

Docklands Light Railway  
Ltd.

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**DLR Horizon 2020  
Study**

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Business Case Appraisal

Docklands Light Railway Ltd.

**DLR Horizon 2020 Study**

Business Case Appraisal

July 2005

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

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### Appendix A: BCDM Spreadsheets

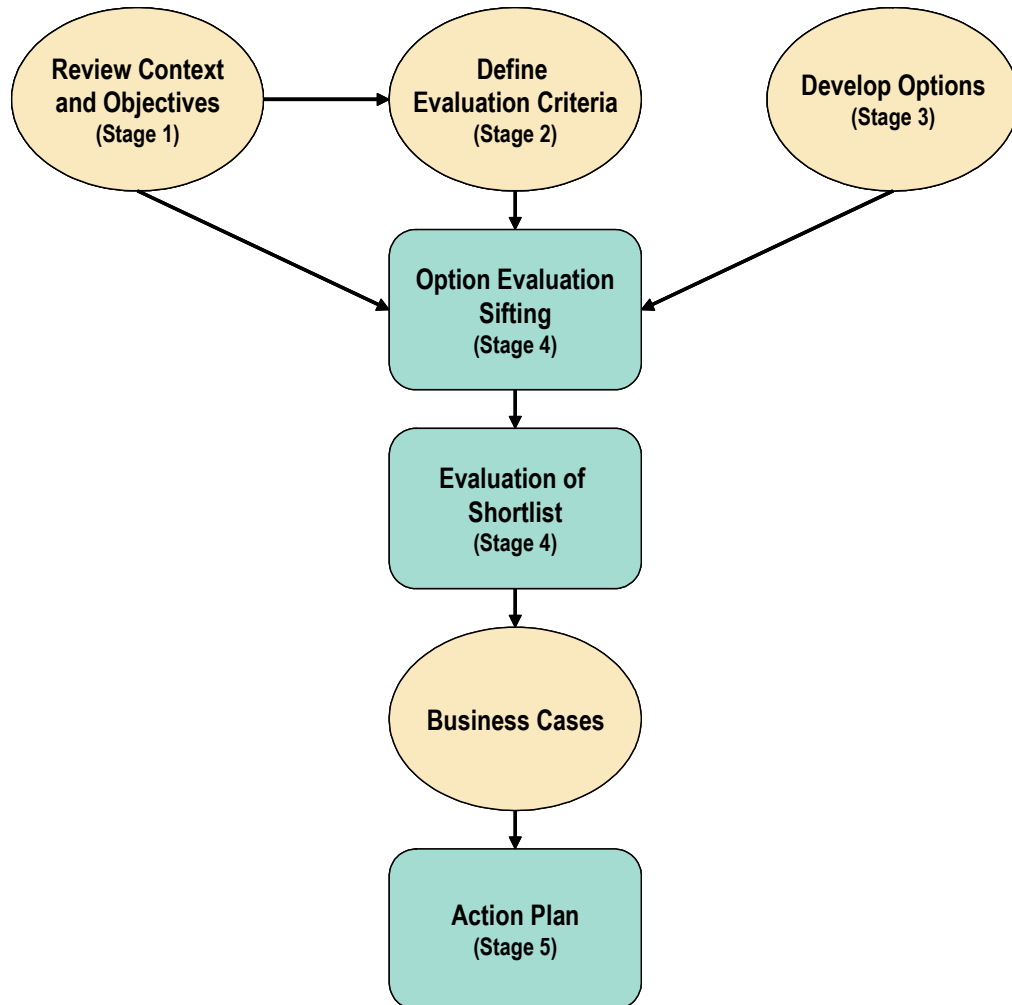
## 1. STUDY BACKGROUND

### 1.1 DLR Horizon Studies

- 1.1.1** Arup were commissioned by Docklands Light Railways Limited (DLRL), part of Transport for London, to undertake the DLR Horizon Study 2020. The role of the study is to consider how the DLR should be developed over the period 2012 to 2020, identifying pragmatic development schemes that will enhance the existing network and / or expand the network. DLR is a subsidiary of TfL under the Mayor of London and the Greater London Authority and, as such, is responsible for delivering the DLR related aspects of the Mayor's Transport Strategy and the London Plan.
- 1.1.2** The previous "Horizon Study" in 1998 evaluated possible DLR extensions to the railway over a ten year period which were feasible, viable in financial and economic terms and implementable. The study recommended three schemes, namely:
- an extension to London City Airport;
  - conversion of the North London line between Canning Town and Stratford;
  - an extension of the City Airport line to Woolwich Arsenal.
- 1.1.3** Since the completion of the Horizon study, these schemes have been taken forward to various degrees. Construction began on the City Airport extension in 2003 with completion due by the end of 2005. Powers have also been granted for the extension to Woolwich Arsenal with a likely construction start date of Summer 2005 and a completion date of 2009. DLR is also beginning work on preparing a Transport & Works Act application for the route to Stratford, including a further extension to the CTRL station at Stratford International.
- 1.1.4** The study comprised five distinct stages, as set out in Figure 1.1. This report covers the final stage, Stage 5, of the study, namely the development of business cases and an action plan for the shortlisted schemes. The findings from the preceding stages are set out in the following reports:
- **Stage 1:** "DLR Horizon Study 2020. Context and Objectives". Arup, October 2004;
  - **Stage 2:** "DLR Horizon Study 2020. Development of Evaluation Criteria and Proforma". Arup, November 2004;
  - **Stage 3:** "DLR Horizon 2020 Study. Option Development Report". Arup, January 2005.
  - **Stage 4:** "DLR Horizon Study 2020. Long List Option Sifting". Arup, March 2005.
- 1.1.5** The option development stage of the study resulted, after stakeholder consultation, in a "long list" of approximately 45 potential options encompassing interchanges, extensions, new stations, enhancements and upgrades to the network. These options were then assessed using an appraisal framework consistent with TfL's Business Case Development Manual, with a short list of schemes drawn up.
- 1.1.6** As the study progressed, it became evident that the majority of interchanges enhancements, new stations and capacity upgrades had either secured funding or their status had changed. Therefore, most of the short listed options were extension schemes. These then developed in more detail including the development of more detailed alignments, station location, costing, development of service patterns and demand forecasting.

- 1.1.7** Sinclair Knight Merz (SKM), one of TfL's demand forecasting consultants, were commissioned by DLRL to develop demand forecasts for each alignment using the DPTM and Railplan models as appropriate.

**Figure 1.1. Horizon Study 2020: Methodology Summary**



## 1.2 Report Structure

- 1.2.1** This report outlines Stage 5 of the DLR Horizon 2020 study; the report is structured as follows:

- Section 2 describes the do minimum and briefly sets out the short-listed options;
- Section 3 outlines the appraisal methodology;
- Sections 4-14 set out the business case for each of the preferred options, including scheme background, engineering issues and costs, the demand and revenue forecasts; environmental impacts and NATA scores, and the appraisal findings;
- Section 15 contains a summary of the finding and draws the main conclusions.
- Appendix A contains the detailed business case spreadsheets for each option.

## 2. DO MINIMUM TRANSPORT SCENARIO

### 2.1 Transport Infrastructure

**2.1.1** The Horizon study addresses the development of the DLR over the period 2012-2020. By 2012, there are likely to be a number of new public transport schemes in place, both DLR schemes themselves and other major transport schemes in and around East London which will have a fundamental impact on DLR. For the demand forecasting and appraisal it is crucial to select a do minimum scenario, so that all projections have a clear reference basis. Those transport schemes that are likely to have an impact on DLR form part of the do minimum are described below.

**2.1.2** The previous 1998 Horizon Study recommended extensions to City Airport, Woolwich Arsenal and the conversion of the North London Line to DLR. The City Airport extension should open in 2005, the extension to Woolwich Arsenal in 2009 and TWA powers are being sought for the Stratford International Extension. In addition to those schemes recommended in the 1998 Horizon Study, DLR has submitted a TWA application to upgrade Lewisham-Bank services to 3 car operation.

**2.1.3** DLR's development proposals, as included in the TfL Investment Programme, are illustrated in Figure 2.1. These include extensions, new stations and service upgrades in response to continuing prospects for travel growth in the inner Thames Gateway and in support of the Mayor's Transport Strategy. However, it should be noted that the proposed extension to Barking Reach and Dagenham Dock to serve residential development in the Thames Gateway is not as far advanced as other schemes and is not included in the TfL Investment Programme. Therefore, it does not form part of the 2012 do minimum and it is appraised as part of this Horizon Study. The 2012 planning capacity assumed for each DLR service is shown in Table 2.1.

**Figure 2.1 Current DLR Development Proposals**



**Table 2.1 2004 and 2012 DLR Do Minimum Planning Capacity<sup>[1]</sup> (Passengers/hour/direction)**

Route	2004 Peak tph	2004 Planning Capacity	2012 Peak tph	2012 Planning Capacity
Bank-Lewisham	17	6,120	15	8,100
Stratford-Lewisham	8.5	3,060 <sup>[2]</sup>	10	3,600
Tower Gateway-Beckton	8.5	3,060	5	1,800
Bank-Woolwich Arsenal		N/A	5	1,800
Canary Wharf-Woolwich Arsenal		N/A	5	1,800
Stratford International-Woolwich		N/A	5	1,800
Stratford International-Prince Regent		N/A	10	3,600

Note [1] Planning Capacity assumed to be 360 for 2-car and 540 for 3-car trains

[2] Split between Stratford-Lewisham and Stratford-Crossharbour

## 2.2 CTRL Domestic Services

**2.2.1** A consultation draft was published by the SRA in February 2004, titled “Integrated Kent Franchise, Train Service Specification, A Consultation Document”. This sets out the following services:

- Ebbsfleet - St. Pancras 2 trains per hour (tph);
- Ramsgate - St. Pancras 1tph;
- Folkestone - St. Pancras 1tph;
- Rochester - St. Pancras 1.5tph;
- Broadstairs - St. Pancras 1.5tph.
- St. Pancras - Ebbsfleet 2tph;
- St. Pancras - Ramsgate 1tph;
- St. Pancras - Folkestone 1tph;

(All services stop at Stratford International)

**2.2.2** Therefore, there are 7tph to St. Pancras and 4tph from St. Pancras. New, high specification rolling stock with 125mph capability will also need to be procured. The CTRL Domestic trains are expected to improve journey times to London significantly, and much improved access to the major regeneration area around Stratford.

## 2.3 Crossrail

**2.3.1** The preferred alignment for Crossrail Line 1 was announced in August 2004 although only part of the required funding has been committed thus far. In addition to the core route section between Paddington and Whitechapel, there are alignments to Heathrow Airport and Maidenhead in the west, and Shenfield and Abbey Wood in the east. The Abbey Wood alignment will use a new tunnel section between Whitechapel and Abbey Wood. New stations are also proposed at Custom House and the Isle of Dogs. With up to 12tph calling at all intermediate stations, Crossrail Line 1 will significantly improve rail access between parts of south east London and central London and provide an alternative to DLR between Custom



House, the Isle of Dogs and the City. Improved direct links to the west end may provide relief of interchange problems at Bank.

## **2.4 East London Line Extension**

**2.4.1** The project to extend the East London Line is being promoted by Transport for London (TfL). The powers to do the works reside with London Underground, who originally developed the project, and were obtained by Transport and Works Act Orders granted in 1997 (for the northern extension) and 2001 (for the southern extension). The first phase is being implemented with a likely 2010 completion date.

**2.4.2** The Northern Extension of the East London Line runs from south of Shoreditch Station, north to Dalston Junction using the disused former North London Line viaduct, and then on to the North London Line. The extension will include new stations at Shoreditch High Street, Hoxton, Haggerston and Dalston Junction and terminates at Dalston Junction.

**2.4.3** The Southern Extension involves linking the existing East London Line, from south of Surrey Quays, to the South London Line between South Bermondsey and Queens Road, Peckham, and will include a new station at Surrey Canal Road. This will provide for an all stations service to Clapham Junction, helping to provide the Orbirail network proposed in the Mayor's Transport Strategy. The East London Line will also extend south of New Cross Gate to provide all station services to Crystal Palace and West Croydon.

## **2.5 Thameslink 2000**

**2.5.1** Thameslink 2000 is a major upgrade of London's North-South Thameslink rail route which will increase the number of services across central London, reducing overcrowding, increasing capacity and giving better access to Luton and Gatwick airports.

**2.5.2** Following a planning inquiry, the Office of the Deputy Prime Minister (ODPM) confirmed in January 2003 that powers would not be granted until a revised TWA application is submitted in respect of certain aspects of the project. Implementation is now not likely before 2012 assuming that these outstanding issues can be resolved.

## **2.6 London, Tilbury & Southend (LTS) C2C upgrade**

**2.6.1** Possible solutions to crowding have been considered for c2c services; these mainly revolve around train lengthening on the North Thameside Corridor (Tilbury Loop) and the Chafford Hundred line. New stations have been proposed on the Tilbury Loop in the Barking Reach/Dagenham Dock area. Whilst these proposals are at an early stage of development, the provision of additional parallel east-west capacity may lead to some crowding relief on DLR.

## **2.7 East London Transit (ELT)**

**2.7.1** This scheme has been developed by TfL in partnership with the London Boroughs of Barking & Dagenham, Havering, Newham and Redbridge. It is a bus-based proposal for a network serving Barking, Ilford, Romford, Harold Hill and linking into regeneration sites in London Riverside and the Royal Docks, forecast to carry 39 million passengers a year. There is also the option of linking up with intermediate mode proposals south of the River Thames via the proposed Thames Gateway Bridge. Phase 1 of ELT, due for completion in 2008, is included in TfL's Investment programme and is assumed in the Horizon do minimum scenario.

## **2.8 Greenwich Waterfront Transit (GWT)**

- 2.8.1** This proposal is for a segregated busway between Abbey Wood and Greenwich town centre, which form part of the Mayor's plans to expand and improve the quality of London's transport system. GWT is a two phase project: Phase 1 would run between Abbey Wood station, Thamesmead town centre and Woolwich Ferry roundabout and could open by 2008. Phase 2 would run from Woolwich Ferry roundabout to North Greenwich station. Only Phase 1 is assumed for the Horizon do minimum scenario.

## **2.9 Jubilee Line Upgrade**

- 2.9.1** Proposals for upgrading the Jubilee Line include new rolling stock and signal upgrading which will increase Jubilee Line capacity by 40% as part of the PPP. The timetable is:

- 2006: extra 7th car is added to Jubilee Line trains;
- 2009: extra rolling stock is purchased to operate enhanced service;
- 2009: The signalling upgrade as per PPP is complete enabling extra trains to operate and increase peak hour frequency.

- 2.9.2** The opening of the Jubilee Line extension in 1999 had a significant affect on DLR, represented mainly by a slowing of DLR patronage growth to and from the Isle of Dogs. The introduction of additional Jubilee Line capacity would presumably lead to some abstraction from DLR.

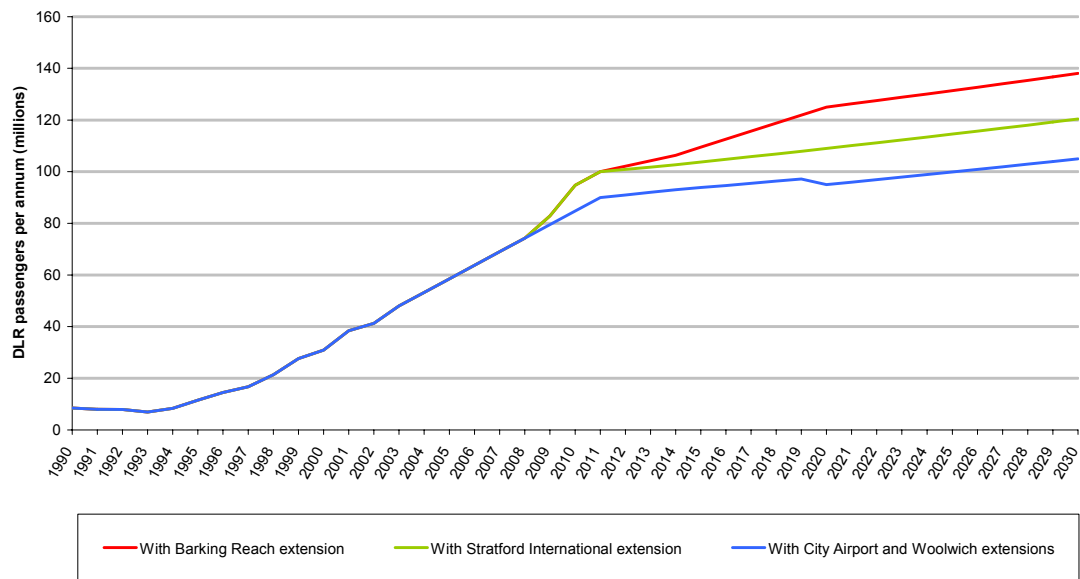
## **2.10 Thames Crossings**

- 2.10.1** The Thames Gateway River Crossings are part of a package of planned improvements to transport in east London, proposed in the Mayor's Draft Transport Strategy in July 2001. Following public consultation on the document they were detailed in the final London Transport Strategy as:

- a rail crossing at Woolwich which could be an extension of the North London Line or the Docklands Light Railway (DLR);
- a bridge between Barking and Thamesmead, known as the Thames Gateway Bridge (TGB), which would have dedicated lanes for public transport, possibly intermediate modes;
- the Silvertown Link - a crossing between North Greenwich and Silvertown.

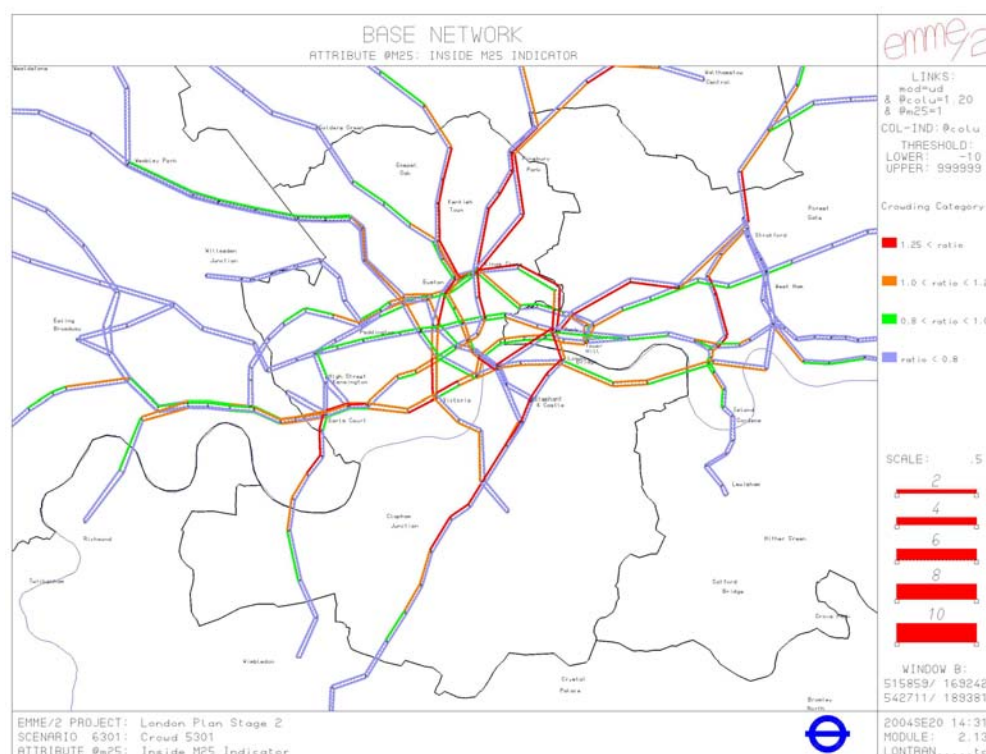
## **2.11 Capacity and Supply Issues**

- 2.11.1** The DLR is now carrying more passengers than ever before with 51.2 million passenger journeys made on DLR in the year up to July 2005. This is expected to rise to over 95 million per year by 2016, assuming 3-car operation on Bank-Lewisham and the completion of the London City Airport and Woolwich Arsenal extensions. This is forecast to rise further to 105 million passengers per year with Stratford International and 113 million passengers per year with Barking Reach. Assuming all extensions are built, annual passengers are forecast to rise to almost 140 million by 2030. This is shown in Figure 2.2.

**Figure 2.2 DLR Forecasts for Do Minimum**


**2.12** Table 2.1 indicates a current planning capacity of 12,240 on the DLR network by direction during peak periods. If the capacity of all services is added together. The do minimum, as defined in Table 2.1, increases planning capacity to 22,500 on the same basis, an 84% increase in capacity.

**2.13** Even with these capacity increases, research by TfL indicates that, by 2016, sections of the DLR between Canary Wharf and Bank could be crowded and between Stratford and Canary Wharf the DLR could be very crowded (Mayor's Transport Strategy, July 2001). This is shown in Figure 2.3.

**Figure 2.3 Crowding on Underground and TfL, 2016 (Source: TfL Railplan Model)**


## 2.14 Other Routes

**2.15** New east-west routes include Crossrail and CTRL; east-west capacity will also be increased on the Jubilee Line and c2c. The East London Line Extension and Thameslink 2000 will primarily increase north-south capacity and East London Transit will have a more local effect. The combination of Crossrail, CTRL and upgrades to the Jubilee Line and c2c will increase east-west capacity by around 13,250 seats per hour during peak periods which will cater for some of the Thames Gateway demand. This is shown in Table 2.2.

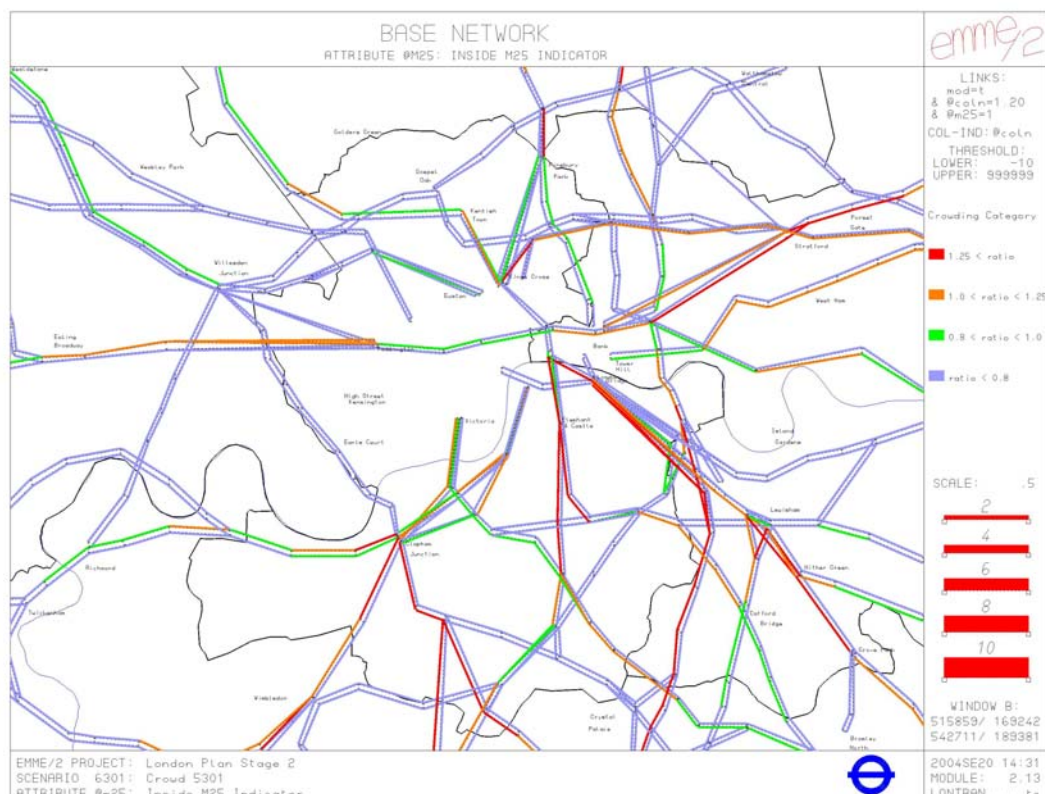
**Table 2.2 2012 Do minimum East-West Capacity Increases**

Route		2004 Capacity per hour	2012 Capacity per hour	Increase in Capacity
Crossrail	From Shenfield	N/A	6,000	[1]
	From Ebbsfleet	N/A	6,000	6,000
CTRL Domestic		N/A	4,200	4,200
Jubilee Line from Stratford		4,800	6,720	1,920
C2c	Main Line	13,500	13,500	0
	Tilbury Loop	2,250	3,380	1,130
<b>Total</b>				<b>13,250</b>

Note [1] There will be some increase in capacity here as 10-car Crossrail trains will replace existing 8-car trains

**2.15.1** Research by TfL indicates that, even assuming the implementation of the Mayor's Transport Strategy, the westbound District, Metropolitan and Central lines will all be crowded. In addition, "One" services on the GEML between Stratford and Liverpool Street will have a PIXC (Passengers in Excess of Capacity) index greater than 1%. (Mayor's Transport Strategy, July 2001). This is shown in Figures 2.3 for the Underground and 2.4 for National Rail.

**Figure 2.4 Crowding on National Rail, 2016 (Source: TfL Railplan Model)**



### 3. APPRAISAL METHODOLOGY

#### 3.1 Background

**3.1.1** The appraisal of schemes proposed as part of the Horizon Study was a twofold process; the long list of schemes was sifted using an appraisal framework which is described fully in “DLR Horizon Study 2020. Development of Evaluation Criteria and Proforma”. Arup, November 2004 and “DLR Horizon Study 2020. Long List Option Sifting”. Arup, March 2005. Schemes on the shortlist were then appraised using TfL’s Business Case Development Manual (BCDM).

#### 3.2 Shortlisting Process

**3.2.1** Using a scoring process based on objectives and impacts, it was possible to rank all options. However, there are some necessary conditions or “showstoppers” which could make some schemes highly unattractive, namely:

- **Affordability.** Capital costs of DLR extensions have tended to be up to around £200m with annual spend on extensions in recent years under £50 p.a. If this were to continue, over the period 2010-2020, it equates to around £500m.
- **Appropriateness.** Some schemes are not particularly appropriate to DLR; for example, schemes that are very long, that require very high capacity or schemes that duplicate existing high quality public transport, either now or in the future.
- **Dependencies.** Schemes dependant on other infrastructure schemes could be an issue. For example, some city schemes maybe dependent on Thameslink 2000, others on Crossrail or on taking over Network rail lines.
- **Operations Issues.** There may be operational difficulties with some schemes. Whilst most schemes extend from the extremities of the DLR network, some, such as New Cross, form spurs. With a do minimum service to Lewisham of 25 tph, all of which are required on capacity grounds, then serving New Cross would reduce the level of service to Lewisham which may be unacceptable.

**3.2.2** In addition, as the work progressed, it became clear that some schemes included in the original long list had secured funding or changed their status. This affected five proposals which were removed from the long list.

- **DLR Feeders**, i.e. bus-based services with DLR branding serving DLR from residential areas. It was decided by DLR not to pursue this as part of the Horizon Study, due to difficulties in defining in detail and hence costing and demand forecasting. However, the fact that this scores well suggests that it is worthy of consideration by other parts of TfL.
- **Lewisham Interchange improvements.** This scheme is being progressed through a Masterplan and European Union Single Regeneration Budget funding.
- **3 car upgrade on the remainder of the DLR network.** DLR assume that this will happen anyway. However, costs of any extensions should include provision for 3 car operation.
- **Bow Church-Stratford double tracking.** DLRL has funding allocated for this from the TfL Business Plan so it should be included in the do minimum.

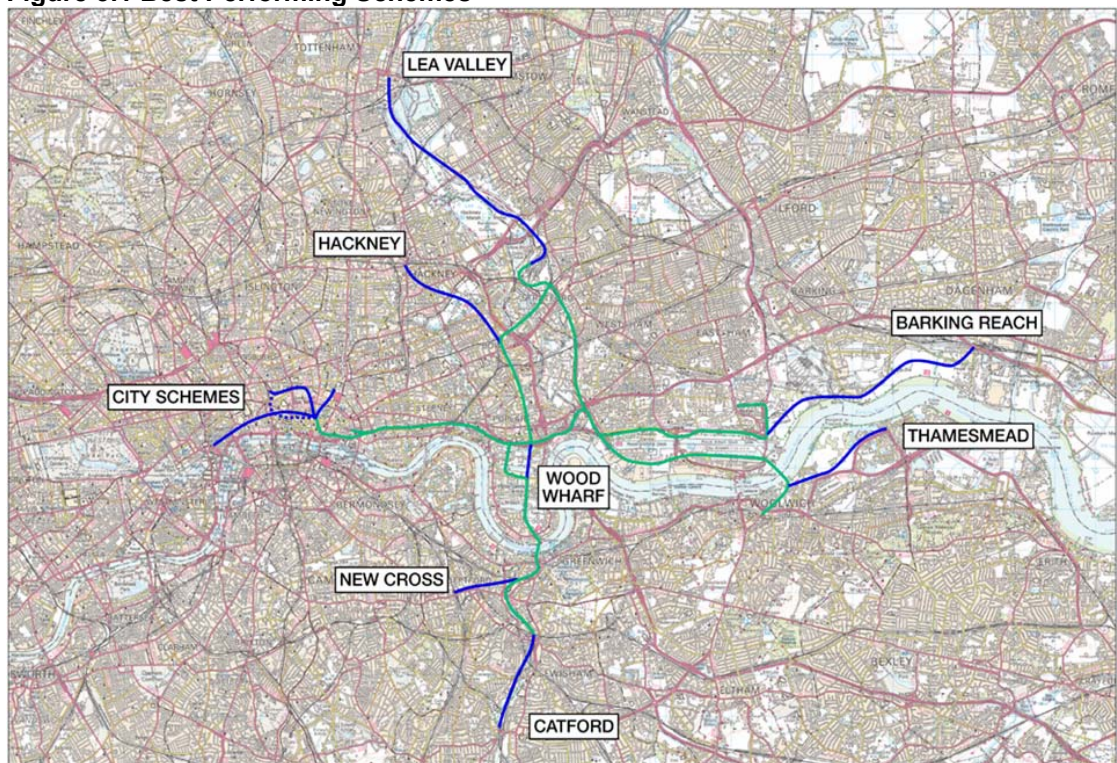


- **Stations.** Langdon Park, Thames Wharf and Oriental Road were considered but are not being pursued at present. Thames Wharf has been passively designed for as part of the City Airport Extension but is subject to development coming forward.

**3.2.3** The following extensions, also shown in Figure 3.1, were the best scoring in the shortlisting process:

- E11 All Saints-Crossharbour to east of Canary Wharf (Wood Wharf);
- E12 Greenwich-New Cross/New Cross Gate in Tunnel;
- E7 Bank-Moorgate-Farringdon (or loop via Cannon Street-City Thameslink);
- E5 Bank-Liverpool Street with possible extension to the ELL;
- E21 Stratford-Lea Valley/Tottenham Hale;
- E24 Gallions Reach-Barking Reach;
- E22 Bow Church-North London Line/Hackney;
- E13 Lewisham-Catford;
- E29 Woolwich Arsenal-Thamesmead;
- E2 Bank-Farringdon/Aldwych-Charing Cross.

**Figure 3.1 Best Performing Schemes**



**3.2.4** A number of interchange schemes were proposed. Of these schemes, improvements at Lewisham were removed from the long list as this scheme is being progressed through separate work. In addition, interchange improvements at Tower Gateway and Shadwell are being progressed by DLRL through separate studies. For these reasons, no further work was carried out on these schemes as part of the Horizon study.

**3.2.5** A number of other schemes were proposed through the stakeholder consultation. Of these schemes, double tracking Bow-Stratford has allocated funding and is, therefore, included in

the do minimum, DLR assume that upgrading to three car operation, incremental to Bank-Lewisham three car upgrading, will happen on other parts of the network and DLR feeders is difficult to define, although its performance suggests that it is worthy of consideration by TfL. This leaves capacity improvements at Delta Junction which, despite a rather low score, would offer operating benefits and may be a prerequisite for other schemes.

### 3.3 Business Case Assessment

#### Background

- 3.3.1** The demand forecasting work for the Horizon Business Case work was undertaken using DLR's forecasting model, the Docklands Public Transport Model (DPTM). This is a network assignment model which predicts, for any given pattern of public transport demand and any given set of network assumptions, the route choice of passengers throughout the network. The pattern of demand is imported from the LTS model, but is augmented within Docklands and the wider study area with more detailed information from the LUTE model.

#### Forecasting Process

- 3.3.2** The DPTM is an AM peak period model (0700-1000) that is capacity constrained based on the same crowding principles as Transport for London's (TfL) 'RailPlan' demand forecasting model.
- 3.3.3** The DPTM covers an area the size of greater London, but with significant detail in and around the greater Docklands area. The DPTM relies on two main components to provide demand information. These are:
- the London Transportation Study (LTS) model is a strategic London-wide transportation model, containing trip generation, trip distribution and mode split, and assignment modules;
  - the Land Use Trip End model (LUTE) originally developed by the London Docklands Development Corporation and now comprehensively updated on behalf of DLRL. LUTE holds land use information on a site-by-site basis for different forecast years and scenarios for an area that is generally served by the DLR in a database and produces trip ends using a variety of parameters.

#### Transport Appraisal

- 3.3.4** The Government's White Paper "A New Deal for Transport: Better for Everyone" (DETR, 1998) put an integrated transport policy at the core of transport appraisal.
- 3.3.5** The White Paper introduced the New Approach to Appraisal (NATA) to appraise and inform the prioritisation of transport investment proposals. More recently, the Department for Transport has introduced its Transport Appraisal Guidance (TAG) website, ([www.WEBTAG.org.uk](http://www.WEBTAG.org.uk)), which sets out current guidance on the appraisal of transport schemes.
- 3.3.6** TAG sets out five main objectives for transport schemes.
- The **Economy** objective is concerned with improving the economic efficiency of transport. There are five sub-objectives to improve economic efficiency for consumers and for business users and providers of transport, to improve reliability and the wider economic impacts, and to get good value for money in relation to impacts on public accounts. This part of the appraisal is discussed in more detail below.

- The **Environment** objective involves reducing the direct and indirect impacts of transport facilities on the environment of both users and non-users. There are 10 sub-objectives including noise, atmospheric pollution of differing kinds, impacts on countryside, wildlife, ancient monuments and historic buildings.
- The **Safety** objective is concerned with reducing the loss of life, injuries and damage to property resulting from transport incidents and crime. The two sub-objectives are to reduce accidents and improve security. The security aspect was appraised through the provision of security measures at the new DLR stations. The accident sub-objective was assessed by estimating the number of accidents reduced by the estimated modal shift from car to DLR.
- The **Accessibility** objective is concerned with the ability with which people can reach different locations and facilities by different modes. It is split into three sections: option values, which was calculated by the number of potential trips which would be made within the catchment area of the options; severance was calculated by measuring the length of new DLR route which would block routes previously accessed by pedestrians and; access to the transport system was measured using isochrones, identifying the area of land within 20 minutes walking time from each proposed DLR station.
- The **Integration** objective aims to ensure that all decisions are taken in the context of the Government's integrated transport policy, and investigates how the scheme provides interchange with the rest of the transport system.

## Economic Appraisal

- 3.3.7** The economic case compares the benefits to society as a whole, corresponding to the Greater London area, against the costs of the project, to produce a Net Present Value (NPV). Thus, for example, changes to total rail network revenues are factored in rather than project specific revenues.
- 3.3.8** The economic appraisal is produced in standard TfL Business Case Development Manual format. It should be noted that this calculates Benefit/Cost ratios using net costs, in contrast to the Department for Transport formulation, which shows revenues on the benefits side, to be off-set against gross costs.
- 3.3.9** Whilst DfT now advocate a 60 year appraisal period, TfL advised that the Horizon projects should be appraised over a 30 year period using a 3.5% discount rate. An optimism bias uplift is applied to project costs to take into account the historical under-estimation of costs. The rate for standard engineering projects is 66% although costs are based on recent DLR schemes.

## Forecasting Assumptions

- 3.3.10** The general DPTM and appraisal assumptions used for the Horizon 2020 Business Cases are:
- opening years for all schemes assumed to be the beginning of 2012;
  - DPTM forecasts were undertaken for years 2012 and 2020. The 2012 flows were taken as representing the 2012 opening year, given that the scheme is forecast to open at the beginning of 2012;
  - link distances were extracted from base mapping using GIS. Link times were based on a default speed of 25 kph and a nominal station dwell time of 20 seconds;
  - DPTM imposes a time penalty when demand crosses a fare zone boundary to represent the increased cost of the journey. Stations were assumed to lie in the current fare zone structure defined by TfL for the London and South East region.



## Capital Cost Assumptions

### 3.3.11 The following assumptions were made:

- price base is 4th Quarter 2003;
- optimism bias uplift of 66% for infrastructure costs;
- optimism bias uplift of 10% for rolling stock;
- capital cost build up - 50% in 2011 and 50% in 2012;
- rolling stock upgrade every 15 years (£0.5m per car).

The different optimism bias rates were adopted as DLR have a proven track record of rolling stock procurement and hence rolling stock costs have a significantly higher level of confidence than the capital costs.

## Operating Cost Assumptions

The following assumptions with regards to operating costs were made:

- price base is 4th Quarter 2003;
- annualisation factor of 960 applied to 3-hour peak numbers;
- train staff per additional train, 4.5;
- salary cost per train staff member, £30,000;
- operating cost per vehicle km, £0.65 i.e. 2 car train = £1.30, 3 car = £1.95;
- station maintenance cost per annum, £40,000;
- station lift maintenance cost per annum, £2,200;
- station ticket machine maintenance cost per annum, £3,000;
- number of ticket machines per station, three;
- number of lifts per station, two.

## Appraisal Assumptions

The assumptions made in undertaking this appraisal are summarised as follows:

- 30 year appraisal period (but see section 3.3.9);
- value of time of £8.00 per hour at 2004 prices;
- value of time growth:
  - 2004-2005: 2.19%;
  - 2005+: 2.03%;
- discount rate 3.5%;
- annualisation factor of 1,300 applied to 3-hour peak model outputs;
- increase in benefits after 2020 is 1% per annum;
- revenue elasticity from time saving benefits 0.27.

## **4. ALL SAINTS-CROSSHARBOUR (E11)**

### **4.1 Scheme Description**

- 4.1.1** This extension comprises a line around the east side of Canary Wharf between All Saints and Crossharbour serving the Wood Wharf development and the east of the Canary Wharf Estate serving it with a new station and providing additional north-south capacity and relief of Delta Junction. All Stratford-Lewisham services would run via this line with increased frequency.

### **4.2 Alignment and Operating Issues**

- 4.2.1** The route would be on viaduct, much of it through the Wood Wharf part of West India and Millwall Docks, which will be redeveloped. Hence, apart from the links at the North and South ends, the topographic constraints are relatively easily managed. At the Northern end the route needs to cross over Aspen Way and the existing Poplar to Beckton DLR tracks. The eastbound DLR track to Beckton is already elevated, which means that the new link must be quite high, with rail level approximately 8m above ground level.
- 4.2.2** A steep gradient would be needed to bring track levels down to get under Poplar High Street, which is approximately 150m further to the north. This gradient would be substantially steeper than the maximum allowed gradient of 5% for open track, so would not be permitted. Thus, if this option is to be considered further, other solutions would be required involving one of the following:
- extensive remodelling of the existing track layout east of Poplar Station to permit the eastbound Beckton Line to be lowered to ground level (This would have a significant adverse effect upon the service pattern, and is unlikely to be acceptable);
  - raising the Eastbound Beckton Line so that it is above the new link line;
  - extending the viaduct for the new link so that it stays elevated until it is north of Poplar High Street, then reducing to grade before East India Dock Road;
  - raising the soffit of the Poplar High Street overbridge to ease the gradient of the link to  $\leq 5\%$ .
- 4.2.3** The feasibility of any of the above possible solutions needs to be investigated further before the viability of the option can be established. These solutions would be expensive, but have not been costed at this stage pending review with DLR.
- 4.2.4** Some remodelling would be needed to the DLR sidings to the south of Poplar High Street to keep clear of the new link tracks, possibly with the loss of one or both of these sidings.
- 4.2.5** The new link is assumed to be served by 15tph Lewisham-Wood Wharf-Stratford at peak periods. The existing Bank-Lewisham service of 15tph would continue via Canary Wharf. Net additional trains would be needed.
- 4.2.6** At the southern end there could be a significant impact upon the modern industrial units on the eastern side of Limeharbour if there is a need for a grade separated junction north of Crossharbour to retain reliable operation for 15tph via Canary Wharf and 15tph via Wood Wharf. The most practicable way of achieving this partial grade separation to eliminate a flat crossing would be for the existing southbound Lewisham track to be elevated from the east end of the proposed new South Quay Station, cross over the new link tracks, and then descend until joining the existing track alongside Limeharbour Road. It may be necessary for this track

(approximately 5m higher than the existing viaduct) to run along the east side of Limeharbour for a short distance, immediately in front of the industrial units.

**4.2.7** Between Marsh Wall and the West India/Millwall Docks there are modern high-rise office and residential buildings which the DLR viaduct would need to pass between. There is sufficient space for this, but there would clearly be an adverse effect on these buildings, which would need to be taken into account.

**4.2.8** Blackwall Basin and Trafalgar Way would also be affected by the scheme, but the impact on these should be quite limited and manageable.

### 4.3 Costs

**4.3.1** The capital costs of the scheme were estimated using the assumptions set out in Section 3 of this report and are summarised in Table 4.1

**Table 4.1 All Saints-Crossharbour. Indicative Capital and Operating Costs, 2004**

Capital and Operating Costs	£m
<b>Capital Costs:</b>	
Infrastructure	85.0
Rolling Stock	11.0
Rolling Stock Refurbishment	3.0
Land	6.0
National Rail	0.0
<b>Total</b>	<b>105.0</b>
<b>Total Including Optimism Bias</b>	<b>166.0</b>
<b>Annual Operating Costs:</b>	<b>1.2</b>

### 4.4 Demand Forecasts and Transport Benefits

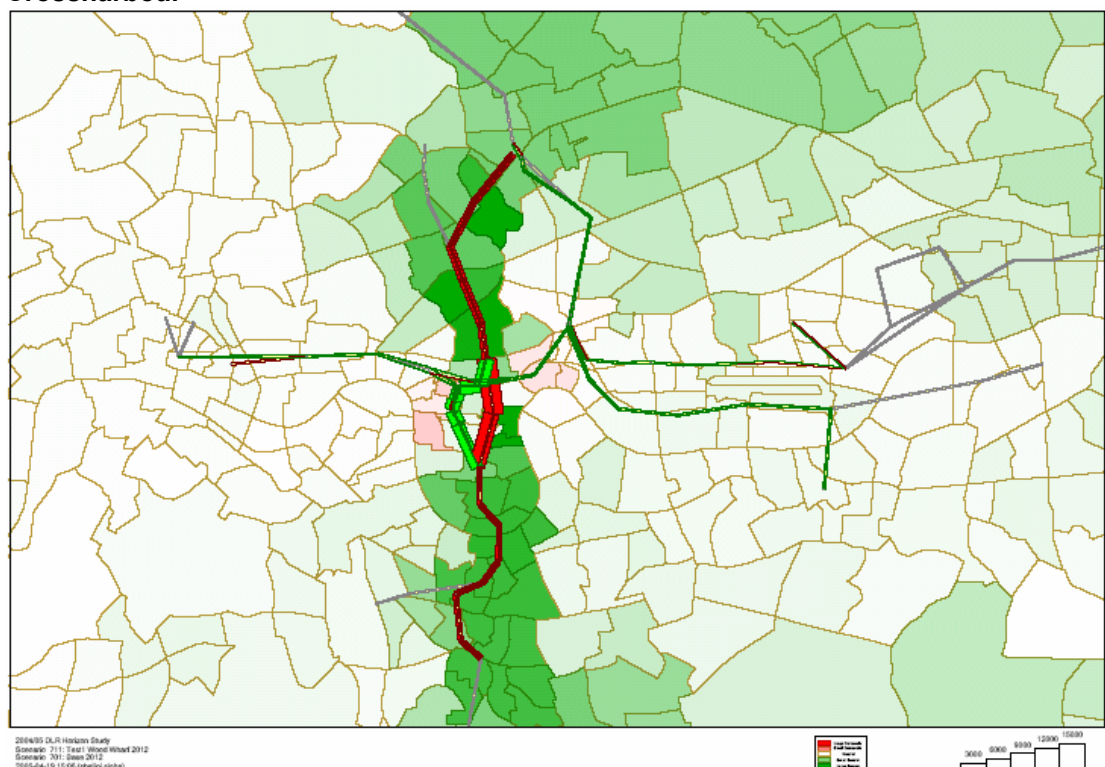
**4.4.1** The scheme attracts a significant number of passengers (almost 6,000 passengers in 2012) on the new section between All Saints and South Quay but with a corresponding flow reduction (around -4,500 in 2012) between Westferry and South Quay due to the service reduction of 10tph and diversion of Stratford trains. Figure 4.1 shows the impact of E11 on DLR peak passenger loadings by link (red for more, green for less) compared with the Do Minimum. Passenger kilometres on DLR increase in 2012 as a result of the scheme, with corresponding reductions on LUL. Overall, there is a net increase in passenger kilometres which are shown in Table 4.2.

**Table 4.2 Peak Period (0700-1000) Passenger Kilometres: All Saints- Crossharbour  
Indicative Capital and Operating costs £m, 2004**

Mode	Do Minimum pass kms (2012)	All Saints-Crossharbour pass kms (2012)	Difference
DLR	459,600	469,000	+9,400
LUL	11,134,500	11,118,000	-16,500
National Rail	20,103,700	20,115,000	+11,300
<b>Total</b>			<b>+4,200</b>

- 4.4.2** The strengthening of the Stratford-Lewisham service by 5tph results in an increase in patronage on the Stratford-All Saints and Crossharbour-Lewisham sections (in both directions), together with an increase in demand attracted from the northbound Woolwich Arsenal branch of the DLR (around 350 passengers in 2012) and the northbound section between Canning Town and Stratford International (around 200 passengers in 2012).
- 4.4.3** The scheme has knock-on effects on the Jubilee Line with reductions in 2012 demand of between 400 and 700 passengers northbound between Canary Wharf and Stratford and between 450 and 500 passengers southbound). In addition, National Rail services into Lewisham and Greenwich experience an increase in patronage with passengers taking advantage of the enhanced Stratford - Lewisham DLR service. There is a corresponding decrease on National Rail services into Woolwich Arsenal; this also helps explain the decline in patronage on the northbound DLR Woolwich Arsenal branch.
- 4.4.4** The scheme results in generalised journey time benefits in the area surrounding the proposed scheme, with particularly high benefits around the Blackwall Basin. This is shown in Figure 4.1, along with the flow changes on DLR, with green areas corresponding to a generalised journey time benefit and red a disbenefit. The darker the shade, the greater the benefit or disbenefit. Further benefits are accrued on a north-south axis adjacent to the section of the DLR between Stratford and Lewisham, due to increases in service levels. There are further minor generalised cost benefits elsewhere. There are also some disbenefits within the Isle of Dogs due to the diversion of services from the section between All Saints and Crossharbour via Canary Wharf.

**Figure 4.1 DLR Flow Changes and Generalised Journey Time Benefits. All Saints-Crossharbour**



- 4.4.5** The scheme affects the level of interchange primarily at Stratford, where the level of interchange increases by 14% in 2012, and at Lewisham, which experiences 16% increase in 2012. Interchange at Canary Wharf decreases by 8% in 2012, and by some 5% in 2020, although it should be noted that the overall do-minimum level of interchange at Canary Wharf

in 2020 is significantly higher than in 2012 due to Crossrail. In absolute terms, the number of alighters decreases significantly at Canary Wharf as the Stratford-Lewisham services would run via Wood Wharf. Interchange at Bank decreases slightly, by some 2%, as a result of the slight reductions in demand from Canary Wharf to Bank.

- 4.4.6** The impact of the scheme on DLR planning capacity into and out of Bank was investigated. The scheme has very little effect on DLR flows into and out of Bank and hence capacity at this point is virtually unaffected, as shown in Table 4.3.

**Table 4.3 Impact of Scheme E11 on DLR Crowding**

	Scheme			
	Do Minimum		With EH	
	2012	2020	2012	2020
E/B flow Bank-Shadwell 0700-1000	7,663	5,235	7,592	5,234
W/B flow Shadwell-Bank 0700-1000	14,377	8,658	14,283	8,563
Planning capacity Bank-Shadwell (peak hour) <sup>[1]</sup>	9,900	9,900	9,900	9,900
Peak hour V/C ratio Bank-Shadwell	42%	29%	41%	29%
Peak hour V/C ratio Shadwell-Bank	78%	47%	78%	47%

Note <sup>[1]</sup> Peak Hour taken as 54% of 0700-10:00 using standard TfL conversion factor

## 4.5 Wider Impacts

- 4.5.1** The wider scheme impacts for each option are contained in Appendix A which comprises the TfL Business Case spreadsheets. A commentary on the main points is given below.

### Maintain Existing Transport Services

- 4.5.2** Whilst this option increases the level of service between Stratford & Lewisham, it removes direct services from Stratford and Lewisham to Canary Wharf and Poplar. Although passengers can access Canary Wharf from Wood Wharf station, the effect on removing direct access to Poplar is more adverse. For example, passengers from the Stratford to Beckton branches could previously change at Poplar; passengers from Stratford would now need to travel south to Crossharbour, change trains and then travel north towards Poplar. However, this effect could be alleviated by service optimisation. For example, of the 15tph Stratford-Lewisham via Wood Wharf, 5tph could run via Canary Wharf and 10tph via Wood wharf which would lessen the effects for Canary Wharf and Beckton Branch passengers, although crowding impacts would need to be checked.

### Reduce Crowding and Congestion

- 4.5.3** Increases in the level of service between Stratford and Lewisham results in lower crowding, despite flow increases. As the effects are largely confined to the Stratford/Lewisham corridor, there are minimal effects elsewhere on the network.

### Promote Equality and Inclusion

- 4.5.4** The Mayor's Transport Strategy states that "transport initiatives should support the social inclusion by taking account of the needs of all Londoners to access jobs, facilities and services". (Policy 3.9, Mayor's Transport Strategy, July 2001.) Of particular relevance to DLR are the need to take account of the needs of deprived areas and address the needs of groups with specific travel requirements.

- 4.5.5** The higher level of service would benefit the mobility impaired due to step-free access to DLR. As well as improving accessibility to employment and residential areas on the east of Isle of Dogs. The enhanced Stratford-Lewisham services would pass through wards in Tower Hamlets & Newham with some of the highest indices of multiple deprivation and unemployment rates in London, with unemployment rates of between 6%-10%, compared to a London average of 3.3%. The option would also serve areas with percentages of black and minority ethnic populations of between 40% and 100% compared with a London average of 37%.

#### **Expand Network Capacity**

- 4.5.6** The option would have a beneficial effect by relieving the capacity constraint at Delta Junction, allowing an increase in DLR service frequencies on Stratford-Lewisham which would not be possible otherwise. This will lead to operational benefits and allow the future expansion of services currently running through Delta Junction.

#### **Noise**

- 4.5.7** The scheme would have some impact on noise due to its elevated alignment running close to office development close to South quay to the south of Wood Wharf. The scheme passes within 50 metres of 28 existing residential and 128 commercial properties, although no key receptors such as schools or hospitals would be affected.

#### **Contribution to Other Relevant Mayoral Strategies or NATA Objectives.**

- 4.5.8** Ecology/biodiversity: The scheme passes through:
- Poplar Dock and Blackwall Basin SBI, Grade 1, an area of Remnant vacant land, containing dockside and marginal vegetation, of particular importance to birds. The importance of the attribute is moderate with scarce resource and habitat types, green corridor function and docks and brownfield land a target habitat type within the LBAP;
  - Millwall and West India Docks SBI, Grade 2, a dock area of open water habitat, of particular importance to birds. The importance of the attribute is moderate with a green corridor function, a valuable bird resource and docks a target habitat type within the LBAP.
- 4.5.9** The Biodiversity and earth heritage values for both these areas are medium and the magnitude of the impact is forecast to be Neutral - Minor negative.

## **5. BANK-LIVERPOOL STREET/SHOREDITCH (E5/E6B)**

### **5.1 Description**

- 5.1.1** The extension of DLR from Bank to Liverpool Street comprises extending Bank - Lewisham (15tph) and Bank - Woolwich Arsenal (5tph) services from Bank via new tunnel to Liverpool Street with the objectives of alleviating interchange crowding at Bank and providing a direct link from national rail services at Liverpool Street, particularly NE London Suburban and West Anglia Main Line (WAML) trains to Docklands. A variant of this scheme, extending onwards from Liverpool Street to Bishopsgate Goods Yard and the East London Line Extension at Shoreditch High Street, was also considered.

### **5.2 Alignment and Operating Issues**

- 5.2.1** The proposed extension to Liverpool Street would run from the western end of the Bank overrun tunnel to a new DLR station at Liverpool Street that connects with LUL services and the proposed Crossrail line. Whilst this extension is quite short, it will be expensive because of its complicated interfaces with the proposed Liverpool Street Crossrail station.
- 5.2.2** There would be no need to retain a turnback facility at Bank station. This facility can be provided to the north of the new DLR Liverpool Street station. It is proposed that the existing Bank overrun tunnel become the new northbound tunnel, with the southbound linking in to the west end of the eastbound Bank station platform via a step-plate junction. This option would require agreement to a new tunnel under the Bank of England.
- 5.2.3** Provided that suitable agreements can be reached with the Crossrail team, the optimum alignment for the extension would seem to be underneath Finsbury Circus so that the DLR works can be integrated into the Crossrail proposals without prejudicing the designs of the ticket halls and escalators at each end of the Crossrail station.
- 5.2.4** The new overrun tunnel would be located under Finsbury Avenue or Wilson Street to keep clear of piled foundations for the Broadgate Development.
- 5.2.5** The vertical alignment for this option will be quite restricted by the need to cross under/over the following other tunnels and facilities:-
- Northern Line;
  - BT cable tunnel under London Wall;
  - disused Post Office Railway;
  - proposed Crossrail station at Liverpool Street;
  - Circle/Hammersmith and City line.

### **5.3 Costs**

- 5.3.1** The capital costs of the core scheme and the variant to Bishopsgate were estimated using the standard assumptions and are summarised in Table 5.1.

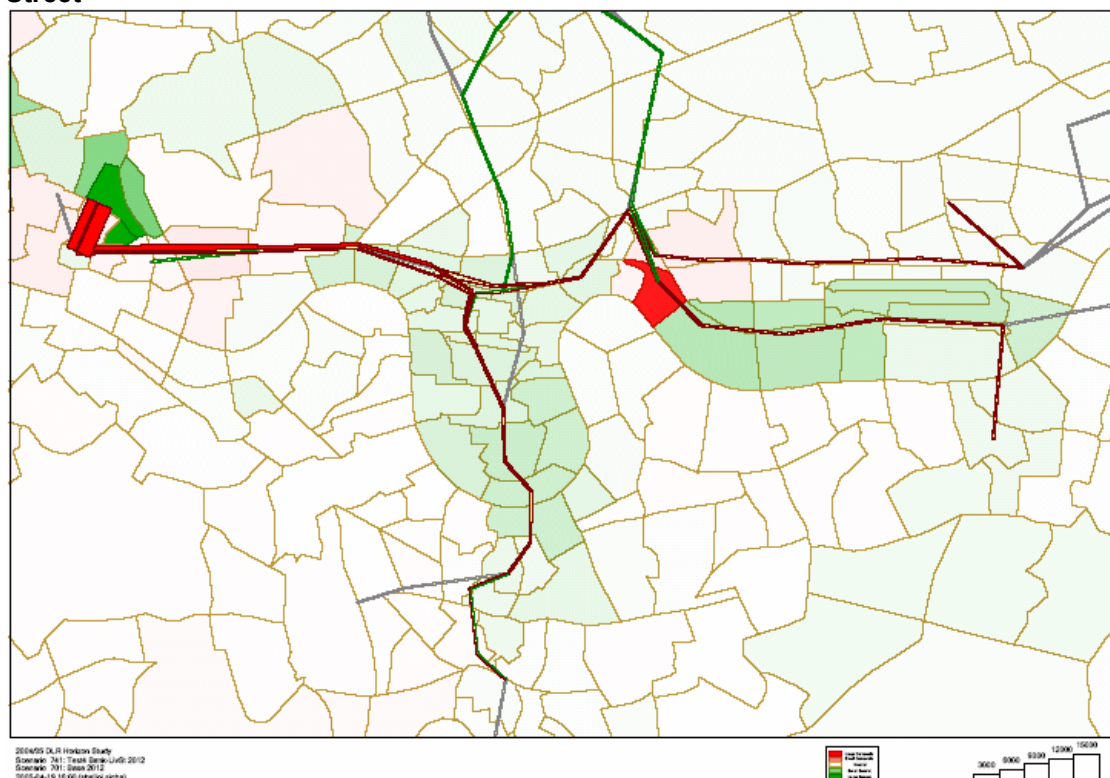
**Table 5.1 Bank-Liverpool Street or Bishopsgate Goods Yard (Shoreditch). Indicative Capital and Operating Costs, 2004**

<b>Capital and Operating Costs</b>	<b>Bank-Liverpool Street E5 (£m)</b>	<b>Bank-Bishopsgate E6B (£m)</b>
<b>Capital Costs:</b>		
Infrastructure	100.0	200.0
Rolling Stock	16.0	22.0
Rolling Stock Refurbishment	5.0	6.0
Land	6.0	14.0
National Rail	13.0	15.0
<b>Total</b>	<b>140.0</b>	<b>257.0</b>
<b>Total Including Optimism Bias</b>	<b>220.0</b>	<b>411.0</b>
<b>Annual Operating Costs:</b>	<b>1.9</b>	<b>2.9</b>

## 5.4 Demand Forecasts and Transport Benefits

- 5.4.1** The scheme creates significant additional demand on the West Anglia Main lines due to improved interchange at Liverpool Street, together with additional demand on the DLR Lewisham-Liverpool Street branch with significant increases on the line between South Quay and Liverpool Street. Improved interchange at Liverpool Street also results in increased demand on the Hammersmith & City/Metropolitan/Circle Lines between Liverpool Street and Kings Cross and the Central Line east of Liverpool Street.
- 5.4.2** Flows are highest on the new section of DLR between Liverpool Street and Bank where the forecast is around 8,750 passengers in 2012 in the southbound direction. Flow changes on DLR east of Bank are around 3,000 more eastbound and 1,130 westbound.
- 5.4.3** Improved interchange conditions at Liverpool Street also creates significant extra demand on the Hammersmith & City/Metropolitan/Circle Lines between Liverpool Street and Kings Cross (relieving the Northern Line) and some extra demand on the Central Line east of Liverpool Street. The increases are largest between Moorgate and Liverpool Street, with increases of over 4,000 eastbound and 2,000 westbound in 2012, reflecting improved links with GN services. There are also significant reductions in demand on District/H&C (east of Liverpool Street), Central Line (west of Liverpool Street) and Jubilee lines.
- 5.4.4** The effect of Crossrail, post 2012, is to reduce patronage on the Liverpool St - Lewisham section of DLR, and between Woolwich Arsenal and Canning Town. For the 2020 model tests, which includes Crossrail, there is a reduction in Crossrail morning peak (0700-1000) patronage to the Isle of Dogs of around 1,300 eastbound and 650 westbound.
- 5.4.5** Model runs show significant generalised journey time benefits for origins around Liverpool Street, on the national rail corridor north of Liverpool Street and along the Lewisham Branch. This is shown in Figure 5.1 along with flow changes on DLR.



**Figure 5.1 DLR Flow Changes and Generalised Journey Time Benefits. Bank-Liverpool Street**

**5.4.6** This option results in a significant increase in passenger kilometres on DLR as shown in Table 5.2.

**Table 5.2 Peak Period (0700-1000) Passenger Kilometres: Bank-Liverpool Street**

Mode	Do Minimum pass kms (2012)	Bank-Liverpool Street pass kms (2012)	Difference
DLR	459,600	493,400	+33,800
LUL	11,134,500	11,140,000	-5,500
National Rail	20,103,700	20,106,800	+3,100
<b>Total</b>			<b>+31,400</b>

**5.4.7** The scheme has a significant effect on interchange levels at Bank with a reduction of around 32% in 2012 and 23% in 2020. However, it should be noted that the do-minimum interchange flows at Bank in 2020 are significantly lower due to relief offered by Crossrail. The major benefits are to DLR-Central Line and DLR-Northern Line movements. There are slight corresponding increases to Bank-Waterloo & City Line movements. There is also a reduction in interchange between the East London Line and DLR at Shadwell due to flow reductions on the East London Line itself.

**5.4.8** The impact of the scheme on DLR planning capacity into and out of Bank was investigated. The 2012 do minimum ratio of DLR flow to planning capacity is 78%, i.e. there is around 20% spare capacity. Extending DLR to Liverpool Street increases the westbound flow into Bank by around 1300 passengers between 07:00 and 10:00. This increases the V/C ratio from 78% to 85%, implying some spare capacity. This is shown in Table 5.3.

**Table 5.3 Impact of E5 on DLR Crowding**

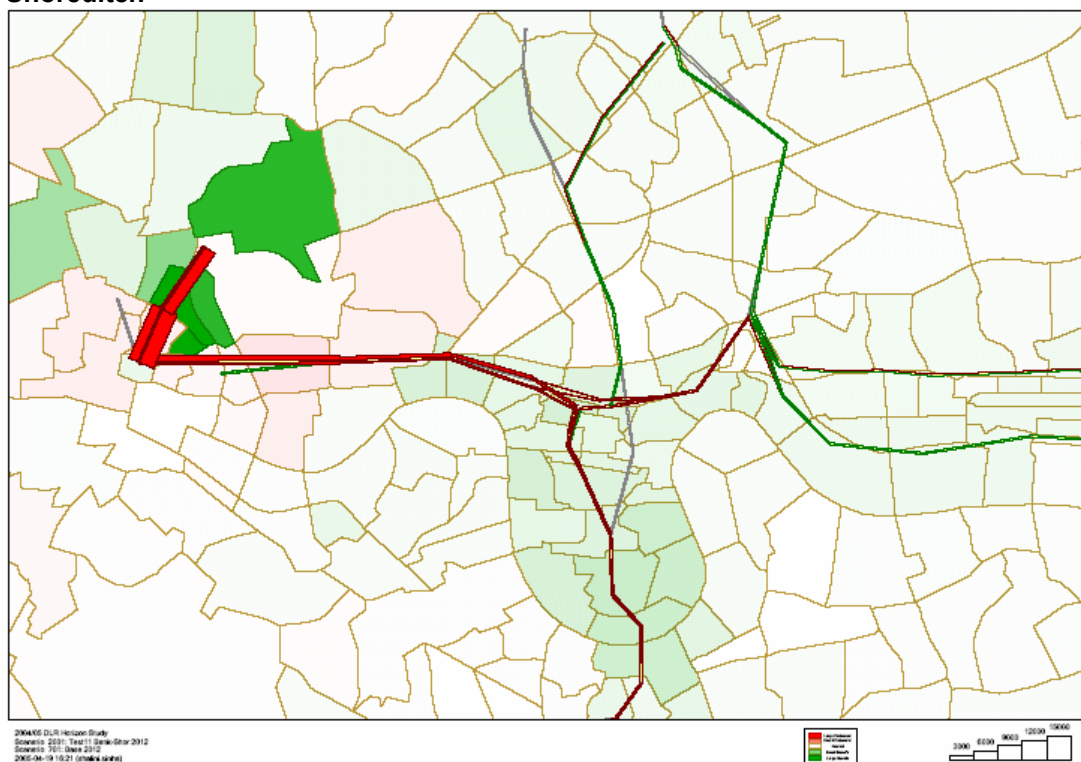
	Scheme			
	Do Minimum		With E5	
	2012	2020	2012	2020
E/B flow Bank-Shadwell 0700-1000	7,663	5,235	10,809	8,343
W/B flow Shadwell-Bank 0700-1000	14,377	8,658	15,656	10,267
Planning capacity Bank-Shadwell (peak hour) <sup>[1]</sup>	9,900	9,900	9,900	9,900
Peak hour V/C ratio Bank-Shadwell	42%	29%	59%	46%
Peak hour V/C ratio Shadwell-Bank	78%	47%	85%	56%

Note <sup>[1]</sup> Peak Hour taken as 54% of 0700-10:00 using standard TfL conversion factor

## 5.5 Bank-Liverpool Street-Shoreditch variant (E6B)

**5.5.1** A variant of the Liverpool Street scheme extends the Liverpool Street DLR onwards to Bishopsgate Goods Yard to tie in with the redevelopment and to provide interchange with the East London Line Extension at Shoreditch High Street. This leads to significant demand on DLR southbound between Shoreditch and Liverpool Street. Demand on the East London Line south of Shoreditch High Street falls by around 1,500 in 2012 and 800 in 2020. However, the majority of DLR demand between Shoreditch High Street and Liverpool Street is abstracted from local buses with a reduction of around 5,000 southbound passengers. Outside the Shoreditch/Liverpool Street area, the flow differences between the scheme and the do minimum are almost identical to the core Bank-Liverpool Street scheme.

**5.5.2** The generalised journey time benefits are very similar to the core scheme with the exception of large savings to passengers originating in the Shoreditch/Hoxton areas. This is shown in Figure 5.2, along with flow changes on DLR.

**Figure 5.2 DLR Flow Changes and Generalised Journey Time Benefits. Bank-Shoreditch**

## **5.6 Wider Impacts**

- 5.6.1** The wider scheme impacts for each option are contained in Appendix A which comprises the TfL Business Case spreadsheets. A commentary on the main points is given below.

### **Maintain Existing Transport Services**

- 5.6.2** The scheme extends the 20tph Bank DLR services onward to Liverpool Street with a variant of extending to Bishopsgate Goods Yard with an increase in planning capacity between these two stations of 9,900. This would result in interchange possibilities with the East London Line Extension. No services are removed as a result of the scheme.

### **Reduce Crowding and Congestion**

- 5.6.3** The scheme would have a significant effect on overcrowding and congestion with significant reductions in the level of interchange and congestion at Bank station and capacity relief for Central Line services between Bank and Liverpool Street. The major benefits are to DLR-Central Line and DLR-Northern Line movements. There are also significant reductions in demand and, therefore, crowding on the Central Line west of Liverpool Street, the Jubilee Line and the H&C Line east of Liverpool Street.

### **Promote Sustainable Development**

- 5.6.4** The core scheme would have a minimal impact on promoting sustainable development although the variant of extending to Shoreditch High Street would help promote the development of Bishopsgate Goods Yard and improve accessibility between Shoreditch regeneration area and City/Docklands.

### **Promote Equality and Inclusion**

- 5.6.5** The core scheme would have a small impact on equality and inclusion, although improved public transport services would benefit areas of low car ownership, high indices of multiple deprivation and high proportions of black and minority ethnic populations in East London. The variant of extending onwards to Shoreditch High Street would benefit the Hoxton, Haggerston and Dalston areas which all suffer from high indices of multiple deprivation, car ownership of 20%-40%, compared to a London average of 63% and unemployment rates of 4%-6% compared to a London average of 3.3%.

### **Expand Network Capacity**

- 5.6.6** The scheme would provides an additional 20 tph service between Liverpool Street and Bank, equating to an increase in planning capacity on this corridor of 9,900 per hour.

### **Integration (Including Interchange)**

- 5.6.7** The scheme would have a positive effect on interchange with improved access to DLR services, Circle, Metropolitan and the Hammersmith and City Lines.

### **Regeneration**

- 5.6.8** The variant of extending to Shoreditch High Street would provide a strong boost to the Bishopsgate Good Yard redevelopment.

**Noise, Townscape & Local Air Quality**

- 5.6.9** Because this scheme would be in tunnel throughout, there would be no effect under any of these objectives.

**Journey Ambience**

- 5.6.10** The effect on journey ambience would be strongly beneficial, due primarily to the reduction in congestion through Bank station, and crowding relief on Central Line.

## **6. BANK-MOORGATE-BARBICAN-FARRINGDON (E7)**

### **6.1 Description**

- 6.1.1** The DLR extension from Bank to Farringdon via Moorgate, utilising redundant Thameslink 2000 tunnels aims to provide interchange relief at Bank and link into GN services at Moorgate and Thameslink services at Farringdon. The extension could be served by extending Bank - Lewisham (15tph) and Bank - Woolwich Arsenal (5tph) services to Moorgate, Barbican and Farringdon.

### **6.2 Alignment and Operating Issues**

- 6.2.1** This extension was originally proposed to run from the western end of the Bank overrun tunnel, via Moorgate and Barbican, to Farringdon. Complications that the Crossrail scheme impose have significantly changed this proposal, including curtailing it to Barbican for reasons given below.
- 6.2.2** There would be no need to retain a turnback facility at Bank Station. It is proposed that the existing Bank overrun tunnel become the new northbound tunnel, with the southbound linking in to the west end of the eastbound Bank Station platform via a step-plate junction. This would require agreement to a new tunnel under the Bank of England.
- 6.2.3** It does not seem to be practicable to develop a DLR alignment that can use the existing City Widened Line platforms at Moorgate Station because of Crossrail's proposed western ticket hall. The preferred alignment is to run under Coleman Street, with a new DLR Moorgate Station underground near London Wall, before the DLR tracks turn west to reach the City Widened Lines alignment before the Barbican Development. New subways could be provided linking into the Crossrail western ticket hall for Liverpool Street, and the LUL station at Moorgate.
- 6.2.4** The extension would terminate at the existing Barbican Station at the platforms now used by Thameslink, with crossovers located to the east of the station. Whilst it would normally be preferable for the crossover to be west of the station to provide a headshunt, this is not practicable here because of the works associated with Crossrail's Farringdon Station.
- 6.2.5** The Eastern ticket hall for Crossrail's Farringdon Station is located between Lindsey Street and Hayne Street, only just beyond the western end of Barbican Station. It is, therefore, quite easy and economic to achieve good interchange with the Crossrail Farringdon Station without needing to extend DLR beyond Barbican. Whilst this arrangement will give less attractive interchange with the City Thameslink services, the Crossrail works associated with their Western ticket hall at Farringdon would probably prevent extending DLR far enough to provide direct interchange with City Thameslink.
- 6.2.6** As with the other City extension proposals, there are complex interfaces with a number of other underground railway and utility tunnels which will need to be accommodated in the design. These include:
- the disused Post Office Railway;
  - BT cable tunnel under London Wall;
  - Crossrail;
  - (disused) City Widened Lines.

- 6.2.7** It is critical to the feasibility of this extension that the interfaces with Crossrail's proposals for their Liverpool Street and Farringdon Stations are resolved at an early stage. If there is considered to be a realistic prospect of this extension being constructed, negotiations should be undertaken with the Crossrail Team as soon as possible, before the Crossrail Parliamentary Bill proceeds much further, while there is the maximum chance of amending the Crossrail scheme and while Crossrail have the need to overcome potential objections to their Bill.

## 6.3 Costs

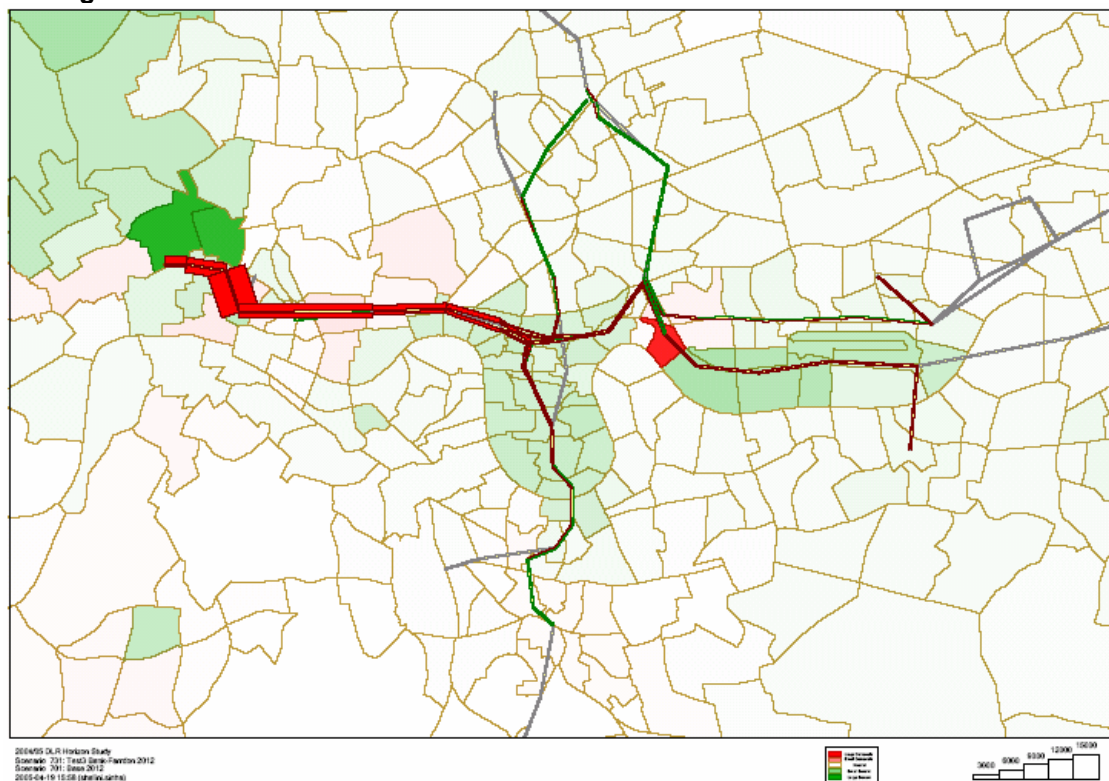
- 6.3.1** The capital costs of the scheme were estimated using standard assumptions and are summarised in Table 6.1.

**Table 6.1 Bank-Moorgate-Farringdon Indicative Capital and Operating Costs, 2004**

Capital and Operating Costs	£m
<b>Capital Costs:</b>	
Infrastructure	112.0
Rolling Stock	27.0
Rolling Stock Refurbishment	8.0
Land	8.0
National Rail	3.0
<b>Total</b>	<b>158.0</b>
<b>Total Including Optimism Bias</b>	<b>242.0</b>
<b>Annual Operating Costs:</b>	<b>1.9</b>

## 6.4 Demand Forecasts and Transport Benefits

- 6.4.1** The option results in large morning peak DLR patronage on the Barbican-Bank section, along with large flow increases in each direction between Bank and the Isle of Dogs of almost 3,000 passengers eastbound and 2,000 westbound in 2012. There are smaller increases on the DLR Lewisham and Beckton branches. Corresponding flow reductions occur on the Jubilee Line, with a decline east of Canary Wharf of 2,250 eastbound and 750 westbound. There are also flow reductions on the Central Line between Bond Street and Bank, on the Northern Line between Moorgate and Kings Cross and on Thameslink services south of Farringdon. The decline on this section is between 300 and 700 passengers northbound, and between 450 and 1,150 southbound.
- 6.4.2** Patronage increases are forecast to occur on H&C/Circle/Metropolitan Line services between Baker Street and Moorgate of 1,600 eastbound and 1,100 westbound, on GN services into Moorgate and Thameslink services between Kings Cross and Farringdon (3,100 southbound and 650 northbound). It appears that the option encourages interchange from the sub-surface lines to DLR at Moorgate.
- 6.4.3** The introduction of Crossrail in later years has the effect of reducing the flow changes.
- 6.4.4** Generalised cost reductions are widespread and occur in two main concentrations: along the Circle Line corridor and north west London and in the entire Isle of Dogs/Royal Docks/Lewisham areas. This is shown in Figure 6.1, along with flow changes on DLR.

**Figure 6.1 DLR Flow Changes and Generalised Journey Time Benefits. Bank-Farringdon**

**6.4.5** Table 6.1 indicates that, whilst there is a significant increase in passenger kilometres on DLR, there is a larger reduction on LUL, reflecting the reductions experienced on the Jubilee, Central and Northern Lines. The increase in NR passenger kilometres, as a result of flow increases on GN services into Moorgate and Thameslink services south of Kings Cross results in a small net increase in passenger kilometres.

**Table 6.2 Peak Period (0700-1000) Passenger Kilometres: Bank-Moorgate-Barbican-Farringdon**

Mode	Do Minimum pass kms (2012)	With E7 pass kms (2012)	Difference
DLR	459,600	519,100	+59,500
LUL	11,134,500	11,058,100	-76,400
National Rail	20,103,700	20,123,000	+19,300
<b>Total</b>			<b>+2,400</b>

**6.4.6** The scheme is particularly successful at offering reductions in the level of crowding at Bank with a 60% reduction in interchange in 2012 and a 16% reduction in 2020. However, it should be noted that the do-minimum interchange flows at Bank in 2020 are significantly lower due to relief offered by Crossrail. Whilst the effect of the scheme on the level of interchange at Canary Wharf in 2012 is largely neutral, interchange in 2020 falls by some 75%, due almost entirely to very large reductions in the level of Crossrail-DLR interchange. This is due to flow reductions on Crossrail because DLR is providing a direct alternative.

**6.4.7** The impact of the scheme on DLR crowding into and out of Bank was investigated. The 2012 do minimum ratio of DLR flow to planning capacity is 78%, i.e. there is around 20% spare

capacity. Extending DLR to Farringdon increases the westbound flow into Bank by around 2900 passengers between 07:00 and 10:00. This increases the V/C ratio from 78% to 94%, implying that DLR would be approaching capacity on this section. However, the DLR flows on the new sections of DLR between Bank and Farringdon would operate below capacity. This is shown in Table 6.3

**Table 6.3 Impact of Scheme E7 on DLR Crowding. Bank-Shadwell**

	Scheme			
	Do Minimum		Bank-Farringdon	
	2012	2020	2012	2020
E/B flow Bank-Shadwell 0700-1000	7,663	5,235	11,933	9,623
W/B flow Shadwell-Bank 0700-1000	14,377	8,658	17,249	11,383
Planning capacity Bank-Shadwell (peak hour) <sup>[1]</sup>	9,900	9,900	9,900	9,900
Peak hour V/C ratio Bank-Shadwell	42%	29%	65%	52%
Peak hour V/C ratio Shadwell-Bank	78%	47%	94%	62%

Note <sup>[1]</sup> Peak Hour taken as 54% of 0700-10:00 using standard TfL conversion factor

## 6.5 Wider Impacts

**6.5.1** The wider scheme impacts for each extension are contained in Appendix A which comprises the TfL Business Case spreadsheets. A commentary on the main points is given below.

### Maintain Existing Transport Services

**6.5.2** The scheme extends the 20tph Bank DLR services onward to Farringdon with an increase in planning capacity of 9,900. The extension would provide services on the Thameslink spur to Moorgate likely to be vacated by TL2000, although this is already covered by the Metropolitan/Hammersmith and Circle Line/Circle. Existing Thameslink services to Moorgate will cease to allow Crossrail construction.

### Reduce Crowding and Congestion

**6.5.3** The scheme will result in significant reductions in the level of interchange and congestion at Bank station of over 60% in 2012 and 16% in 2020 and crowding relief for Central Line services between Bond Street and Bank, the Northern Line between Moorgate and Kings Cross and the Jubilee Line.

### Promote Equality and Inclusion

**6.5.4** The scheme will have a small impact, although improved DLR service would benefit areas of low car ownership, high indices of multiple deprivation and high proportions of black and minority ethnic populations in East London.

### Expand Network Capacity

**6.5.5** The scheme will provides additional planning capacity between Barbican and Bank of almost 10,000 pax.hr/direction providing relief for Bank station and Circle/Hammersmith lines which may be impacted by CrossRail and loss of Thameslink to Moorgate.



**Integration (Including Interchange)**

- 6.5.6** The scheme will have a highly positive effect by providing new direct interchange between DLR, TL2000, GN suburban and Crossrail.

**Journey Ambience**

- 6.5.7** The scheme will have a positive impact. Reduction in congestion through Bank station, resulting in faster and more comfortable journeys, particularly at peak times.

## 7. LEWISHAM-CATFORD (E13)

### 7.1 Description

- 7.1.1** The Lewisham-Catford extension would project the DLR Bank - Lewisham service from Lewisham alongside the existing rail line with stops at Ladywell, Catford Medusa Road and Catford Station. The objectives of the scheme include improved DLR penetration further into south London providing direct access from Ladywell and Catford to Docklands.

### 7.2 Alignment and Operating Issues

- 7.2.1** Major topographic constraints south of Lewisham Station would necessitate a long length (at least 500 to 600 metres) of viaduct or tunnel at Lewisham Station because of:-

- the railway overbridge immediately north of Lewisham DLR Station
- the road (Loampit Vale) and river immediately south of the Station.

This would necessitate a new DLR Lewisham Station, either elevated or in tunnel.

- 7.2.2** There would be an interface between any possible DLR extension and the Lewisham Gateway development that would need to be carefully considered.

- 7.2.3** South of Lewisham the proposed alignment is alongside and east of the Mid-Kent Railway line. Some complex bridge works are necessary and there are tight alignment constraints at Doggett Road, to the North of Ladywell Road, and on the approach to Catford Bridge Station. Whilst some of these issues – together with the necessary modifications to Ladywell Station and Catford Bridge Station – are significant; they are less critical than the interface near Lewisham Station.

- 7.2.4** It is assumed that all peak period Bank-Lewisham services (15tph) would be extended to Catford, leading to a increase in the number of trains servicing Catford.

### 7.3 Costs

- 7.3.1** The capital costs of the scheme were estimated using standard assumptions and are summarised in Table 7.1.

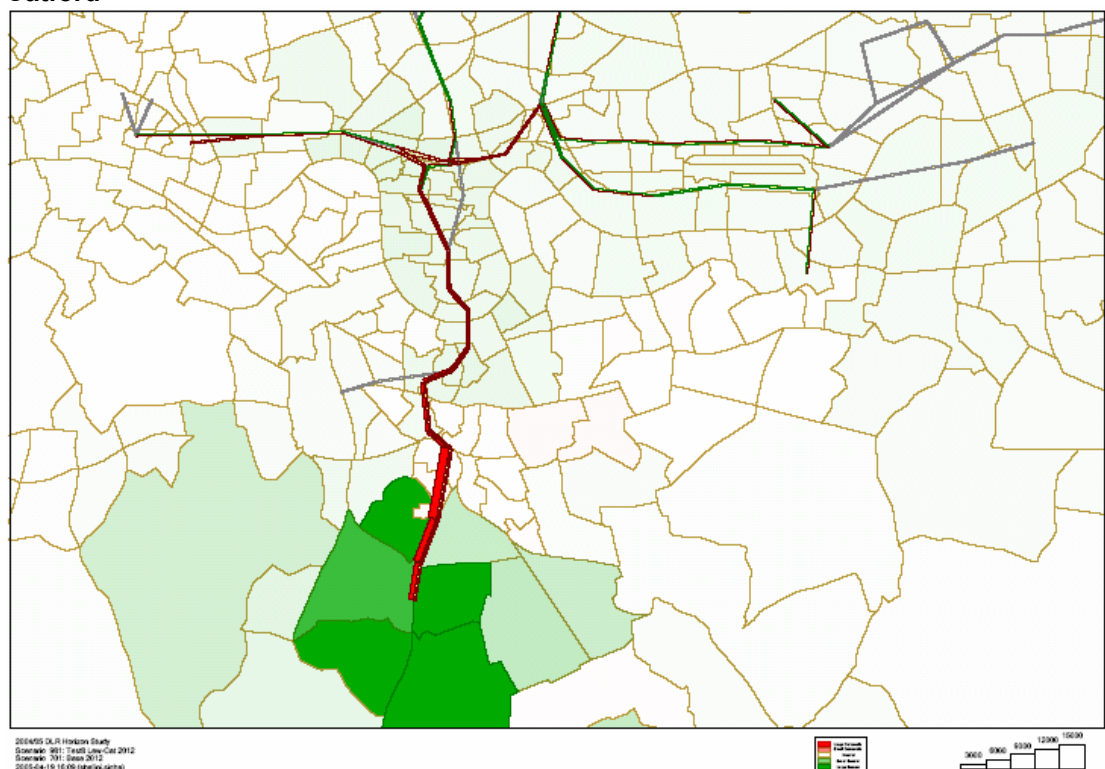
**Table 7.1 Lewisham-Catford. Indicative Capital and Operating Costs, 2004**

Capital and Operating Costs	£m
<b>Capital Costs:</b>	
Infrastructure	111.0
Rolling Stock	22.0
Rolling Stock Refurbishment	6.0
Land	13.0
National Rail	5.0
<b>Total</b>	<b>157.0</b>
<b>Total Including Optimism Bias</b>	<b>245.0</b>
<b>Annual Operating Costs:</b>	<b>1.5</b>

## 7.4 Demand Forecasts and Transport Benefits

- 7.4.1** There are significant peak flows on the northbound DLR extension between Catford and Lewisham of around 7,000 northbound and 1,500 southbound and between Lewisham and Canary Wharf of around 1,700 northbound and 400 southbound. The effect on the remainder of the DLR network is minimal.
- 7.4.2** The majority of the DLR demand is abstracted from local bus services with significant reductions on northbound bus services between Catford and Lewisham (3,500 northbound, 1,000 southbound) and on northbound services into New Cross (1,000 northbound, 100 southbound) , indicating that the scheme attracts Catford and Lewisham traffic.
- 7.4.3** There are decreases on National Rail between Catford and Lewisham (-800 passengers), Catford and Nunhead (-300 passengers) and Forest Hill and Brockley (-500 passengers). The scheme also encourages passengers to change to National rail at Lewisham with an increase in interchange between DLR and National Rail at Lewisham of approximately 2,000 passengers, suggesting that the scheme has the effect of re-routing Central London demand.
- 7.4.4** The scheme also reduces East London Line patronage with a decline of approximately 650 passengers between Surrey Quays and Canada Water northbound. In addition, the eastbound Jubilee Line between Canada Water and Canary Wharf experiences a reduction in patronage of approximately 500 passengers. This suggests that the scheme has some effect in re-routing traffic for the Isle of Dogs, confirmed by a reduction on the interchange walk link between East London Line and Jubilee Line at Canada Water of 500.
- 7.4.5** There are significant reductions in generalised cost for trips from the Catford-Lewisham corridor but also for areas through the Isle of Dogs and as far north as Stratford. This is shown in figure 7.1, along with flow changes on DLR.

**Figure 7.1 DLR Flow Changes and Generalised Journey Time Benefits. Lewisham-Catford**



- 7.4.6** Table 7.2 indicates a significant increase in DLR passenger kilometres with corresponding but smaller reductions in passenger kilometres on other rail services.

**Table 7.2 Peak Period (0700-1000) Passenger Kilometres for Scheme E13**

<b>Mode</b>	<b>Do Minimum pass kms (2012)</b>	<b>With E13 pass kms (2012)</b>	<b>Difference</b>
DLR	459,600	486,100	+26,500
LUL	11,134,500	11,132,900	-1,600
National Rail	20,103,700	20,097,000	-6,700
<b>Total</b>			<b>+18,200</b>

- 7.4.7** The scheme has very little effect on either the level of interchange at Bank or on the level of flow, and hence crowding into and out of Bank. There is significant demand attracted to the new sections of DLR approaching Lewisham station from the south, with a maximum 07:00-10:00 one-way flow of around 5,100 in 2012 and 6,600 in 2020. The service pattern would be an extension of the Bank-Lewisham 3 car trains with a planning capacity of 8,100 per hour. The peak hour flow would be around 3,600 in 2020, giving a V/C ratio of around 45%. To the north of Lewisham station, the 07:00-10:00 flows rise from around 8,000 in the do minimum to around 10,750 in 2020; the peak hour flow of 5,800 would increase the V/C ratio from around 55% to 72%.

## **7.5 Wider Impacts**

### **Maintain Existing Transport Services**

- 7.5.1** The scheme will extend Bank-Lewisham 3-car services to Catford, providing additional planning capacity of 8,100 per hour along this corridor. Some corresponding reduction in parallel bus services is likely but probably not on heavy rail services.

### **Improve Safety and Security**

- 7.5.2** Small likely mode shift may result in reduced highway accidents. New high frequency public transport service south of Lewisham with staff on trains will maintain personal security.

### **Reduce Crowding and Congestion**

- 7.5.3** The scheme would provide relief to heavy rail and buses between Lewisham and Catford. However, additional patronage north of Lewisham will lead to increased crowding on this section, although still well within DLR planning capacity.

### **Promote Sustainable Development**

- 7.5.4** The scheme will support redevelopment around Catford station, and could play a role in the Lewisham Masterplanning exercise. It will also service a new station at Catford Medusa Road which will encourage more sustainable travel.

### **Promote Equality and Inclusion**

- 7.5.5** The extension will serve areas with a high percentage of disability claimants, 4% to 6% compared to a London average of 3.4%. The higher level of service will benefit the mobility impaired due to step-free access to DLR. Services will pass through wards in LB Lewisham

with unemployment rates of between 6% and 10%, compared to a London average of 3.3%. It will also serve areas with 40-60% black and minority ethnic populations compared with a London average of 37%.

### **Expand Network Capacity**

- 7.5.6** Although the service replicates existing heavy rail and high frequency bus services, there would be a net increase in capacity. The service would provide direct access from greater parts of south London to Docklands.

### **Integration (Including Interchange)**

- 7.5.7** Positive. Improved connectivity to Docklands from South London rail routes, may be some disbenefit to existing Lewisham passengers depending on patronage generated by the extension.

### **Regeneration**

- 7.5.8** The scheme will support redevelopment around Catford station.

### **Noise**

- 7.5.9** Minimal impact, as extension runs alongside existing heavy rail line. However, 205 residential and 48 commercial properties are within 50m of the alignment.

### **Local Air Quality/Reduction of Greenhouse Gases**

- 7.5.10** Small positive benefit as a result of small mode shift from car and from bus.

### **Townscape**

- 7.5.11** Minimal impact as extension would run alongside existing heavy rail lines. However, it would need integrating with the Lewisham Masterplan.

### **Physical Fitness**

- 7.5.12** Demand forecasts do not give an estimate of modal switch. Key information on isochrone plots and population distribution not available. However, any switch from car to public transport is likely to increase walking and aid fitness.

### **Journey Ambience**

- 7.5.13** Small benefit. Replication of bus and heavy rail lines between Lewisham and Catford, improved connections to Docklands and Stratford.

### **Ecology**

- 7.5.14** The scheme would pass near to Railside Land SBI, Grade 2 (Lewisham Rail Triangles), St Mary's Churchyard, SBI Grade 2 and Ladywell Fields SLI. All are categorised as of local scale and moderate importance. Effect of extension on each respectively is -2 (moderate adverse), 0 (neutral) and -1 (slight adverse).

## **8. BANK-ALDWYCH-CHARING CROSS (E2)**

### **8.1 Description**

- 8.1.1** The extension would comprise extending Bank services to Charing Cross via City Thameslink and Aldwych. The extension would, as far as possible, utilise the corridor of the existing Jubilee Line tunnels between Charing Cross and Aldwych, Aldwych Station and redundant Jubilee Line platforms at Charing Cross. Possible benefits of the scheme would be relief of interchange at Bank, congestion relief to LUL lines and improved access to Docklands from other areas.

### **8.2 Alignment and Operating Issues**

- 8.2.1** The existing overrun tunnel at Bank would probably be retained so that there was still the possibility of reversing trains without any disruption to the rest of the service. This would necessitate the construction of junctions at the west end of each of the Bank Station platforms, leaving the existing overrun tunnel between the new tunnels to Charing Cross. There would be significant issues in this area with respect to tunnelling under particularly sensitive buildings, the eastbound tunnel would be under the Bank of England, and the westbound tunnel would be very close to the Mansion House.
- 8.2.2** Much of the rest of the alignment for the eastern part of the route would need to be investigated in detail to establish the optimised route that is clear of piled foundations for buildings because, in this area, it is not feasible to run under streets. To the west of Ludgate Circus it should be possible to find an alignment that is under streets.
- 8.2.3** The part of the route between Bank Station and City Thameslink DLR Station is quite complicated because of the need to avoid numerous railway and utility tunnels in the area. The tunnels to be crossed include the following, as shown on the plan for the City options:
- Northern Line;
  - Central Line (twice);
  - Post Office Railway (twice);
  - BT cable tunnel under Coleman Street;
  - City Thameslink.
- 8.2.4** The DLR City Thameslink Station would provide interchange with Thameslink services and could probably use the existing entrances at street level.
- 8.2.5** Aldwych Station could use some of the facilities of the disused Piccadilly Line Station, but extensive additional works would be needed because that station only has lift access rather than escalator access – which would probably be required. Nevertheless, this would seem to be the optimal location for the station, possibly with acquisition of the two buildings between the existing station and Surrey Street. It is understood that the existing station is listed, hence parts of the station may need to be retained.
- 8.2.6** To the west of Aldwych, the alignment to Charing Cross follows that of the disused Jubilee Line tunnels. Unfortunately, these tunnels are too small for DLR trains, being 3,850mm internal diameter compared to the 5,200mm needed for DLR. Even if any need for an emergency walkway could be eliminated, the Jubilee Line tunnels would still be too small.

- 8.2.7** Enlarging the Jubilee Line tunnels to make them suitable for DLR would be very expensive, possibly about the same cost as building entirely new tunnels – but this is probably the preferable solution because of the reduced amount of excavated material to be disposed of and the greater ease in using the existing Charing Cross Station platforms for the Jubilee Line. It is hoped that the station tunnels can be used without any need for their enlargement.
- 8.2.8** It should be noted that use of the former Jubilee Line station at Charing Cross would eliminate the emergency turn-back facility that LUL currently has there for Jubilee Line trains from the northwest. This would need to be reviewed/agreed with LUL.
- 8.2.9** The 20tph DLR peak service extended from Bank could reverse west of the JL station using the existing scissors crossover tunnel. JL tunnels would need to be enlarged into the DLR headshunts.

### 8.3 Costs

- 8.3.1** The capital costs of the scheme were estimated using standard assumptions and are summarised in Table 8.1.

**Table 8.1 Bank-Aldwych-Charing Cross. Indicative Capital and Operating Costs, 2004**

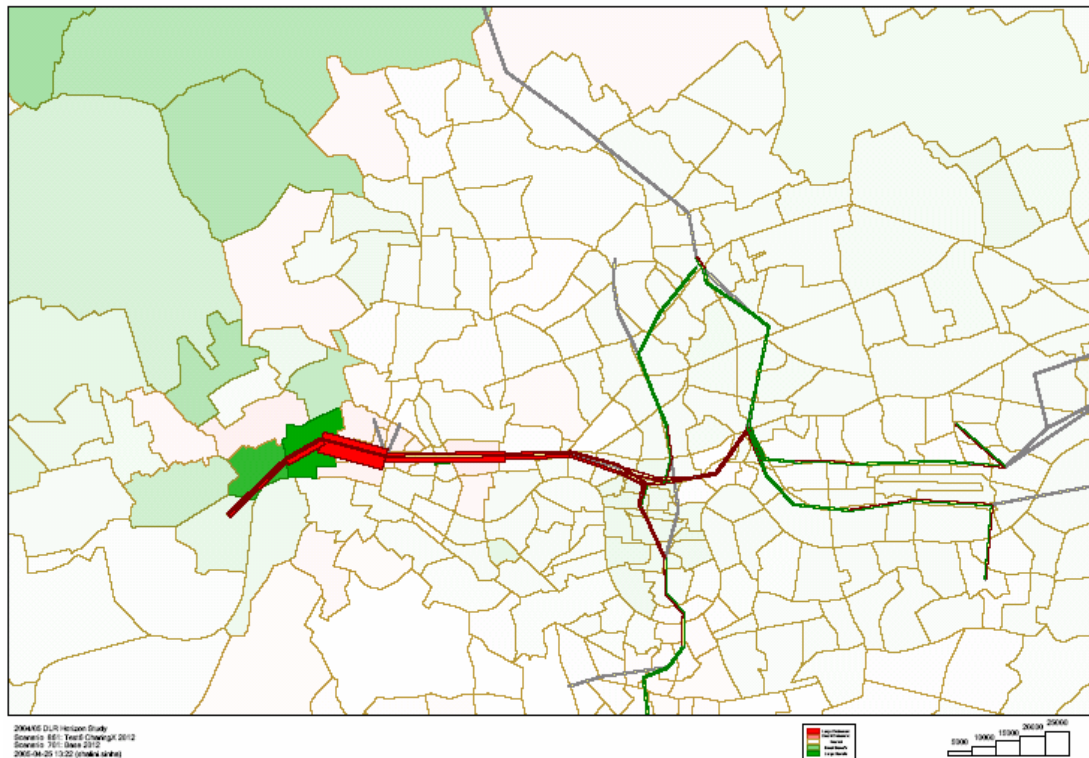
Capital and Operating Costs	£m
<b>Capital Costs:</b>	
Infrastructure	232.0
Rolling Stock	32.0
Rolling Stock Refurbishment	9.0
Land	17.0
National Rail	1.0
<b>Total</b>	<b>291.0</b>
<b>Total Including Optimism Bias</b>	<b>461.0</b>
<b>Annual Operating Costs:</b>	<b>2.8</b>

### 8.4 Demand Forecasts and Transport Benefits

- 8.4.1** The extension attracts significant passenger traffic, in the order of 30 million passenger journeys on DLR in 2012. However, this scheme was tested using TFL's Railplan model, rather than the DPTM model used for all other schemes, because it extends beyond DPTM's area of detail. The major flows occur westbound between Bank and Aldwych, with morning peak flows (0700-1000) in excess of 15,000 westbound and 3,100 eastbound. Aldwych is a key station with most passengers ending their journey there; the westbound flows between Aldwych and Charing Cross are substantially lower, at around 1,200 passengers.
- 8.4.2** There is an increase in peak demand on DLR of between 1,500 and 5,000 passengers on the westbound section between Westferry and Bank. There is a smaller amount of additional demand attracted on the northbound section between Cutty Sark and Westferry (approximately 500 passengers), and on the westbound section between Canning Town and Westferry (approximately 350 passengers). There is a small decline in patronage on the northbound section between Canning Town and Stratford International.

- 8.4.3** There is significant abstraction from adjacent LUL lines, particularly the westbound Central Line between Liverpool Street and Bank (-2,500 to -4,100 passengers), the westbound District Line between Tower Hill and Temple (-2,300 to -4,000 passengers), the eastbound District line between Embankment and Temple (approximately 2,400 passengers), the eastbound sub-surface lines between Farringdon and Moorgate (approximately 1,000 passengers) and the Jubilee Line (to/from Isle of Dogs).
- 8.4.4** The scheme attracts some passengers from National Rail, most notably at City Thameslink where there is an increase in flow on Southbound Thameslink services between Farringdon and City Thameslink of approximately 2,500 passengers. There appears to be much lower interchange on northbound National Rail into Charing Cross (an increase of approx. 250 passengers). There also appears to be some interchange from C2C services at Limehouse; there is an increase of approx. 250 passengers on westbound C2C into Limehouse. Generalised Journey time benefits are fairly widespread across west London and these, along with flow changes on DLR are shown on Figure 8.1.
- 8.4.5** A significant amount of demand is attracted from bus services in the vicinity of the scheme with a reduction of approximately 3,500 passengers on eastbound bus services.
- 8.4.6** The scheme is only marginally successful at offering reductions in the level of crowding at Bank with a 3% reduction in interchange in both 2012 and 2020. The major benefits are to DLR-Central Line westbound and DLR-Monument (District Line) movements.

**Figure 8.1 DLR Flow Changes and Generalised Journey Time Benefits. Bank-Charing Cross**



- 8.4.7** The impact of the scheme on DLR planning capacity into and out of Bank was investigated. The 2012 07:00 - 10:00 forecast flow is around 20,200, with a peak hour demand of 10,900. Comparing this to the planning capacity of 9,900 gives a V/C ratio of 110%, implying that DLR would be operating somewhat above planning capacity, although below crush capacity, on this section.. This is shown in Table 8.2.



**Table 8.2 Impact of Scheme E2 on DLR Crowing Bank-Shadwell**

	Scheme			
	Do Minimum		Bank-Farringdon	
	2012	2020	2012	2020
E/B flow Bank-Shadwell 0700-1000	7,663	5,235	13,559	12,949
W/B flow Shadwell-Bank 0700-1000	14,377	8,658	20,220	19,904
Planning capacity Bank-Shadwell (peak hour) <sup>[1]</sup>	9,900	9,900	9,900	9,900
Peak hour V/C ratio Bank-Shadwell	42%	29%	74%	71%
Peak hour V/C ratio Shadwell-Bank	78%	47%	110%	109%

Note <sup>[1]</sup> Peak Hour taken as 54% of 0700-10:00 using standard TfL conversion factor

## 8.5 Wider Impacts

### Maintain Existing Transport Services

- 8.5.1** This option is strongly beneficial, unless parallel bus services are trimmed, with no loss of service and an extension of the 20tph Bank DLR services to Charing Cross providing improved interchange with TL2000 at City Thameslink, potentially Cross River Tram at Aldwych, and Heavy Rail/LUL and bus services at Charing Cross. There is an increase in TfL planning capacity of 9,900 per hour west of Bank.

### Improve Safety and Security

- 8.5.2** The scheme will provide some benefits in terms of reduction in the amount of interchange at Bank and lower levels of crowding on a number of LUL lines.

### Reduce Crowding and Congestion

- 8.5.3** This option will have very strong benefits due to reduced crowding on Central, Jubilee, District/Circle and Northern Lines. Some reduction in interchange and congestion at Bank station.

### Promote Sustainable Development

- 8.5.4** This option would have a minimal direct impact but would strengthen London's public transport network generally.

### Promote Equality and Inclusion

- 8.5.5** The extension itself would have minimal impact other than providing more direct connections from east and south east London, with above average levels of unemployment and of black and minority ethnic populations and below average car ownership, to larger parts of central London at 20tph which might be increased if necessary. Further extensions westward from Charing Cross could provide further benefits.

### Expand Network Capacity

- 8.5.6** The scheme would have a significant impact on expanding network capacity with additional planning capacity of 9,900/hour on an east-west alignment through central London.

**Integration (Including Interchange)**

- 8.5.7** The scheme would have strong positive effects with no loss of service, and an extension of Bank DLR services to Charing Cross improving interchange with TL2000 and City Thameslink, and possibly, with Cross River Tram.

**Noise/Townscape**

- 8.5.8** The scheme would have a neutral effect as it would be in tunnel throughout.

**Local Air Quality/Reduction of Greenhouse Gases**

- 8.5.9** Some modal shift from car/bus/taxi, and hence improvements in air quality are expected but these are unlikely to be significant.

**Physical Fitness**

- 8.5.10** The demand forecasts do not give estimate of modal switch. However, any switch to public transport would increase the amount of walking and should increase physical fitness.

**Journey Ambience**

- 8.5.11** Positive impact. A Reduction in congestion through Bank station and crowding relief on parallel LUL lines. Reduced interchange for Docklands passengers from Central London.

## **9. GREENWICH-NEW CROSS AND NEW CROSS GATE (E12)**

### **9.1 Description**

- 9.1.1** The extension from Greenwich to New Cross and New Cross Gate would comprise a branch from west of Greenwich to interchange stations with NR at New Cross and New Cross Gate. The objective of this extension would be to open up areas of South London to DLR by providing interchange opportunities with the ELL and National Rail. This is one of the few extension proposals that would form a 'spur' leading to some potential operational and capacity issues.

### **9.2 Alignment and Operating Issues**

- 9.2.1** The extension westward from Greenwich DLR Station would be on viaduct until beyond Deptford Creek, and would descend into tunnel between the Creek and Church Street. It would probably be necessary to close Creekside (Road) where it crosses the alignment.
- 9.2.2** There is probably insufficient space available for a grade-separated junction between the New Cross and Lewisham Lines, but this would need to be considered further when any detailed design is undertaken. We assumed a flat junction. Apart from the possibility of any need to close Creekside, there is only a limited impact on properties in the area where the route changes from viaduct to tunnel construction. Most of the land in this area is undeveloped.
- 9.2.3** The DLR Stations at New Cross and New Cross Gate would be underground. Significant modifications would be needed to both existing stations to provide efficient interchange with the Network Rail and ELL services, but these should not be insurmountable. Both New Cross and New Cross Gate would be served by the East London Line Project, with New Cross Gate being substantially busier and adjacent to a bus station. Given the close proximity of the two stations, consideration could be given to serving just New Cross Gate.
- 9.2.4** In the Do Minimum case there are 25tph operating at peak times through Greenwich to Lewisham. The NX extension would require at least 10tph generating a reduction in capacity on the Greenwich-Lewisham. This shortfall could to be plugged by extending Woolwich Arsenal-Canary Wharf trains to Lewisham. This would give 30tph between Canary Wharf and Greenwich. This does result in a net reduction of 5 tph between Greenwich and Lewisham (although there is a 5 tph increase between Canary Wharf and Greenwich). The O&M costs would, therefore, be greater than those on the new extension.

### **9.3 Costs**

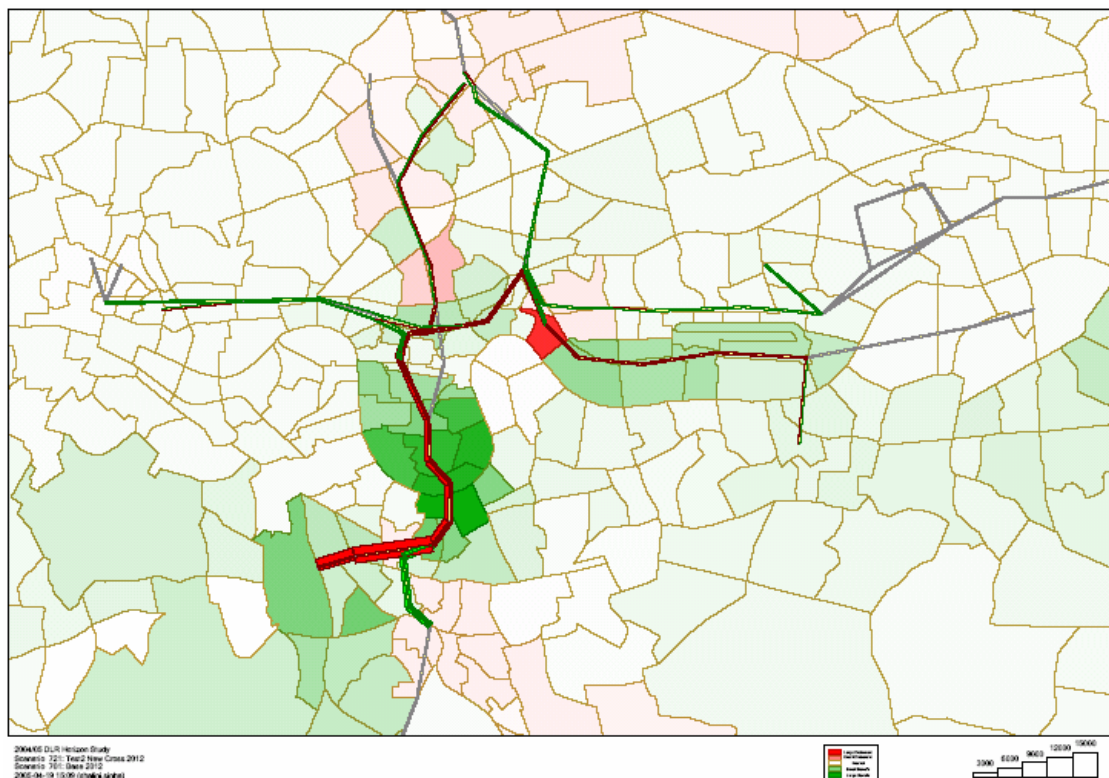
- 9.3.1** The capital costs of the scheme were estimated using standard assumptions and are summarised in Table 9.1.

**Table 9.1 Greenwich-New Cross Gate. Indicative Capital and Operating Costs, 2004**

<b>Capital and Operating Costs</b>	<b>£m</b>
<b>Capital Costs:</b>	
Infrastructure	156.0
Rolling Stock	18.0
Rolling Stock Refurbishment	5.0
Land	5.0
National Rail	2.0
<b>Total</b>	<b>186.0</b>
<b>Total Including Optimism Bias</b>	<b>296.0</b>
<b>Annual Operating Costs:</b>	<b>1.8</b>

## 9.4 Demand Forecasts and Transport Benefits

- 9.4.1** In the morning peak (0700-1000) forecast patronage on the new DLR branch towards Docklands is over 5,000 passenger, but with reductions of around 1,500 northbound on DLR between Lewisham and Greenwich due to the reduction in service on this section. There are also smaller patronage reductions between Westferry and Bank, due to fewer Lewisham-Bank through trains. A large proportion of passengers using the service in the morning peak wish to access Canary Wharf, with only a small proportion travelling further.
- 9.4.2** The extension abstracts passengers from ELL services to Canada Water and the JLE, most notably between Canada Water and Canary Wharf where flows fall by around 2,500.
- 9.4.3** The scheme results in patronage reductions on the South Eastern Line from New Cross to Lewisham as passengers would have a direct route into Docklands from New Cross and hence do not need to use the interchange at Lewisham. This further explains the reduction in patronage on the Lewisham-Greenwich section of DLR. Model results from 2020 indicate that Crossrail does not have a significant impact on the scheme.
- 9.4.4** Model runs show generalised cost reductions around New Cross in particular but also between Greenwich and Canary Wharf, which benefits from an increased service frequency. There are also benefits along the Woolwich/City Airport extension due to the introduction of direct services to Lewisham. There are generalised journey time disbenefits to areas between Greenwich and Lewisham, particularly to the east of DLR, due to the reduction in service level on DLR to Lewisham. The generalised journey time changes associated with the scheme, along with flow changes on DLR, are shown in Figure 9.1.

**Figure 9.1 DLR Flow Changes and Generalised Journey Time Benefits. New Cross/New Cross Gate Extension**

**9.4.5** The scheme results in a significant increase in DLR passenger kilometres. However, these are largely cancelled out by reductions in passenger kilometres on Jubilee Line and East London Line services. Reductions in passenger kilometres on National Rail result in a net reduction for the scheme reflecting net time savings to rail users.

**Table 9.2 Peak Period (0700-1000) Passenger Kilometres: Greenwich-New Cross/New Cross Gate**

Mode	Do Minimum pass kms (2012)	Pass kms with E12	Difference
DLR	459,600	481,500	+21,900
LUL	11,134,500	11,109,700	-24,800
National Rail	20,103,700	20,100,500	-3,200
<b>Total</b>			<b>-6,100</b>

**9.4.6** The scheme has very little effect on either the level of interchange at Bank or on the level of flow, and hence crowding into and out of Bank. There is a relatively high level of demand attracted to the new sections of DLR particularly westbound between New Cross and Greenwich, with a maximum 07:00-10:00 one-way flow of around 5,100 in both 2012 and 2020. However, the assumed 10tph service would give a planning capacity of 3,600 per hour, giving a V/C ratio on this section of around 80%.

**9.4.7** Whilst new services are provided from Greenwich to New Cross / New Cross Gate, the scheme would operate as a spur from Lewisham branch resulting in a reduction in current service frequency to Lewisham. Woolwich Arsenal-Canary Wharf services are extended onward to Lewisham but this still results in a net reduction of 5 tph between Greenwich and Lewisham (although there is a 5 tph increase between Canary Wharf and Greenwich). It also duplicates some of the benefits of the East London Line extension.

## **9.5 Wider Impacts**

### **Maintain Existing Transport Services**

- 9.5.1** Whilst new services are provided from Greenwich to New Cross / New Cross Gate, the scheme would operate as a spur from Lewisham branch resulting in a reduction in current service frequency to Lewisham. Woolwich Arsenal-Canary Wharf services are extended onward to Lewisham but this still results in a net reduction of 5 tph between Greenwich and Lewisham (although there is a 5 tph increase between Canary Wharf and Greenwich).

### **Improve Safety and Security**

- 9.5.2** Improvements to safety and security of new passengers who would previously have used other public transport modes.

### **Reduce Crowding and Congestion**

- 9.5.3** The scheme will have positive effects with reduced interchange and congestion at Canada Water station and subsequent reductions in Jubilee Line crowding.

### **Promote Equality and Inclusion**

- 9.5.4** The extension will pass through or near wards in Lewisham with relatively high indices of multiple deprivation and low car ownership. It would also serve areas with unemployment rates of between 4% and 6%, compared to a London average of 3.3%. It will also serve areas with percentages of black and minority ethnic populations of 40% to 80% compared with a London average of 37%.

### **Expand Network Capacity**

- 9.5.5** Even though the spur operation means that there is a net reduction of services between Greenwich and Lewisham, there would be a net overall increase in network capacity south and west of Greenwich of 5tph. The service level between Canary Wharf and Greenwich would rise from 25tph to 30tph in the morning peak.

### **Integration (Including Interchange)**

- 9.5.6** Positive. Improved connectivity to Docklands from South London rail routes, significant relief to Canada Water LUL interchange.

### **Noise/Local Air Quality**

- 9.5.7** No effect as scheme is mostly in tunnel or not adjacent to development.

### **Physical Fitness**

- 9.5.8** The demand forecast does not include estimates of modal switch. However, any mode switch from car will increase walking and physical fitness.

### **Journey Ambience**

- 9.5.9** Positive impact. Improved interchange to Docklands and decreased journey times.

## 10. STRATFORD-LEA VALLEY/TOTTENHAM HALE (E21)

### 10.1 Description

- 10.1.1** A DLR extension to Tottenham Hale via the Lea Valley was tested extending all services (15tph) onwards from Stratford International. The route would run alongside the Lea Valley rail route. The DLR extension is seen as serving intermediate markets (heavy rail would only stop at Tottenham Hale and Stratford) and would serve the Olympic site(s) and the Olympic legacy with additional stops at Lea Bridge and Walthamstow Marshes. Potential drawbacks are largely environmental, covering concerns over Hackney Marshes and the Lea Valley reservoirs.

### 10.2 Alignment and Operating Issues

- 10.2.1** Depending on the choice of alignment to Stratford International, extension opportunities north of Stratford International could be restricted by development proposals at Stratford City. In addition, there are the other issues, including heavy rail options, which could affect the scheme, as follows.

- there is an existing proposal for a heavy rail passenger service along the line, operating 2 or 4tph. This could be operated, and enhanced, at a far lower cost than a DLR extension;
- there are long-standing heavy-rail proposals for four-tracking of the Temple Mills Line to the North of Coppermill Junction. Such a proposal would not be feasible with the DLR route on the surface.

- 10.2.2** For the test it was assumed all 15tph servicing Stratford International are extended to Tottenham Hale providing a through service from Woolwich Arsenal and Prince Regent.

### 10.3 Costs

- 10.3.1** The capital costs of the scheme were estimated using standard assumptions and are summarised in Table 10.1.

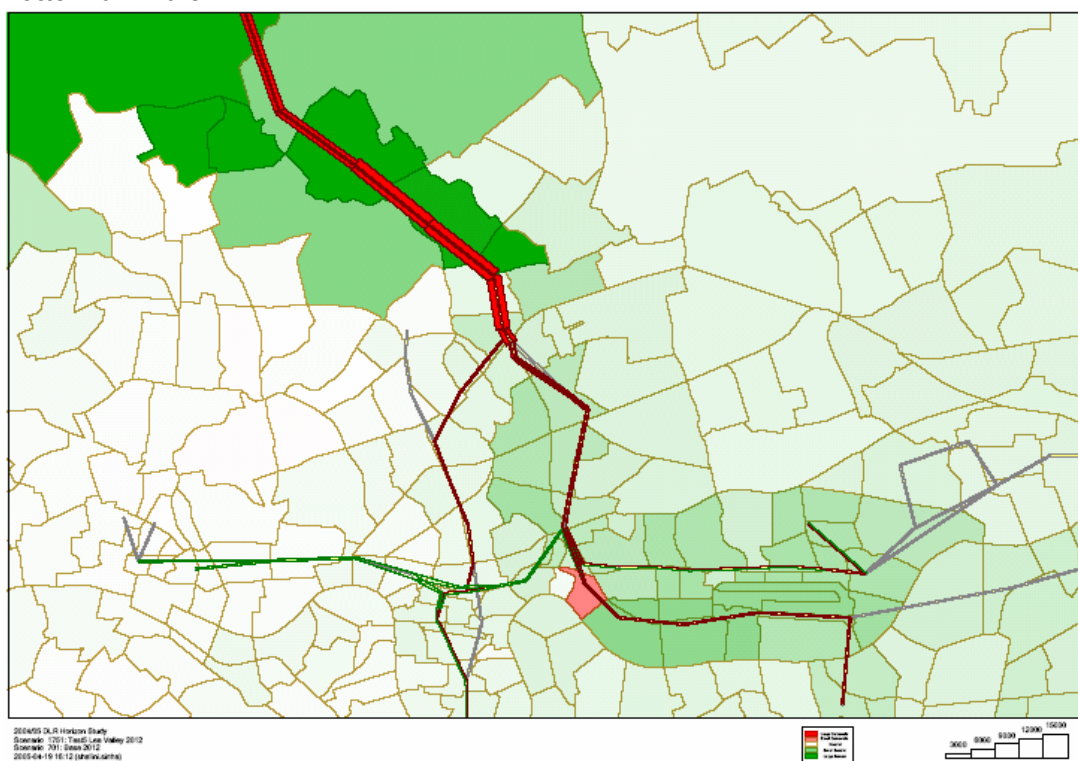
**Table 10.1 Stratford-Lea Valley Tottenham Hale. Indicative Capital and Operating Costs, 2004**

Capital and Operating Costs	£m
<b>Capital Costs:</b>	
Infrastructure	173.0
Rolling Stock	40.0
Rolling Stock Refurbishment	11.0
Land	2.0
National Rail	10.0
<b>Total</b>	<b>236.0</b>
<b>Total Including Optimism Bias</b>	<b>363.0</b>
<b>Annual Operating Costs:</b>	<b>2.9</b>

## 10.4 Demand Forecasts and Transport Benefits

- 10.4.1** The extension attracts significant patronage with a morning peak (0700-1000) two-way flow of around 8,000. Whilst some of this is for Tottenham Hale-Stratford movements, a surprisingly large number of passengers are attracted to intermediate stops. There are some corresponding, albeit small, reductions on nearby rail routes, such as Tottenham Hale-Liverpool Street, the NLL and Barking-Gospel Oak, although much of the patronage is abstracted from adjacent bus services.
- 10.4.2** Generalised journey time savings are significant and concentrated along the Lea Valley between Tottenham Hale and Stratford. There are also smaller benefits in the Royal Docks, associated with direct services between the Royals and Tottenham Hale. These are shown in Figure 10.1, along with flow changes on DLR.

**Figure 10.1 DLR Flow Changes and Generalised Journey Time Benefits. Stratford-Tottenham Hale**



- 10.4.3** The scheme has very little effect on either the level of interchange at Bank or on the level of flow, and hence crowding, into and out of Bank. There is a relatively high level of demand attracted to the new sections of DLR north of Stratford, with a maximum 07:00-10:00 one-way flow of around 4,900 in 2012 and 5,200 in 2020. However, the assumed 15tph service offers a planning capacity of 5,400 per hour. Even in 2020, the V/C ratio on the busiest section is just above 50%.

## 10.5 Wider Benefits

### Maintain Existing Transport Services

- 10.5.1** The scheme would extend DLR services from Stratford International to Tottenham Hale, strengthening access between Stratford, Tottenham Hale and orbital routes around North East



London. Given heavy rail service improvements proposed for this corridor, the scheme will have a small impact but may mean parallel bus service reductions.

### **Improve Safety and Security**

- 10.5.2** Improvements in safety and security would result from high frequency, high, quality, local PT presence along the Lea Valley.

### **Reduce crowding and congestion**

- 10.5.3** The scheme has a small impact. It improves connectivity between Tottenham Hale and Stratford, but as there is no existing PT provision there is limited relief of crowding. There may be some crowding relief on Victoria and Central Lines, and also WAGN lines to Liverpool Street.

### **Promote sustainable development**

- 10.5.4** The effects of this scheme will be strongly beneficial as it will support the Olympic/Non-Olympic masterplanning to the north of Stratford International. To the north, the alignment runs mostly through greenspace and could support redevelopment along the east side of the Lea Valley.

### **Promote equality and inclusion**

- 10.5.5** The scheme will have a positive impact as it will strengthen orbital transport links around North East London improving public transport access in an area of relatively low car ownership, above average unemployment of 4% to 6% compared to a London average of 3.3% and high proportions of disability claimants of 4% to 6% compared to a London average of 3.42%. The extension would serve areas with between 60% and 80% black and minority ethnic populations compared with a London average of 37%.

### **Expand network capacity**

- 10.5.6** The effects will be positive as, although the scheme replicates the committed heavy rail services, it strengthens orbital passenger services and reduces need for interchange at Stratford or Central London, as well as strengthening access to CTRL from the North.

### **Regeneration**

- 10.5.7** Strong benefit to Olympic/Non-Olympic masterplanning area North of Stratford. Much of Lea Valley is safeguarded greenspace but could support regeneration schemes around Lea Bridge Road.

### **Noise**

- 10.5.8** The scheme will have a minimal impact as it mostly runs alongside the existing heavy rail line and not adjacent to development.

### **Local Air Quality / Reduction of Greenhouse Gases**

- 10.5.9** There will be some small benefits due to modal switch from car.

**Physical Fitness**

- 10.5.10** The demand forecasts do not give modal switch. However, we expect some switch from car which will increase the amount of walking which promotes fitness.

**Journey Ambience**

- 10.5.11** The scheme will have a positive benefit as most demand will switch from local buses resulting in more pleasant, smoother, less crowded journeys.

**Extent of Effect on Other Mayoral Strategies or NATA Objectives; Ecology**

- 10.5.12** The scheme passes through:
- the Lea Valley SSSI, SPA and Ramsar site, which are significant areas of open water and marginal habitats; of particular importance to scarce plants, birds, invertebrates, reptiles;
  - Temple Mills Wasteland SBI, Grade 1, abandoned and unused marshalling yards and railside habitats of importance to scarce plants and invertebrates;
  - Dagenham Brook SLI, Stream corridor habitat including bank-side scrub and trees, of educational/local recreational value.

The first of these is of international scale and high importance with the others of local scale and moderate to low importance. The biodiversity and earth heritage value can be described as very high, medium and low for each of the sites respectively with assessment scores of slight adverse, intermediate negative and low respectively.

## 11. BOW CHURCH-NORTH LONDON LINE/HACKNEY (E22)

### 11.1 Description

- 11.1.1** A DLR extension from Bow Church to Hackney would be a branch of the DLR Poplar-Stratford line serving Roman Road, Victoria Park and Hackney. The section between the NLL and Bow Church is an old railway alignment although parts have been sold for housing and developments, which suggests a tunnel option throughout. The main objective would be to provide a Hackney-Canary Wharf link with strong regeneration benefits.

### 11.2 Alignment and Operating Issues

- 11.2.1** There is no surface alignment available. Much of the railway corridor running parallel to the A102(m) has either been sold off or has been already built upon. Therefore the optimal route would therefore seem to be via a tunnelled alignment between Bow Church and Hackney Central, with the route going into tunnel south of the Network Rail/ District Line tracks. The extension would run Bow Church - Hackney Central, with intermediate stops either side of Victoria Park. The new DLR Station at Hackney Central would probably be an underground Station with interchange with the NLL.
- 11.2.2** As this would be a spur from an existing DLR branch, it would have to be considered in parallel with options that would allow service frequencies to increase overall on the corridor. In the absence of this, it would have a severe impact on the ability to operate services into Stratford. For this reason, the extension is assumed to be a package with the All Saints-Crossharbour scheme with the Stratford-Lewisham service staying at 10tph (not increasing to 15tph) together with a new 10tph service to Hackney Central via Bow Church and Wood Wharf. It should serve a new station at Wood Wharf but would not serve Poplar.

### 11.3 Costs

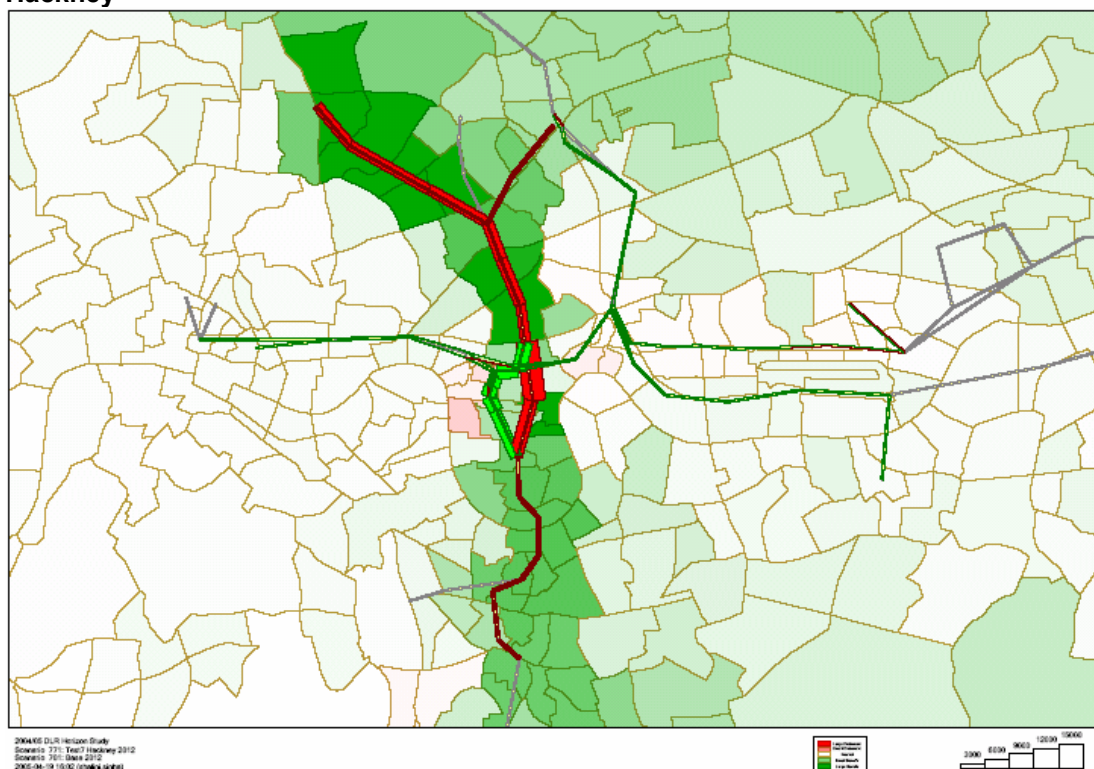
- 11.3.1** The capital costs of the scheme were estimated using standard assumptions and are summarised in Table 11.1

**Table 11.1 Bow Church-Hackney. Indicative Capital and Operating Costs, 2004**

Capital and Operating Costs	£m
<b>Capital Costs:</b>	
Infrastructure	348.0
Rolling Stock	18.0
Rolling Stock Refurbishment	5.0
Land	17.0
National Rail	2.0
<b>Total</b>	<b>390.0</b>
<b>Total Including Optimism Bias</b>	<b>635.0</b>
<b>Annual Operating Costs:</b>	<b>2.9</b>

## **11.4 Demand Forecasts and Transport Benefits**

- 11.4.1** This extension provides more direct access between Hackney and Isle of Dogs/Millennium Quarter and also doubles the level of service (from 10tph to 20tph) between Bow Church and All Saints.
- 11.4.2** The option attracts between 1,850 and 2,100 passengers in the westbound direction and between 2,900 and 3,500 passengers in the eastbound direction morning peak (0700-1000) passengers between Hackney and Bow. Patronage on the new section between All Saints and Crossharbour via Wood Wharf is between 2,400 and 7,700 in the southbound direction and between 4,600 and 4,900 in the northbound direction. The southbound flows are actually higher compared to the All Saints - Crossharbour test due to extra demand from the Hackney extension. Patronage also increases significantly on the section between Bow Church and All Saints (an increase of between 3,200 and 3,650 in the southbound direction and an increase of between 1,750 and 2,450 in the northbound direction).
- 11.4.3** There are corresponding reductions in Jubilee Line flows between Stratford and Canary Wharf. There are some fairly large flow reductions in National Rail flows between Hackney Downs and Liverpool Street and diversion of short distance trips from bus; the fact that there are few competing rail/LUL lines results in relatively low abstraction for this option.
- 11.4.4** The majority of passengers (approximately 62%) on the extension are bound for Wood Wharf. Approximately 50% of westbound demand originates from the extension itself, with quite an even distribution of demand from other locations between Bow Church and Lewisham. Therefore, the Hackney extension attracts both short-distance DLR trips on the extension itself and longer-distance DLR trips to Wood Wharf.
- 11.4.5** The diversion of the 10tph Stratford - Lewisham service via Wood Wharf means that passengers can access destinations along the route quicker than previously. However, the sections between Bow Church and Stratford and between Lewisham and Wood Wharf do not have the added enhancement of an increase in frequency to 15tph as is the case in the All Saints-Crossharbour test. It may be that some passengers are disbenefited by having to now use Wood Wharf rather than Canary Wharf to access the Isle of Dogs, whilst others are benefited by this change.
- 11.4.6** With the diversion of the Stratford - Lewisham service, there is a reduction in service between Poplar and Crossharbour of 10tph, resulting in a decline in patronage on this section (between 2,750 and 4,450 in the northbound direction and between 1,780 and 4,550 in the southbound direction).
- 11.4.7** Generalised journey time benefits are widespread, but concentrated in the Hackney-Bow Church corridor and, to a lesser extent, between Bow Church and All Saints. There is also a concentration of small benefits around Lewisham. This is shown in Figure 11.1, along with flow changes on DLR.

**Figure 11.1 DLR Flow Changes and Generalised Journey Time Benefits. Bow Church-Hackney**

**11.4.8** Table 11.2 indicates a reasonable increase in DLR passenger kilometres, although these are exceeded by reductions in LUL passenger kilometres, primarily due to Jubilee Line flow reductions. Increases in National Rail passenger kilometres result in an overall small net increase in passenger kilometres.

**Table 11.2 Peak Period (0700-1000) Passenger Kilometres: Bow Church- Hackney**

Mode	Do Minimum pass kms (2012)	pass kms with E22 (2012)	Difference
DLR	459,600	469,000	+9,400
LUL	11,134,500	11,118,000	-16,500
National Rail	20,103,700	20,115,000	+11,300
<b>Total</b>			<b>+4,200</b>

**11.4.9** The scheme has very little effect on either the level of interchange at Bank or on the level of flow, and hence crowding into and out of Bank. There is a relatively high level of demand attracted to the new sections of DLR north of Bow Church, with a maximum 07:00-10:00 one-way flow of around 3,650 in 2012 and 4,000 in 2020. However, the assumed 10tph service would give a planning capacity of 3,600 per hour. Even in 2020, the V/C ratio on the busiest section is around 60%.

## **11.5 Wider Benefits**

### **Maintain Existing Transport Services**

- 11.5.1** A new service would be introduced between Hackney Central and Wood Wharf. Whilst this scheme would only work if introduced together with the Wood Wharf Scheme, Lewisham-Stratford services would run via Canary Wharf.

### **Improve Safety and Security**

- 11.5.2** The scheme would have a positive effect by providing improved public transport presence along a corridor with poor existing provision.

### **Reduce Crowding and Congestion**

- 11.5.3** Because there is no rail/LUL access along the Hackney extension corridor, there would be limited crowding relief although as passengers mostly divert from bus, there would be lower bus loadings.

### **Promote Sustainable Development**

- 11.5.4** The scheme would have a positive effect by improving access from the largely residential areas of Hackney/Victoria Park to Docklands and Bank. It would also widen the DLR catchment on the Isle of Dogs

### **Promote Equality and Inclusion**

- 11.5.5** The scheme would offer significant equality and inclusion benefits by providing public transport services to areas of Hackney with some of the lowest car ownership levels in London (20%-40% compared to London average figure of 62.5%), highest unemployment (8%-10% compared to London average figure of 3.3%) and highest proportions of black and minority ethnic populations (60%-80% compared to London Average of 37.1%).

### **Expand Network Capacity**

- 11.5.6** The scheme would have a positive effect by providing 10tph on a corridor with no rail or underground provision.

### **Integration (Including Interchange)**

- 11.5.7** The scheme would provide interchange between Hackney and Stratford services at Bow Church and would improve connectivity from Hackney to Docklands and Lewisham in the South, Stratford to the East and Bank to the West.

### **Regeneration**

- 11.5.8** The scheme would help support the London Plan 'Opportunity Area', and would be likely to increase housing demand within the borough.

### **Noise**

- 11.5.9** No impact as extension is completely in tunnel.

**Local Air Quality/Reduction of Greenhouse Gases**

- 11.5.10** Minimal benefit due to limited mode shift.

**Townscape**

- 11.5.11** The scheme would have minimal impact as it mostly runs underground.

**Physical Fitness**

- 11.5.12** Demand forecasts do not give modal switch. However, some switch from car can be expected which would increase walking and promote fitness.

**Journey Ambience**

- 11.5.13** The scheme would have a positive impact with bus/car journeys being made by quicker, smoother mode of transport

## **12. WOOLWICH ARSENAL-THAMESMEAD (E29)**

### **12.1 Description**

- 12.1.1** A DLR extension to Thamesmead via Woolwich was originally envisaged as a Stage III of the DLR network following the construction of the Beckton extension and formed part of a 1997 study for the Government Office for London. The onward extension of the City Airport extension to Woolwich includes limited passive provision for a junction just south of the river which would permit an eastward extension to Thamesmead without a need for reversing at Woolwich Arsenal. The extension would serve new stations at west Thamesmead and Thamesmead Town centre.

### **12.2 Alignment and Operating Issues**

- 12.2.1** The service would comprise diverting the Canning Town-Woolwich Arsenal services to provide 5tph to Thamesmead. With this approach to testing this extension, Woolwich Arsenal, therefore, experiences a service reduction of 5tph. The objectives are largely regeneration and social benefits although competition with Thames Gateway Transit is a potential issue.
- 12.2.2** The original proposed alignment starts from a step-plate junction off the Woolwich Extension, continuing eastward in tunnel, before rising to viaduct along Western Way/Central Way. With this alignment it would be difficult to find a suitable location for the ramp from tunnel to viaduct, and there are significant problems in crossing the Thames Gateway junction of Western Way/Central Way.
- 12.2.3** A better alignment would be to divert the tunnel further north and have the tunnel portal in Tripcock Park, to the east of the small hill that is located there. However, this would have a major impact on the DLR Woolwich Arsenal extension. From there the route would continue further east, crossing under Thames Gateway Bridge, with the opportunity for interchange North of Barnham Drive with buses and the proposed Greenwich Waterfront Transit. The route would then continue on viaduct along the northern edge of Central Way to its junction with Carlyle Road. The precise amount of at grade/viaduct construction in the Tripcock Park/Barnham Drive area would need to be determined following evaluation of the capital cost/environmental impact aspects of the alternatives.
- 12.2.4** This option only considers the DLR route as far as the junction with Carlyle Way. However, it should be noted that there is the possibility of the line being continued along Carlyle Way and Harrow Manor Way to link up with the Network Rail (and possible Crossrail) services at Abbey Wood Station.

### **12.3 Costs**

- 12.3.1** The costs of the scheme were estimated using standard assumptions and are summarised in Table 12.1.

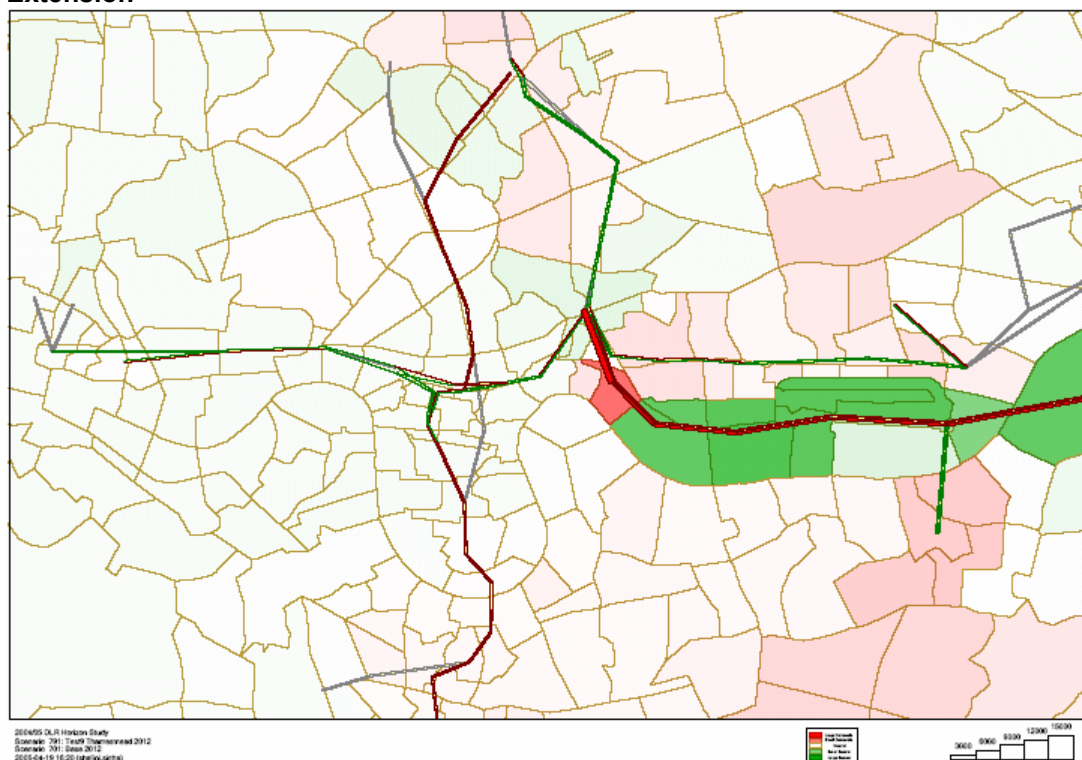


**Table 12.1: Woolwich Arsenal-Thamesmead. Indicative Capital and Operating Costs, 2004**

<b>Capital and Operating Costs</b>	<b>£m</b>
<b>Capital Costs:</b>	
Infrastructure	136.0
Rolling Stock	25.0
Rolling Stock Refurbishment	7.0
Land	10.0
National Rail	0.0
<b>Total</b>	<b>178.0</b>
<b>Total Including Optimism Bias</b>	<b>278.0</b>
<b>Annual Operating Costs:</b>	<b>2.0</b>

## 12.4 Demand Forecasts and Transport Benefits

- 12.4.1** This option attracts around 1,500 additional westbound morning peak (0700-1000) DLR passengers between Thamesmead and King George V and with corresponding, although smaller, reductions between Woolwich Arsenal and King George V due to the reduction in services. The net effect is small when compared with other schemes. There is also limited abstraction from the parallel Beckton branch and a minor reduction (around 200 passengers) between Canning Town and Stratford which could also be explained by the reduced service. A sensitivity test was also undertaken assuming no Greenwich Waterfront Transit and 5,000 additional houses in Thamesmead. However, the net effects were small, even with these assumptions.
- 12.4.2** There is some minor abstraction from National Rail services from Abbey Wood and Plumstead into London due to the reduced level of interchange at Woolwich. There are also small reductions on London Underground services as a result of the scheme with a small reduction (around 230 passengers) on the Hammersmith and City/District Line inbound as a result of the reduced interchange opportunity at West Ham.
- 12.4.3** Generalised time benefits are concentrated around Thamesmead but with smaller benefits in the Royal Docks resulting from the additional 5tph between King George V and Canning Town. However, it should be noted that there are compensating generalised time disbenefits in a band between Abbey Wood, Woolwich and Greenwich as well as in an area north of the Royal Docks. This is shown in Figure 12.1, along with flow changes on DLR.

**Figure 12.1 DLR Flow Changes and Generalised Journey Time Benefits. Thamesmead Extension**

- 12.4.4** The area is served by a high-frequency bus service, which, together with the presence of Thames Gateway Transit, seems to result in relatively low patronage and benefits on the extension. The introduction of the scheme results in passengers transferring from bus to DLR, although bus still has a significant market share.
- 12.4.5** In 2020 (See Figure 8) similar trends are shown, although scheme flows are reduced by 50% due to the implementation of Crossrail.
- 12.4.6** Table 12.2 indicates a reasonable increase in DLR passenger kilometres, although these are exceeded by reductions in LUL passenger kilometres, primarily due to Jubilee Line flow reductions. Increases in National Rail passenger kilometres result in an overall small net increase in passenger kilometres.

**Table 12.2: Peak Period (0700-1000) Passenger Kilometres: Woolwich Arsenal-Thamesmead**

Mode	Do Minimum pass kms (2012)	pass kms with E29 (2012)	Difference
DLR	459,600	472,454	+12,854
LUL	11,134,500	11,139,966	+5,466
National Rail	20,103,700	20,103,284	-416
<b>Total</b>			<b>+17,364</b>

- 12.4.7** The scheme has very little effect on either the level of interchange at Bank or on the level of flow, and hence crowding into and out of Bank. The relatively low level of demand generated by the scheme has little effect on crowding levels over the entire DLR network.

## **12.5 Wider Impacts**

- 12.5.1** The wider scheme impacts for each option are contained in Appendix A which comprises the TfL Business Case spreadsheets. A commentary on the main points is given below.

### **Maintain Existing Transport Services**

- 12.5.2** The scheme would have a slight negative impact as whilst there are new services to Thamesmead, Woolwich would suffer from a 5tph loss in service, although there would be a net increase between King George V and Canning Town.

### **Improve Safety and Security**

- 12.5.3** New DLR services will lead to safer and more secure journeys.

### **Reduce Crowding and Congestion**

- 12.5.4** The scheme is likely to have a minimal effect. There is sufficient capacity to Thamesmead. However, the reduction in service to Woolwich Arsenal increases crowding and flows northbound from Woolwich are over 90% of planning capacity. Negligible effects on interchange at Bank or crowding on other LUL services.

### **Promote Equality and Inclusion**

- 12.5.5** The higher level of service will benefit the mobility impaired due to step-free access to DLR. Services will pass through wards in Thamesmead with high indices of multiple deprivation and unemployment rates of between 6-10%, compared to a London average of 3.3%. It will serve areas with black and minority ethnic populations forming 20%-40% of the population compared with a London average of 37%. It will serve areas with disability claimants of 4%-6% compared with a London average of 3.4%.

### **Expand Network Capacity**

- 12.5.6** The scheme will extend the DLR network east, into an area poorly served by public transport with the potential to tie in with Thames Gateway and Transit proposals at West Thamesmead, and future opportunity to extend to Abbey Wood Station.

### **Integration (Including Interchange)**

- 12.5.7** The scheme offers the potential to improve interchange with Thames Gateway Transit proposals. As well as offering an improved service choice from Canning Town. Small frequency improvement (5tph) to City Airport and King George V.

### **Regeneration**

- 12.5.8** The scheme will aid the regeneration of Thamesmead by providing service improvement through the North Woolwich regeneration area as well as significant access and journey time improvement to Thamesmead.

### **Noise**

- 12.5.9** The scheme would be in tunnel from North Woolwich - West Thamesmead and on viaduct from there to the centre of Thamesmead. The alignment runs alongside dual carriageway,

housing and public buildings with around 100 properties and 1 school within 50metres of the elevated alignment.

### **Ecology**

- 12.5.10** The scheme would pass through the following sites of Metropolitan(SMI) or Borough (SBI) Importance: Thamesmead Wetland Historic Area SBI Grade 1, Twin Tumps and Thamesmere SBI Grade 1, Gallions Reach Park SBI Grade 2, River Thames SMI. The magnitude on all these is estimated as Neutral-Minor negative.

### **13. LOOP EXTENSION BANK-CANNON STREET-CITY THAMESLINK-BARBICAN-MOORGATE-BANK (E4)**

#### **13.1 Description**

- 13.1.1** This loop alignment could either be a single track – as on the Heathrow loop for the Piccadilly Line – or double. Whilst the former would be cheaper and easier to construct it would be less attractive to passengers.
- 13.1.2** This one way circular DLR option would comprise extending Bank services to Moorgate, Barbican, City Thameslink and Cannon Street. The objectives of this extension are to relieve interchange at Bank, aid regeneration of the City Fringe/Smithfield areas and provide interchange with Thameslink.

#### **13.2 Alignment and Operating Issues**

- 13.2.1** It is feasible to construct this loop from Bank via Moorgate, Barbican, City Thameslink and Cannon Street Station to rejoin the existing DLR line east of Bank as either a single or double track route. Whilst it would, clearly, be much cheaper to construct as a single track loop the benefits would be somewhat reduced. For the purpose of this initial assessment the double track option has been selected.
- 13.2.2** With the double track option, a balance of service between clockwise/anticlockwise is required. Consideration would need to be given to grade separation to the south of Bank Station to eliminate the flat junction conflict. With the single track option some trains would operate clockwise round the loop, with others terminating at Bank (as existing).
- 13.2.3** The existing overrun tunnel would probably be retained so that there was still the possibility of reversing trains at Bank without any disruption to the rest of the service. This would necessitate the construction of junctions at the west end of each of the Bank Station platforms, leaving the existing overrun tunnel between the new tunnels of the loop line. There would be significant issues in this area with respect to major tunnelling under particularly sensitive buildings, the eastbound tunnel would be under the Bank of England, and the westbound tunnel would be very close to the Mansion House.
- 13.2.4** The alignment constraints between Bank and Barbican are as for the Bank to Barbican Extension.
- 13.2.5** To the west of Barbican the route comes southward to reach a new DLR station at City Thameslink. This section of the route would have a major impact upon the Eastern Ticket Hall of Crossrail's Farringdon Station, which is located between Lindsey Street and Hayne Street. It is critical to the feasibility of this loop line that the interfaces with Crossrail's proposals for their Liverpool Street Station are resolved at an early stage.
- 13.2.6** The junction with the existing DLR line to the east of Bank Station would be quite complex because of the other railway tunnels in the area (Circle/District and Northern Lines) and the need for the anticlockwise DLR Loop Service to be grade separated under or over the existing DLR line. This may well necessitate the new DLR tunnel being under the existing DLR tunnels, with associated geotechnical and tunnelling problems if the tunnels cannot be in the London Clay.

- 13.2.7** Most of the route can be aligned to run under streets, thus avoiding problems with piled foundations to buildings, but at the west end of the loop and where the loop joins the existing DLR to the east of Bank Station this is not feasible. In these areas the alignment will need to be finalised following detailed review of the constraints that such foundations impose.

### 13.3 Costs

- 13.3.1** The costs of the scheme were estimated using standard assumptions and are summarised in Table 13.1

**Table 13.1 Bank Loop Capital and Operating costs £m, 2004**

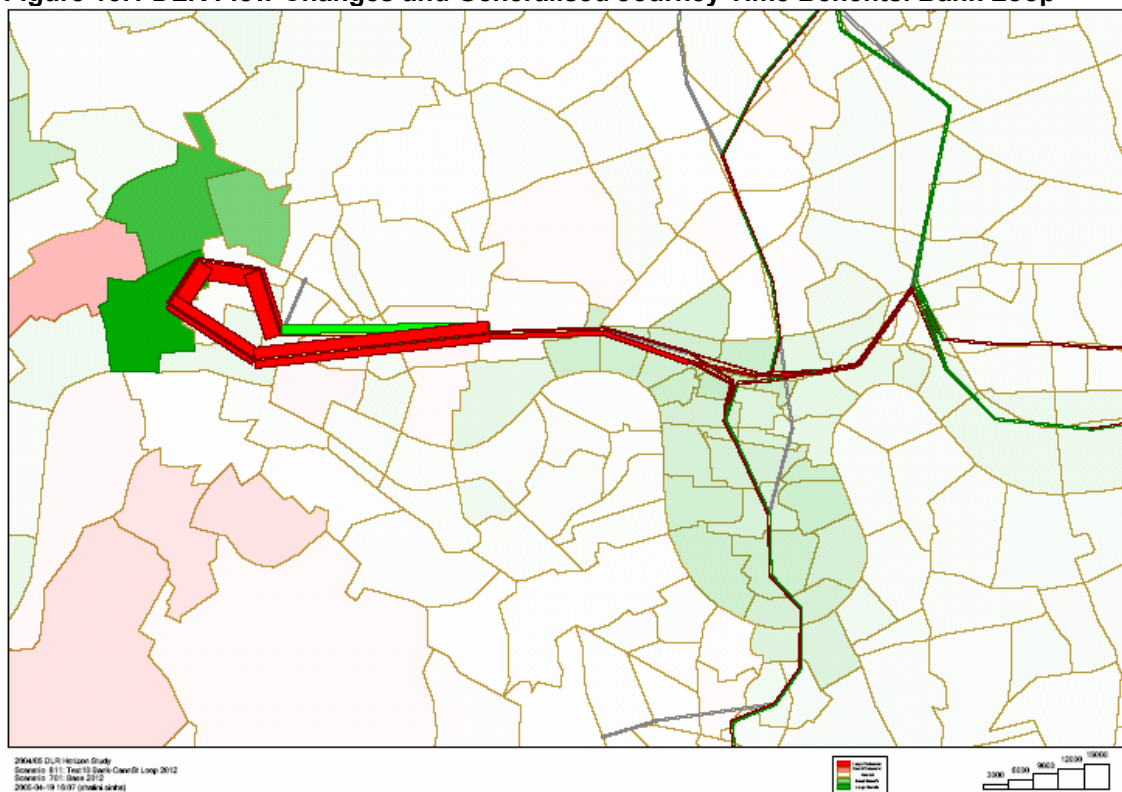
<b>Capital and Operating Costs</b>	<b>£m</b>
<b>Capital Costs:</b>	
Infrastructure	285.0
Rolling Stock	38.0
Rolling Stock Refurbishment	11.0
Land	19.0
National Rail	4.0
<b>Total</b>	<b>356.0</b>
<b>Total Including Optimism Bias</b>	<b>564.0</b>
<b>Annual Operating Costs:</b>	<b>3.0</b>

### 13.4 Demand Forecasts and Transport Benefits

- 13.4.1** This scheme attracts between approximately 6000 and 11000 trips in the anticlockwise direction, and between 800 and 4500 trips in the clockwise. There is also shows a significant decline (of approximately 5500) on the Bank - Shadwell eastbound section; this could also be reasonably expected given that as part of the re-arrangement of services there is a decline in frequency of 15tph on this link.
- 13.4.2** Whilst much of the extension traffic boards DLR on the extension itself, a significant proportion of traffic appears to board DLR on other sections of the network. The scheme results in significant flow reductions on the Northern Line between Bank and Kings Cross, on westbound Central Line between Bank and Chancery Lane, on westbound District/Circle lines into Blackfriars and on eastbound Jubilee Line into London Bridge.
- 13.4.3** There is also a reduction in patronage on southbound East London Line services between Highbury and Islington and Canada Water. It would appear that the scheme makes the East London Line less attractive as a means of interchange. There are corresponding patronage increases on WAGN services into Moorgate and on southbound Thameslink services into City Thameslink. It would appear that these stations become more attractive interchanges with the scheme in place. Figure There are also significant reductions on Thameslink between London Bridge and City Thameslink; the new DLR scheme competes for this traffic on the new DLR link between Cannon Street and City Thameslink. Generalised journey time benefits are spread through west London and the Isle of Dogs as shown in Figure 13.1.
- 13.4.4** The scheme achieves significant reductions in the level of crowding at Bank with a 70% reduction in interchange in 2012 and an 80% reduction in 2020. However, this is due in part to the lower level of service offered to Bank passengers due to the loop operation. Moreover, it

should be noted that the do-minimum interchange flows at Bank in 2020 are significantly lower due to relief offered by Crossrail.

**Figure 13.1 DLR Flow Changes and Generalised Journey Time Benefits. Bank Loop**



**13.4.5** The impact of the scheme on DLR planning capacity into and out of Bank was investigated. The 2012 westbound forecast flow into Bank is over 19,000, with a peak hour demand of around 10,300. Comparing this to the planning capacity of 9,900 gives a V/C ratio of 104%, implying that DLR would be operating over planning capacity on this section. However, the DLR flows on the new sections of DLR on the loop would all operate below capacity. This is shown in Table 13.2.

**Table 13.2 Bank-Cannon Street Loop Capacity**

	Scheme			
	Do Minimum		Bank-Farringdon	
	2012	2020	2012	2020
E/B flow Bank-Shadwell 0700-1000	7,663	5,235	9,086	7,204
W/B flow Shadwell-Bank 0700-1000	14,377	8,658	19,106	12,834
Planning capacity Bank-Shadwell (peak hour) <sup>[1]</sup>	9,900	9,900	9,900	9,900
Peak hour V/C ratio Bank-Shadwell	42%	29%	50%	39%
Peak hour V/C ratio Shadwell-Bank	78%	47%	104%	70%

Note <sup>[1]</sup> Peak Hour taken as 54% of 0700-10:00 using standard TfL conversion factor

## **13.5 Wider Impacts**

- 13.5.1** The wider scheme impacts for each option are contained in Appendix A which comprises the TfL Business Case spreadsheets. A commentary on the main points is given below.

### **Maintain Existing Transport Services**

- 13.5.2** Whilst there is a net increase in DLR trains to the west of Bank, the loop operation would result in a lower level of service to Bank.

### **Improve Safety and Security**

- 13.5.3** Additional DLR services would reduce crowding on other parts of the LUL network, thereby improving safety.

### **Reduce Crowding and Congestion**

- 13.5.4** Crowding relief on Northern Line north of Bank, westbound Central, westbound District /Circle and eastbound Jubilee Line.

### **Promote Sustainable Development**

- 13.5.5** Minimal Impact

### **Promote Equality and Inclusion**

- 13.5.6** Scheme has a small impact, although improved public transport services would benefit areas of low car ownership, high indices of multiple deprivation and high proportions of black and minority ethnic populations in East London.

### **Expand Network Capacity**

- 13.5.7** Mixed effect as although the scheme provides 20 tph additional service west of Bank, Bank itself would have a lower level of service.

### **Integration (Including Interchange)**

- 13.5.8** Positive. Improved interchange with access to DLR services Circle, Metropolitan, Hammersmith and City Lines and Thameslink at City Thameslink.

### **Regeneration**

- 13.5.9** Minor impact

### **Noise**

- 13.5.10** None. Tunnel throughout.

### **Local Air Quality**

- 13.5.11** Likely limited mode shift so benefits small but positive.



**Reduction of Greenhouse Gases**

- 13.5.12** Minimal. Some modal shift from car/taxi but unlikely to be significant.

**Townscape**

- 13.5.13** None. Tunnel throughout.

**Physical Fitness**

- 13.5.14** Demand forecast does not give estimate of modal switch. Key information on isochrome plots and population distribution not available.

**Journey Ambience**

- 13.5.15** Beneficial, due primarily to the reduction in congestion through Bank station, and crowding relief on Central Line.

## 14. GALLIONS REACH-DAGENHAM DOCK (E24)

### 14.1 Description

- 14.1.1** The proposed Barking extension would run from Gallions Reach to Dagenham Dock through the proposed regeneration areas of Barking Riverside and Creekmouth. Significant earlier work has been undertaken on this route including development of scheme costs and a May 2004 Business Case.

### 14.2 Alignment and Operating Issues

- 14.2.1** The preferred Route has five proposed stations and splits from the existing viaduct north of Gallions Reach Station before running beneath the proposed Thames Gateway crossing at grade. The route then descends into bored tunnel to pass beneath the Thames Water Sewage Treatment Works and the River Roding before resurfacing to the east of the River Roding to enter the south west boundary of the Barking Reach development. The route passes south of the existing Barking Power Station buildings and associated overhead cables and passes close to the Thames before turning northwards towards Dagenham Dock.
- 14.2.2** Interchange opportunities are available with heavy rail 'C2C' services and the East London Transit (ELT) at Dagenham Dock as well as further interchange with the ELT at Creekmouth.
- 14.2.3** The scheme would comprise the extension of the 10 tph Stratford International-Prince Regent service to Dagenham Dock, and is assumed to operate in conjunction with the proposed extension to Stratford International (which is a do minimum scheme). New unmanned stations are proposed at Beckton Riverside, Creekmouth, Barking Riverside, Dagenham Vale and Dagenham Dock (with full interchange to heavy rail c2c services).

### 14.3 Costs

- 14.3.1** The capital costs are summarised in Table 14.1.

**Table 14.1: Barking Reach Capital and Operating Costs, 2004**

Capital and Operating Costs	£m
<b>Capital Costs:</b>	
Infrastructure	211.0 <sup>[1]</sup>
Rolling Stock	15.0
Rolling Stock Refurbishment	4.0
Land	5.0
National Rail	Not Available
<b>Total</b>	<b>235.0</b>
<b>Total Including Optimism Bias</b>	<b>380.0</b>
<b>Annual Operating Costs:</b>	<b>1.2</b>

Note: <sup>[1]</sup> includes £23m General Client over and above cost estimate of £188m.

## 14.4 Demand Forecasts and Transport Benefits

**14.4.1** A review of the land use in the area surrounding the proposed extension was undertaken with the numerous development proposals and different master plans fed into LUTE. This indicated that the extension is expected to attract high growth in land use and trips. A marginally higher public transport mode split is also forecast due to the proposed land use type and density.

**14.4.2** The morning peak 2011 forecast demand on the extension is between 2,000 and 2,700 westbound and 1,850 and 100 eastbound. The 2020 forecast pattern mirrors that of the 2011 forecasts, albeit with an increase in the order of 70%. The effect of Crossrail is to increase demand on the DLR extension by around 15%, due to the increased opportunities for interchange with Crossrail at Custom House.

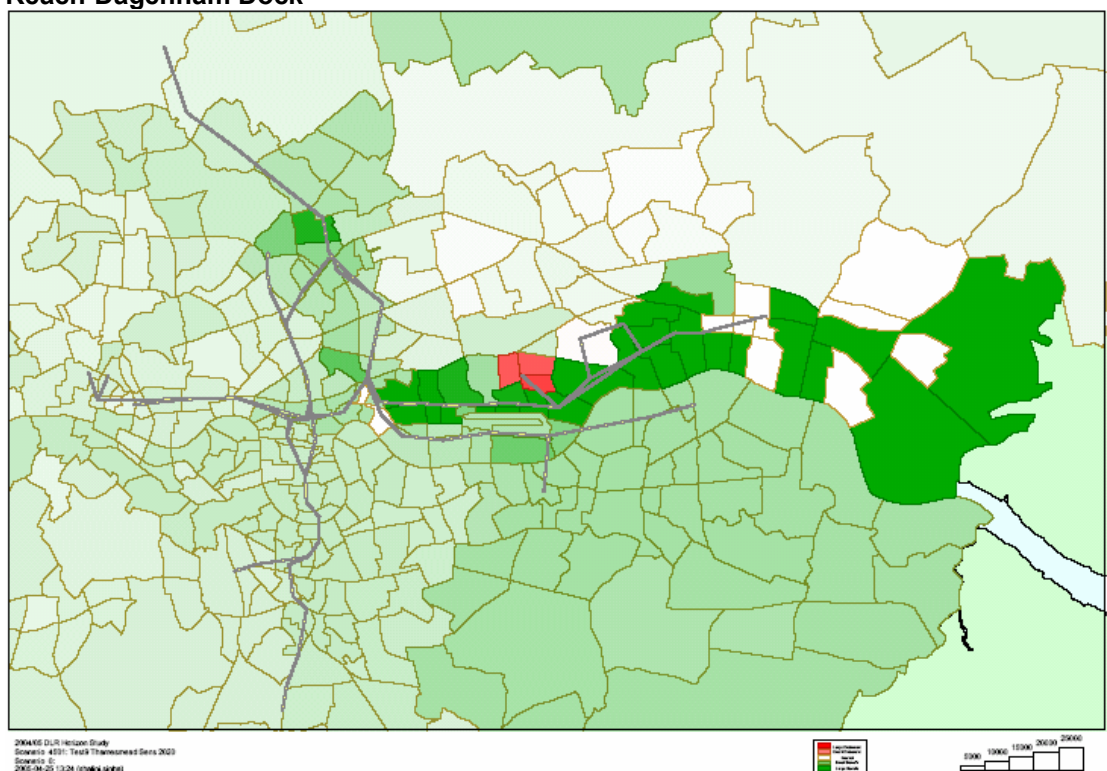
**14.4.3** The effect of the proposed extension on the ELT indicates that, based on the premise that a significant increase in land use occurs with the proposed DLR extension, then the proposed extension increases demand on the ELT by around 35%. Whilst the DLR abstracts demand from ELT, the combined effect of this and the associated land use changes is a net increase in ELT demand.

**14.4.4** The benefits for the proposed extension are made up of three components:

- crowding relief to the C2C line;
- passenger time savings for new development in the extensions catchment;
- increased accessibility to Stratford / Lower Lea Valley.

This is supported by the generalised journey time benefits which are widespread throughout the north Thames corridor with some small disbenefits around Beckton, associated with loss of service. This is shown in Figure 14.1.

**Figure 14.1 DLR Flow Changes and Generalised Journey Time Benefits. Gallions Reach-Dagenham Dock**



- 14.4.5** By providing an alternative alignment into the Royals from the east, another option exists for C2C passengers who could otherwise only use West Ham. The c2c service in the area is forecast to experience high levels of crowding. The DLR offers these commuters an alternative on a less crowded service, thus providing crowding benefits.
- 14.4.6** Given the large development proposed for the immediate catchment area of the extension the DLR offers a fast and more direct service than the existing network, thereby generating passenger travel time savings for the extension.
- 14.4.7** The fact that the proposed extension services are assumed to offer direct service to Stratford provides a significant improvement in access to Stratford for the wider catchment area of the proposed extension.

## **14.5 Wider Impacts**

- 14.5.1** The wider scheme impacts for each option are contained in Appendix A which comprises the TfL Business Case spreadsheets. A commentary on the main points is given below.

### **Maintain Existing Transport Services**

- 14.5.2** This option provides a service of 10tph to an area with very limited public transport levels at present. There is an offsetting reduction in level of service between Gallions Reach and Beckton.

### **Improve Safety and Security**

- 14.5.3** There is predicted to be an increase in car transport caused by new trips arising from additional development. This will result in an increase in traffic accidents compared with a do minimum scheme. However, the scheme will also lead to improved security, with high security indicators for public transport users at DLR stations.

### **Reduce Crowding and Congestion**

- 14.5.4** The C2C service in the area is forecast to experience high levels of crowding. The DLR offers these commuters an alternative on a less crowded service, thus providing crowding benefits.

### **Promote Equality and Inclusion**

- 14.5.5** The new service would benefit the mobility impaired due to step-free access to DLR as well as improving accessibility to regeneration areas of Barking Reach. The enhanced Stratford-Lewisham services would pass through wards in Barking and Dagenham with relatively high indices of multiple deprivation and unemployment rates in London, with unemployment rates of between 4% and 6%, compared to a London average of 3.3%. The option would also serve areas with percentages of disability claimants of between 4% and 6% compared with a London average of 3.4%.

### **Expand Network Capacity**

- 14.5.6** The scheme would expand network capacity by providing a new link from Dagenham Dock to Gallions Reach. The introduction of the DLR extension, in combination with the Thames Gateway Bridge, brings the employment sites at South Dagenham within less than an hour's travel time of Thamesmead.

## Integration (Including Interchange)

- 14.5.7** The scheme offers good transport interchange with the existing DLR network at Gallions Reach, and mainline rail at Dagenham Dock Station, together with some interchange with the bus network, with routes 387, 262 and 355 running close to stations. The scheme offers a good waiting environment.

## Regeneration

- 14.5.8** The scheme provides access to important regeneration sites in the River Roding Valley, as well as fitting in well with appropriate land-use measures outlined in the London Plan and the Mayor's Transport Strategy. The design of the scheme would incorporate measures that satisfy policy requirements relating to specific land use issues.

## Noise

- 14.5.9** The changes in traffic noise that is likely to arise as a result of this DLR Extension would not be characterised as a significant impact. No impact arises on the do-minimum DLR network.

## Local Air Quality/Reduction of Greenhouse Gases

- 14.5.10** This route will result in an increase in highway vehicle trips, and an increase in rail kilometres travelled, and, therefore, is likely to increase regional air pollution and greenhouse gas emissions.

## Townscape

- 14.5.11** Most areas not significantly affected. The route is in tunnel at the most sensitive area (River Roding). Tunnel approach cuttings will create severance, and elevated viaduct will create clutter and visual intrusion.

## Physical Fitness

- 14.5.12** The scheme will largely be used by the new population and, therefore, the effects cannot be predicted although any additional use of public transport is likely to be beneficial.

## Journey Ambience

- 14.5.13** The scheme will affect a large number of travellers with neutral views.

## Contribution to Other Relevant Mayoral Strategies or NATA Objectives

- 14.5.14** **Heritage of Historic Resources:** The route passes through an Area of Archaeological Importance, and scattered finds close to the route include Neolithic, Mesolithic and Bronze Age remains. Possible effects on roman camp and medieval settlement sites during construction. Impacts on built heritage would be neutral or slightly beneficial (assuming appropriate mitigation).
- 14.5.15** **Biodiversity:** The route passes through non-statutory nature conservation sites affected by habitat loss, fragmentation, disturbance, possible degradation of habitats.
- 14.5.16** **Water Environment:** The main impacts are during construction with largely insignificant impacts during the operation phase. Minor significance due to pumping requirements during operation.

## 15. BUSINESS CASE SUMMARIES

**15.1.1** The capital and operating costs from the costing exercise, together with the benefits and the revenue from the DPTM runs were fed into the TfL BCDM spreadsheets and discounted over a 30 year period. The summary of this is shown in Table 15.1. The individual BCDM spreadsheets are reproduced in Appendix A.

**Table 15.1 Business Case Summaries, Discounted Values, 2004**

	Capital Costs £m <sup>[1]</sup>	Operating Costs £m <sup>[1]</sup>	Total Costs £m <sup>[1]</sup>	Benefits £m	Revenue £m	Net Present Value £m	BCR
E11 All Saints-Crossharbour	-127,400	-16,028	143,428	259,395	70,037	186,003	3.5:1
E5 Bank-Liverpool Street	-168,653	-12,746	181,398	484,220	130,739	433,561	9.6:1
E6B Bank-Shoreditch	-302,259	-24,263	326,522	666,754	180,024	520,256	4.6:1
E7 Bank-Farringdon	-184,459	-22,850	207,309	323,420	87,323	203,434	2.7:1
E13 Lewisham-Catford	-186,817	-18,697	205,514	270,305	72,982	137,773	2.0:1
E2 Bank-Charing Cross	-352,698	-34,520	387,218	549,754	148,434	310,970	2.3:1
E12 Greenwich-New Cross	-226,870	-21,550	248,421	341,535	92,214	185,329	2.2:1
E21 Lea Valley	-276,440	-36,167	312,607	405,437	109,468	202,298	2.0:1
E22 Bow Church-Hackney	-488,538	-35,724	524,262	334,387	90,285	-99,590	0.8:1
E29 Thamesmead	-212,181	-24,201	236,383	214,849	58,009	36,476	1.2:1
E4 Cannon Street Loop	-432,431	-36,967	469,398	418,213	112,917	61,732	1.2:1
E24 Gallions Reach-Dagenham Dock	-273,500	-14,900	288,400	512,000	137,000	360,600	3.4:1

Note: <sup>[1]</sup> Including Optimism Bias

**15.1.2** Table 15.1 indicates that only one scheme has a BCR lower than 1, namely Bow Church to Hackney, with a BCR of 0.8:1. Two schemes have BCRs just above 1, namely the Cannon Street Loop and the Thamesmead extension.

**15.1.3** The DfT have recently published a document, “Guidance on Value for Money”, Department for Transport, 15 December 2004, which gives guidance about a consistent assessment of value for money for investment decisions and choices. This can be found at:

[http://www.dft.gov.uk/stellent/groups/dft\\_about/documents/page/dft\\_about\\_033477.hcsp](http://www.dft.gov.uk/stellent/groups/dft_about/documents/page/dft_about_033477.hcsp)

**15.1.4** The guidance states that, unless the non-monetised impacts are sufficiently significant relative to the costs to shift the value for money categorisation, a project will generally be:

- poor value for money (vfm) if its BCR is less than 1;
- low vfm if its BCR is between 1 and 1.5;
- medium vfm if its BCR is between 1.5 and 2;
- High vfm if its BCR is over 2.

- 15.1.5** The guidance goes on to state that advice to ministers should reflect the presumption that, purely on grounds of value for money (vfm), the DfT funding rules should be:
- projects with poor vfm not funded;
  - very few projects with low vfm to be funded;
  - some, but by no means all, projects with medium vfm to be funded;
  - most, if not all, projects with high vfm to be funded.
- 15.1.6** The implication of this advice is that:
- Wood Wharf, Bank-Liverpool Street, Bank Shoreditch, Bank-Charing Cross, Bank-Farringdon, Greenwich-New Cross and Barking Reach all offer high vfm.
  - Lewisham-Catford and Lea Valley offer medium value for money;
  - Cannon Street Loop and Thamesmead offer low value for money;
  - Bow Church-Hackney offers poor value for money;
- 15.1.7** It seems, therefore, that the Cannon Street Loop, Thamesmead and Bow Church-Hackney are poorly performing schemes offering low value for money and should not be progressed any further at this stage. Lewisham-Catford and Lea Valley offer medium value for money and require further investigation. The role of heavy rail in the Lea Valley is being investigated by London Rail and is key to the viability of a DLR extension here.
- 15.1.8** The westward DLR extensions from Bank are generally mutually exclusive; it seems, therefore, that only one of Bank-Liverpool Street, Bank-Shoreditch, Bank-Charing Cross, Bank-Farringdon or Cannon Street loop should be recommended. Most of these schemes perform well in offering high vfm with the exception of the Cannon Street loop which does not.
- 15.1.9** Greenwich-New Cross and Lewisham-Catford, whilst not mutually exclusive, may give rise to problems if combined because diverting 10tph from the Lewisham line to Greenwich-New Cross may lead to capacity problems between Lewisham and Greenwich if Bank-Lewisham trains were extended to Catford. These two schemes perform similarly in terms of vfm and should be reviewed in light of the recent planning submission for Lewisham and the possible duplication of the East London Line benefits by the Greenwich-New Cross scheme.
- 15.1.10** The Dagenham Dock extension is a good performer and is at a much more advanced stage than the other schemes, both in terms of costing and demand forecasting. It would also help to unlock the enormous development potential in the Barking Riverside and South Dagenham development areas. The fact that this scheme performs well, together with the lower risks associated with more definitive costing, means that this is, therefore, an obvious candidate for recommendation.
- 15.1.11** Finally, Wood Wharf performs well and, providing a suitable alignment and solution to the differences in levels at Poplar can be found, this scheme should be pursued. There are also unquantified operational benefits including relief of Delta Junction and provision of a diversionary route to Canary Wharf.

## **16. ACTION PLAN**

**16.1** The brief requires an action plan for DLR, recommending the way forward for DLRL on each of the shortlisted options. This is set out below.

### **16.2 All Saints-Crossharbour**

- Further engineering and alignment work investigating levels and crossing options of the eastbound Beckton Line and impacts on sidings, Poplar Business Park and property at southern end.
- Investigate grade separation and additional routing/alignment/frequency options.
- Obtain further information relating to timing and nature of Wood Wharf development and potential interface opportunities.
- Review capital costs and business case.
- Review property and land budget.
- Further network modelling of service options and benefits compared to other options.

### **16.3 Bank-Liverpool Street (Shoreditch)**

- Discuss case for pursuing this option with TfL and CoL.

### **16.4 Bank-Moorgate-Farringdon**

- Discuss case for pursuing this option with TfL and CoL.

### **16.5 Lewisham-Catford**

- Further review engineering issues surrounding Lewisham station and remaining alignment to Catford.
- Review interface with SRB6 scheme south of Lewisham.
- Review capital costs.
- Review station options.
- Hold discussions with London Buses and TOCs on potential impacts on local network and services.
- Review property and land budget.
- Further network modelling of service options and benefits.

### **16.6 Bank-Aldwych-Charing Cross**

- Commission more detailed alignment and tunnel study.
- Review utility information.
- Review utilisation and costs associated with re-using Aldwych station.
- Discuss crowding and service impacts with LUL/NR/London Buses.



- Undertake further work on Charing Cross platform utilisation.
- Review capital costs and business case.
- Review property and land budget.
- Undertake further modelling tests to review robustness of Railplan outputs.

#### **16.7 Greenwich-New Cross/New Cross Gate**

- Discuss case for pursuing this option with TfL.

#### **16.8 Stratford-Tottenham Hale**

- Review heavy rail interface and synergies with heavy rail schemes.

#### **16.9 Bow Church-Hackney**

- Discuss case for pursuing this option with TfL and GLA.

#### **16.10 Woolwich Arsenal-Thamesmead**

- Discuss potential for pursuing this option with TfL, GLA and London Borough of Greenwich

#### **16.11 Bank-Cannon Street-City Thameslink-Moorgate**

- Discuss case for pursuing this option with TfL and Corporation of London.

#### **16.12 Gallions Reach-Dagenham Dock**

- Continue alignment optioning work.
- Undertake public consultation on options.
- Select preferred option.
- Agree timing issues.
- Agree way forward on funding.

## APPENDIX A

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### **BCDM Spreadsheets**

# Business Case Summary

## CLASSIFICATION DETAILS

Business Unit

Docklands Light Railway ▼

Sub-business Unit

Docklands Light Railway ▼

Programme Unit

Docklands Light Railway ▼

Activity Name

Maximum size = 250 characters

Test 1 (Crossrail Included)

Component Name

Maximum size = 250 characters

All Saints - Crossharbour

Objectives of Component

Maximum size = 1000 characters

Stratford - Lewisham service diverted to new loop via Blackwall Basin, and frequency increased from 10tph to 15tph

Project life, i.e. number of years over which discounted (normally max = 30)

30

## COSTS AND REVENUES

Capital costs (total)

Maximum size for fields below = 160 characters

Undiscounted  
(£000s)

Discounted  
(£000s PV)

-166240

-127400

Sub-category 1 Infrastructure capital costs

-151060

Sub-category 2 National Rail capital costs

0

Sub-category 3 Rolling stock capital costs

-11880

Sub-category 4 Rolling stock renewal costs

-3300

Costs avoided  
(e.g. scheduled asset replacements)

Residual value (if significant after 30 yrs) Infrastructure and rolling stock residual value

Operating costs Maintenance, staffing and station operations

-1306

pa

-16028

Ongoing cost savings

0

pa

0

Revenue from increased demand Increased revenue

6047

pa

70037

Secondary income (advertising, etc)

0

pa

Revenue loss avoided

0

pa

Net Financial Effect (NFE)

-73392

Third party contributions (total)

0

Sub-category 1

Sub-category 2

Sub-category 3

## SOCIAL BENEFITS

Journey time (total)

22397

pa

259395

Sub-category 1 Journey time and crowding benefits

22397

pa

Sub-category 2

0

pa

Sub-category 3

0

pa

Sub-category 4

0

pa

Ambience

0

pa

Safety improvements

0

pa

Total Social Benefit

259395

## OUTCOME OF QUANTIFIED ANALYSIS

Net Financial Effect (NFE) from above

XX.X : 1  
(or Fin Pos)

NFE  
(£000s PV)

-73392

Benefit : cost ratio

3.5:1

Years

Number of years until project becomes financially positive to TfL

XX.X : 1  
(or Fin Pos)

NFE  
(£000s PV)

-73392

Sensitivity to subtracting any third party contributions from full cost

3.5:1

Sensitivity to assumptions associated with the most uncertainty

Maximum size = 160 characters

Sensitivity test 1

Sensitivity test 2

Sensitivity test 3

## IMPACT ON STRATEGIES

Extent and explanation of contribution to TfL Strategic Priorities, where relevant:

# Business Case Summary

<b>Maintain existing transport services</b>	<b>Maximum size for all impact fields below = 500 characters</b>
Whilst this option increase the level of service between Stratford & Lewisham, it removes direct services from Stratford & Lewisham to Canary Wharf and	
<b>Improve safety and security</b>	
Minimal. Reduces traffic through Delta Junction constraint. No impact on other modes.	
<b>Reduce crowding and congestion</b>	
Increase in service frequency between Stratford and Lewisham resulting in lower crowding. As the effects are largely confined to the Stratford/Lewisham	
<b>Promote sustainable development</b>	
Good. Will improves accesibility to ongoing redevelopment at Wood Wharf to the east of Canary Wharf	
<b>Promote equality and inclusion</b>	
The higher level of service will benefit the mobility impaired due to step-free access to DLR. Improved accessibility to employment & residential areas on east of	
<b>Expand network capacity</b>	
Beneficial Effect. Relieves Delta Junction capacity constraint, allowing increase in DLR service frequencies on Stratford-Lewisham which would not be possible	
<b>Extent and explanation of contribution to key NATA objectives, where relevant:</b>	
<b>Integration (including interchange)</b>	
Loss of Canary Wharf and Poplar DLR interchange as noted under "Maintain Existing Transport Services" but journey time and frequency improvements along	
<b>Regeneration</b>	
Good. New route directly serves area of regeneration in Canary Wharf and links this to the Stratford Corridor providing good links between the two areas.	
<b>Noise</b>	
Some impact. Elevated alignment running close to office development to the south of Wood Wharf. The scheme passes within 50 metres of 30 existing	
<b>Local Air Quality</b>	
Minimal local impact.	
<b>Reduction of Greenhouse Gases</b>	
Small. Minimal mode shift from slight journey time improvement Stratford Lewisham.	
<b>Townscape</b>	
Elevated alignment but this will run through an area to be developed and so can be integrated into the townscape.	
<b>Physical Fitness</b>	
The scheme is unlikely to lead to increases of walk or cycle journeys greater than 15 minutes duration, although any mode shift would result in an increase in	
<b>Journey Ambience</b>	
Little change. Reductions in journey times and crowding will lead to less stressful journeys.	
<b>Financial Efficiency</b>	
<b>Extent and explanation of contribution to other Mayoral strategies or NATA objectives, etc, where relevant:</b>	<b>Maximum size = 1000 characters</b>
Ecology/biodiversity: The scheme passes through the Poplar Dock and Blackwall Basin SBI, Grade 1, an area of Remnant vacant land, containing dockside and	
<b>Assumptions</b>	
<b>Any non-standard assumptions used in the cost-benefit analysis</b>	<b>Maximum size = 150 characters</b>
<b>Assumption 1</b>	
<b>Assumption 2</b>	
<b>Assumption 3</b>	
<b>Assumption 4</b>	
<b>Risks</b> (Technical risks, procedural barriers, dependence on other projects, etc )	<b>Maximum size = 500 characters</b>
<b>Other options considered</b>	<b>Maximum size = 500 characters</b>
<b>OVERALL ASSESSMENT</b>	
<b>Overall assessment, given quantified analysis, sensitivity tests, any benefits not included in quantified analysis, and project risks</b>	<b>Maximum size = 1000 characters</b>
<b>Impact of scope reduction or deferral</b>	<b>Maximum size = 500 characters</b>
<b>MEASURES OF SUCCESS</b>	(At least one, but preferably two or three)
	<b>Description of measure</b>
	<b>Maximum size = 240 characters</b>
<b>Measure 1</b>	
<b>Measure 2 (Optional)</b>	
<b>Measure 3 (Optional)</b>	
<b>Person responsible for reporting back on Measures of Success</b>	
<b>Name</b>	
<b>Contact details (tel no. / email)</b>	
<b>Date to report back</b>	
<b>Date report received</b>	
<b>Person responsible for Business Case</b>	
<b>Date submitted</b>	
<b>Endorsed by TfL Business Case Development</b>	
<b>Date submitted</b>	

# Business Case Summary

## CLASSIFICATION DETAILS

Business Unit

Docklands Light Railway ▼

Sub-business Unit

Docklands Light Railway ▼

Programme Unit

Docklands Light Railway ▼

Activity Name

Maximum size = 250 characters

Test 4 (Crossrail Included)

Component Name

Maximum size = 250 characters

Bank - Liverpool Street

Objectives of Component

Maximum size = 1000 characters

Bank - Lewisham (15tph) and Bank - Woolwich Arsenal (5tph) services extended from Bank via new infrastructure to Liverpool Street.

Project life, i.e. number of years over which discounted (normally max = 30)

30

## COSTS AND REVENUES

Capital costs (total)

Maximum size for fields below = 160 characters

Undiscounted  
(£000s)

Discounted  
(£000s PV)

-200390

-168653

Sub-category 1 Infrastructure capital costs

-175960

Sub-category 2 National Rail capital costs

-21580

Sub-category 3 Rolling stock capital costs

-17820

Sub-category 4 Rolling stock renewal costs

-4950

Costs avoided  
(e.g. scheduled asset replacements)

Residual value (if significant after 30 yrs) Infrastructure and rolling stock residual value

Operating costs Maintenance, staffing and station operations

-1038 pa

-12746

Ongoing cost savings

pa

0

Revenue from increased demand Increased revenue

11274 pa

130739

Secondary income (advertising, etc)

pa

Revenue loss avoided

pa

Net Financial Effect (NFE)

-50659

Third party contributions (total)

0

Sub-category 1

Sub-category 2

Sub-category 3

## SOCIAL BENEFITS

Journey time (total)

41757 pa

484220

Sub-category 1 Journey time and crowding benefits

41757 pa

Sub-category 2

pa

Sub-category 3

pa

Sub-category 4

pa

Ambience

pa

Safety improvements

pa

Total Social Benefit

484220

## OUTCOME OF QUANTIFIED ANALYSIS

Net Financial Effect (NFE) from above

XX.X : 1  
(or Fin Pos)

NFE  
(£000s PV)

-50659

Benefit : cost ratio

9.6 : 1

Years

Number of years until project becomes financially positive to TfL

XX.X : 1  
(or Fin Pos)

NFE  
(£000s PV)

-50659

Sensitivity to subtracting any third party contributions from full cost

Sensitivity to assumptions associated with the most uncertainty

Maximum size = 160 characters

Sensitivity test 1

Sensitivity test 2

Sensitivity test 3

## IMPACT ON STRATEGIES

Extent and explanation of contribution to TfL Strategic Priorities, where relevant:

# Business Case Summary

<b>Maintain existing transport services</b>	<b>Maximum size for all impact fields below = 500 characters</b>
Good. No loss of service. Extends all Bank DLR services to Liverpool Street for improved interchange. Variant of extending to Bishopsgate Goods Yard would	
<b>Improve safety and security</b>	
Minimal.	
<b>Reduce crowding and congestion</b>	
Good. Significant reductions in level of interchange and congestion at Bank station of over 30% in 2012 and 25% in 2020 and capacity relief for Central Line	
<b>Promote sustainable development</b>	
Minimal impact for core scheme although variant of extending to Shoreditch High Street would promote development of Bishopsgate Goods Yard and improve	
<b>Promote equality and inclusion</b>	
Core scheme has a small impact, although improved PT service would benefit areas of low car ownership, high indices of multiple deprivation and high	
<b>Expand network capacity</b>	
Good. Provides 20 tph additional service between Liverpool Street and Bank, capacity relief for Bank station and Central Line services and additional	
<b>Extent and explanation of contribution to key NATA objectives, where relevant:</b>	
<b>Integration (including interchange)</b>	
Positive. Improved interchange with access to DLR services Circle, Metropolitan, Hammersmith and City Lines.	
<b>Regeneration</b>	
Some impact. Variant of extending to Shoreditch High Street would provide a strong boost to Bishopsgate Good Yard redevelopment.	
<b>Noise</b>	
None. Tunnel throughout.	
<b>Local Air Quality</b>	
Likely limited mode shift so benefits small but positive.	
<b>Reduction of Greenhouse Gases</b>	
Minimal. Some modal shift from car/taxi but unlikely to be significant.	
<b>Townscape</b>	
None. Tunnel throughout	
<b>Physical Fitness</b>	
Demand forecast does not give estimate of modal switch. Key information on isochrone plots and population distribution not available	
<b>Journey Ambience</b>	
Strongly beneficial, due primarily to the reduction in congestion through Bank station, and crowding relief on Central Line.	
<b>Financial Efficiency</b>	
<b>Extent and explanation of contribution to other Mayoral strategies or NATA objectives, etc, where relevant:</b>	
<b>Maximum size = 1000 characters</b>	
None. Tunnel throughout	
<b>Assumptions</b>	
Any non-standard assumptions used in the cost-benefit analysis	
<b>Maximum size = 150 characters</b>	
Assumption 1	
Assumption 2	
Assumption 3	
Assumption 4	
<b>Risks</b> (Technical risks, procedural barriers, dependence on other projects, etc )	
<b>Maximum size = 500 characters</b>	
<b>Other options considered</b>	
<b>Maximum size = 500 characters</b>	
<b>OVERALL ASSESSMENT</b>	
Overall assessment, given quantified analysis, sensitivity tests, any benefits not included in quantified analysis, and project risks	
<b>Maximum size = 1000 characters</b>	
<b>Impact of scope reduction or deferral</b>	
<b>Maximum size = 500 characters</b>	
<b>MEASURES OF SUCCESS</b>	
(At least one, but preferably two or three)	
	<b>Description of measure</b>
	<b>Maximum size = 240 characters</b>
Measure 1	
Measure 2 (Optional)	
Measure 3 (Optional)	
<b>Person responsible for reporting back on Measures of Success</b>	
Name	
Contact details (tel no. / email)	
Date to report back	
Date report received	
Person responsible for Business Case	
Date submitted	
Endorsed by TfL Business Case Development	
Date submitted	

# Business Case Summary

## CLASSIFICATION DETAILS

Business Unit

Docklands Light Railway ▼

Sub-business Unit

Docklands Light Railway ▼

Programme Unit

Docklands Light Railway ▼

Activity Name

Maximum size = 250 characters

Test 4 (Crossrail Included)

Component Name

Maximum size = 250 characters

Bank - Liverpool Street-Shoreditch

Objectives of Component

Maximum size = 1000 characters

Bank - Lewisham (15tph) and Bank - Woolwich Arsenal (5tph) services extended from Bank via new infrastructure to Liverpool Street.

Project life, i.e. number of years over which discounted (normally max = 30)

30

## COSTS AND REVENUES

Capital costs (total)

Maximum size for fields below = 160 characters

Undiscounted  
(£000s)

Discounted  
(£000s PV)

Sub-category 1 Infrastructure capital costs

-393900

-302259

Sub-category 2 National Rail capital costs

-355240

-8300

Sub-category 3 Rolling stock capital costs

-23760

Sub-category 4 Rolling stock renewal costs

-6600

Costs avoided  
(e.g. scheduled asset replacements)

Residual value (if significant after 30 yrs) Infrastructure and rolling stock residual value

Operating costs Maintenance, staffing and station operations

-1976

pa

-24263

Ongoing cost savings

pa

0

Revenue from increased demand Increased revenue

15522

pa

180024

Secondary income (advertising, etc)

pa

Revenue loss avoided

pa

Net Financial Effect (NFE)

-146499

Third party contributions (total)

0

Sub-category 1

Sub-category 2

Sub-category 3

## SOCIAL BENEFITS

Journey time (total)

57487

pa

666754

Sub-category 1 Journey time and crowding benefits

57487

pa

Sub-category 2

pa

Sub-category 3

pa

Sub-category 4

pa

Ambience

pa

Safety improvements

pa

Total Social Benefit

666754

## OUTCOME OF QUANTIFIED ANALYSIS

Net Financial Effect (NFE) from above

XX.X : 1  
(or Fin Pos)

NFE  
(£000s PV)

-146499

Benefit : cost ratio

4.6 : 1

Years

Number of years until project becomes financially positive to TfL

XX.X : 1  
(or Fin Pos)

NFE  
(£000s PV)

-146499

Sensitivity to subtracting any third party contributions from full cost

Sensitivity to assumptions associated with the most uncertainty

Maximum size = 160 characters

Sensitivity test 1

Sensitivity test 2

Sensitivity test 3

## IMPACT ON STRATEGIES

Extent and explanation of contribution to TfL Strategic Priorities, where relevant:

# Business Case Summary

Maintain existing transport services	Maximum size for all impact fields below = 500 characters	
Improve safety and security		
Reduce crowding and congestion		
Promote sustainable development		
Promote equality and inclusion		
Expand network capacity		
Extent and explanation of contribution to key NATA objectives, where relevant:		
Integration (including interchange)		
Regeneration		
Noise		
Local Air Quality		
Reduction of Greenhouse Gases		
Townscape		
Physical Fitness		
Journey Ambience		
Financial Efficiency		
Extent and explanation of contribution to other Mayoral strategies or NATA objectives, etc, where relevant:		Maximum size = 1000 characters
<b>Assumptions</b>		
Any non-standard assumptions used in the cost-benefit analysis		Maximum size = 150 characters
Assumption 1		
Assumption 2		
Assumption 3		
Assumption 4		
<b>Risks</b> (Technical risks, procedural barriers, dependence on other projects, etc )		Maximum size = 500 characters
<b>Other options considered</b>		Maximum size = 500 characters
<b>OVERALL ASSESSMENT</b>		
Overall assessment, given quantified analysis, sensitivity tests, any benefits not included in quantified analysis, and project risks		Maximum size = 1000 characters
<b>Impact of scope reduction or deferral</b>		Maximum size = 500 characters
<b>MEASURES OF SUCCESS</b>		(At least one, but preferably two or three)
	Description of measure	Maximum size = 240 characters
Measure 1		
Measure 2 (Optional)		
Measure 3 (Optional)		
<b>Person responsible for reporting back on Measures of Success</b>		
Name		
Contact details (tel no. / email)		
Date to report back		
Date report received		
Person responsible for Business Case		
Date submitted		
Endorsed by TfL Business Case Development		
Date submitted		



# Business Case Summary

## CLASSIFICATION DETAILS

Business Unit

Docklands Light Railway ▼

Sub-business Unit

Docklands Light Railway ▼

Programme Unit

Docklands Light Railway ▼

Activity Name

Maximum size = 250 characters

Test 3 (Crossrail Included)

Component Name

Maximum size = 250 characters

Bank - Farringdon

Objectives of Component

Maximum size = 1000 characters

Bank - Lewisham (15tph) and Bank - Woolwich Arsenal (5tph) services extended from Bank via new infrastructure to Farringdon.

Project life, i.e. number of years over which discounted (normally max = 30)

30

## COSTS AND REVENUES

Capital costs (total)

Maximum size for fields below = 160 characters

Undiscounted  
(£000s)

Discounted  
(£000s PV)

-242130

-184459

Sub-category 1 Infrastructure capital costs

-199200

Sub-category 2 National Rail capital costs

-4980

Sub-category 3 Rolling stock capital costs

-29700

Sub-category 4 Rolling stock renewal costs

-8250

Costs avoided  
(e.g. scheduled asset replacements)

Residual value (if significant after 30 yrs) Infrastructure and rolling stock residual value

Operating costs Maintenance, staffing and station operations

-1861 pa

-22850

Ongoing cost savings

pa

0

Revenue from increased demand Increased revenue

7357 pa

87323

Secondary income (advertising, etc)

pa

Revenue loss avoided

pa

Net Financial Effect (NFE)

-119986

Third party contributions (total)

0

Sub-category 1

Sub-category 2

Sub-category 3

## SOCIAL BENEFITS

Journey time (total)

27249 pa

323420

Sub-category 1 Journey time and crowding benefits

27249 pa

Sub-category 2

pa

Sub-category 3

pa

Sub-category 4

pa

Ambience

pa

Safety improvements

pa

Total Social Benefit

323420

## OUTCOME OF QUANTIFIED ANALYSIS

Net Financial Effect (NFE) from above

XX.X : 1  
(or Fin Pos)

NFE  
(£000s PV)

-119986

Benefit : cost ratio

2.7 : 1

Years

Number of years until project becomes financially positive to TfL

XX.X : 1  
(or Fin Pos)

NFE  
(£000s PV)

-119986

Sensitivity to subtracting any third party contributions from full cost

Sensitivity to assumptions associated with the most uncertainty

Maximum size = 160 characters

Sensitivity test 1

Sensitivity test 2

Sensitivity test 3

## IMPACT ON STRATEGIES

Extent and explanation of contribution to TfL Strategic Priorities, where relevant:

# Business Case Summary

<b>Maintain existing transport services</b>	<b>Maximum size for all impact fields below = 500 characters</b>
Good. No loss of service and would provide serv+C124ices on Thameslink spur to Moorgate likely to be vacated by TL2000.	
<b>Improve safety and security</b>	
Minimal. Should reduce level of interchange at Bank and improve station safety.	
<b>Reduce crowding and congestion</b>	
Good. Significant reductions in level of interchange and congestion at Bank station of over 60% in 2012 and 16% in 2020 and crowding relief for Central Line	
<b>Promote sustainable development</b>	
Minimal impact. Connection with TL2000 provides improved PT service from areas served by TL2000 to Docklands and East London.	
<b>Promote equality and inclusion</b>	
Scheme has a small impact, although improved PT service would benefit areas of low car ownership, high indices of multiple deprivation and high proportions of	
<b>Expand network capacity</b>	
Good. Provides additional planning capacity between Farringdon and Bank of almost 10,000 providing relief for Bank station and Circle/Hammersmith lines	
<b>Extent and explanation of contribution to key NATA objectives, where relevant:</b>	
<b>Integration (including interchange)</b>	
Highly Positive. Provides new direct interchange between DLR and TL2000 and Crossrail.	
<b>Regeneration</b>	
Helps support TL2000 and CrossRail schemes, likely to generate housing demand outside London and improve connectivity with Docklands and East London	
<b>Noise</b>	
None. Tunnel throughout.	
<b>Local Air Quality</b>	
Likely limited mode shift so benefits small but positive.	
<b>Reduction of Greenhouse Gases</b>	
Minimal. Some modal shift from car/taxi but unlikely to be significant.	
<b>Townscape</b>	
None. Tunnel throughout.	
<b>Physical Fitness</b>	
Demand forecast does not give estimate of modal switch. Key information on isochrone plots and population distribution not available.	
<b>Journey Ambience</b>	
Positive impact. Reduction in congestion through Bank station, resulting in faster journey times	
<b>Financial Efficiency</b>	
<b>Extent and explanation of contribution to other Mayoral strategies or NATA objectives, etc, where relevant:</b>	
<b>Maximum size = 1000 characters</b>	
<b>Assumptions</b>	
Any non-standard assumptions used in the cost-benefit analysis	
<b>Maximum size = 150 characters</b>	
Assumption 1	
Assumption 2	
Assumption 3	
Assumption 4	
<b>Risks</b> (Technical risks, procedural barriers, dependence on other projects, etc )	
<b>Maximum size = 500 characters</b>	
<b>Other options considered</b>	
<b>Maximum size = 500 characters</b>	
<b>OVERALL ASSESSMENT</b>	
Overall assessment, given quantified analysis, sensitivity tests, any benefits not included in quantified analysis, and project risks	
<b>Maximum size = 1000 characters</b>	
<b>Impact of scope reduction or deferral</b>	
<b>Maximum size = 500 characters</b>	
<b>MEASURES OF SUCCESS</b>	
(At least one, but preferably two or three)	
	<b>Description of measure</b>
	<b>Maximum size = 240 characters</b>
Measure 1	
Measure 2 (Optional)	
Measure 3 (Optional)	
<b>Person responsible for reporting back on Measures of Success</b>	
Name	
Contact details (tel no. / email)	
Date to report back	
Date report received	
Person responsible for Business Case	
Date submitted	
Endorsed by TfL Business Case Development	
Date submitted	

# Business Case Summary

## CLASSIFICATION DETAILS

Business Unit

Docklands Light Railway ▼

Sub-business Unit

Docklands Light Railway ▼

Programme Unit

Docklands Light Railway ▼

Activity Name

Maximum size = 250 characters

Test 8 (Crossrail Included)

Component Name

Maximum size = 250 characters

Lewisham - Catford

Objectives of Component

Maximum size = 1000 characters

Bank - Lewisham (15tph) service extended from Bank via new infrastructure to Catford.

Project life, i.e. number of years over which discounted (normally max = 30)

30

## COSTS AND REVENUES

Capital costs (total)

Maximum size for fields below = 160 characters

Undiscounted  
(£000s)

Discounted  
(£000s PV)

-244500

-186817

Sub-category 1 Infrastructure capital costs

-205840

Sub-category 2 National Rail capital costs

-8300

Sub-category 3 Rolling stock capital costs

-23760

Sub-category 4 Rolling stock renewal costs

-6600

Costs avoided  
(e.g. scheduled asset replacements)

Residual value (if significant after 30 yrs) Infrastructure and rolling stock residual value

Operating costs Maintenance, staffing and station operations

-1523 pa

-18697

Ongoing cost savings

pa

0

Revenue from increased demand Increased revenue

6357 pa

72982

Secondary income (advertising, etc)

pa

Revenue loss avoided

pa

Net Financial Effect (NFE)

-132532

Third party contributions (total)

0

Sub-category 1

Sub-category 2

Sub-category 3

## SOCIAL BENEFITS

Journey time (total)

23543 pa

270305

Sub-category 1 Journey time and crowding benefits

23543 pa

Sub-category 2

pa

Sub-category 3

pa

Sub-category 4

pa

Ambience

pa

Safety improvements

pa

Total Social Benefit

270305

## OUTCOME OF QUANTIFIED ANALYSIS

Net Financial Effect (NFE) from above

XX.X : 1  
(or Fin Pos)

NFE  
(£000s PV)

-132532

Benefit : cost ratio

2.0 : 1

Years

Number of years until project becomes financially positive to TfL

XX.X : 1  
(or Fin Pos)

NFE  
(£000s PV)

-132532

Sensitivity to subtracting any third party contributions from full cost

2.0 : 1

Sensitivity to assumptions associated with the most uncertainty

Maximum size = 160 characters

Sensitivity test 1

Sensitivity test 2

Sensitivity test 3

## IMPACT ON STRATEGIES

Extent and explanation of contribution to TfL Strategic Priorities, where relevant:

# Business Case Summary

Maintain existing transport services	Maximum size for all impact fields below = 500 characters	
Improve safety and security		
Reduce crowding and congestion		
Promote sustainable development		
Promote equality and inclusion		
Expand network capacity		
Extent and explanation of contribution to key NATA objectives, where relevant:		
Integration (including interchange)		
Regeneration		
Noise		
Local Air Quality		
Reduction of Greenhouse Gases		
Townscape		
Physical Fitness		
Journey Ambience		
Financial Efficiency		
Extent and explanation of contribution to other Mayoral strategies or NATA objectives, etc, where relevant:		Maximum size = 1000 characters
<b>Assumptions</b>		
Any non-standard assumptions used in the cost-benefit analysis		Maximum size = 150 characters
Assumption 1		
Assumption 2		
Assumption 3		
Assumption 4		
<b>Risks</b> (Technical risks, procedural barriers, dependence on other projects, etc )		Maximum size = 500 characters
<b>Other options considered</b>		Maximum size = 500 characters
<b>OVERALL ASSESSMENT</b>		
Overall assessment, given quantified analysis, sensitivity tests, any benefits not included in quantified analysis, and project risks		Maximum size = 1000 characters
<b>Impact of scope reduction or deferral</b>		Maximum size = 500 characters
<b>MEASURES OF SUCCESS</b>		(At least one, but preferably two or three)
	Description of measure	Maximum size = 240 characters
Measure 1		
Measure 2 (Optional)		
Measure 3 (Optional)		
<b>Person responsible for reporting back on Measures of Success</b>		
Name		
Contact details (tel no. / email)		
Date to report back		
Date report received		
Person responsible for Business Case		
Date submitted		
Endorsed by TfL Business Case Development		
Date submitted		

# Business Case Summary

## CLASSIFICATION DETAILS

Business Unit

Docklands Light Railway ▼

Sub-business Unit

Docklands Light Railway ▼

Programme Unit

Docklands Light Railway ▼

Activity Name

Maximum size = 250 characters

Test 6 (Crossrail Included)

Component Name

Maximum size = 250 characters

Bank - Charing Cross via Aldwych

Objectives of Component

Maximum size = 1000 characters

Bank - Lewisham (15tph) and Bank - Woolwich Arsenal (5tph) services extended from Bank via new infrastructure to Charing Cross.

Project life, i.e. number of years over which discounted (normally max = 30)

30

## COSTS AND REVENUES

Capital costs (total)

Maximum size for fields below = 160 characters

Undiscounted  
(£000s)

Discounted  
(£000s PV)

Sub-category 1 Infrastructure capital costs

-460540

-352698

Sub-category 2 National Rail capital costs

-413340

Sub-category 3 Rolling stock capital costs

-1660

Sub-category 4 Rolling stock renewal costs

-35640

-9900

Costs avoided  
(e.g. scheduled asset replacements)

Residual value (if significant after 30 yrs) Infrastructure and rolling stock residual value

Operating costs Maintenance, staffing and station operations

-2812

pa

-34520

Ongoing cost savings

pa

0

Revenue from increased demand Increased revenue

12769

pa

148434

Secondary income (advertising, etc)

pa

Revenue loss avoided

pa

Net Financial Effect (NFE)

-238784

Third party contributions (total)

0

Sub-category 1

Sub-category 2

Sub-category 3

## SOCIAL BENEFITS

Journey time (total)

47293

pa

549754

Sub-category 1 Journey time and crowding benefits

47293

pa

Sub-category 2

pa

Sub-category 3

pa

Sub-category 4

pa

Ambience

pa

Safety improvements

pa

Total Social Benefit

549754

## OUTCOME OF QUANTIFIED ANALYSIS

Net Financial Effect (NFE) from above

XX.X : 1  
(or Fin Pos)

NFE  
(£000s PV)

-238784

Benefit : cost ratio

2.3 : 1

Years

Number of years until project becomes financially positive to TfL

XX.X : 1  
(or Fin Pos)

NFE  
(£000s PV)

-238784

Sensitivity to subtracting any third party contributions from full cost

Sensitivity to assumptions associated with the most uncertainty

Maximum size = 160 characters

Sensitivity test 1

Sensitivity test 2

Sensitivity test 3

## IMPACT ON STRATEGIES

Extent and explanation of contribution to TfL Strategic Priorities, where relevant:

# Business Case Summary

<b>Maintain existing transport services</b>	<b>Maximum size for all impact fields below = 500 characters</b>
Strongly beneficial. No loss of service. Extends 20tph Bank DLR services to Charing Cross providing improved interchange with TL2000 at City Thameslink.	
<b>Improve safety and security</b>	
Minimal Impact. Some reduction in level of interchange at Bank and improvement in station security	
<b>Reduce crowding and congestion</b>	
Very strong benefits due to reduced crowding on Central, Jubilee, District/Circle and Northern Lines. Some reduction in interchange and congestion at Bank	
<b>Promote sustainable development</b>	
Minimal impact.	
<b>Promote equality and inclusion</b>	
Minimal impact of extension itself other than providing more direct connections from east and south east London, with above average levels of unemployment	
<b>Expand network capacity</b>	
Good. Additional capacity on east-west alignment through central London.	
<b>Extent and explanation of contribution to key NATA objectives, where relevant:</b>	
<b>Integration (including interchange)</b>	
Positive. No loss of service, extends Bank and DLR services to Charing Cross improving interchange with TL2000 and City Thameslink.	
<b>Regeneration</b>	
Minimal impact.	
<b>Noise</b>	
None. Tunnel throughout.	
<b>Local Air Quality</b>	
Minimal. Some modal shift from car/bus/taxi but unlikely to be significant.	
<b>Reduction of Greenhouse Gases</b>	
Minimal.	
<b>Townscape</b>	
None. Tunnel throughout.	
<b>Physical Fitness</b>	
Demand forecast does not give estimate of modal switch. Key information on Isochrome plots and population distribution not available.	
<b>Journey Ambience</b>	
Positive impact. A Reduction in congestion through Bank station and crowding relief on parallel LUL lines. Reduced interchange for Docklands passengers from	
<b>Financial Efficiency</b>	
<b>Extent and explanation of contribution to other Mayoral strategies or NATA objectives, etc, where relevant:</b>	
<b>Maximum size = 1000 characters</b>	
<b>Assumptions</b>	
<b>Any non-standard assumptions used in the cost-benefit analysis</b>	
<b>Maximum size = 150 characters</b>	
Assumption 1	
Assumption 2	
Assumption 3	
Assumption 4	
<b>Risks</b>	<b>(Technical risks, procedural barriers, dependence on other projects, etc )</b>
<b>Maximum size = 500 characters</b>	
<b>Other options considered</b>	
<b>Maximum size = 500 characters</b>	
<b>OVERALL ASSESSMENT</b>	
<b>Overall assessment, given quantified analysis, sensitivity tests, any benefits not included in quantified analysis, and project risks</b>	
<b>Maximum size = 1000 characters</b>	
<b>Impact of scope reduction or deferral</b>	
<b>Maximum size = 500 characters</b>	
<b>MEASURES OF SUCCESS</b>	<b>(At least one, but preferably two or three)</b>
	<b>Description of measure</b>
	<b>Maximum size = 240 characters</b>
Measure 1	
Measure 2 (Optional)	
Measure 3 (Optional)	
<b>Person responsible for reporting back on Measures of Success</b>	
Name	
Contact details (tel no. / email)	
Date to report back	
Date report received	
Person responsible for Business Case	
Date submitted	
Endorsed by TfL Business Case Development	
Date submitted	

# Business Case Summary

## CLASSIFICATION DETAILS

Business Unit

Docklands Light Railway ▼

Sub-business Unit

Docklands Light Railway ▼

Programme Unit

Docklands Light Railway ▼

Activity Name

Maximum size = 250 characters

Test 2

Component Name

Maximum size = 250 characters

Greenwich - New Cross/New Cross Gate

Objectives of Component

Maximum size = 1000 characters

Strat-Lewisham diverted from Greenwich to NX/NXG (10tph) and Woolwich Arsenal - Canary Wharf extended to Lewisham (5tph)

Project life, i.e. number of years over which discounted (normally max = 30)

30

## COSTS AND REVENUES

Capital costs (total)

Maximum size for fields below = 160 characters

Undiscounted  
(£000s)

Discounted  
(£000s PV)

Sub-category 1 Infrastructure capital costs

-295880

-226870

Sub-category 2 National Rail capital costs

-267260

Sub-category 3 Rolling stock capital costs

-3320

Sub-category 4 Rolling stock renewal costs

-19800

-5500

Costs avoided  
(e.g. scheduled asset replacements)

Residual value (if significant after 30 yrs) Infrastructure and rolling stock residual value

Operating costs Maintenance, staffing and station operations

-1755

pa

-21550

Ongoing cost savings

pa

0

Revenue from increased demand Increased revenue

7888

pa

92214

Secondary income (advertising, etc)

pa

Revenue loss avoided

pa

Net Financial Effect (NFE)

-156206

Third party contributions (total)

0

Sub-category 1

Sub-category 2

Sub-category 3

## SOCIAL BENEFITS

Journey time (total)

29216

pa

341535

Sub-category 1 Journey time and crowding benefits

29216

pa

Sub-category 2

pa

Sub-category 3

pa

Sub-category 4

pa

Ambience

pa

Safety improvements

pa

Total Social Benefit

341535

## OUTCOME OF QUANTIFIED ANALYSIS

Net Financial Effect (NFE) from above

XX.X : 1  
(or Fin Pos)

NFE  
(£000s PV)

-156206

Benefit : cost ratio

2.2 : 1

Years

Number of years until project becomes financially positive to TfL

XX.X : 1  
(or Fin Pos)

NFE  
(£000s PV)

-156206

Sensitivity to subtracting any third party contributions from full cost

Sensitivity to assumptions associated with the most uncertainty

Maximum size = 160 characters

Sensitivity test 1

Sensitivity test 2

Sensitivity test 3

## IMPACT ON STRATEGIES

Extent and explanation of contribution to TfL Strategic Priorities, where relevant:

# Business Case Summary

<b>Maintain existing transport services</b>	<b>Maximum size for all impact fields below = 500 characters</b>
Whilst new services are provided from Greenwich to New Cross / New Cross Gate, the scheme would operate as a spur from Lewisham branch resulting in a	
<b>Improve safety and security</b>	
Improvements to safety and security of new passengers who would previously have used other public transport modes.	
<b>Reduce crowding and congestion</b>	
Good. Reduced interchange and congestion at Canada Water station and subsequent reductions in Jubilee Line crowding.	
<b>Promote sustainable development</b>	
Minimal impact. Not directly serving new areas of development.	
<b>Promote equality and inclusion</b>	
The extension will pass through or near to wards in Lewisham with relatively high indices of multiple deprivation and low car ownership. It would also serve areas	
<b>Expand network capacity</b>	
Even though the spur operation means that there is a net reduction of services between Greenwich and Lewisham, there would be a net overall increase in	
<b>Extent and explanation of contribution to key NATA objectives, where relevant:</b>	
<b>Integration (including interchange)</b>	
Positive. Improved connectivity to Docklands from South London rail routes, significant relief to Canada Water LUL interchange.	
<b>Regeneration</b>	
Minimal impact.	
<b>Noise</b>	
None. Tunnel throughout.	
<b>Local Air Quality</b>	
None. Tunnel throughout.	
<b>Reduction of Greenhouse Gases</b>	
Minimal. Short extension mainly providing alternative route choice to existing PT passengers.	
<b>Townscape</b>	
None. Tunnel throughout.	
<b>Physical Fitness</b>	
Demand forecast does not give estimate of modal switch. Key information on Isochrome plots and population distribution not available.	
<b>Journey Ambience</b>	
Positive impact. Improved interchange to Docklands and decreased journey times.	
<b>Financial Efficiency</b>	
<b>Extent and explanation of contribution to other Mayoral strategies or NATA objectives, etc, where relevant:</b>	
<b>Maximum size = 1000 characters</b>	
<b>Assumptions</b>	
Any non-standard assumptions used in the cost-benefit analysis	
<b>Maximum size = 150 characters</b>	
Assumption 1	
Assumption 2	
Assumption 3	
Assumption 4	
<b>Risks</b> (Technical risks, procedural barriers, dependence on other projects, etc )	
<b>Maximum size = 500 characters</b>	
<b>Other options considered</b>	
<b>Maximum size = 500 characters</b>	
<b>OVERALL ASSESSMENT</b>	
Overall assessment, given quantified analysis, sensitivity tests, any benefits not included in quantified analysis, and project risks	
<b>Maximum size = 1000 characters</b>	
<b>Impact of scope reduction or deferral</b>	
<b>Maximum size = 500 characters</b>	
<b>MEASURES OF SUCCESS</b> (At least one, but preferably two or three)	
	<b>Description of measure</b>
	<b>Maximum size = 240 characters</b>
Measure 1	
Measure 2 (Optional)	
Measure 3 (Optional)	
<b>Person responsible for reporting back on Measures of Success</b>	
Name	
Contact details (tel no. / email)	
Date to report back	
Date report received	
Person responsible for Business Case	
Date submitted	
Endorsed by TfL Business Case Development	
Date submitted	



# Business Case Summary

## CLASSIFICATION DETAILS

Business Unit

Docklands Light Railway ▼

Sub-business Unit

Docklands Light Railway ▼

Programme Unit

Docklands Light Railway ▼

Activity Name

Maximum size = 250 characters

Test 5

Component Name

Maximum size = 250 characters

Lea Valley

Objectives of Component

Maximum size = 1000 characters

Stratford Intl - Dag Dock (10tph) extended to Tottenham Hale; Woolw Arsenal - Can. Town (5tph) extended Stratfd Intl and Tott Hale

Project life, i.e. number of years over which discounted (normally max = 30)

30

## COSTS AND REVENUES

Capital costs (total)

Maximum size for fields below = 160 characters

Undiscounted  
(£000s)

Discounted  
(£000s PV)

Sub-category 1 Infrastructure capital costs

-362760

-276440

Sub-category 2 National Rail capital costs

-290500

Sub-category 3 Rolling stock capital costs

-16600

Sub-category 4 Rolling stock renewal costs

-43560

-12100

Costs avoided  
(e.g. scheduled asset replacements)

Residual value (if significant after 30 yrs) Infrastructure and rolling stock residual value

Operating costs Maintenance, staffing and station operations

-2946

pa

-36167

Ongoing cost savings

pa

0

Revenue from increased demand Increased revenue

9437

pa

109468

Secondary income (advertising, etc)

pa

Revenue loss avoided

pa

Net Financial Effect (NFE)

-203139

Third party contributions (total)

0

Sub-category 1

Sub-category 2

Sub-category 3

## SOCIAL BENEFITS

Journey time (total)

34952

pa

405437

Sub-category 1 Journey time and crowding benefits

34952

pa

Sub-category 2

pa

Sub-category 3

pa

Sub-category 4

pa

Ambience

pa

Safety improvements

pa

Total Social Benefit

405437

## OUTCOME OF QUANTIFIED ANALYSIS

Net Financial Effect (NFE) from above

XX.X : 1  
(or Fin Pos)

NFE  
(£000s PV)

-203139

Benefit : cost ratio

2.0 : 1

Years

Number of years until project becomes financially positive to TfL

XX.X : 1  
(or Fin Pos)

NFE  
(£000s PV)

-203139

Sensitivity to subtracting any third party contributions from full cost

Sensitivity to assumptions associated with the most uncertainty

Maximum size = 160 characters

Sensitivity test 1

Sensitivity test 2

Sensitivity test 3

## IMPACT ON STRATEGIES

Extent and explanation of contribution to TfL Strategic Priorities, where relevant:

# Business Case Summary

<b>Maintain existing transport services</b>	<b>Maximum size for all impact fields below = 500 characters</b>
Small impact. Extension affecting all Stratford International services strengthening access between Stratford, Tottenham Hale and orbital routes around North	
<b>Improve safety and security</b>	
Improvements resulting from high frequency PT presence along Lea Valley improving personal safety and station security.	
<b>Reduce crowding and congestion</b>	
Small impact. Improves connectivity between Tottenham Hale and Stratford, but routes uncrowded. Maybe some crowding relief on Victoria and Central Lines,	
<b>Promote sustainable development</b>	
Strong. Will support Olympic/Non-Olympic masterplanning to the north of Stratford International. To the north, the alignment runs mostly through greenspace	
<b>Promote equality and inclusion</b>	
Positive impact. Will strengthen orbital transport links around North East London improving PT access in an area of relatively low car ownership, above average	
<b>Expand network capacity</b>	
Positive. Replicates existing heavy rail line, but strengthens orbital passenger services and reduces need for interchange at Stratford or Central London.	
<b>Extent and explanation of contribution to key NATA objectives, where relevant:</b>	
<b>Integration (including interchange)</b>	
Strong. Improves direct links to Stratford and Docklands from the North, avoiding Central London. Improves connectivity with CTRL from the North.	
<b>Regeneration</b>	
Strong benefit to Olympic/Non-Olympic masterplanning area North of Stratford. Much of Lea Valley is safeguarded greenspace but could support regeneration	
<b>Noise</b>	
Minimal impact, mostly runs alongside existing heavy rail line.	
<b>Local Air Quality</b>	
Minimal benefit. Much of alignment undeveloped.	
<b>Reduction of Greenhouse Gases</b>	
Minimal, may be small mode shift from orbital car and bus trips around North East London .	
<b>Townscape</b>	
Minimal impact, mostly runs alongside existing heavy rail lines.	
<b>Physical Fitness</b>	
Demand forecast does not give estimate of modal switch. Key information on isochrone plots and population distribution not available.	
<b>Journey Ambience</b>	
Positive benefit. Replication of low frequency heavy rail line between Tottenham Hale and Stratford. Improved through service to Docklands and Lewisham	
<b>Financial Efficiency</b>	
<b>Extent and explanation of contribution to other Mayoral strategies or NATA objectives, etc, where relevant:</b>	
<b>Maximum size = 1000 characters</b>	
The scheme passes through: The Lea Valley SSSI, SPA and Ramsar site; Temple Mills Wasteland SBI, Grade 1;Dagenham Brook SLI. The first of these is of	
<b>Assumptions</b>	
<b>Any non-standard assumptions used in the cost-benefit analysis</b>	
<b>Maximum size = 150 characters</b>	
Assumption 1	
Assumption 2	
Assumption 3	
Assumption 4	
<b>Risks</b> (Technical risks, procedural barriers, dependence on other projects, etc )	
<b>Maximum size = 500 characters</b>	
<b>Other options considered</b>	
<b>Maximum size = 500 characters</b>	
<b>OVERALL ASSESSMENT</b>	
<b>Overall assessment, given quantified analysis, sensitivity tests, any benefits not included in quantified analysis, and project risks</b>	
<b>Maximum size = 1000 characters</b>	
<b>Impact of scope reduction or deferral</b>	
<b>Maximum size = 500 characters</b>	
<b>MEASURES OF SUCCESS</b>	
(At least one, but preferably two or three)	
	<b>Description of measure</b>
	<b>Maximum size = 240 characters</b>
Measure 1	
Measure 2 (Optional)	
Measure 3 (Optional)	
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Date report received	
Person responsible for Business Case	
Date submitted	
Endorsed by TfL Business Case Development	
Date submitted	

# Business Case Summary

## CLASSIFICATION DETAILS

Business Unit

Docklands Light Railway ▼

Sub-business Unit

Docklands Light Railway ▼

Programme Unit

Docklands Light Railway ▼

Activity Name

Maximum size = 250 characters

Test 7 (Crossrail Included)

Component Name

Maximum size = 250 characters

Bow Church - Hackney

Objectives of Component

Maximum size = 1000 characters

Diversion of Stratford - Lewisham 10tph service via Wood Wharf loop + new Wood Wharf - Hackney 10tph service via Bow Church

Project life, i.e. number of years over which discounted (normally max = 30)

30

## COSTS AND REVENUES

Capital costs (total)

Maximum size for fields below = 160 characters

Undiscounted  
(£000s)

Discounted  
(£000s PV)

-634520

-488538

Sub-category 1 Infrastructure capital costs

-605900

Sub-category 2 National Rail capital costs

-3320

Sub-category 3 Rolling stock capital costs

-19800

Sub-category 4 Rolling stock renewal costs

-5500

Costs avoided  
(e.g. scheduled asset replacements)

Residual value (if significant after 30 yrs) Infrastructure and rolling stock residual value

Operating costs Maintenance, staffing and station operations

-2910

pa

-35724

Ongoing cost savings

pa

0

Revenue from increased demand Increased revenue

7680

pa

90285

Secondary income (advertising, etc)

pa

Revenue loss avoided

pa

Net Financial Effect (NFE)

-433977

Third party contributions (total)

0

Sub-category 1

Sub-category 2

Sub-category 3

## SOCIAL BENEFITS

Journey time (total)

28443

pa

334387

Sub-category 1 Journey time and crowding benefits

28443

pa

Sub-category 2

pa

Sub-category 3

pa

Sub-category 4

pa

Ambience

pa

Safety improvements

pa

Total Social Benefit

334387

## OUTCOME OF QUANTIFIED ANALYSIS

Net Financial Effect (NFE) from above

XX.X : 1  
(or Fin Pos)

NFE  
(£000s PV)

-433977

Benefit : cost ratio

0.8 : 1

Years

Number of years until project becomes financially positive to TfL

XX.X : 1  
(or Fin Pos)

NFE  
(£000s PV)

-433977

Sensitivity to subtracting any third party contributions from full cost

Sensitivity to assumptions associated with the most uncertainty

Maximum size = 160 characters

Sensitivity test 1

Sensitivity test 2

Sensitivity test 3

## IMPACT ON STRATEGIES

Extent and explanation of contribution to TfL Strategic Priorities, where relevant:

# Business Case Summary

<b>Maintain existing transport services</b>	<b>Maximum size for all impact fields below = 500 characters</b>
New service introduced between Hackney Central and Wood Wharf. Some loss of connectivity as this scheme would only work if introduced together with the	
<b>Improve safety and security</b>	
The scheme would have a positive effect by providing improved public transport presence along a corridor with poor existing provision.	
<b>Reduce crowding and congestion</b>	
Because there is no rail/LUL access along this corridor, there is limited crowding relief although as passengers mostly divert from bus, there would be lower bus	
<b>Promote sustainable development</b>	
The scheme would have a positive effect. Improves PT access to Docklands and Bank. Improved PT service for residential areas of Hackney/Victoria Park.	
<b>Promote equality and inclusion</b>	
The scheme would offer significant E&I benefits by providing public transport services to areas of Hackney with some of the lowest car ownership levels in	
<b>Expand network capacity</b>	
The scheme would have a positive effect providing 10tph on a corridor with no rail/underground provision	
<b>Extent and explanation of contribution to key NATA objectives, where relevant:</b>	
<b>Integration (including interchange)</b>	
Positive. Provides interchange between Hackney and Stratford services at Bow Church and would improve connectivity from Hackney to Docklands and	
<b>Regeneration</b>	
Good. Helps support London Plan 'Opportunity Area', scheme likely to increase housing demand within the borough.	
<b>Noise</b>	
No impact as extension completely in tunnel.	
<b>Local Air Quality</b>	
Minimal benefit due to limited mode shift.	
<b>Reduction of Greenhouse Gases</b>	
Minimal benefit due to limited mode shift.	
<b>Townscape</b>	
Minimal impact. Mostly runs underground.	
<b>Physical Fitness</b>	
Demand forecast does not give estimate of modal switch. Key information on Isochrome plots and population distribution not available.	
<b>Journey Ambience</b>	
The scheme would have a positive impact with bus/car journeys being made by quicker, smoother mode of transport.	
<b>Financial Efficiency</b>	
<b>Extent and explanation of contribution to other Mayoral strategies or NATA objectives, etc, where relevant:</b>	
<b>Maximum size = 1000 characters</b>	
<b>Assumptions</b>	
<b>Any non-standard assumptions used in the cost-benefit analysis</b>	
<b>Maximum size = 150 characters</b>	
Assumption 1	
Assumption 2	
Assumption 3	
Assumption 4	
<b>Risks</b> (Technical risks, procedural barriers, dependence on other projects, etc )	
<b>Maximum size = 500 characters</b>	
<b>Other options considered</b>	
<b>Maximum size = 500 characters</b>	
<b>OVERALL ASSESSMENT</b>	
<b>Overall assessment, given quantified analysis, sensitivity tests, any benefits not included in quantified analysis, and project risks</b>	
<b>Maximum size = 1000 characters</b>	
<b>Impact of scope reduction or deferral</b>	
<b>Maximum size = 500 characters</b>	
<b>MEASURES OF SUCCESS</b>	
(At least one, but preferably two or three)	
	<b>Description of measure</b>
	<b>Maximum size = 240 characters</b>
Measure 1	
Measure 2 (Optional)	
Measure 3 (Optional)	
<b>Person responsible for reporting back on Measures of Success</b>	
Name	
Contact details (tel no. / email)	
Date to report back	
Date report received	
Person responsible for Business Case	
Date submitted	
Endorsed by TfL Business Case Development	
Date submitted	

# Business Case Summary

## CLASSIFICATION DETAILS

Business Unit

Docklands Light Railway ▼

Sub-business Unit

Docklands Light Railway ▼

Programme Unit

Docklands Light Railway ▼

Activity Name

Maximum size = 250 characters

Test 9

Component Name

Maximum size = 250 characters

Thamesmead - Tunnel Option

Objectives of Component

Maximum size = 1000 characters

Canning Town - Woolwich services diverted from King George V to Thamesmead West and Thamesmead Central (10tph)

Project life, i.e. number of years over which discounted (normally max = 30)

30

## COSTS AND REVENUES

Capital costs (total)

Maximum size for fields below = 160 characters

Undiscounted  
(£000s)

Discounted  
(£000s PV)

-277780

-212181

Sub-category 1 Infrastructure capital costs

-242360

Sub-category 2 National Rail capital costs

0

Sub-category 3 Rolling stock capital costs

-27720

Sub-category 4 Rolling stock renewal costs

-7700

Costs avoided  
(e.g. scheduled asset replacements)

Residual value (if significant after 30 yrs) Infrastructure and rolling stock residual value

Operating costs Maintenance, staffing and station operations

-1971

pa

-24201

Ongoing cost savings

pa

0

Revenue from increased demand Increased revenue

4984

pa

58009

Secondary income (advertising, etc)

pa

Revenue loss avoided

pa

Net Financial Effect (NFE)

-178374

Third party contributions (total)

0

Sub-category 1

Sub-category 2

Sub-category 3

## SOCIAL BENEFITS

Journey time (total)

18459

pa

214849

Sub-category 1 Journey time and crowding benefits

18459

pa

Sub-category 2

pa

Sub-category 3

pa

Sub-category 4

pa

Ambience

pa

Safety improvements

pa

Total Social Benefit

214849

## OUTCOME OF QUANTIFIED ANALYSIS

Net Financial Effect (NFE) from above

XX.X : 1  
(or Fin Pos)

NFE  
(£000s PV)

-178374

Benefit : cost ratio

1.2 : 1

Years

Number of years until project becomes financially positive to TfL

XX.X : 1  
(or Fin Pos)

NFE  
(£000s PV)

-178374

Sensitivity to subtracting any third party contributions from full cost

1.2 : 1

Sensitivity to assumptions associated with the most uncertainty

Maximum size = 160 characters

Sensitivity test 1

Sensitivity test 2

Sensitivity test 3

## IMPACT ON STRATEGIES

Extent and explanation of contribution to TfL Strategic Priorities, where relevant:

# Business Case Summary

<b>Maintain existing transport services</b>	<b>Maximum size for all impact fields below = 500 characters</b>
Slight negative impact as Canning Town - Woolwich service diverted to Thamesmead at Woolwich Crossing. Whilst there are new services to Thamesmead,	
<b>Improve safety and security</b>	
New DLR services will lead to safer and more secure journeys.	
<b>Reduce crowding and congestion</b>	
Minimal effect. There is sufficient capacity to Thamesmead. However, the reduction in service to Woolwich Arsenal increases crowding and flows northbound	
<b>Promote sustainable development</b>	
Positive. Improves PT accessibility to North Woolwich and Thamesmead areas of regeneration.	
<b>Promote equality and inclusion</b>	
The higher level of service will benefit the mobility impaired due to step-free access to DLR. Services will pass through wards in Thamesmead with high indices	
<b>Expand network capacity</b>	
The scheme will extend the DLR network East, into an area poorly served by PT with the potential to tie in with Thames Gateway and Transit proposals at West	
<b>Extent and explanation of contribution to key NATA objectives, where relevant:</b>	
<b>Integration (including interchange)</b>	
Potential to improve interchange with Thames Gateway Transit proposals. Improved service choice from Canning Town. Small frequency improvement (5tph) to	
<b>Regeneration</b>	
Good. Service improvement through North Woolwich regeneration area and significant access and journey time improvement to Thamesmead.	
<b>Noise</b>	
Scheme in tunnel from North Woolwich - West Thamesmead. Elevated track to centre of Thamesmead alignment runs alongside dual carriageway, housing and	
<b>Local Air Quality</b>	
There is likely to be a small positive impact as a new DLR service will lead to some modal shift from car.	
<b>Reduction of Greenhouse Gases</b>	
There is likely to be a small positive effect due to modest mode shift from car.	
<b>Townscape</b>	
Scheme in tunnel through West Thamesmead then elevated alignment to town centre. Scheme will run adjacent to existing dual carriageway, housing and public	
<b>Physical Fitness</b>	
Demand forecast does not give estimate of modal switch. Key information on isochrone plots and population distribution not available.	
<b>Journey Ambience</b>	
Slight improvement. DLR alternative to regular bus service. Reduced interchange to Docklands and Central London improving journey times.	
<b>Financial Efficiency</b>	
<b>Extent and explanation of contribution to other Mayoral strategies or NATA objectives, etc, where relevant:</b>	
<b>Maximum size = 1000 characters</b>	
Ecology. The scheme would pass through the following sites of Metropolitan (SMI) or Borough (SBI) Importance:Thamesmead Wetland Historic Area SBI Grade 1,	
<b>Assumptions</b>	
Any non-standard assumptions used in the cost-benefit analysis	
<b>Maximum size = 150 characters</b>	
Assumption 1	
Assumption 2	
Assumption 3	
Assumption 4	
<b>Risks</b> (Technical risks, procedural barriers, dependence on other projects, etc )	
<b>Maximum size = 500 characters</b>	
<b>Other options considered</b>	
<b>Maximum size = 500 characters</b>	
<b>OVERALL ASSESSMENT</b>	
Overall assessment, given quantified analysis, sensitivity tests, any benefits not included in quantified analysis, and project risks	
<b>Maximum size = 1000 characters</b>	
<b>Impact of scope reduction or deferral</b>	
<b>Maximum size = 500 characters</b>	
<b>MEASURES OF SUCCESS</b> (At least one, but preferably two or three)	
	<b>Description of measure</b>
	<b>Maximum size = 240 characters</b>
Measure 1	
Measure 2 (Optional)	
Measure 3 (Optional)	
<b>Person responsible for reporting back on Measures of Success</b>	
Name	
Contact details (tel no. / email)	
Date to report back	
Date report received	
Person responsible for Business Case	
Date submitted	
Endorsed by TfL Business Case Development	
Date submitted	

# Business Case Summary

## CLASSIFICATION DETAILS

Business Unit

Docklands Light Railway ▼

Sub-business Unit

Docklands Light Railway ▼

Programme Unit

Docklands Light Railway ▼

Activity Name

Maximum size = 250 characters

Test 10 (Crossrail Included)

Component Name

Maximum size = 250 characters

Cannon St. Loop

Objectives of Component

Maximum size = 1000 characters

Bank - Lewisham (15tph) extended anticlockwise from Bank and Bank - Woolwich Arsenal (5tph) extended clockwise from Shadwell via existing Thameslink tunnels Moorgate-Barbican and new infrastructure Bank-Moorgate & Barbican-Shadwell via City Thameslink & Cannon Street

Project life, i.e. number of years over which discounted (normally max = 30)

30

## COSTS AND REVENUES

Capital costs (total)

Maximum size for fields below = 160 characters

Undiscounted  
(£000s)

Discounted  
(£000s PV)

-564410

-432431

Sub-category 1

Infrastructure capital costs

-504640

Sub-category 2

National Rail capital costs

-6640

Sub-category 3

Rolling stock capital costs

-41580

Sub-category 4

Rolling stock renewal costs

-11550

Costs avoided

(e.g. scheduled asset replacements)

Residual value (if significant after 30 yrs)

Infrastructure and rolling stock residual value

Operating costs

Maintenance, staffing and station operations

-3011

pa

-36967

Ongoing cost savings

pa

0

Revenue from increased demand

Increased revenue

9639

pa

112917

Secondary income (advertising, etc)

pa

Revenue loss avoided

pa

Net Financial Effect (NFE)

-356481

Third party contributions (total)

0

Sub-category 1

Sub-category 2

Sub-category 3

## SOCIAL BENEFITS

Journey time (total)

35698

pa

418213

Sub-category 1

Journey time and crowding benefits

35698

pa

Sub-category 2

pa

Sub-category 3

pa

Sub-category 4

pa

Ambience

pa

Safety improvements

pa

Total Social Benefit

418213

## OUTCOME OF QUANTIFIED ANALYSIS

Net Financial Effect (NFE) from above

XX.X : 1  
(or Fin Pos)

NFE  
(£000s PV)

-356481

Benefit : cost ratio

1.2 : 1

Number of years until project becomes financially positive to TfL

Years

XX.X : 1  
(or Fin Pos)

NFE  
(£000s PV)

Sensitivity to subtracting any third party contributions from full cost

1.2 : 1

-356481

Sensitivity to assumptions associated with the most uncertainty

Maximum size = 160 characters

Sensitivity test 1

Sensitivity test 2

Sensitivity test 3

## IMPACT ON STRATEGIES

# Business Case Summary

Extent and explanation of contribution to TfL Strategic Priorities, where relevant:

Maintain existing transport services

Maximum size for all impact fields below = 500 characters

Whilst there is a net increase in DLR trains to the west of Bank, the loop operation would result in a lower level of service to Bank.

Improve safety and security

Additional DLR services would reduce crowding on other parts of the LUL network, thereby improving safety.

Reduce crowding and congestion

Crowding relief on Northern Line north of Bank, westbound Central, westbound District /Circle and eastbound Jubilee Line

Promote sustainable development

Minimal Impact

Promote equality and inclusion

Scheme has a small impact, although improved public transport services would benefit areas of low car ownership, high indices of multiple deprivation and high

Expand network capacity

Mixed effect as although the scheme provides 20 tph additional service west of Bank, Bank itself would have a lower level of service.

Extent and explanation of contribution to key NATA objectives, where relevant:

Integration (including interchange)

Positive. Improved interchange with access to DLR services Circle, Metropolitan, Hammersmith and City Lines and Thameslink at City Thameslink.

Regeneration

Minor impact

Noise

None. Tunnel throughout.

Local Air Quality

Likely limited mode shift so benefits small but positive.

Reduction of Greenhouse Gases

Minimal. Some modal shift from car/taxi but unlikely to be significant.

Townscape

None. Tunnel throughout

Physical Fitness

Demand forecast does not give estimate of modal switch. Key information on isochrone plots and population distribution not available

Journey Ambience

Beneficial, due primarily to the reduction in congestion through Bank station, and crowding relief on Central Line.

Financial Efficiency

Extent and explanation of contribution to other Mayoral strategies or NATA objectives, etc, where relevant:

Maximum size = 1000 characters

**Assumptions**

Any non-standard assumptions used in the cost-benefit analysis

Maximum size = 150 characters

Assumption 1

Assumption 2

Assumption 3

Assumption 4

**Risks** (Technical risks, procedural barriers, dependence on other projects, etc )

Maximum size = 500 characters

**Other options considered**

Maximum size = 500 characters

**OVERALL ASSESSMENT**

Overall assessment, given quantified analysis, sensitivity tests, any benefits not included in quantified analysis, and project risks

Maximum size = 1000 characters

**Impact of scope reduction or deferral**

Maximum size = 500 characters

**MEASURES OF SUCCESS**

(At least one, but preferably two or three)

Description of measure

Maximum size = 240 characters

Measure 1

Measure 2 (Optional)

Measure 3 (Optional)

**Person responsible for reporting back on Measures of Success**

Name

Contact details (tel no. / email)

Date to report back

Date report received

Person responsible for Business Case

Date submitted

Endorsed by TfL Business Case Development

Date submitted