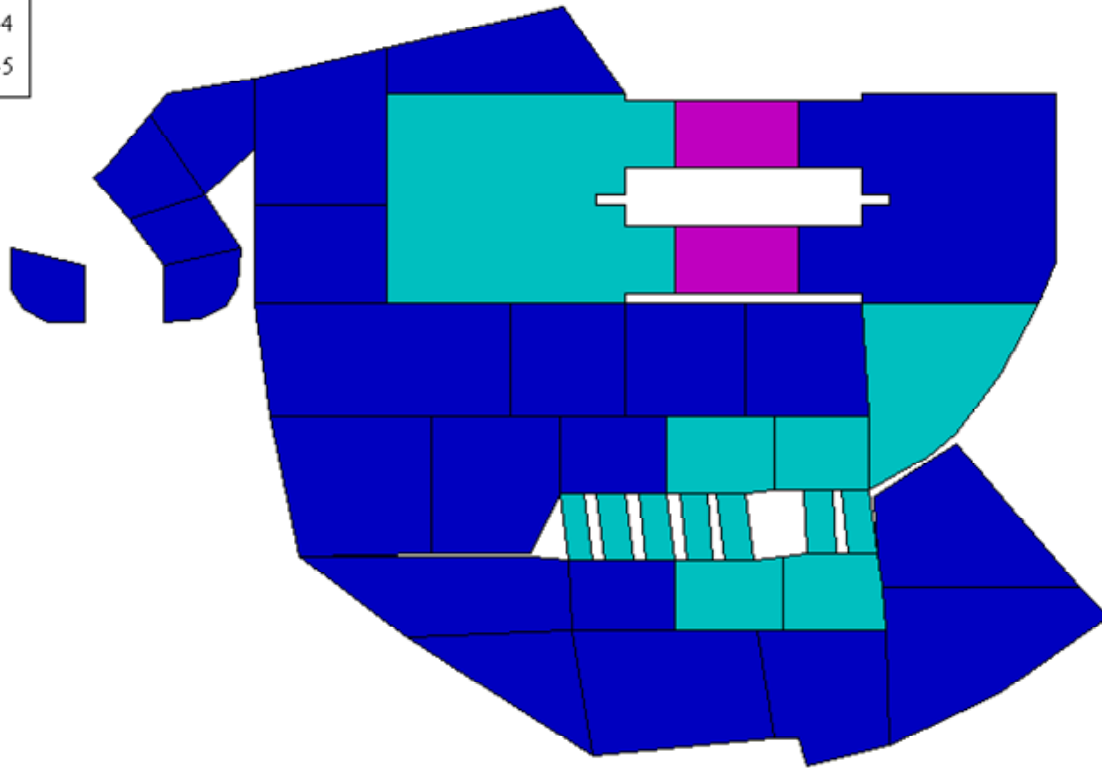
6.3.2 The York Road station design offers two lifts for vertical circulation, each with a design capacity of 50 persons and a cycle time of around 2 minutes. This provides a theoretical lift capacity of around 4,200 passengers per hour.

6.3.3 The forecast passenger flows at York Road Station have been assessed on a 15-minute profile. The peak 15-minute one-way flow is calculated at 1,070 passengers. Whilst this is marginally above the lift capacity of 1,050 passengers per 15-minute period the analysis indicates that, in general, there should be sufficient lift capacity to cope with the central forecast level of demand. However, the analysis indicates that there is no spare lift capacity and therefore any positive variation in demand or growth over time would not be accommodated without additional passenger delays.

#### **Crowding**

6.3.4 The Pedroute analysis indicates that some low levels of crowding are anticipated to occur within the ticket hall areas during the peak period, but that it is short in duration and within acceptable standards. Limited congestion occurs on both sides of the gateline and in front of the lifts.

6.3.5 Congestion also occurs at platform level during the peak periods of the day, in particular on the westbound platform during the peak 15-minute AM period, as indicated in Figure 6.1. The level of crowding reaches conditions that are marginally above the acceptable standards.



**Figure 6.1**

**York Road Station, Concourse Level 2016 AM: 0900 - 0915  
Without York Road Station Scenario**



6.4

**Impact of scheme on public transport network (2016)**

6.4.1

The Railplan model outputs provide an indication of the impact of the scheme upon the public transport network as a whole. Three key output: passenger boarding, passenger kilometres and journey times, all disaggregated by mode provide an incite into the impact of the scheme

**Passenger boardings**

6.4.2

Table 6.2 presents the forecast passenger boardings across the public transport network, both with and without York Road Station. Although in overall terms public transport trips remain largely unchanged. The nature of the forecast use of York Road Station results in more multi-leg trips. As noted below, more of these require interchange at Kings Cross St. Pancras from the underground lines and Network Rail.

**Table 6.2**

**Forecast passenger boardings – CENTRAL CASE, AM Peak 2016**

<b>Platform</b>	<b>Without York Road</b>	<b>With York Road</b>	<b>Difference</b>
Underground	1,492,796	1,501,396	8,600
Heavy Rail	1,216,576	1,216,893	317
London Buses	857,048	854,252	-2,796
Other modes	92,447	92,422	-25
<b>Total</b>	<b>3,658,867</b>	<b>3,664,962</b>	<b>6,095</b>

*Source: Railplan (Halcrow 2005)*

6.4.3

The number of boardings on the underground is forecast to increase by 8,600 trips in the AM peak period. In addition there is a small increase in heavy rail trips (Moorgate Great Northern and Thameslink services) and a reduction in bus boardings.

6.4.4

Overall the results suggest that of the 9,200 trips forecast to use York Road Station around 28% are passengers who would otherwise access/egress the Piccadilly Line at King’s Cross St Pancras Station. A further 27% of trips are also passengers who would otherwise use King’s Cross St Pancras Station (all other Underground Lines or heavy rail), with the remaining 45% using other Underground or heavy rail stations, bus or walk.

6.4.5 The total number of public transport boardings increases as a significant proportion of York Road Piccadilly users interchange onto another Underground line or mode, primarily at King's Cross St Pancras Station. This issue is assessed further in Section 6.5.

#### Passenger kilometres

6.4.6 Table 6.3 presents the forecast passenger boardings across the public transport network, both with and without York Road Station.

**Table 6.3 Forecast passenger kilometres – CENTRAL CASE, AM Peak 2016**

Platform	Without York Road	With York Road	Difference
Underground	10,432,586	10,440,224	7,638
Heavy Rail	39,915,924	39,919,718	3,794
London Buses	2,950,781	2,942,853	-7,928
Other modes	475,220	475,169	-51
<b>Total</b>	<b>53,774,511</b>	<b>53,777,964</b>	<b>3,453</b>

*Source: Railplan (Halcrow 2005)*

6.4.7 The total number of public transport passenger kilometres is forecast to increase. This is because of those passengers who transfer from bus to the Underground actually increase their average trip length, although the average generalised time for these trips is lower (i.e. whilst the distance is longer, the combination of journey time, wait time and interchange time is shorter).

#### Journey time

6.4.8 Table 6.4 presents the forecast passenger times across the public transport network, both with and without York Road Station.

Table 6.4

## Forecast passenger generalised journey times – CENTRAL CASE, AM Peak 2016

Platform	Without York Road	With York Road	Difference
PT crowded hours	1,086,273	1,086,770	497
PT uncrowded hours	211,444	211,762	318
Other hours *	2,792,398	2,790,647	-912
<b>Total</b>	<b>4,090,115</b>	<b>4,089,179</b>	<b>-97</b>

Source: Railplan (Halcrow 2005)

\* other hours = sum of interchange, wait, boarding and walk hours

## 6.4.9

The sum of all public transport generalised journey time is forecast to remain relatively constant (central forecast reduction in generalised journey time of only 97 hours). However, detailed analysis indicates that this outcome is highly sensitive to the assumed walk times from within the KCC development to both King's Cross St Pancras and York Road Stations.

## 6.4.10

There are two contrasting factors in relation to the impact of York Road on journey times. Firstly, as a result of adding in an additional stop on the Piccadilly Line, all existing users of that route either incur an additional one minute on their journey or they choose to transfer to an additional route incurring up to a minute of additional time. It is estimated that this amounts for an additional 800 generalised hours of travel time for existing users in the AM Peak, a considerable negative impact of the proposed scheme. The increased patronage on the Piccadilly Line between King's Cross St Pancras and Caledonian Road may also increase the levels of crowding and will affect passengers' route choices.

## 6.4.11

In contrast, a positive impact is the reduction in generalised journey times that the forecast users York Road would obtain. Obviously for passengers to choose to use the new station means it must offer a reduction in generalised cost over their existing method of transport. Analysis indicates that this reduction in generalised costs results from a decrease in walk times and bus journey times to access King's Cross St Pancras. The walk times are, in particular, difficult to estimate given lack of definitive data in regard to the KCC development. This makes an accurate measure of the journey times difficult to assess. However, a central forecast of generalised journey time savings for users of York Road Station is estimated at around 850 generalised hours (an average of 5.5 generalised minutes per passenger).

6.4.12 The level of crowded hours on the Piccadilly Line is forecast to remain relatively constant in comparison to the ‘without York Road Station’ scenario. This suggests that there is sufficient line capacity on the Piccadilly Line between King’s Cross and Caledonian Road in 2016 to accommodate the additional trips generated by York Road without creating congestion.

6.5 ***Impact of scheme on King’s Cross St Pancras Station (2016)***

**Passenger demand**

6.5.1 Total passenger movements in King’s Cross St Pancras Station during the AM peak period, including interchange trips, are forecast by Railplan to be 82,400. This represents a marginal increase in passenger movements within King’s Cross St Pancras Station of 230 additional trips.

6.5.2 This result would, at first, appear to be counter intuitive as it was expected that the re-opening of York Road Station would reduce the flow of passengers into King’s Cross St Pancras. However, it is possible to use Railplan outputs to provide a general explanation.

6.5.3 The Railplan output allows an assessment of the direction of travel amongst the forecast users of York Road Station. Table 6.5 summaries this data.

**Table 6.5 York Road Passenger Boardings and Alightings – CENTRAL CASE, AM Peak (2016)**

<b>Boardings and Alightings</b>	<b>Passengers</b>	<b>Percentage of total York Road Trips</b>
Alightings on eastbound platform	3,850	42%
Boardings on westbound platform	4,050	44%
<b>Trips between King’s Cross St Pancras and York Road</b>	<b>7,900</b>	<b>86%</b>
Alightings on westbound platform	850	9%
Boardings on eastbound platform	450	5%
<b>Trips between Caledonian Road and York Road</b>	<b>1,300</b>	<b>14%</b>
<b>Total York Road Trips</b>	<b>9,200</b>	<b>100%</b>

*Source: Railplan (Halcrow 2005)*

6.5.4 This highlights around 7,900 York Road users (86%) are forecast to travel between King’s Cross St Pancras and York Road. Table 6.6 provides an indicative analysis of the source of abstraction for these trips i.e. their mode of travel in the ‘without York Road’ scenario.

**Table 6.6 Source of Abstraction for York Road Passenger Trips – CENTRAL CASE, AM Peak (2016)**

	Passengers	Percentage
<b>Trips between King’s Cross St Pancras and York Road</b>	<b>7,900</b>	<b>100%</b>
<b>Source of Abstraction</b>		
King’s Cross St Pancras – Piccadilly Line	2,550	32%
King’s Cross St Pancras – Other Underground lines and heavy rail	2,450	31%
Other *	2,900	37%

*Source: Railplan (Halcrow 2005)*

*\* other = other LUL and heavy rail stations, bus or walk trips*

6.5.5 The analysis indicates that around 2,550 trips (32%) previously boarded/alighted the Piccadilly Line at King’s Cross St Pancras. A further 2,450 trips (31%) previously boarded/alighted all other Underground lines or heavy rail services at King’s Cross St Pancras. The remaining 2,900 trips (37%) previously used other Underground or heavy rail stations, the bus or walked.

6.5.6 The above analysis highlights the fact that whilst the re-opening of York Road Station results in 5,000 fewer passengers directly accessing King’s Cross St Pancras around 2,450 of these passengers still interchange at the station, transferring from the Piccadilly line to other Underground Lines or heavy rail lines. Thus the net impact is to reduce passenger movements by only 2,550 trips.

6.5.7 Of the 2,900 trips that previously used other Underground or heavy rail stations, the bus or walked but that would choose to use York Road Station the Railplan model suggests that a significant proportion will interchange at King’s Cross St Pancras.

6.5.8 In addition, there may be other passenger trips that previously travelled through King’s Cross St Pancras on the Piccadilly line but, as a result of the increased

journey time and congestion resulting from re-opening York Road Station, they now choose to travel to King's Cross St Pancras by an alternative mode and then interchange onto the Piccadilly Line. As an example, the model predicts an additional 100 trips on Thameslink services into King's Cross Thameslink who may interchange onto the Piccadilly Line.

6.5.9 Overall, Railplan predicts that the reduction in passengers using King's Cross St Pancras to access the Piccadilly line is outweighed by the volume of additional trips travelling into the station and interchanging either to or from the Piccadilly line.

#### **Station congestion**

6.5.10 Despite there being a forecast increase in the number of passenger movements at King's Cross St Pancras, it is feasible that the distribution of these trips might result in less congestion. A 2016 Pedroute model of King's Cross St Pancras Station has been run under the 'with York Road Station' scenario and compared against the 'without York Road Station' scenario.

6.5.11 A comparison of the Western, Northern and Tube ticket halls and other areas of circulation, including vertical circulation, indicates little difference in the performance of the station in these areas.

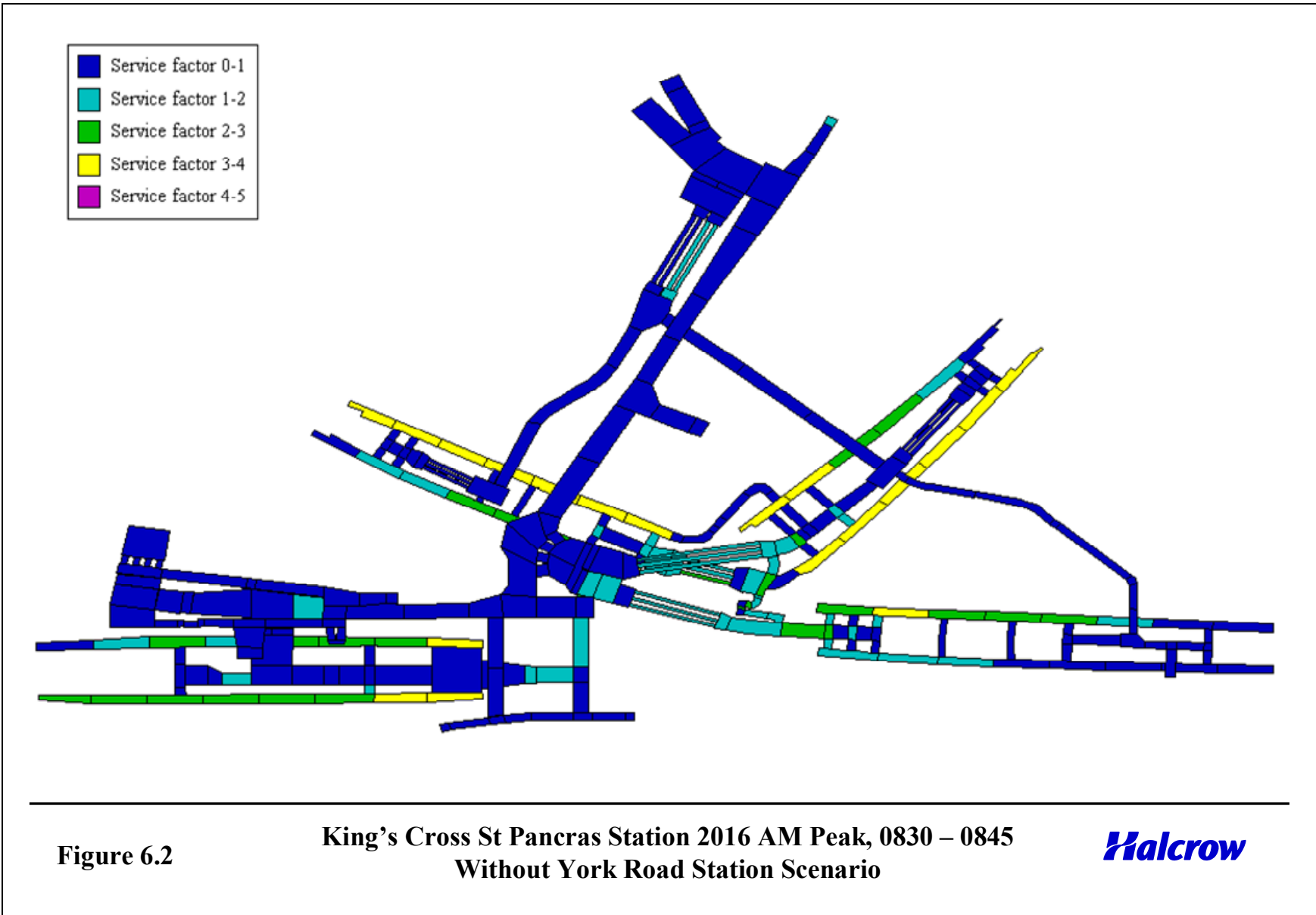
6.5.12 The passenger demand flow data suggests that fewer passengers will be passing through the these areas, however given that these areas were already anticipated to operate under congestion-free conditions there are no forecast benefits in terms of reducing passenger congestion.

6.5.13 During the AM peak, as indicated in Figure 6.2, congestion is anticipated to become more widespread at platform level, in particular the westbound Piccadilly Line platform and the southbound Northern Line platform. The eastbound Piccadilly Line platform, MCL platforms and Southbound Victoria Line platforms also experience more delay. This is as a result of more interchange occurring between the low level platforms.

6.5.14 During the PM peak unacceptable levels of congestion remain on the eastbound Piccadilly Line platform and there is still some congestion on the northbound Victoria Line platform.

6.5.15 The Pedroute social cost value for the 'with York Road Station' scenario is just over £26.4 million, which is around £1.25 million higher than for the 'without

York Road Scenario'. This indicates that the overall impact of re-opening York Road Station is to make congestion worse at King's Cross St Pancras Station. This is due to the increase in interchange that takes place at low level station areas, which already experience congestion in the base scenario.



## 7 Costs and Revenue

### 7.1 *Introduction*

7.1.1 Outline estimates of the capital costs associated with both York Road option layouts have been produced by the study team. For a full description of the costs included and their source readers are referred to within the associated Technical Pre-Feasibility Report

7.1.2 In addition, operating and maintenance costs have been provided by LUL for operating York Road Station.

7.1.3 All costs and revenues within this report have been adjusted to represent 2005 prices. All present values are over 30 years, discounted to 2005 prices, and assuming a scheme year of opening of 2016.

### 7.2 *Capital Costs*

#### **Infrastructure Costs**

7.2.1 The infrastructure costs for the Scenario One layout of York Road Station are summarised in Table 7.1. The estimated capital cost is £21.5 million.

**Table 7.1 Capital Costs for York Road Station**

<b>Item</b>	<b>Capital Cost</b> (£'000, 2005 Prices)
Enabling works & sequencing operations to shafts	3,160
Reconstruction of concourse building	2,585
Platform works and finishes	2,700
Mechanical & engineering installations	4,875
Signalling alternations	300
Contractor preliminaries/management costs	2,724
Provisional sums	5,196
<b>Total</b>	<b>21,540</b>

*Source: Cyril Sweet 2005*

7.2.2 These capital costs exclude the following:

- LUL management costs
- PPP contract arrangements costs
- Possession/compensation costs
- Works to track and bed (including suicide pit)

7.2.3 It is assumed that all required track works can be undertaken during scheduled closures for the PPP Piccadilly line upgrade.

7.2.4 For the purposes of estimating the scheme's benefit to cost ratio a 20% contingency has been added to the costs.

#### **Infrastructure Cost schedule**

7.2.5 It has been assumed that the infrastructure costs will be spread over three years prior to the re-opening of the station with the following distribution: Year 1 – 25%; Year 2 – 35%; Year 3 – 40%.

#### **Renewal Costs**

7.2.6 An allowance for renewal costs has been included within the Tube Lines operating and maintenance cost schedule (see Section 7.6).

#### **Residual Values**

7.2.7 By the terms of conditions of the PPP that Tube Lines have for maintaining Underground stations they are assumed to have no residual value at the end of the contract. Whilst this is unlikely to be the case it makes it difficult to predict the future condition of the station asset and thus to estimate a monetary residual value.

7.2.8 No residual value has been included within the analysis.

#### **Capital Cost Optimism Bias**

7.2.9 HM Treasury and DfT guidance requires estimates of capital costs to be inflated to counter the under-estimation of costs typically found in past engineering projects.

7.2.10 The latest DfT guidance<sup>1</sup> suggests that for rail schemes a 57% up-lift should be applied to ensure that the risk of cost overrun is less than 20 per cent. It is

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1 Procedures for Dealing with Optimism Bias in Transport Planning, Guidance Note, DfT, June 2004

recommended that this value is applied at the outset of a project when costs remain relatively unknown. This value should be reduced to 6% once more detailed examinations of costs have been undertaken.

7.2.11 The capital costs for the scheme are only outline estimates therefore the full 57% optimism bias has been applied.

#### **Present Value of Capital Costs**

7.2.12 The present value of the capital costs, including 20% contingency and 57% optimism bias, and assuming the cost schedule specified is £29.6 million.

### 7.3 ***Operating and Maintenance Costs***

7.3.1 Operating and maintenance costs are broken down into the LUL staff costs for the station and contract cost agreed with Tube Lines to maintain and provide utilities to the Underground stations. The Tube Lines contract includes a requirement to carry out capital renewals as and when required so this is incorporated within the value. The breakdowns of these costs are summarised in Table 7.2.

#### **Staff Costs**

7.3.2 Staff costs were provided by LUL and are estimated to be in the region of £400,000 per annum.

#### **Maintenance Costs**

7.3.3 The Tube Lines maintenance contract for the station would be around £220,000 per annum. This includes the provision of utilities to the station. The value has been calculated based upon the existing average station maintenance rates across the network.

**Table 7.2 Operating and Maintenance Costs for York Road**

<b>Type of Operating Cost</b>	<b>Cost</b> (£'000, 2005 prices)
Staff costs	£400,000
Tube Lines maintenance costs	£220,000
<b>Total Operating &amp; Maintenance Costs</b>	<b>£620,000</b>

*Source: LUL (2004)*

7.3.4 For the purposes of estimating the scheme's benefit to cost ratio a 20% contingency has been added to the costs and an up-lift of 25% has been applied to allow for optimism bias.

#### **Present Value of Operating and Maintenance Costs**

7.3.5 The present value of the operating and maintenance costs, including 20% contingency and 25% optimism bias, and assuming 100% of the costs per annum from scheme year of opening is £27.9 million.

#### **7.4 *Procurement and related costs***

7.4.1 Procurement options have not been assessed at this stage of the appraisal process and hence any associated costs are not included within the economic appraisal.

#### **7.5 *Client Costs***

7.5.1 No allowance has been made for LUL management costs which may be incurred up until the year of opening 2016. It was indicated by LUL, however, that these would be negligible.

#### **7.6 *Third party contributions***

7.6.1 It has been assumed that there will be no third party contributions to the scheme. Opportunities for any such contribution will be assessed later in the appraisal process.

#### **7.7 *Costs avoided (Do-minimum Costs)***

7.7.1 The introduction of a public transport scheme can result in cost reductions for other areas of the public transport network. However the York Road Scheme would not result in any reduction in either LUL services or other mode services, therefore the scope for avoided costs is limited.

7.7.2 It may have been the case that the re-opening of York Road Station would reduce the requirement for further capacity investment at King's Cross St Pancras Interchange by reducing passenger congestion. However, the demand modelling results have suggested that this is unlikely to be the case with very little congestion relief forecast at King's Cross St Pancras Interchange.

7.8 **Revenue Impacts**

**Increased public transport trips**

7.8.1 The direct public transport revenue impact of the scheme has been generated through applying fare rates per passenger kilometre to changes in public transport passenger kilometres. This produces the results presented in Table 7.3.

**Table 7.3 Changes in Public Transport Revenue with York Road Station, 2016**

Item	Change in Passenger km (million km pa)	Fare (£ per km)	Revenue (£'000, 2005 prices)
Underground	8.3	0.1610	1,334
Heavy Rail	4.9	0.0966	478
Bus	-12.1	0.1250	-1,507
Docklands Light Railway	-0.1	0.1660	-12
<b>Total</b>	<b>1.1</b>	<b>-</b>	<b>293</b>

*Source: Halcrow (February 2005)*

7.8.2 This suggests that the increase in revenue on the Underground and heavy rail marginally outweighs the reduction on London Buses. Assuming a ramp-up of 65% in Year 1; 85% in Year 2 and 100% in all future years this translates to a present value of £6.9 million.

**Secondary revenue sources**

7.8.3 Secondary revenues from the scheme are anticipated to be relatively small. There is only a small retail unit within the station design along with an ATM. There would be a small revenue stream from advertising but it could be argued because the passengers are simply transferring from other public transport modes that the amount of advertising exposure and hence revenue would be neutral across the public transport network.

7.8.4 An allowance of £20,000 pa has been allowed for secondary revenue. This translates to a present value over 30 years of £291,000.

## 8 Non-financial Benefits

### 8.1 *Introduction*

8.1.1 This section assesses the additional non-financial benefits deriving from the scheme.

### 8.2 *Public transport user benefits*

#### **Journey Time Savings**

8.2.1 Section 6.8 to 6.11 has already presented a detailed assessment of the impact of the York Road scheme on public transport journey times. Table 8.1 presents the monetisation of the annual generalised journey time savings.

**Table 8.1 Public Transport Journey Time benefits – Central Forecast, AM Peak 2016**

<b>Platform</b>	<b>Generalised Journey Time Savings</b> (hrs, Am peak)	<b>Annual Public Transport User Benefit</b> (£m, 2005 prices)
PT crowded hours	497	-6.287
PT uncrowded hours	318	-4.021
Other hours *	-917	11.599
<b>Total</b>	<b>-102</b>	<b>1.292</b>

*Source: Railplan (Halcrow 2005)*

*\* other hours = sum of interchange, wait, boarding and walk hours*

8.2.2 The results indicate that, overall, there is a marginal generalised journey time savings to public transport users from the scheme, despite the fact that it increases journey times on the Piccadilly Line between King's Cross St Pancras and Caledonian Road for all existing users by one minute.

#### **Congestion relief at King's Cross St Pancras Station**

8.2.3 Section 6.5.7 details the impact of the proposed scheme on congestion at King's Cross St Pancras Station. The results, from the Pedroute analysis, indicate that the scheme will increase social costs at the station in region of £1.25 million pa.

### Net Public Transport User Benefits

8.2.4 The overall net impact of the scheme for public transport user benefits is summarised in Table 8.2. This indicates that overall there is forecast to be a very marginal positive benefit to users of £42,000 pa. As has been discussed earlier this result is sensitive to the assumed walk distance within the KCC development.

Table 8.2 Summary of Public Transport user benefits (2016) – Central Forecast

Trip Purpose	Annual User Benefits (£M, 2005 prices)
Public transport journey time savings	1.292
In-station crowding relief	-1.250
<b>Total</b>	<b>-0.042</b>

Source: Halcrow York Road Railplan Model

### Present Value of Net Public Transport User Benefits

8.2.5 Assuming a ramp-up of 65% in Year 1; 85% in Year 2 and 100% in all future years this translates to a present value of just £0.898 million.

### 8.3 Safety improvements

8.3.1 The layout design is non-compliant with a number of health and safety design standards. These issues would need to be addressed with HMRI before the scheme could be progressed further.

8.3.2 York Road station is currently designated as an intervention point on the Piccadilly Line. Re-opening the station would offer safety benefits as the station could then be used as an evacuation point as well. The economic impact of this has not been quantified.

### 8.4 Other non quantifiable benefit

8.4.1 Re-opening the York Road Station may provide additional regeneration benefits to the local area in terms of improving its desirability to work or reside. Direct access to the Piccadilly Line may encourage further investment in the area, over and above the KCC development.

## 9 Impacts

### 9.1 *Introduction*

9.1.1 The following section assesses the impact of re-opening York Road Station on various strategic objectives. The section generally provides a summary of the analysis presented within the rest of the report.

### 9.2 *Impact on TfL Strategic Priorities*

#### **Maintain existing transport services**

9.2.1 The analysis has already indicated that the York Road scheme has a considerable detrimental impact upon the existing Piccadilly Line service with an additional 1 minute added to the journey time between King's Cross St Pancras and Caledonian Road.

#### **Improve safety and security**

9.2.2 York Road station is currently designated as an intervention point on the Piccadilly Line. Re-opening the station would offer safety benefits as the station could then be used as an evacuation point as well.

9.2.3 The York Road scheme design is non-compliant with a number of health and safety design standards. These issues would need to be addressed with HMRI before the scheme could be progressed further.

9.2.4 The proposed York Road scheme does not offer any benefits in terms of overall reduced passenger demand at King's Cross St Pancras Station and therefore there would be no associated safety or security benefits derived.

#### **Reduce crowding and congestion**

9.2.5 The analysis has indicated that it is unlikely that there would be any benefits from crowding relief at King's Cross St Pancras Station. The Pedroute analysis suggests that the social cost of passenger movements through the station would in fact increase.

#### **Promote sustainable development**

9.2.6 York Road Station would improve accessibility to the KCC development site, an area that is designated as an opportunity area. However, it also increases journey times on the Piccadilly Line thus reducing accessibility to other areas.

### **Promote equality and inclusion**

York Road station would service an area which is recognised as being socially deprived. Within the Office of the Deputy Prime Minister's published data on Multiple Deprivation, the King's Cross 'Super Output Area' is designated as being in the 10% most deprived areas in the country. It has a very high proportion of economically inactive residents who have low levels of qualifications. The scheme would therefore help promote equality and social inclusion, although the magnitude of the impact is not considered likely to be significant.

### **Expand network capacity**

9.2.7 The scheme does not offer any additional public transport network capacity.

### **9.3 *Impact upon NATA objectives***

9.3.1 In relation to the NATA sub-objective the York Road scheme is considered to have no measurable impact upon ***noise, local air quality, reduction in green house gases, townscape or physical fitness.***

9.3.2 The scheme is also not considered to have any impact positive upon ***integration.*** The analysis indicates that it does not aid interchange at King's Cross St Pancras Station and increase journey times on the Piccadilly Line.

9.3.3 York Road station would serve a socially deprived area and as such may have a positive impact upon ***regeneration.*** It will improve accessibility to the KCC development site as well as the residential areas to the east of the station.

9.3.4 The proposed York Road station has been designed to comply with current standards as far as possible, although as noted in the technical report, there are still areas where concessions would be required, notably the platforms. However, with the proposal, of a mix of modern materials with the original framework, it is hoped that the proposal offers a high quality of ***journey ambience.*** The knock on effect of the scheme may have implications for Kings Cross St Pancras station on crowding levels and journey times between Kings Cross St Pancras and Caledonian Road.

### **9.4 *Impact on other Mayoral strategies***

9.4.1 The table below presents the key objectives of the Mayoral Strategies and whether the York Road Station scheme is likely to have a positive, neutral or negative impact.

Objective	Description of York Road Station Impact	Impact *
<b>London Plan</b>		
<i>To accommodate London's growth within its boundaries without encroaching on open spaces</i>	Improves accessibility to Brownfield site	+
<i>To make London a better city for people to live in.</i>	Improve the choice of public transport options but also increases journey times on the Piccadilly Line	0
<i>To make London a more prosperous city with strong and diverse economic growth.</i>	Minimal effect	0
<i>To improve London's accessibility</i>	Improves accessibility to the local area around York Road Station but increases journey times on the Piccadilly Line	0
<i>To make London a more attractive, well-designed and green city.</i>	Scheme would maintain the historical façade of the building	+
<b>Transport Policy</b>		
<i>Integrating transport and development</i>	Facilitates the development of KCC	+
<i>London's international, national and regional transport links</i>	Improve the choice of public transport options but also increases journey times on the Piccadilly Line	0
<i>Increasing the capacity, quality and integration of public transport to meet London's needs</i>	No impact	0
<i>Tackling congestion and reducing traffic</i>	No effect on reducing crowding at King's Cross St Pancras Station	0
<i>Freight Strategy i.e. improving freight movements and the distribution of goods</i>	No impact	0
<b>Strategy for Development</b>		
<i>Opportunity Areas<sup>2</sup></i>	King's Cross St Pancras, is designated as an area for opportunity	+
<i>Areas for Intensification<sup>3</sup></i>	No impact	+
<i>Areas for Regeneration<sup>4</sup></i>	Kings Cross earmarked as regeneration areas	+

\* positive(+), neutral(0) or negative (-)

2 Opportunity Areas can typically accommodate at least 5,000 jobs or 2,500 homes or a mix of the two, together with appropriate provision for other uses such as shops, leisure facilities and schools. Development in these areas will be geared to the use of public transport: either they already have good public transport access, or they require public transport improvements to support development

3 Areas for Intensification have significant potential for more intensive use – and for more varied use – than at present where they are well served by public transport.

4 Areas for Regeneration are those which currently suffer substantial social exclusion and economic deprivation, and where development can play a key role in pursuing the Mayor's vision.

9.4.2

This suggests that, overall, the scheme is likely to have a positive impact and support the mayoral strategies.

## 10 Outcome of quantified analysis

### 10.1 *Introduction*

10.1.1 Economic appraisal is a systematic examination of the advantages and disadvantages of achieving the defined scheme objective. It provides a decision maker with the information to make a clear choice between competing projects, or project options.

10.1.2 A cost benefit analysis has been prepared to provide an indication of the economic viability of the scheme design for the re-opening of York Road Station. The central forecast level of passenger demand has been assumed.

10.1.3 A series of sensitivity tests have examined the sensitivity to key assumptions and have provided a range of forecasts around the central demand forecasts.

### 10.2 *Central demand forecasts*

A summary of the results from the Central Case scenario is as follows (all annual benefits presented for 2016):

(a) Annual York Road boarders and alighters	=	10 million
(b) Annual change in TfL public transport revenue	=	£293,000
(c) Annual PT user benefits	=	£42,000

### 10.3 *Economic appraisal*

10.3.1 The economic appraisal uses a simple Cost Benefit Analysis (CBA), which seeks to identify all the costs and benefits of the project, irrespective of to whom they accrue. Generally, projects have an initial capital investment, followed by some recurrent costs, and a revenue and benefit stream. Comparing costs and benefits that occur at different times, requires them to be converted, or discounted, back to a base year, in this case 2005, using an appropriate discount rate<sup>5</sup>.

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<sup>5</sup> All projects involving public money are required, for consistency, to use the discount rate recommended by H.M. Treasury.

10.3.2 The sum of discounted costs and benefits gives the ‘net present value’ of the project. This is the primary indicator of the ‘value’ of an investment. A project with a positive NPV indicates that the expected costs of the project are less than the expected benefits. This suggests that a project offers good value for money and, based on this criterion alone, should proceed.

10.3.3 An alternative indicator of the value of a scheme is the benefit to cost ratio (BCR). This is the ratio of the present value of user and non-user benefits to the present value of costs minus net revenues. A BCR of greater than 1:1 indicates that the scheme is expected to give a net benefit to society and, subject to availability of funds, should be taken forward. TfL have a weighted average passmark for schemes of 1.5:1.

10.3.4 Table 10.1 presents the summary results from economic analysis of the York Road design layout with central forecast demand.

**Table 10.1: Present Value of Revenue, Benefits and Costs - Central Forecast**

Trip Purpose	Present Value (£'000, base 2005)
(a) Present value of revenue	6,862
(b) Present value of PT user benefits	0.898
(c) Present value of non-PT user benefits	0
(d) Present value of station operating & maintenance costs	-12,197
(e) Present value of avoided costs	0
(f) Present value of station capital costs	-29,634
<b>Net Present Value (NPV)</b>	<b>-34,071</b>
<b>TfL Benefit Cost Ratio (BCR)</b>	<b>0.03 : 1</b>

*Assumes discount rate of 3.5% over first 30yrs and 3.0% from then on*

10.3.5 Within Table 10.1 the BCR is calculated as the ratio of present value of user benefits (a) and non-user benefits (b) [ = £0.898 million ] to the present value of costs (d) - (e) + (f) minus net revenues (a) [ = £34.969 million ], giving 0.03 : 1.

10.3.6 The results indicate that Central Case scheme has a negative NPV and the TfL BCR highlights the fact that almost no net user benefits are engendered by the scheme.

10.4 ***Effect of non-quantified benefits***

10.4.1 The analysis has indicated that there are no significant non-quantifiable benefits outside the economic appraisal that the York Road scheme could also engender.

10.5 ***Sensitivity testing***

**Introduction**

10.5.1 Two tests have been carried out to highlight the sensitivity of specific inputs on the economic appraisal.

**Test Specifications**

The sensitivity test specification are summarised below:

(a) *Increased walk time savings*

This test examines the sensitivity of the results to the assumed walk time savings amongst forecast users of York Road Station. The Railplan model assumes a walk time from zone origins to access both York Road Station and King's Cross St Pancras. The user benefits from the scheme are sensitive to these assumed walk times. Within this test there is assumed to be a 5% increase in the journey time savings for users of York Road Station. This replicates the impact of longer walk times from KCC development to King's Cross St Pancras Station.

(b) *High passenger demand*

This examines the impact of including the high level forecasts of passenger demand for York Road Station. This would increase the AM peak demand from the central case value of 9,200 trips up to 13,300 trips.

(c) *Neutral congestion impact at King's Cross St Pancras*

Within the Central Case the Pedroute analysis indicates that there is a negative social cost of congestion of £1.25 million at King's Cross St Pancras that results from re-opening York Road Station. This sensitivity test examines the impact on the economic performance if this social cost figure were equal to zero.

10.6 ***Sensitivity test results***

Table 10.2 presents the NPV and BCR values for each of the three sensitivity tests.

**Table 10.2: NPV and BCR for Sensitivity Tests**

<b>Sensitivity Test</b>		<b>NPV</b>	<b>TfL BCR</b>
<b>Central Case</b>		<b>-34,071</b>	<b>0.03 : 1</b>
A	Increased walk time savings	-6,543	0.81 : 1
B	High passenger demand	-11,991	0.37 : 1
C	Neutral congestion impact at KX	-7,133	0.80 : 1

*10.6.1*

The result indicate that for each sensitivity test the benefit to cost ratio remains below 1: 1, suggesting the scheme does not offer a net social benefit to society.

# 11 Feasibility and Risk

## 11.1 *Introduction*

In appraisals there is always likely to be some difference between what is forecast and what eventually happens because of biases, risk and uncertainties within the appraisal. It is therefore important to identify and mitigate these risks wherever feasible.

11.1.1 Section 10.5 highlighted specific factors within the demand forecasting and economic appraisal which may impact upon the analysis and Section 10.6 conducted sensitivity tests on these factors to indicate their influence on the results.

11.1.2 In addition to the sensitivity tests Halcrow have also internally conducted a more general discussion group to identify the preliminary feasibility and risks involved with the York Road scheme. The workshop allowed the assessment of risks and opportunities within seven areas of the project: Engineering, financial, management, operational, political, regulatory and reputation. From this a structure for the risk register was developed.

## 11.2 *Summary of Risk Register*

Below are examples of the type of issues that were identified:

**Financial** – *simultaneous upgrade of Piccadilly Line, construction of suicide pit requiring closure of Piccadilly Line, closure of Piccadilly Line for general station works, temporary closure of intervention point, additional works for façade, contractual issues, passenger demand uncertainty, development uncertainty, national economy.*

**Management** – *Engineering design, site access emergencies*

**Operational** – *no manned ticket office, temporary closure to upgrade station to allow for greater passenger usage than forecast*

**Political** – *Lack of public support, local opposition,*

**Regulatory** – *Frontage issues, objections from interested parties, changes in planning process*

**Reputation (HSE)** – *visual impacts*

### *11.2.1*

Were the scheme is to be developed further then additional workshops should be scheduled in which to identify the level of risk associated with each item specified within the risk register. This would then highlight the necessity for any particular remedial measures.

# 12 Summary

## 12.1 *Introduction*

12.1.1 This section summaries the main findings within the appraisal process and then assesses the project performance against the original objectives.

## 12.2 *Summary*

12.2.1 The scheme is forecast to:

- Attract 10 million annual boarders and alighters in 2016. This equates to 9,200 trips in the AM peak;
- Serve a designated ‘Opportunity Area’ with high level of social deprivation;
- Increase journey times on the Piccadilly Line between King’s Cross St Pancras and Caledonian Road by 1 minute affecting over 50 million passenger pa;
- Have minimal impact upon the volume of throughput at King’s Cross St Pancras Station but marginally increase the social cost of passenger movement within the station;
- Achieve a negative net present value of -£34.1 million and a benefit : cost ratio of 0.03 : 1; and
- Have a generally neutral impact upon other government policies.

## 12.3 *Performance against objectives*

12.3.1 Table 12.1 provides an assessment of the schemes performance against the objectives.

**Table 12.1 Performance of York Road Station Scheme against Objectives**

<b>Category</b>	<b>Objective</b>	<b>Performance</b>
I	Improve public transport options available to area around York Road Station	Provides an additional public transport option from the area serving the northern end of the KCC development as well as the residential area to the east of the station
	Provide congestion relief at King's Cross St Pancras Station	Little benefit in terms of providing congestion relief for King's Cross St Pancras Station. The social cost of passenger movements through the station increase as a result of the scheme
II	Improve accessibility to/from the King's Cross Central development lands and the surrounding areas	The provision of an additional public transport options improves accessibility to the area surrounding the station. The increase in journey time on the Piccadilly Line between King's Cross St Pancras and Caledonian Road reduces accessibility for existing users
III	Support Mayor's Spatial Strategy by serving Major Centres, Opportunity Areas, Areas for Intensification and Areas for Regeneration	Provides minimal support for the Mayoral Spatial Strategy. Serves the Opportunity Area at King's Cross. Improves accessibility to inner London brownfield development site. Otherwise generally neutral impact.
	Support policies to promote social inclusion	The catchment area for the station is a socially deprived area with a high proportion of economically inactivity and low qualified residents
IV	Meet all the objectives in an economically efficient and deliverable package	The Net Present Value for the scheme is negative with a benefit : cost ratio is 0.15 : 1 indicating the scheme offers a poor social return.
V	Provide environmental benefits	Neutral impact
VI	Provide safety benefits	Station design is non-compliant with some health and safety station planning guidelines Generally neutral impact