Greenwich Waterfront Transit

Summary Report

Transport *for* London

This report has been produced by
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Foreword

In 1997, following a series of strategic studies into the potential for intermediate modes in different parts of outer London, London Transport (LT) commenced a detailed assessment under the title "Greenwich Waterfront Transit" of a potential scheme along the south bank of the Thames between Greenwich Town Centre and Thamesmead then on to Abbey Wood. In July 2000, LT's planning functions were incorporated into Transport for London (TfL).

A major factor in deciding to carry out a detailed feasibility study for Waterfront Transit has been the commitment shown by Greenwich and Bexley Councils to assist in the development of the project and their willingness to consider the principle of road space re-allocation in favour of public transport. This support, as well as that of other bodies such as SELTRANS, Greenwich Development Agency, Woolwich Development Agency and the Thames Gateway London Partnership, is acknowledged by TfL. The ongoing support of these bodies will be crucial if the proposals are to proceed.

A major objective of this exercise has been to identify the traffic management measures required to achieve segregation and high priority over other traffic to encourage modal shift towards public transport, particularly from the private car.

It is TfL's view, supported by the studies undertaken, that the securing of this segregation and priority would be critical in determining the success of Waterfront Transit. Although TfL recognise that the traffic management measures required to secure this priority are likely to generate considerable debate within the affected area, TfL believe that the impacts of the measures on other traffic would not be severe and could be managed in a way that would enhance the overall environmental quality of the area. In addition, TfL believe that in the traffic impacts arising from Waterfront Transit would likely to be small in comparison to those that will arise from the additional traffic generated by the various regeneration projects already under way or planned in the Greenwich Waterfront area.

TfL believe that the results of this study show that there is a case for investment in a high priority surface intermediate mode between (initially) the Dome and Abbey Wood, but this does require acceptance of any adverse impacts on general traffic. Such a network could make a major contribution towards regeneration in the Greenwich Waterfront area by providing an attractive alternative form of transport to the car. It also potentially links up with the East London Transit proposals north of the River Thames via the proposed Thames Gateway Bridge, if it proceeds. However the potential of Transit can only be realised if local authorities wish to support the proposals, and TfL now invite them to respond to this challenge with vision.

Contents

Executive summary

One way of significantly improving the quality, safety, accessibility and efficiency of public transport is through intermediate mode schemes. Transport for London, working together with the local authorities, have recently completed comprehensive feasibility and evaluation studies of the potential for four intermediate mode schemes in London.

This report sets out the results of the studies for a proposal in Southeast London known as Greenwich Waterfront Transit, which has been developed in partnership with the London Boroughs of Greenwich and Bexley. The studies have established and evaluated options for a 12 - 16 km bus, trolleybus or tram-based scheme, serving regeneration areas, town centres and residential areas including many parts of Thamesmead. There is also the option of linking up via the proposed Thames Gateway Bridge with the East London Transit scheme north of the River Thames. The key results of the Waterfront Transit studies are:

Transport and Economic

- Forecast annual ridership for the full 16 km scheme is 11.2 million (with trolleybus technology) and 15.5 million (with tram technology).
- Public transport users would experience a net reduction in travel times of between 0.7 and 1.6 million passenger hours per annum, and there would be an increase in transport use of between 8 and 16 million passenger-kilometres per annum.
- The public transport priority measures would result in private car users experiencing a net increase in travel times of approximately 0.1 million vehicle hours per annum during peak periods for the reference alignment (more for the reduced cost scheme).
- Capital costs could be £70 million (for the 12 km reduced cost scheme with trolleybus technology) up to £182 million (for the full 16 km scheme with tram technology)
- The benefit-cost ratios for the reference alignment are all less than 1:1, with the reduced cost scheme 1.6:1.

Environmental

- Overall the scheme would provide a moderate level of environmental benefit. In net terms, 125 properties would experience less noise and 811 properties would experience reduced local emissions. The scheme would reduce CO_2 emission by 5,100 tonnes per year and increase SO_X emissions by 1.2 tonnes per year. Overall, energy consumption would reduce by 82,000 MJ per year.
- Most of the proposed 16 km scheme would be on new alignments through development sites. The remainder would be along existing roads (including 2.4 km of road-space reallocation in Thamesmead) and segregated busways built in anticipation of Transit (1.8 km). The 12 km reduced cost scheme would incorporate 1.8 km of existing busways and about 10 km of road-space reallocation.

- Some property acquisition would be necessary for the 16 km scheme: this is mainly confined to properties that are already scheduled for demolition. Nearly 1,500 domestic properties and 360 non-domestic properties fronting the proposed alignment would be affected by the construction of the scheme.

Safety

- Overall there would be slight improvements in safety, equivalent to a 0.2 reduction in fatalities per annum. This is due to the modal transfer from private to public transport and the corresponding reduction in the number of car journeys in the area.

Accessibility

- Access to Thamesmead local centre would improve significantly with an extra 51,000 people within 30 minutes travel time. Other local centres would receive modest increases in accessibility with between 2,000 and 11,000 extra people within 30 minutes.
- A small reduction (i.e. improvement) in community severance is forecast.
- With Waterfront Transit operating on a new, largely segregated alignment, the traffic management measures required for the project would have a very small impact (compared with the other Intermediate Mode schemes) on the levels and distribution of highway traffic in the study area. Access for servicing would be maintained to all commercial properties.

Integration

- Transit would be an important component in assisting the Boroughs' regeneration aspirations by linking the development sites and areas of deprivation into existing residential, commercial and transport nodes in Southeast London.
- Up to 11,000 people living in areas with below average deprivation scores would benefit from increased public transport accessibility from Transit.
- Improved public transport services would bring around 135,000 extra people within 30 minutes of key development sites in the area.

Conclusions

Greenwich Waterfront Transit would provide benefits in assisting regeneration, improving public transport accessibility (especially to Thamesmead) and improving the environment. The two main factors in determining these benefits are segregation and high priority at junctions to ensure that public transport services operate without delays due to traffic congestion and parked vehicles. However it is also vital that other conventional bus services in the corridor are rationalised to take advantage of the segregation and priority measures, where appropriate, but to avoid wasteful duplication of capacity.

Subject to the views of the private sector, Waterfront Transit does not appear to justify the major initial expenditure which tram technology would require. Some 25 – 30% of demand for Waterfront Transit is development-related, giving uncertainty about timing and ultimate development density along the route. The scheme could reasonably, therefore, be phased in with rubber-tyred technology (bus or trolleybus) and converted to tram technology if and when justified by actual patronage. The alignment has been designed to accommodate either or both technologies.

Way Forward

TfL and the local authorities have decided to proceed to the next phase on the development of Greenwich Waterfront Transit – preliminary public consultation. The purpose of the consultation is to establish what level of support exists for Transit from the public as well as potential private sector partners. It will be used to inform the formal decision to be taken by the Mayor, TfL and the Boroughs as to whether and when to proceed with the development and implementation of the scheme, and the type of scheme that might be developed.

The alignment offered for public consultation will be slightly different in parts to the one subject to the MCAF evaluation and described in detail in this document. This is because since the completion of the evaluation it has been possible to incorporate a number of improvements.

1 Introduction

In 1997, LT commenced, in partnership with the local authorities of Greenwich and Bexley, a detailed assessment of the potential for an intermediate mode route along the south side of the River Thames serving Greenwich, Woolwich and Thamesmead town centres along with a number of key development sites including the North Greenwich Millennium site and Royal Arsenal.

This assessment followed on from a number of previous studies that had reduced a list of nearly fifty potential corridors and areas suitable for intermediate modes in outer London down to the most promising four, including the Greenwich to Thamesmead corridor. A major factor influencing the decision to carry out a detailed evaluation of this intermediate mode route was the support offered by the relevant local authorities, in particular their willingness to consider the re-allocation of highway capacity in favour of the mode in the affected corridor.

The aim of this detailed evaluation stage – known as the Project Definition stage – has been to produce detailed designs and assessment of the costs and benefits of providing an intermediate mode route between Greenwich and Thamesmead in order to help LT's successor T*f*L, the local authorities and other stakeholders to decide whether or not this project should proceed to the next stage of development. A further aim has been to define in more detail the infrastructure and traffic management measures that would be required to provide the intermediate mode with a significant level of priority over private road vehicles and to help the local authorities understand the impacts of introducing these measures.

The Project Definition stage of Waterfront Transit has now been completed and its main conclusions are summarised in this report. Following this introduction, the remainder of this report is divided into eight sections:

- An introduction to intermediate modes
- A summary of the work carried out to date on intermediate modes in London
- A description of the objectives of the Waterfront Transit project
- A description of the current Waterfront Transit project
- A description of the project evaluation process
- A summary of the main results of the evaluation process
- Conclusions and recommendations
- A discussion on the proposed way forward for the project

2 What are intermediate modes?

London's public transport network is largely made up of heavy rail systems (Underground and Railtrack), bus services and taxis. However, throughout the world, a number of alternative transport modes, known as intermediate modes, are being introduced in a variety of situations, in a bid to improve the image and performance of public transport and to attract private vehicle users on to public transport. Intermediate public transport modes are those with costs and capacities lying between heavy rail and bus. They include light rail systems, tramways, busways (with and without vehicle guidance), trolleybuses and unconventional bus technologies such as dual mode electric/diesel vehicles (duobuses).

Within London, the Docklands Light Railway (DLR - a fully segregated automatic light railway) and Croydon Tramlink (light rail with street running) are examples of intermediate modes. Outside London, new light rail systems have been constructed in Manchester, Sheffield and Birmingham, while guided buses run in Leeds and Ipswich. Recently, the Manchester light rail system (Metrolink) was extended and construction of a new light rail system serving Nottingham has commenced. Following the successful introduction of sections of guided busways in Leeds, plans are now being developed to extend this system to other parts of the city.

Although intermediate modes have a wide range of characteristics, there are no hard and fast rules in assessing which is the most appropriate in any given situation and as a result, in every case, individual site characteristics, local policy objectives and priorities need to be taken into account in selecting the preferred type. For example, with levels of emissions, diesel vehicles produce particulates at point of use, while electric vehicles are emission-free at the point of operation. However many electric vehicles impose visual intrusion by requiring overhead electrification equipment in the streets while the construction-related impacts of some fixed track systems are very high.

Light rail – Croydon Tramlink

Guided light transit – Paris

Guided bus – Rotterdam

3 Background to intermediate mode studies

There is now widespread support for the improvement of public transport in London and the provision of an attractive alternative to the car, within the context of improved accessibility and sustainable economic development.

Within this policy context, the importance of the bus, both in terms of the number of passengers carried and its inherent flexibility in meeting a wide range of transport roles, has been firmly acknowledged in recent key policy documents. The development of the Priority (Red) Route network on trunk and main roads, and the London Bus Priority Network (LBPN) on main and secondary roads has formed the basis of a London-wide strategy to protect buses from the worst effects of congestion.

Whilst the Priority (Red) Routes and LBPN programmes are already delivering significant benefits to passengers, these programmes have been limited by the degree to which it has been deemed acceptable to restrain other road users. Local authorities however, are now required to prepare statements on how they will reduce traffic and improve air quality in their areas and are now developing measures to achieve this.

These measures will allow road space to be re-allocated in favour of public transport and permit the introduction of more radical forms of priority. Although this approach is often portrayed as being an attempt to 'punish' car drivers, in reality it reflects the fact that the level of priority given to surface public transport primarily determines its performance and therefore its attractiveness as an alternative to the private car. As a result, although road space re-allocation may cause some delays to car users, it should also lead to an overall improvement in both the efficiency of the transport network and the environment.

Tram only street – Strasbourg

Bus priority – Shepherd's Bush, London

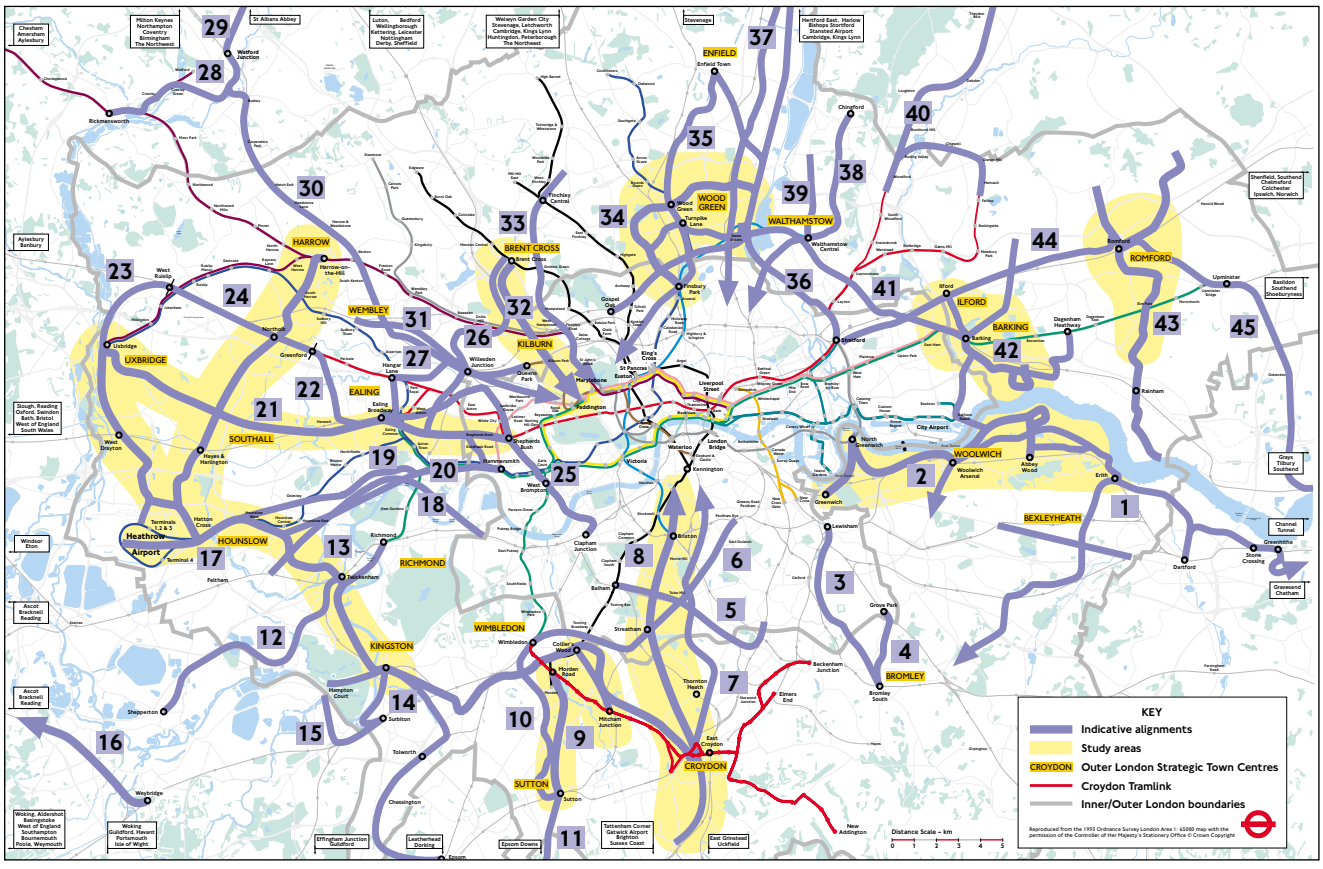
New ideas for Public Transport in outer London

In 1994, faced with a growing willingness from both national and local politicians to consider in principle the issue of road space re-allocation, along with the successful implementation of the DLR and the development of the Croydon Tramlink project, LT commenced a strategic review of possible areas and transport corridors in outer London that might benefit from the introduction of intermediate modes. Outer London is currently the area of London of greatest challenge to public transport – residential densities are low, car ownership and use are high and growing, trip patterns are diverse and the public transport market share is the lowest in London.

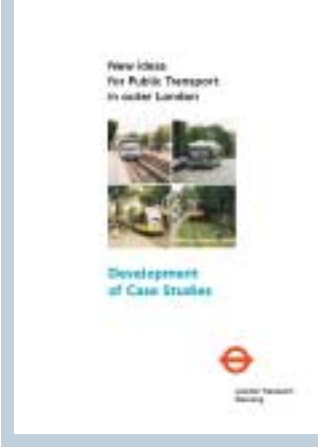
Through consultation with the outer London Boroughs and analysis of present-day demand on the bus and rail networks, around 60 ideas were generated which were then grouped into 45 areas for review. These 45 areas were then assessed for their potential for intermediate modes, using a largely qualitative method and comparative framework, against indicators agreed with the local authorities.

In June 1995, LT published the report New ideas for Public Transport in outer London which identified the nine most promising areas for intermediate modes in outer London and recommended that these should be assessed in further detail.

Intermediate Modes in London: initial corridors for review



New ideas for Public Transport in outer London – Development of Case Studies



The nine case studies identified in the 1995 report were developed to a greater level of detail by LT in 1996. For each of the areas, outline engineering design and cost estimation work was carried out and demand forecasts and preliminary environmental impact assessments produced. As in the previous study, the various schemes were assessed on a consistent basis against agreed objectives, which were developed in consultation with the relevant local authorities and from current policy objectives.

The results of the studies into the nine case studies were published by LT in September 1996 in *New ideas for Public Transport in outer London – Development of Case Studies*. This study concluded that overall there appeared to be a strong case for investment in intermediate modes in a number of these study areas:

Study area	Conclusion
Thamesmead/ Greenwich	High potential for segregation in development areas, consider bus-based system
A23 corridor	Consider track-based system, but major roadspace re-allocation problems. Consider Underground extension.
Edgware Road	Consider track-based system, but roadspace re-allocation problems
Wood Green	Consider bus-based system
Barking	High potential for segregation in development areas, consider bus-based system
Tramlink extensions	Consider track-based extensions to Purley Way and Sutton
Heathrow Orbital	Consider bus-based system
Uxbridge Road	Consider track-based system
Romford	Consider bus-based system

"The (Waterfront) options perform consistently well against the objectives and there appears to be potential for investment in this corridor … As well as on-street priority there is potential for significant sections of segregated public transport links, particularly through the North Greenwich development area, serving the Millennium site and the Jubilee line station, and through the Royal Arsenal development site."

Source : Conclusions on Thamesmead/ Greenwich intermediate mode scheme: New Ideas for Public Transport in outer London – Development of Case Studies LT 1996

Following the publication of *New ideas for Public Transport in outer London – Development of Case Studies*, LT carried out a consultation exercise with the affected local authorities to gauge their reaction to the report and decide how to proceed further.

LT realised that it would be impossible to proceed further with all these schemes at the same time and that their success depended upon local authorities agreeing to consider seriously road space re-allocation from private to public transport. As a result, it was stipulated that schemes would only proceed further if local authorities would give this commitment towards roadspace re-allocation as well as contributing to the financial cost of further planning work on the projects.

As the end of this consultation process, four of the study areas were identified for further development work – Barking, Romford, Uxbridge Road and Thamesmead/Greenwich. This further development stage, the 'Project Definition' stage commenced in late 1997 under the joint control of LT and the relevant local authorities. The aim of this stage in the project was to identify the detailed traffic management issues required to

secure the priority for the intermediate mode and to produce a detailed assessment of the likely costs and benefits of constructing the intermediate mode.

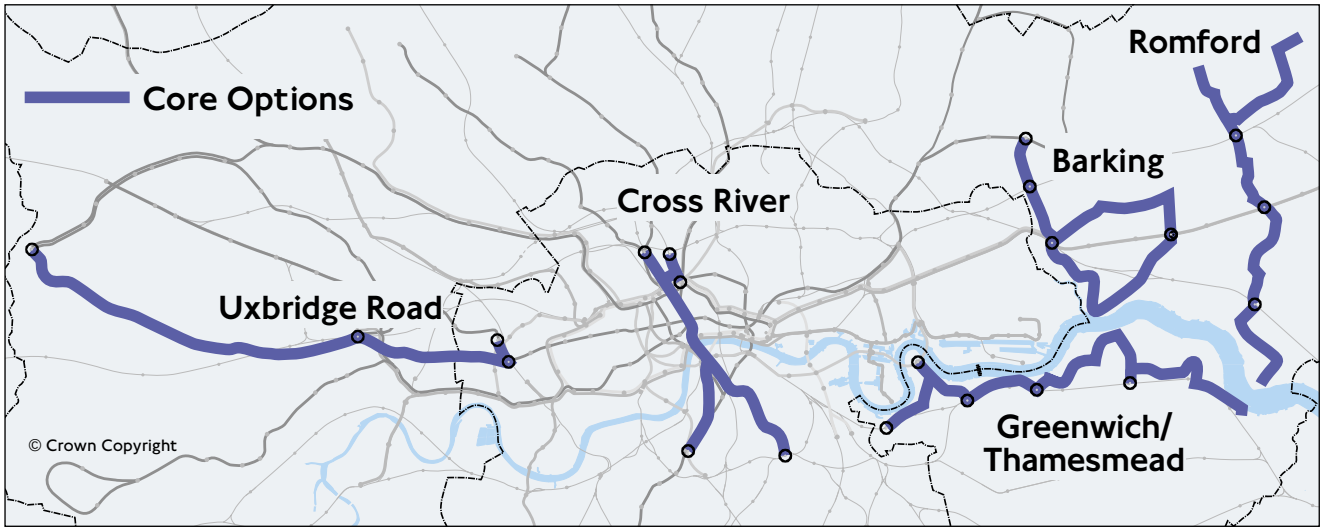
Along with these four outer London projects, LT has also developed the central London Cross River Transit project. This intermediate mode project would run between Waterloo and Euston, with two extensions on the southern end to Peckham and Stockwell and two extensions at the northern end to Camden Town and King's Cross. This project has been developed to the same level of detail as the four outer London studies and is the subject of its own report.

In early 2001, all the intermediate mode projects were included within the Mayor's Draft Transport Strategy for London. This document expresses support for the principle of these projects, as well as recognising that their implementation would require further detailed planning and consultation.

London Bus Initiative

Apart from the intermediate mode studies discussed here, other projects are underway to enhance the attractiveness of bus travel in different parts of London. The most significant of these projects is the London Bus Initiative (LBI) which aims to improve the quality of bus travel on 27 strategically important bus routes, collectively called BusPlus routes. Under this project, each of these routes will have a combination of measures applied which as well as bus priority measures will include the introduction of low floor vehicles and improvements to the accessibility of bus stops. Route 180 operating from Thamesmead East to Lewisham is one of the routes selected as a Whole Route under the LBI.

Intermediate Modes in London: schemes identified for Project Definition stage in 1997



4 Objectives and route derivation

At each stage of the study of the potential for intermediate modes in outer London, an objective led evaluation framework was used to test the performance of the different possible schemes against the planning and transport objectives for the area.

In the case of Waterfront Transit, the objectives for the project were developed in consultation with the London Boroughs of Greenwich and Bexley and from current policy documents such as Unitary Development Plans (UDPs). Although they are interrelated, these objectives can be broadly divided into planning and transport related areas.

Planning objectives

- To improve general public transport accessibility in the local area
- To improve the environment
- To support the economic activity of local centres
- To encourage sustainable development and aid regeneration

Transport objectives

- To improve safety and transport quality in the local area
- To improve the transport efficiency of the area
- To provide a cost effective and worthwhile strategy
- To provide improved links to and through regeneration areas
- To improve public transport accessibility to key strategic locations in the area
- To improve journey times and reliability of public transport in the area
- To attract car users to public transport

Equitable House, Woolwich

View of former Royal Naval College, Greenwich

River scene at Thamesmead

In order to determine the alignment to be evaluated, local centres were identified using the London Planning Advisory Committee's (LPAC) definition of Strategic Town Centres with additional inputs from the relevant local authorities, who also identified development sites, transport nodes and other centres such as hospitals and colleges.

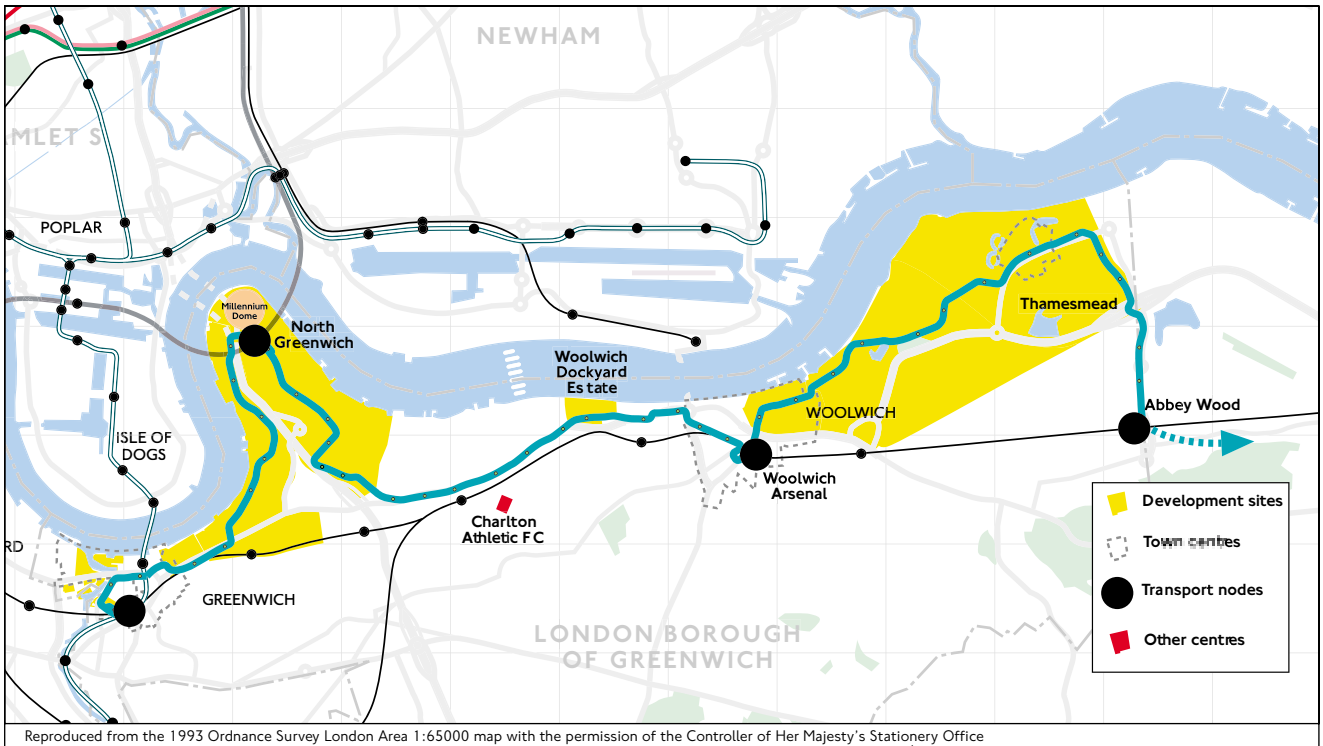
Key centres and development sites identified in the Greenwich to Thamesmead corridor are shown in the map below.

Within their UDPs, each local authority sets out its policies and proposals for the development and use of land, including those relating to transport and traffic management.

The UDPs of both local authorities emphasise the desire to promote and improve public transport as a catalyst in regenerating derelict areas. Both local authorities believe that large employment-generating developments should be adequately integrated with the public transport and both are supportive of existing town centres.

Greenwich specifically notes areas of poor accessibility and is looking for public transport improvements to and within them. More widely, the local authority seeks to encourage suitable bus priority measures and also has a policy on environmental improvement through encouraging reduced pollution from vehicles.

Key centres and development sites identified in the Greenwich to Thamesmead corridor.



The Transit alignment studied in the Project Definition stage of the project is slightly different from the core alignment shown in the earlier 1996 report. In particular, a greater proportion of the reference alignment has been designed to be entirely segregated from other road traffic, especially between Greenwich and North Greenwich and between Woolwich and Thamesmead, while the section of the alignment between Abbey Wood and Erith has been deleted. The deletion of this section reflects the low level of demand forecast between Abbey Wood and Erith in the 1996 report, although Transit has been designed to incorporate a possible extension into Bexley Borough if this is justified by changes in the forecast level of demand.

During the Project Definition stage of the project, additional work was carried out to develop an alternative to the reference alignment between Peartree Way and Thamesmead Town Centre. This aim of this alternative was to reduce the initial capital cost of the scheme, while at the same time preserving as many as possible of the passenger benefits forecast to be derived from the reference scheme. This revised alignment – referred to in this report as the "reduced cost scheme" – assumes that Transit would operate on a segregated basis over more existing infrastructure than already assumed in the reference alignment, until expenditure on more new sections of the reference alignment could be justified. Although there would be a clear cost advantage of initially using existing highways for Transit rather than constructing a new segregated right-of-way, it is recognised that this option would require more aggressive initial road space re-allocation within the Transit corridor and therefore have a greater impact on the road capacity available for private vehicle traffic. At present a "reduced cost scheme" has not been defined between Greenwich and North Greenwich as the Project Definition study forecast that demand on this section of Transit would be very low.

5 The proposal

The aim of the Project Definition stage was to define the Transit system in greater detail than done previously. In TfL's view this involved identifying an alignment and then developing the infrastructure and traffic management measures necessary for achieving high levels of priority for for Transit over other traffic. This allowed the benefits of the traffic priority measures to passengers to be calculated as well as identifying the effects of these measures on private vehicle traffic.

Description of reference alignment

A 16 kilometre long "reference alignment" for Transit has been developed that involves the provision of a largely segregated right-of-way between Greenwich and Abbey Wood stations. A description of the alignment along with proposed stops (shown in bold) is shown in the map overleaf and described below:

Nelson Road, Greenwich town centre

Greenwich to North Greenwich

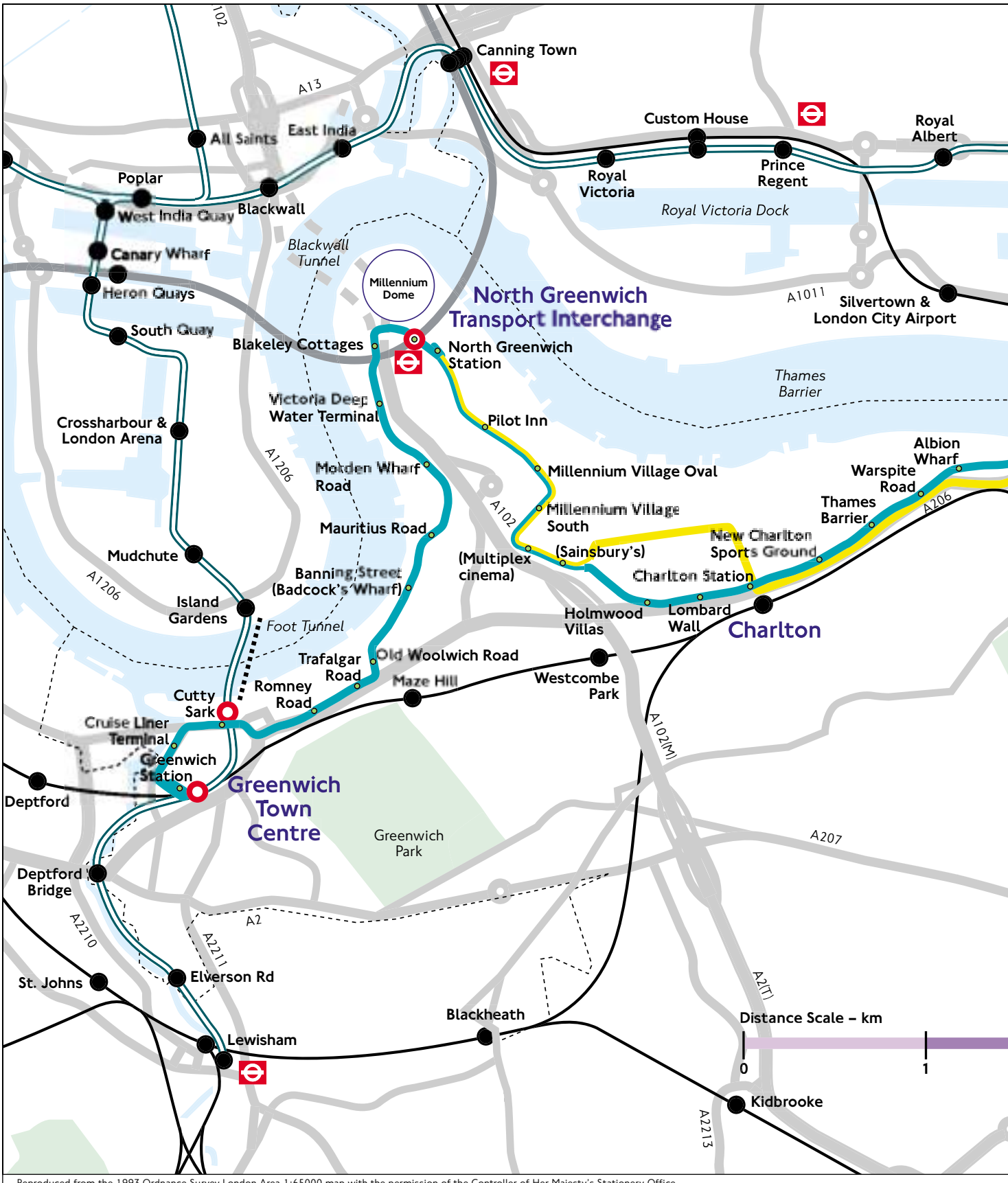
Waterfront Transit would start and terminate adjacent to the **Greenwich station** entrance in Tarves Way, giving a short interchange to and from both Connex and DLR services. Transit would then run north along Norman Road with a stop to serve the proposed **Cruise Liner Terminal** and then east along the Creek Road to a stop outside **Cutty Sark station** (interchange with DLR and river services). Transit would then continue eastwards via Nelson Road, **Romney Road** and **Trafalgar Road** before heading north to cross **Old Woolwich Road** then along **Banning Street** with a stop at **Badcocks Wharf**. Transit would then cross the existing industrial zones with stops at **Mauritius Road**, **Morden Wharf Road**, **Victoria Deep Water Terminal** and **Blakeley Cottages** before turning east to run between the site of the Millennium Dome and **North Greenwich station** (interchange with Jubilee line and bus services).

Greenwich Park

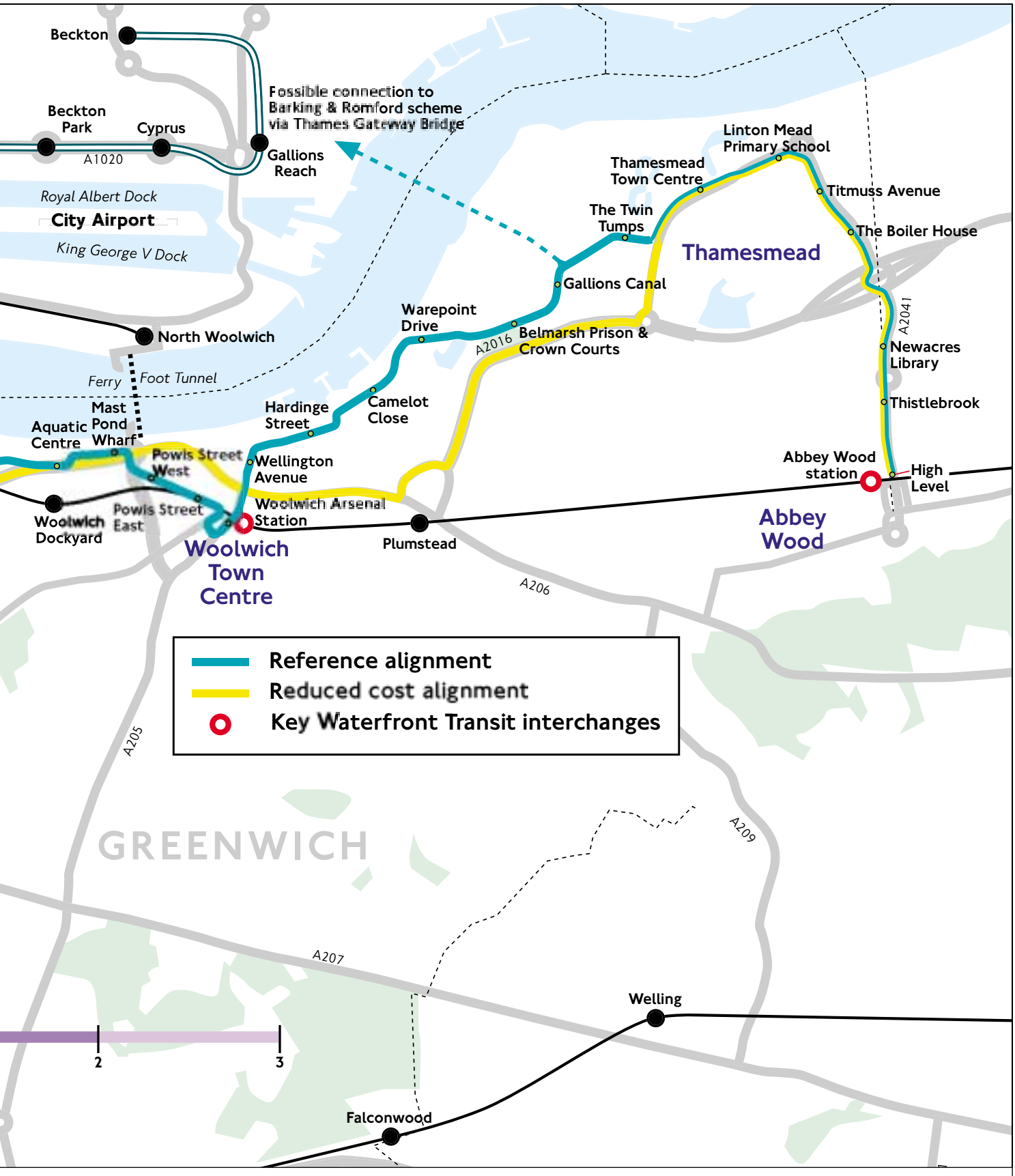
North Greenwich to Woolwich Arsenal station

From North Greenwich station, Transit would turn east and incorporate the infrastructure built for the Millennium Transit past the **Pilot Inn** and then through the Millennium Village (stops at **Oval** and **Millennium Village South**) before crossing Bugsby's Way to serve the **new Filmworks Multiplex cinema** and various retail establishments including **Sainsbury's at Greenwich Peninsula**. The alignment would then cross Peartree Way and run beneath the Angerstein Wharf railway line to serve **Holmwood Villas** (for ASDA) and **Lombard Wall**. Transit would then continue just north of Woolwich Road with stops at **Charlton station**, **New Charlton Sports Ground**, **Thames Barrier** and **Warspite Road**. The alignment would then loop slightly north to serve the Woolwich Dockyard estate with stops at **Albion Wharf** and the

Reference and Reduced



Cost Alignments



Aquatic Centre, before rejoining Woolwich Church Street at **Mast Pond Wharf** and crossing the Free Ferry roundabout to run along Powis Street with stops at **Powis Street West** and **Powis Street East**. Transit would then run through General Gordon Square and into Woolwich New Road to provide an interchange at **Woolwich Arsenal station**.

Woolwich Arsenal station

Woolwich Arsenal station to Thamesmead town centre

Transit would run north along Woolwich New Road and cross Beresford Street and enter the Royal Arsenal site with a stop at **Wellington Avenue**. The alignment would then run east along **Hardinge Street** to Thamesmead West with a stop at **Camelot Close** to serve the high density residential development in Area 8J before crossing the north end of Broadwater Dock to serve **Warepoint Drive** and cross Gallions Park to serve **Belmarsh Prison and Crown Courts**. Transit would then continue east past **Gallions Canal** and a potential junction with the Thames Gateway bridge to **The Twin Tumps** and then, by using one half of an existing dual carriageway, to **Thamesmead town centre**.

Thamesmead town centre to Abbey Wood

Transit would continue east along one half of the existing dual carriageway and serve **Linton Mead Primary School** before turning south to serve **Titmuss Avenue** and **The Boiler House** area. The alignment would then cross the A2016 to **Newacres Library** and **Thistlebrook** before terminating at **Abbey Wood** station (high level) and providing interchange with Connex services and buses. The alignment is capable of extension further into the London Borough of Bexley.

The alignment which will be offered for public consultation will be slightly different in parts to that described above, reflecting a number of improvements which it has been possible to incorporate.

Description of reduced cost scheme

The "Reduced Cost Scheme" assumes that Transit would operate between North Greenwich and Abbey Wood only, over the following (segregated) infrastructure:

Between North Greenwich station and Sainsbury's the "Reduced Cost scheme" would follow the reference alignment as described on page 13 Between Sainsbury's and Thamesmead Town Centre, the reduced cost scheme would take over one carriageway of the following existing dual-carriageway roads: Bugsby's Way, Anchor & Hope Lane, Woolwich Road, Woolwich Church Street, Beresford Street, Plumstead Road, Petman Crescent, Western Way and Central Way.

Between Thamesmead Town Centre and Abbey Wood the "Reduced Cost Scheme" would follow the reference alignment as described above.

Modes considered in this study

The 1996 case study of the Thamesmead to Greenwich corridor concluded that forecast levels of demand within the corridor were likely to justify investment in a bus-based rather than fixed-track based (tram) system. However, for the Project Definition stage of the project, the performance of both bus and fixed-track systems were assessed since some stakeholders were of the view that levels of demand for Transit, particularly from new developments in the corridor, had been understated in the 1996 study.

Integration of Transit with other transport modes

Although no detailed planning has been carried out, it is TfL's view that Transit services should only be introduced as part of an integrated transport network that takes into account the role of other modes of transport.

Interchange between Transit and London Underground's Jubilee Line would be provided at North Greenwich Station.

Interchange between Transit and the National Rail (NR) services would be provided at Greenwich, Woolwich Arsenal and Abbey Wood stations. In addition, interchange would be possible between Transit and NR services at Charlton station, although in this case a short walk would be required from the nearest Transit stop located at the junction of Charlton Church Road and Woolwich Road.

Abbey Wood station

Interchange between Transit and DLR services would be possible at both Greenwich and Cutty Sark stations, (and at Woolwich Arsenal if the DLR is extended to there).

Interchange between Transit and bus services would be provided at Greenwich, Cutty Sark, North Greenwich, Charlton, Woolwich Arsenal and Abbey Wood stations and at other locations along the alignment.

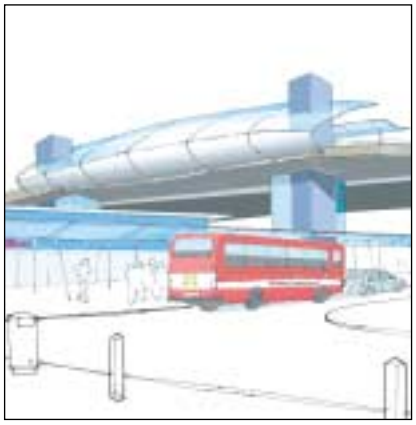
It is proposed that at these interchange locations high quality facilities would be provided for all modes, including pedestrians and cyclists. The exact nature of these facilities would be defined during the detailed design stage of the project, although outline proposals for Greenwich, North Greenwich and Abbey Wood stations are described below.

Introduction of Transit would have an impact on bus services within the corridor and TfL recognises that further work is required to integrate Transit services with the conventional bus network in the area. TfL believe that there are no reasons why Transit and conventional bus services cannot share the alignment where low dwell times can be achieved through the introduction of an "off bus" ticketing system. As a result, a number of conventional bus services stand to benefit from the provision of the Transit alignment, although it also possible that a number of parallel bus services would also be withdrawn to avoid excessive duplication of services in the Transit corridor.

In order to derive the optimum pattern of both Transit and conventional bus services in the study area, TfL will use the same criteria that are currently employed to plan the bus network, namely that any network should be **comprehensive**, **frequent**, **simple**, **reliable** and **integrated.**

Terminal facilities

Outline design work has already been commissioned for the Transit terminal facilities at Abbey Wood, Greenwich and North Greenwich (North Greenwich would be the terminus for Transit if the scheme were to initially operate between there and Abbey Wood). At each location, the facilities have been designed to allow for Transit to be operated by either bus or tram technology – the difference in design requirements and land-take is more significant at termini than anywhere else along the alignment.



Abbey Wood station – proposal

Outline designs for each terminal have been produced in accordance with Best Practice for Interchange guidelines agreed by TfL, Railtrack and the Association of Train Operating Companies and include provision of facilities for taxis, cyclists, pedestrians and "Kiss & Ride". In each location, it is assumed that conventional buses would make early use of the improved interchange facilities, pending implementation of Transit. However, conventional bus services would continue to serve these locations, following the inauguration of Transit.

At Abbey Wood, the terminal would be located to the west of the existing flyover and would straddle the Railtrack lines. At North Greenwich, Transit would use the existing bus station if it were bus-based technology, while options outside the existing bus station are under consideration for a tram-based Transit option.

At Greenwich station, it is envisaged that Transit and some conventional bus services would exploit a new facility on some of the land released by the redevelopment of the New Haddo social housing estate located to the north of the Railtrack lines. South of the Railtrack lines, it is proposed that the existing station forecourt is converted from a car park into an enhanced interchange facility for taxis, cyclists and pedestrians. This facility would also provide an improved eastbound stop for bus route 177, and serve the proposed adjacent hotel development.

At both Abbey Wood and North Greenwich, the designs provide for the extension of Transit at a later date; in the case of North Greenwich, this extension would be to Greenwich NR station, while from Abbey Wood, Transit could be extended further into the London Borough of Bexley, to a presently unspecified location.

Traffic management requirements

It is TfL's view that the level of priority given to Transit would be the major factor determining the performance and therefore success of the project. Providing high priority for Transit (and conventional bus services) would protect these services from the effects of road congestion and lead to reduced journey times as well as improved reliability.

Along the majority of the alignment sufficient space is available to provide a segregated route for Transit without requiring excessive or controversial land take or property demolition. However at a number of locations it has not been possible or cost-effective to design a new segregated Transit alignment and as a result traffic management measures have been developed to ensure that Transit would achieve priority over other traffic, including parked vehicles.

The major locations where the Transit alignment would not be physically segregated from other traffic and where traffic management measures would be required are shown below:

- Transit would require the abolition of the gyratory system in Greenwich town centre and the creation of a bus and Transit-only route through Greenwich Church Street and Nelson Road. However, these roads would need to remain open for the servicing of local businesses and as a result new loading/unloading arrangements would be required there.
- In Romney Road and Trafalgar Road, an additional bus lane would be provided on the highway to provide priority for Transit and buses. Between Trafalgar Road and Mast Pond Wharf, the Transit would require priority over other traffic at the many road junctions along this section of the alignment.
- Woolwich New Road was assumed for MCAF purposes to become two-way for public transport only. However, a shorter alignment (illustrated overleaf) via Green's End is now being considered.
- In Thamesmead Area 8J, Transit may have to share its alignment with local access traffic.
- Between Thamesmead town centre and Newacres Library a segregated Transit and bus route would be created by taking over one half of the existing dual carriageway. This would require other highway traffic to run two-ways on the other half of this dual carriageway.

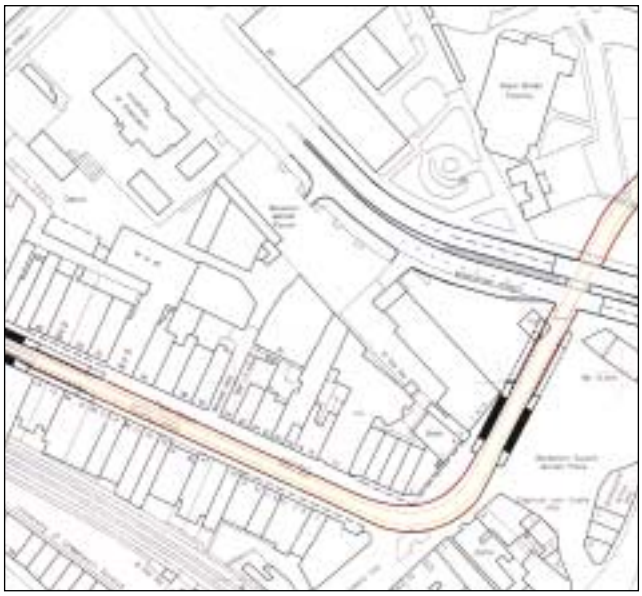
Along its length, Transit would receive signal priority over other traffic at major traffic junctions. This priority would need to be sensibly balanced with consideration of the needs of bus services that cross the Transit alignment at major junctions.

Examples of some of these measures are shown overleaf.

Illustrative Traffic Management Measures

Greenwich town centre

- Nelson Road and section of Greenwich Church Street closed to all through traffic, except Transit and bus services;
- access maintained for servicing vehicles with loading bays provided.



Woolwich town centre (improved scheme, developed since MCAF)

- buses would share Greens End section of Transit route;
- option provides shortest journey time for "through" passengers;
- expensive property acquisition avoided.

Dual carriageway

- One half of dual carriageway converted to segregated two-way use for Transit and bus services;
- other half of road converted to two-way use for other traffic.

Transit stops

It is envisaged that Transit stops would be designed to a high specification. Apart from allowing level boarding on to Transit vehicles by the provision of raised platforms, stops would include high quality shelters, ticket machines, CCTV surveillance and real time passenger information, such as Countdown.

Although conventional buses with off-bus ticketing and Transit vehicles would be able to share the Transit alignment, at present it is not envisaged that buses would be able to share stops with Transit vehicles. This is because conventional buses are not designed to operate with platform-type stops and as a result, there is a risk of the bus striking the edge of the Transit platform. At present, therefore, it is envisaged that bus stops would be located close or adjacent to the Transit stops so that the facilities provided at Transit stops could be shared. However, if the conflict between the bus and the Transit platform could be resolved, it would be possible to allow the vehicles to share the Transit stop.

Guidance

The traffic management proposals for Transit assume that Transit services are allowed to operate through sections of town centres. To allow this, Transit vehicles may require some form of control to limit their speed as well as define a consistent 'swept path' through these areas. In this study, it has been assumed that Transit vehicles would be equipped with a form of electronic guidance, which at a minimum would be operable within these town centre areas. However, as part of this study, the option has also been investigated of extending guidance over the entire Transit network.

It should be noted that electronic guidance is a new technology and remains unproven in a passenger operating environment. As a result, considerable research into its development is still taking place.

Utility removal

Allowance has been made within the cost estimates of Transit for the removal of utilities from below the alignment. However, due to a lack of detailed information on the precise nature and number of utilities located below the alignment, the costs assumed in this study should be viewed as being illustrative only. Obviously, due to the fixed nature of tram tracks, all utilities would need to be removed from underneath the alignment for this option, and as a result, a higher utility removal cost has been assumed.

Busway – Trans Val de Marne, Paris

The permanent removal of utilities from the Transit alignment would be vital to protect the tram option from service suspensions due to road works on the alignment. Although not so critical for bus options, utility removal would still reduce the number of disruptions to the services as well as maintaining the quality of the Transit-way and therefore ride quality of Transit.

Depot facilities

Allowance has been made within the Waterfront Transit cost estimates for the construction of a dedicated depot facility to store and service Transit vehicles. At present, no location for this depot has been identified, although a 35,000 sq metre plot of land would be required at a site close to the alignment to accommodate this facility.

Abbey Wood station

6 The evaluation process

Outline of evaluation process

The evaluation of Waterfront Transit has been carried out using a Multi-Criteria Assessment Framework (MCAF) developed by LT. Although the concept of multi-criteria assessment is not new, it is becoming accepted as a more-embracing evaluation technique than the conventional cost-benefit analysis approach.

The use of multi-criteria assessment has been given added impetus by the Government's 1998 White Paper on Transport which emphasises the five strategic objectives of the Government transport policy – **environment**, **safety**, **economic**, **accessibility** and **integration**. These objectives are more wide-ranging than those that would be captured by more conventional evaluation methods. On the basis of these strategic policy objectives, the Government has devised a new approach to appraisal that summarises the achievement of schemes against these objectives. This allows a comparison to be made by decision-makers between schemes on a range of appropriate indicators that include, but do not give undue prominence to, monetary ones. Initially devised for highway schemes, the New Approach to Appraisal has now been adapted for multi-mode situations, as documented in the Department of Environment, Transport and Regions' (DETR) Guidelines on Multi-Modal Modelling Studies.

MCAF was developed to be as consistent as possible with the Government's new approach, although a number of "bespoke" aspects have been introduced for its use in intermediate modes. The main appraisal criteria for the MCAF, along with selected indicators, are shown below.

"We are developing a new approach to the appraisal of different solutions to transport problems. This is designed to draw together the large amount of information collected as part of the appraisal of transport problems and alternative solutions. This information is set against the five criteria which we have adopted for the review of trunk roads ie integration, safety, economy, environment and accessibility."

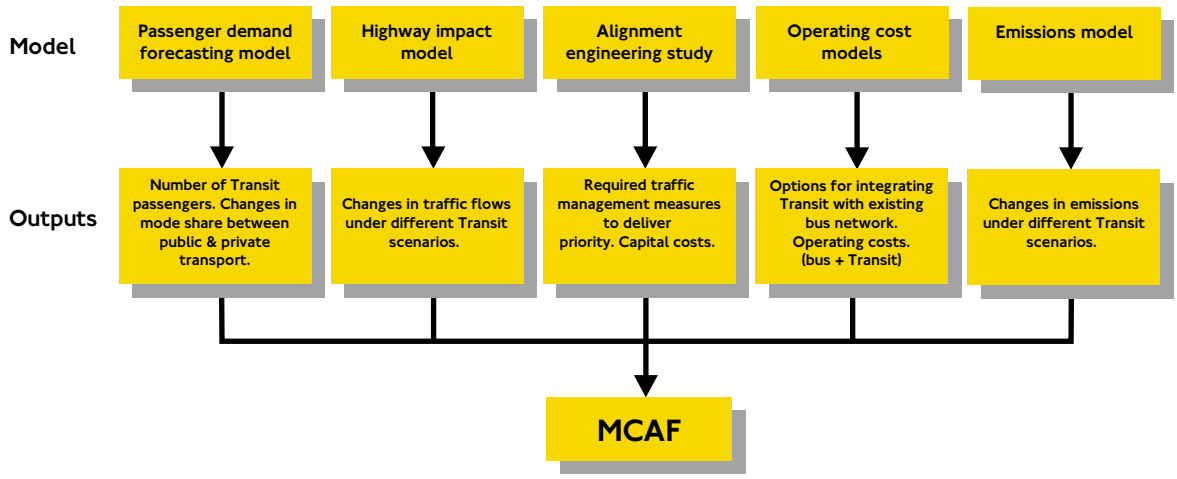
Source: Section 4.195, A New Deal for Transport: Better for Everyone, DETR, 1998

MCAF criteria and indicators

Criteria	Sub-criteria	Indicators
1 Environmental impact	Natural environment	Noise, local air pollution, global emissions, energy and fuel consumption, land-take, townscape, ecology
2 Safety and security	Accidents and personal security	Public and private transport accidents, personal security
3 Economic	Costs, time savings and revenue	Capital and operating costs, public and private use, public and private journey times, revenue, cost-benefit analysis
	Transport capacity	Capacity of corridor, crowding, frequency
4 Accessibility	Public transport accessibility	Pedestrian access to public transport, access to local centres
	Accessibility to other modes	Community severance, pedestrian space, parking and servicing access
5 Integration	Integration with other modes	Interface with other modes
	Accessibility impacts on regeneration and social inclusion	Access to development sites, access to deprived areas, access to employment
	Other local policy/plans Regional economic impact	Local policies, tourism National/EU objectives

MCAF application within overall scope of project

A number of individual studies were carried out to produce the data necessary for the MCAF evaluation. The figure below illustrates the main outputs of each of these studies, while details of each of these areas of work are outlined in more detail below.

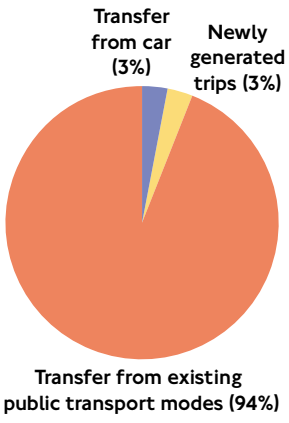


Passenger demand forecasting model

Construction of a forecasting model was commissioned to predict the likely demand for Waterfront Transit services. This model was built to predict demand for a future year where approximately 50% of the new developments forecast for the study area – in particular at Greenwich Peninsula, Royal Arsenal and Thamesmead - were assumed to have been constructed and occupied.

All tests predict healthy levels of demand for the various Transit options, both in the peak and off-peak periods of the day, with the strongest demand existing between Thamesmead and North Greenwich LUL station. Due to the higher capacity of trams and an allowance for the fact that they tend to be favoured by passengers over buses, demand for the tram option is higher than for the bus.

The model predicts that Transit would be attractive both to passengers making local journeys within the corridor as well as passengers using the new mode to access central London from North Greenwich LUL station, with annual ridership forecast to be between 11 and 16 million. As the majority of the passengers travelling to central London currently use NR services, Transit would substantially relieve levels of crowding on the North Kent Line through Woolwich Arsenal. Although the majority of passengers on Transit would be existing public transport users there are also forecast to be additional public transport trips created, equally due to car drivers switching to public transport and newly generated trips.

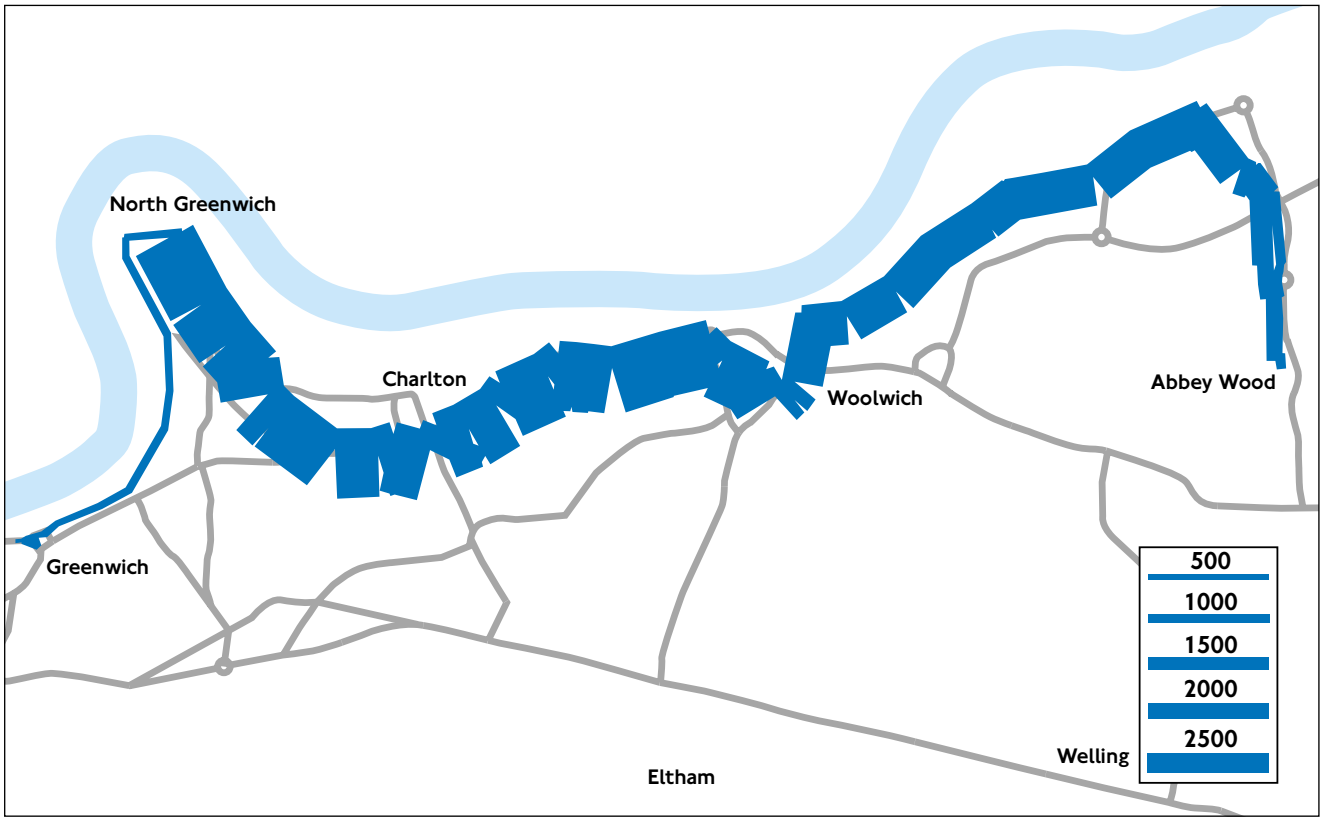


Origin modes of transport passengers (Tram – Reference Alignment)

One exception to the generally healthy levels of demand on Transit is the link between Greenwich NR and North Greenwich LUL stations. Although some local trips use this section of the alignment, the majority of passengers travelling to central London from the Greenwich area would continue to travel via NR and DLR services from Greenwich station, rather than using Transit to access LUL services at North Greenwich. As a result, levels of demand on this section of the alignment are forecast to be very low.

Because it is recognised that the regeneration of development sites along the Transit alignment is likely to play an important role in supporting the viability of the project, an additional sensitivity test was carried out to ascertain the present day (1999) demand level (excluding the additional development assumptions). This test showed that there is significant existing demand for the scheme with approximately 25-30% of demand development related.

Passenger demand: forecast future morning peak period flows for tram option (two-way flows on links).



Highway impact model

A SATURN traffic model was used to assess the likely traffic impacts of Waterfront Transit over a wide area of south east London, particularly the redistribution and journey time effects of restricting private vehicle access to certain sections of the Transit alignment. Traffic forecasts were developed on the basis of the same level and distribution of new developments as the

passenger demand forecasting model. It was assumed in this analysis that by the time Transit was operational, a number of highway improvements would have been made in the area.

The results of the analysis show that for the reference alignment, the overall traffic impacts of Waterfront Transit would be small, since the majority of this alignment would not use existing highways. In addition, in Thamesmead, where the majority of the highway capacity would be removed through the conversion of dual-carriageways to single carriageways, adequate road capacity would exist to handle the levels of private vehicle traffic in the area.

However, in a number of locations where highway capacity would be reduced, it is recognised that potentially large localised changes in road traffic might arise, such as in Greenwich and Woolwich town centres. In these locations detailed management measures would need to be introduced to avoid "rat-running" of traffic through sensitive areas and minimise any other adverse impacts.

Analysis was also carried out on the effects of using the reduced cost alignment option for Transit. The results show that the major change compared to the reference alignment would be a much larger transfer of private vehicle traffic away from the Woolwich Road onto alternative routes directly to the south, including a number of residential roads. This is because this option would require more road space re-allocation than the reference alignment. Should this project proceed therefore, it would be necessary to reduce the effects of the "rat-running" through the introduction of further traffic management measures.

It is T*f*L's view that the impacts of Transit on overall levels of highway traffic in the area would be modest, particularly when compared against the likely growth in private vehicle traffic which will be generated by the new development areas in the study area. As a result, radical plans to provide improved public transport to these areas such as Transit are likely to reduce private vehicle mode share and therefore minimise overall traffic impacts.

Alignment engineering study

T*f*L carried out a detailed review of the Transit alignment and in consultation with the local authorities derived the proposed alignment and traffic priority measures reported in Section 5 of this report.

In addition to deriving these measures, this study was also used to estimate the capital cost of constructing the Transit, including the cost of constructing stops and segregated sections of the alignment, erecting overhead electrification equipment and diverting utilities from beneath the route of Transit. Estimates were also made of the cost of any area-wide traffic management measures that might be required to prevent "rat-running" occuring through residential areas surrounding the Transit alignment.


120 capacity trolleybus

Options assessed by the MCAF

Two different options for Transit were assessed in detail using the MCAF methodology:

- **Tram option** - introduce a new 220 capacity tram system over the Waterfront Transit reference alignment. Recast and integrate bus and tram networks to increase capacity, reliability and speeds on the priority alignment. Permit moving buses to use the Transit alignment in specified areas. Introduce off-vehicle ticketing regime and provide premium quality tram stops.
- **Trolleybus option** - introduce a new 120 capacity electronically-guided trolleybus service over the Waterfront Transit reference alignment. Recast and integrate the conventional bus and trolley networks to increase capacity, reliability and speeds on the priority alignment. Permit other buses to use the Transit alignment where stop dwell times are estimated to be low. Introduce off-vehicle ticketing regime on all buses and provide premium quality trolleybus stops.

In addition, more limited multi-criteria assessments were carried out on two further options:

- **Diesel bus option** - this option is broadly similar to the trolleybus option described above except for the type of vehicles used which are assumed to be new 90 capacity Euro-3 compliant diesel buses. This option therefore dispenses with the need to erect overhead electrification equipment along the Transit alignment.
- **The reduced cost scheme option** - this option utilises the reduced cost scheme described on page 16 of this report. For the assessment, this option has assumed the use of trolleybus vehicles identical in specification to those used in the trolleybus option described above.

A range of options in terms of vehicle design (such as articulated diesel buses) and mode of power (for example gas buses) are possible between the options evaluated. This detail will be further considered if the scheme proceeds.

Service Patterns of Options

Transit option	Route	Vehicles per hour
Diesel bus	Greenwich to Abbey Wood	24
Trolleybus	Greenwich to Abbey Wood	18
Tram	Greenwich to Abbey Wood	12
Reduced cost scheme	North Greenwich to Abbey Wood	18

7 Results of evaluation

As outlined in the previous section, a number of individual studies were carried out to establish the effects of Transit in terms of passenger demand, impact on other highway users and capital cost. Elements of each of these studies were then used to carry out the overall multi-criteria assessment for the project. This section presents the results of the multi-criteria assessment, with these results presented under the different criteria and sub-criteria used by TfL.

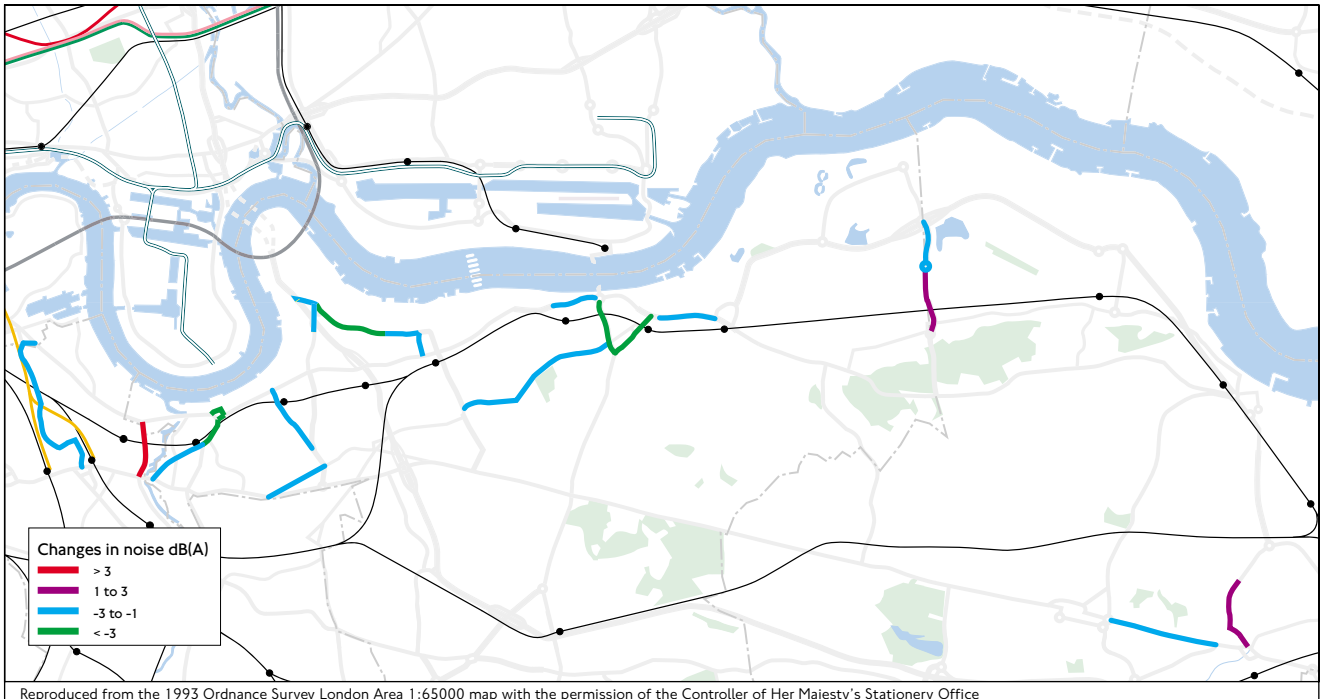
Environmental

Noise impact

Traffic is one of the principal sources of urban noise. The noise impacts of Transit have been calculated for properties on a number of key selected roads within the study area which the highway modelling work predicts would be most affected by the introduction of Transit. Properties were only considered where source noise was greater than 66 dB(A) and where the change between the with and without Transit options would be greater than 1 dB(A).

The results of the assessment show that each of the reference alignment Transit options would provide a small overall benefit in terms of road traffic noise reduction, since a relatively small modal shift from private to public transport is forecast to occur. In addition, as Transit would largely operate on a newly constructed segregated alignment, little diversion of existing highway traffic would take place. The number of residential properties experiencing major noise degradation is forecast to be around 75, compared to around 200 experiencing major improvements. In Greenwich town centre, the closure of Nelson Road would lead to a

Summary of noise impacts



significant redistribution of traffic which could result in potentially large localised changes in road traffic noise.

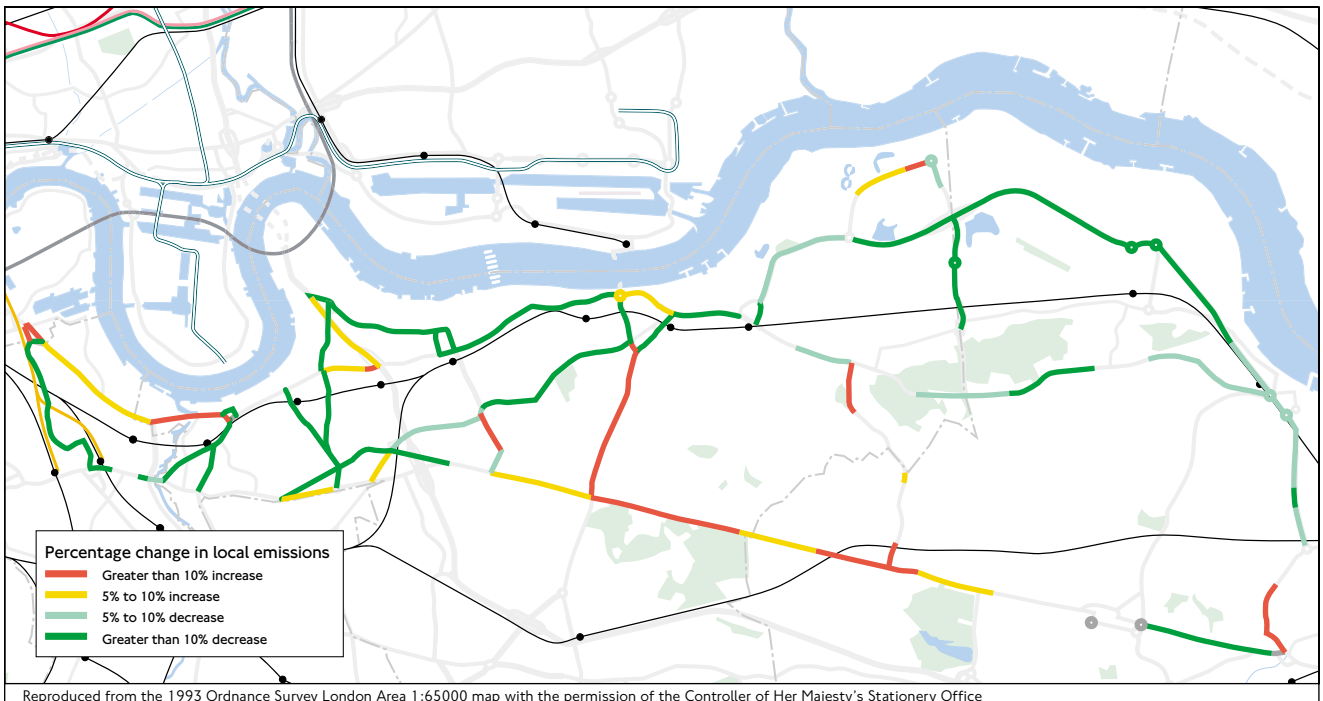
The Transit vehicles used in the tram option would generate levels of noise considerably below the level at which any residents of adjoining properties would be disadvantaged by their operation. No assessment of the trolleybus option has been undertaken since the noise impact of these vehicles would be very similar to that for trams.

Local air pollution

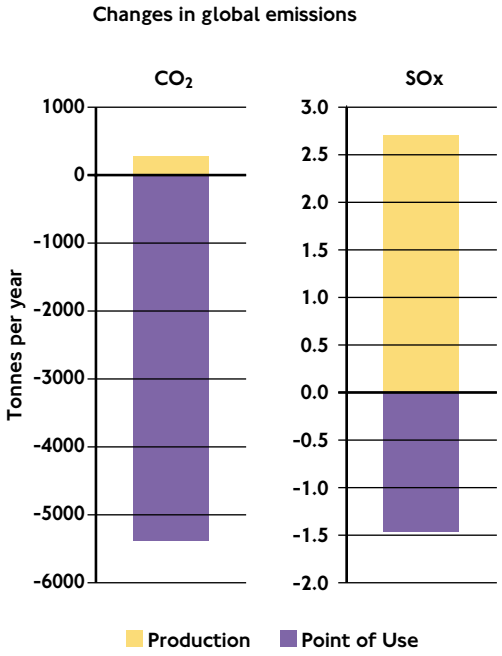
Transport is a major producer of air pollutants. The main local pollutants included in the MCAF are carbon monoxide (CO), hydrocarbons (HC), nitrous oxides (NOx) and total particulate matter (TPM). Using T*f*L's Emissions Model, changes in emission levels have been calculated for the same selected roads within the study area as used for the noise calculations. Properties were selected on these roads where the change in emissions was calculated to be greater than 5%.

The analysis shows that significant reductions are forecast to occur in emissions along much of the alignment, particularly in locations where the introduction of Transit would result in reductions in road capacity such as in Woolwich and Greenwich town centres and between Abbey Wood and Thamesmead. A general increase in emissions is predicted to occur along the A207 between Eltham and Crayford as a result of traffic redistributing from other roads within the study area.

Percentage change in local emissions



Overall a net reduction in the emission of local pollution is forecast to occur for each of the analysed pollutants. Based upon the average number of properties affected by each pollutant, a total of 846 would benefit and 35 disbenefit; the net effect is therefore an overall benefit of 811 properties.

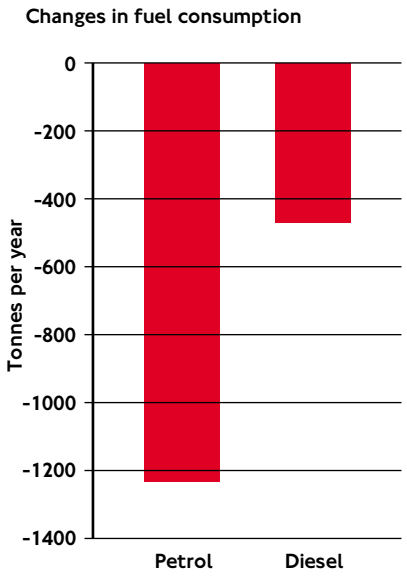


Global air pollution

Two important greenhouse pollutants are produced by road transport – carbon dioxide (CO_2) and sulphur oxides (SO_x). Using T*f* L's Emissions Model, changes in global emissions have been calculated for Waterfront Transit based upon a single electrically-powered option. Changes in emission levels have been calculated for both the point-of-use (exhaust pipe) and production (power station) stages of the fuel cycle.

The assessment shows that emissions of CO_2 and SO_x would decrease at the point-of-use due to slightly reduced levels of road traffic but increase at the production stages as a result of the additional electricity required to power Transit. Overall, Transit is forecast to result in a decrease of nearly 5,100 tonnes per year in CO_2 emissions and an increase of 1.2 tonnes per year in SO_x emissions.

In terms of their overall impact, these reductions are categorised as providing a "slight benefit" in energy efficiency.



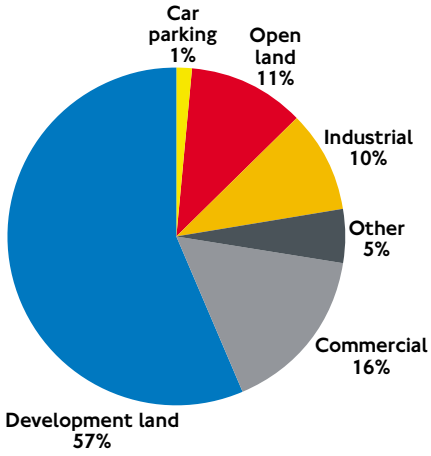
Energy and fuel consumption

Transport is a major and increasing user of energy, consuming about a third of all energy in the UK. The assessment of energy and fuel consumption examines the changes in transport-related energy and fuel consumption, both at the point-of-use and production stages. Results for a single Transit assessment, measuring only private vehicle emissions, has been used in the MCAF.

Transit is forecast to achieve reductions in the consumption of petrol and diesel within the study area of 1,227 and 468 tonnes per year, respectively. This in turn would lead to a reduction in energy consumption of 72,000 MJ per year. Including savings in the production stage, energy consumption would decrease by 82,000 MJ per year. This decrease in fuel consumption is due to the transfer of trips away from private to more efficient public transport modes.

In terms of their overall impact, these reductions are categorised as providing a "slight benefit" in energy efficiency.

Land-take - existing land use of land taken (other than highway land)



Land-take estimate is for North Greenwich to Abbey Wood section of reference alignment only

Land-take

Implementation of the Transit scheme on the reference alignment would involve a degree of land-take and property acquisition. In total, a land-take of around 100,000m^2 would be required as well as the demolition of 125 properties along the entire alignment between Greenwich and Abbey Wood. However, it should be noted that many of these properties are already earmarked for demolition as part of re-development proposals within the Transit corridor. This is demonstrated in the chart of land-take requirements by existing land-use that show that the majority of Transit land requirements would come from land that is already classified as development land. In addition, a proportion of the remaining land-take would come from land that is currently not built on or is used for functions such as car-parking.

This estimate of land-take is based upon the "reference alignment" which takes into account the turning radii and swept path requirements of various Intermediate Mode technologies.

Construction

The construction of Transit would introduce impacts that may be significant for properties located along its alignment. The strength of these impacts would depend upon both the nature of the construction work and its duration.

For Waterfront Transit, the majority of the construction work would be associated with the provision of the segregated right-of-way and the introduction of the necessary traffic management measures on other sections of the alignment. In addition for a number of options, work would be required to erect overhead electrification equipment, while the tram option would also require the laying of rails.

The MCAF estimates that nearly 1,500 domestic properties and 360 non-domestic properties fronting the proposed alignment would be affected by the construction of the scheme, although at this stage in the project, it is not possible to estimate the length of time that these properties would be affected by these works. However, it is likely that the construction impacts of the tram option would be most severe both in terms of the nature and duration of the works due to the need to remove a greater proportion of utilities from beneath the alignment and lay rails.

Croydon Tramlink showing overhead electrification

In addition to the 1900 properties directly affected by the construction works, additional impacts would be imposed on an unquantified number of road users due to road and lane closures and temporary traffic diversions during the construction phase of the project. However, the magnitude of these impacts would be relatively modest since the majority of the Transit alignment would be located on development land and not on existing highways.

Townscape

The main townscape consideration when introducing transport schemes is to improve and protect buildings and areas, which, by their visual architecture or historical association, contribute to the local character.

The MCAF concludes that all the Transit options would have an overall beneficial effect on the townscape areas through which it would pass, by enhancing a "sense of place", providing a feeling of better connectivity and amenity and also providing the scope for new landscaping to enhance the visual character of the area. In addition, reduced traffic levels and greater pedestrian space would lead to further benefits. However in some areas, including the historic centre of Greenwich, the introduction of overhead electrification equipment would create a slightly adverse effect.

Ecology

Ecology is concerned with the conservation of wildlife species and their habitats. Overall, Transit is forecast to have a small negative effect on a number of ecologically-valuable sites including Erith Marshes, Thamesmead Marshes and Lesnes Abbey Wood. During the construction phase of the project, the greatest risk to the ecology of the area would likely come from any run-off, while during the operational phase of the scheme it is unlikely that any adverse ecological effects would be observed.

The reduced cost alignment would have no impact on the local ecology since the scheme would be developed within the existing highway boundary wherever possible.

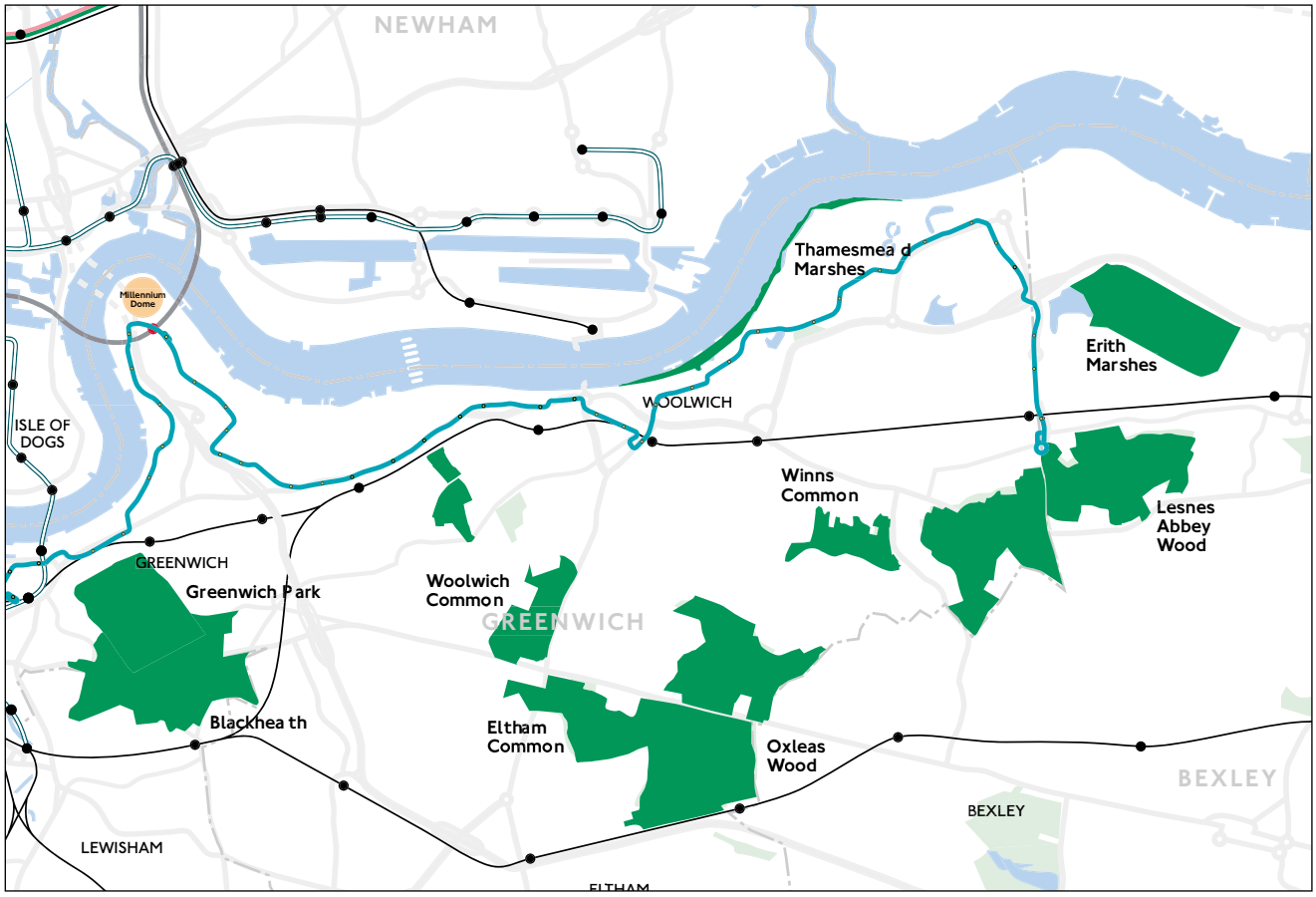
Safety and Security

Accidents

The contribution of Transit to reducing accidents has been calculated on the basis of "equivalent fatalities". This is a standard measure whereby ten major and one hundred slight injuries are each deemed to equal one fatality. Changes in estimated levels of fatalities for both private and public transport have been calculated.

The results of the evaluation show that the modal transfer from private to public transport and the corresponding reduction in the number of car journeys in the area arising from Transit would result in an overall

Ecological areas



reduction in the number of road accidents. Based on data used in the assessment of highway improvements, it is estimated that the monetary values associated with these accident savings are around £500,000 per year for each of the Transit options.

Lack of data has meant that it has not been possible to estimate the impact of Transit on the number of accidents involving both cyclists and pedestrians. The impact of Transit on pedestrians is dealt with under "community severance" (page 36), while for cyclists it is recognised that their needs must be fully taken into account in the detailed design of the project, should it proceed to the implementation stage.

Tram stop on Croydon Tramlink

Personal security

It is proposed that CCTV would be installed at all Transit stops and it is assumed that all Transit passengers switching from other public transport modes would benefit in terms of increased security. Under the trolleybus and tram options, it is estimated that 8.5 and 10.3 million passengers per year respectively would benefit from improved perception of security with the implementation of CCTV.

Bus passengers boarding at stops located close or adjacent to the Transit stops would also benefit from the implementation of CCTV.

Economic

Capital costs

TfL has derived detailed initial capital cost estimates for the three Transit options that would use the reference scheme. In addition, outline costs have been estimated for the reduced cost scheme option. Initial capital costs have also been derived for the Base "Do-minimum" situation which represents the capital costs that will be incurred in maintaining and developing the existing bus network in the area.

Initial capital cost breakdown (£ million)

	Base	Diesel bus	Trolleybus	Tram	Reduced cost
Land & utilities		28.9	28.9	35.6	6.8
Civils & tracks		16.2	16. 2	20.8	3.1
Stops		3.9	3.9	3.9	2.8
Power supply		0	10.1	11.1	8.0
Communications		2.9	2.6	3.1	1.6
Vehicles	15.8	28.6	36.1	59.1	23.3
Depot	14.0	25.3	19.9	19.7	13.8
Traffic signalling		2.2	2.2	2.2	1.6
Road reconstruction		1.2	1.2	1.2	1.0
Traffic management		1.6	1.7	1.7	1.3
Design & management	2.3	6.9	7.9	12.5	3.4
Contingency	3.2	7.5	8.9	12.7	4.1
Total	35.4	125.3	140.4	182.2	70.8

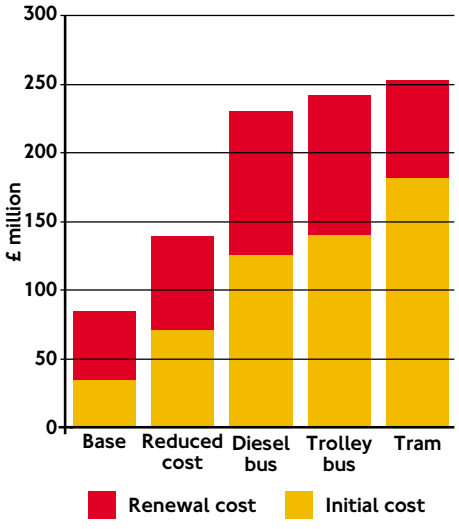
Price base = 1998

The major reasons for the differences in cost between the three Transit options are the higher initial purchase costs of trolleybus and trams compared to diesel buses and the need to provide overhead electrification equipment for these options.

Further renewal and replacement costs would also be incurred during the life of the project. These costs have also been estimated and together with the initial capital costs have been input into the cost-benefit analysis. The cost-benefit analysis has been carried out on the basis of the incremental cost of each of the Transit options; for example, the initial capital cost of the tram option relative to the base is £146.8 million.

Of the options using the reference alignment, the tram has the highest initial capital cost but the lowest renewal cost, largely due to the long vehicle life of this option. Overall, the total cost of these three Transit options vary by only £25 million.

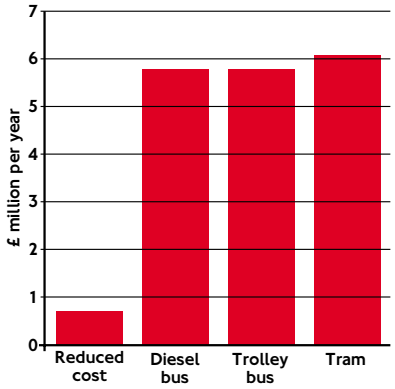
Scheme options: initial capital and renewal costs



Renewal costs are shown as undiscounted values
Price base = 1998

The estimated cost of the reduced cost scheme is considerably lower than for the reference alignment options, with savings in the order of £100 million estimated. The main reasons for this lower cost are the reduced route length, which reduces the associated infrastructure costs combined with the use of the existing highway to achieve segregation.

Changes in annual operating costs



Operating costs

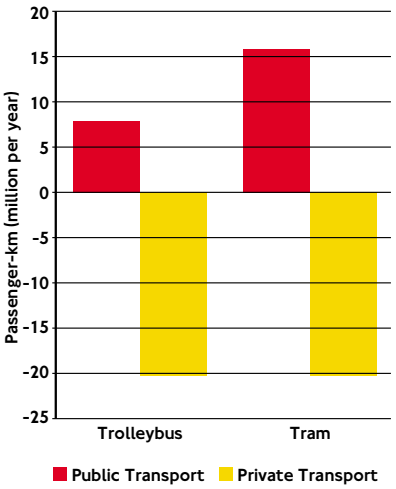
Operating costs for the Transit options are shown here as net changes in the cost of operating the current bus network in the study area and reflects the overall change in operating costs to both Transit and other bus services in the study area.

The large increases in operating costs for the three Transit options that would use the reference alignment can be attributed to the fact that these options would largely operate through new development areas where the scope to remove any duplicate bus services operating on parallel developed corridors would be very limited. This would result in an increase in the total number of vehicles (existing buses and Transit vehicles) operating on the network. Compounding this increase is that the cost of operating Transit vehicles would be substantially higher than diesel buses causing any savings that would be achieved by amending the existing bus network to be more than offset by the cost of introducing Transit.

In comparison, there is only a small net change in the operating costs for the reduced cost scheme. This is can be attributed to the reduction in route length which requires fewer Transit vehicles to operate the route and the on-street running which requires a more radical restructuring of the existing bus network to accommodate Transit.

The assumptions made about changes to the existing bus network in the area are indicative only and are likely to change when networks are optimised at a later date.

Changes in transport use

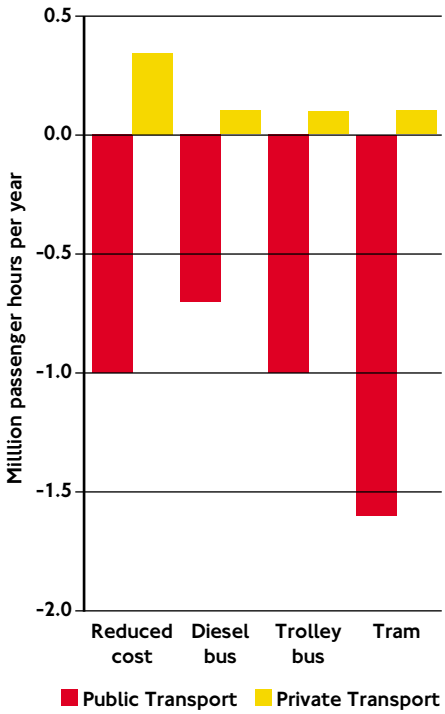


Transport use

Transport use is measured in terms of passenger-kilometres travelled on both public and private transport. As such it is a very useful measure of the effectiveness of policies to encourage a shift from private to public transport.

The results indicate that Transit would result in increases in public transport use of between eight and 16 million passenger kilometres per year. At the same time, private transport use would reduce by around 20 million passenger kilometres per year due to passengers switching to public transport.

Changes in journey times



Journey time changes

Journey time is an important element in the analysis of new transport schemes. From the supply side, the objective of most transport schemes is to improve accessibility and reduce journey times while from the demand side, the main journey attributes from the traveller's point of view are cost and time.

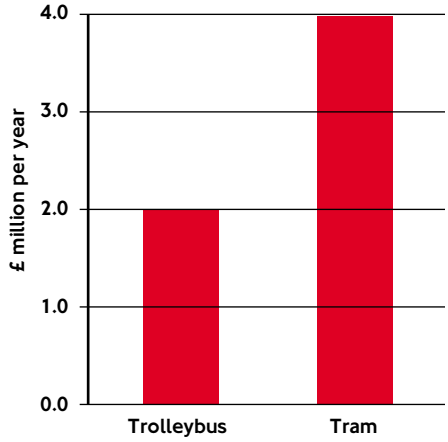
Although the total number of public transport journeys would increase following the implementation of Transit as a result of modal shift from private transport, the total travel time spent on public transport is forecast to decrease by between 0.7 and 1.6 million passenger hours per year. This reduction in journey time is primarily a result of the higher average speeds that would be achieved for public transport as a result of the provision of the segregated alignment and other traffic priority measures.

Conversely, the introduction of these traffic priority measures would increase private transport travel times by around 0.1 million passenger hours per year for the Transit options using the reference alignment. (This estimate is for the peak periods only, as restrictions in the modelling of highway conditions have meant that it is not been possible to derive an all day estimate). Nevertheless, this increase is very small compared to the increases in private transport travel times forecast to be achieved by the other intermediate modes schemes currently under review by T*f*L. This reflects the substantially lower amount of on-street running assumed for Waterfront Transit.

For the reduced cost scheme, increases in private transport travel times would be higher than for any of the reference alignment options since implementation of this scheme would require the removal of more highway capacity.

Overall, the Transit options would result in a net reduction in total travel time with the increases in private travel time being outweighed by the public travel time reductions.

Changes in revenue



Revenue

The Transit options would result in overall increases in revenue to public transport of between £2-£4 million per year. These increases are modest and are mostly the result of additional passengers attracted to Transit due to modal shift from private transport. The figures shown here are net figures that include offsetting reductions in revenue on other modes, particularly bus services.

Benefit-cost analysis

The results of the benefit-cost analysis indicate that the following ratios are achieved for the different Transit options:

	Reference (Diesel bus)	Reference (Trolleybus)	Reference (Tram)	Reduced cost (Trolleybus)
Benefit: cost ratio	0.49:1	0.76:1	0.98:1	1.62:1

These results show that only the reduced cost scheme achieves a positive benefit-cost ratio and indicate that further scheme optimisation may be required. The tram option produces a significantly higher benefit-cost ratio than the trolleybus and diesel bus options. This is because the tram option achieves significantly higher benefits at only slightly higher scheme costs.

The results show that with the exception of the reduced cost scheme, none of the Transit options achieve a positive benefit-cost ratio. This is because the very high initial cost of acquiring and constructing the whole reference alignment would more than offset the additional revenue and passenger benefits generated by the project. The tram option would produce a significantly higher benefit-cost ratio than the trolleybus and diesel bus options as this option would achieve significantly higher passenger benefits at only slightly higher overall cost.

The benefit-cost ratio for the reduced cost scheme is depressed by the large disbenefit reflecting the time penalties imposed on private vehicle users as a result of the traffic priority measures introduced. In the absence of this disbenefit, the benefit-cost ratio would increase to 2.6:1. This does not apply to the reference alignment as most of the proposed scheme would be on new alignments through development sites.

Crowding

The level of crowding is an important aspect of the quality of service provided by a transport system. Consideration is taken of the number of people standing and crowding is an indication of the comfort level of travel. The methodology for assessing the effects of crowding on public transport services is based upon the estimation of the proportion of passengers who experience crowded conditions.

The results indicate that the total level of crowding on both bus and Transit services in the corridor would increase compared to pre-Transit levels of crowding on bus services, as many rail passengers would switch to use Transit. Conversely, Transit would reduce levels of crowding on local rail services, mostly on the North Kent Line between Greenwich and Abbey Wood. The overall impact of these two effects would be neutral,

although the levels of bus and Transit crowding suggest that the forecast demand for Waterfront Transit might require a higher peak service frequency than that assumed in this study (12 vehicles/hour between North Greenwich and Abbey Wood).

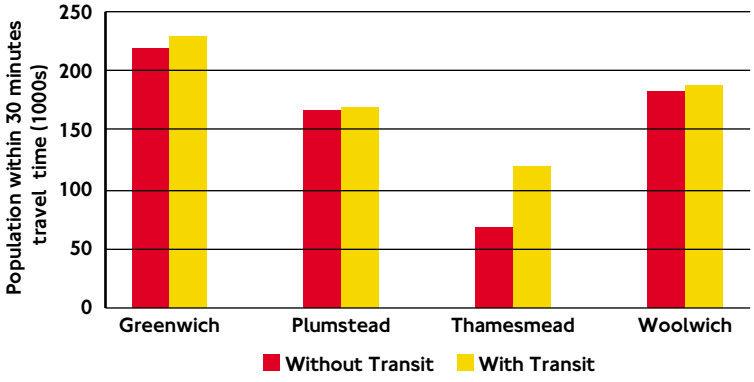
Accessibility

Access to local centres

Waterfront Transit would result in increases in the population within 30 minutes travel time of the four major local centres in the study area – Greenwich, Plumstead, Thamesmead and Woolwich. This is a result of the higher running speeds achieved for both Transit and other bus services through the introduction of the segregated alignment and other traffic priority measures.

In overall terms there is a moderate benefit due to improved public transport accessibility to the local centres. Thamesmead would receive by far the largest increase in catchment area, which is a reflection of its poor current accessibility and the potentially high level of service offered by the scheme to the area.

Access to local centres - changes in population catchment served

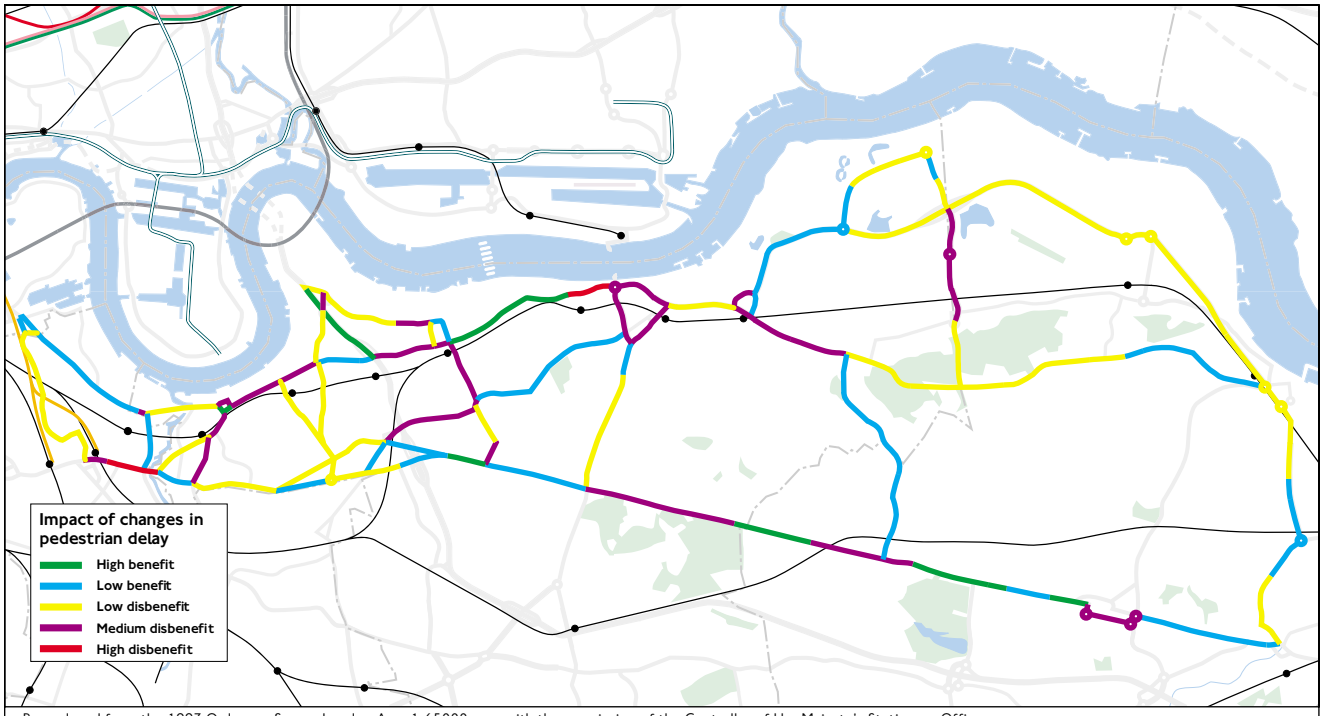


Community severance

Community severance is measured in terms of pedestrian delay. Pedestrian delay when crossing a road is mostly the result of the waiting time for a suitable gap in the traffic or for a signal phase which allows pedestrians to cross over safely. The community severance impacts of Transit are based upon forecast changes in traffic flows on the main roads within the study area.

The assessment shows that Transit is forecast to bring about a small overall reduction in pedestrian severance. This impact is small since the modal shift from private to public transport is forecast to be small with Transit. In addition, because Transit would operate on a largely segregated alignment, the traffic management measures required for the project would have a very small impact on the levels and distribution of highway traffic in the study area.

Impacts on Community Severance



Pedestrian Space

Powis Street

There are only two areas on the Transit alignment where changes in pedestrian space would be significant - Greenwich town centre (Nelson Road) and Woolwich town centre (Powis Street, part of which is currently pedestrianised). It is expected that the area in Greenwich town centre would be pedestrianised to create a public transport "mall" thereby producing benefits to pedestrians. By contrast, Powis Street would have Transit introduced into an already pedestrianised area, potentially reducing the space available for pedestrians in that location.

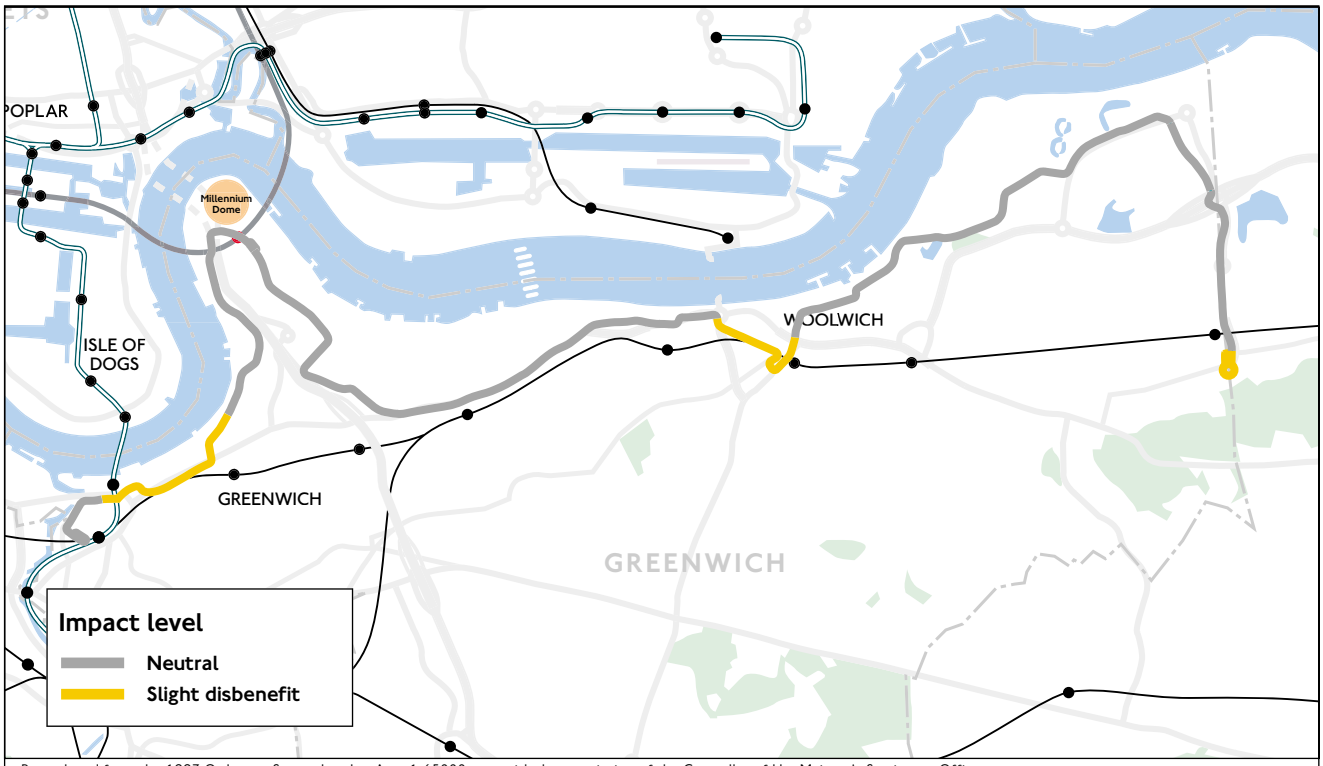
The assessment shows that at present neither location has unacceptable levels of pedestrian congestion and that the impact of Transit on the pavement widths available would be minimal. In Woolwich town centre Transit would be integrated within the pedestrian environment, allowing pedestrians freedom of movement throughout this area. In Greenwich, there would be a slight improvement in the pedestrian space available, thereby producing a small benefit in terms of pedestrian space.

Parking and servicing areas

The successful implementation of Transit would require the free running of its vehicles and to achieve this would require the imposition of parking and servicing restrictions along parts of the alignment. For street running sections which currently have minimal or no restrictions, the imposition of such measures would be likely to invoke criticism from those affected.

The methodology used for assessing the parking and servicing impacts of Transit has been designed to include extra weightings for restrictions close to commercial properties along the alignment, where the level of resistance to such proposals would likely be strongest. The results show that Transit would impose only a slight overall disbenefit in terms of parking and servicing. This is because the great majority of the reference alignment would be segregated from the existing road network.

Parking and servicing impacts



Integration of policy

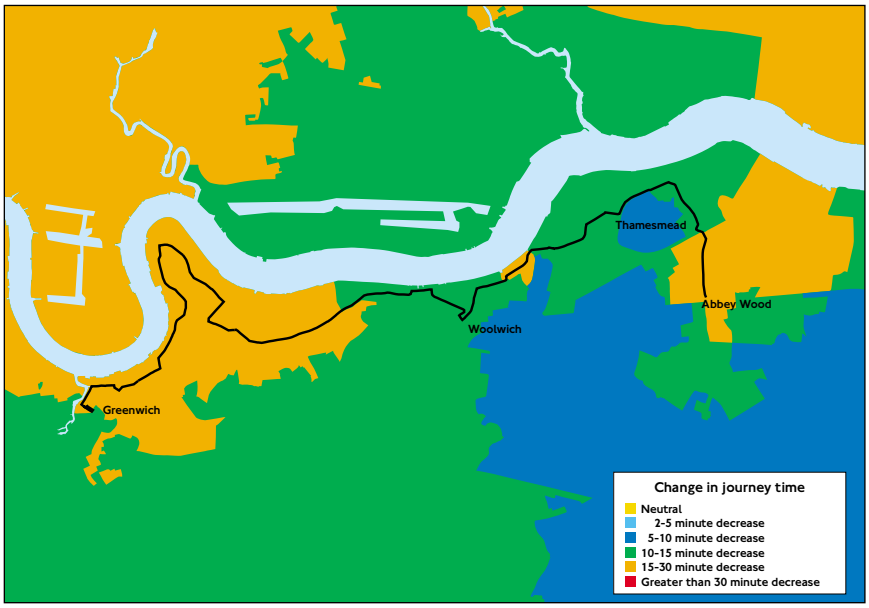
Access to development areas

It is widely recognised that a relationship exists between accessibility and the potential for development, although this relationship is not a precise one. The main development sites within the Waterfront Transit study area are Deptford Creek, Thamesmead, Millennium Village, Royal Arsenal and Woolwich Dockyard Estate.

The assessment has shown that Transit would aid several key development sites by providing improvements to public transport accessibility. Of all the development sites, Thamesmead would benefit the most, with a forecast increase of 75% in population catchment within 30 minutes travel time.

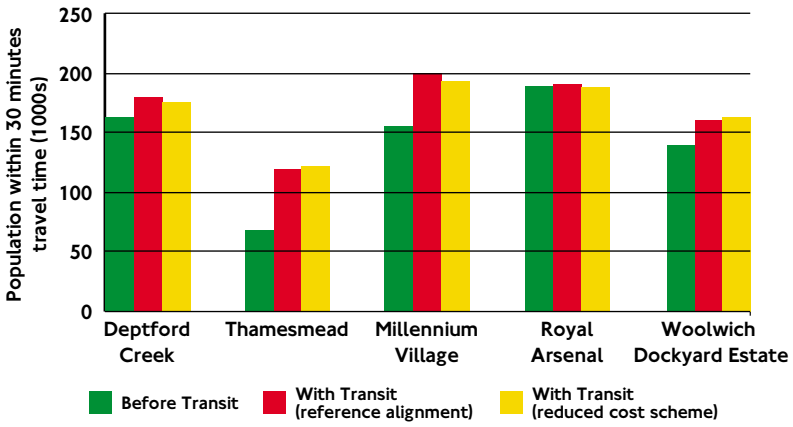
Accessibility to the Royal Arsenal and Woolwich Dockyard Estate sites would also improve significantly.

Change in accessibility of Thamesmead – reference alignment



The assessment also demonstrates that the reduced cost scheme would have a very similar impact to the reference alignment options in terms of accessibility improvements to development sites within the study area. It has been assumed that the same would be true of the scheme's impact on access to local centres, tourism sites, as well as its benefits to deprived areas and access to employment.

Access to development areas - changes in population catchment with Transit



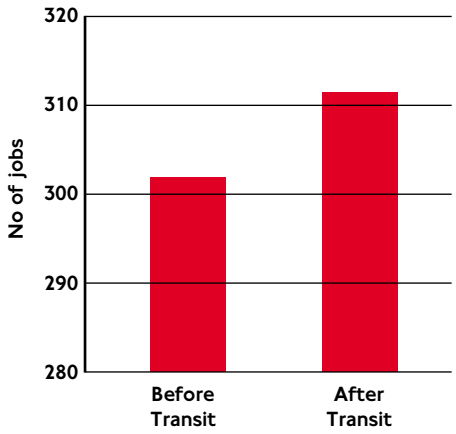
Access to and from deprived areas

An objective of Transit is to improve access to and from deprived areas, integrated with policies to reduce unemployment, enhance social cohesion and increase social inclusion.

The MCAF analysis was based upon calculating the number of people within the deprived population experiencing changes in travel time to reach the nearest local centres as a result of Transit. Deprivation levels use the Index of Local Conditions produced by the Government and, for this analysis, all wards within 400 metres of the Transit alignment were included.

In total, it is estimated that nearly 11,000 people living in deprived areas would benefit from time savings of greater than one minute to their local centre. This is classified as a moderate benefit.

Available jobs within London Borough of Greenwich catchment area



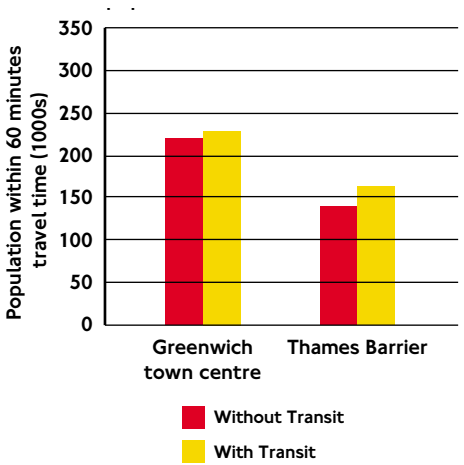
Access to employment

Improved accessibility to employment constitutes an important element of current social policy. It implies that it is beneficial to reduce travel times between areas that can supply labour and areas that require a significant labour force.

For the MCAF application, a methodology was used that relates the occupational split of residents by ward to the available jobs in all other wards within a 60 minute catchment area. In effect, this method indicates the total number of jobs available within the catchment area based on the occupational characteristics of residents.

The assessment shows that within the London Borough of Greenwich, the average number of jobs available for each ward would increase by nearly 10,000. This is equivalent to an average increase of over 3%.

Access to tourist sites - changes in population catchment with Transit



Access to tourist sites

An objective of many London Boroughs is the promotion of tourism within their areas. An improvement in accessibility between tourist sites can assist this process. The key tourist sites within the Waterfront study area are Greenwich town centre and the Thames Barrier.

Cutty Sark, Greenwich

Waterfront Transit would result in increases in the population within 60 minutes travel time of both major tourist sites in the study area. In overall terms there would be a moderate benefit due to improved public transport accessibility. The Thames Barrier would receive a large increase in catchment area, which is a reflection of its current poor level of accessibility.

Integration with other local policies and plans

Objectives	Effect of Transit	Comment
Provide opportunities for all, safe and accessible movement and promote the creation of jobs.	✓✓	–
Give high priority to the environment. Preserve the best of the Borough's environment. Promote a safe, effective and co-ordinated public transport system	✓	Transit would be well integrated with other modes and utilise largely brownfield sites, so conserving open space.
Revitalise older, run-down parts of the Borough	✓✓✓	Transit would serve major development area as well as areas of deprivation
Maintain existing community structures. Promote new communities within development areas	✓✓	Transit would facilitate new community development in areas such as Thamesmead
Enhance economic activity, promote economic and employment growth and the regeneration of run-down areas.	✓✓✓	Transit would improve accessibility to areas of employment growth in the Borough as well as to Central London

Local authorities are committed to following local policy objectives that relate to improvements in various areas of competence. Shown below are the main local policy objectives for the London Borough of Greenwich which it is considered Transit would have an impact upon, along with a qualitative assessment of this impact.

The London Borough of Bexley UDP was also considered. However, the effects of the currently proposed Transit alignment are considered to be neutral since the scheme would be unlikely to impact significantly on Bexley. As a result, the individual strategic policies of the Borough are not listed here.

8 Conclusions

Overall conclusions

Traffic access restriction – bus gate

The Waterfront Transit scheme can attract passengers through reliable, shorter public transport journey times, so long as the direct alignments, the high levels of segregation, the high-quality well-located stops and the high levels of priority at junctions assumed in the evaluation are achieved.

These benefits will be experienced both by passengers travelling on the Transit vehicles themselves and passengers on those conventional bus routes which continue in operation and share parts of the Transit alignment, its priorities and stops (but not platforms). The economic benefits of Transit also depend heavily on the rationalisation of conventional bus routes to ensure that appropriate routes can benefit from the Transit alignment and priorities, without wasteful duplication of resources.

However the scheme, as it stands, is only marginally worth pursuing. Although further consultation and detailed design may alter the exact nature of the scheme, it is TfL's view that any dilution in the extent of directness, segregation and/or priority will reduce the project's benefits, regardless of the mode selected, and make it no longer worth pursuing.

A summary of the results are set out below.

The following overall conclusions have been established by TfL:

Performance against objectives	MCAF ASSESSMENT														
				Environment			Safety	Economic			Accessability			Integration	
	Two-way alignment length (km)	Annual boardings (millions)	Max. One-way flow (1000's per hour)	Noise	Emissions	Land take	Change in equivalent fatalities	Initial capital cost (£m)	Benefit: cost ratio	Benefit:Cost ratio (highway impact = 0)	Accessibility to local centres	Severence	Parking and servicing	Access to development areas	Accessability to deprived areas
Diesel bus	32	11.2	11.2					125							
Trolleybus	32	11.2	11.2					140							
Reduced cost trolleybus	24	11.7	11.7	N/A	N/A	N/A		71			N/A	N/A			
Tram	32	15.5	15.5					182							

Performance indicator: Benefits High Moderate Slight Disbenefits Moderate Slight

Transit would provide benefits

The results of the multi-criteria assessment show that the majority of the objectives set for Transit would be met. Benefits would be realised in terms of improving accessibility to and from regeneration areas (notably Thamesmead) and local centres as well as improving the environment.

Each of the different technologies under consideration for Transit has specific advantages. Trolleybuses perform better than diesel buses in relation to environmental impacts, although they are less flexible to changes in service patterns as they can only operate under (or near to) wires.

Trolleybuses are more flexible, than trams. There are higher initial capital costs for trolleybuses and trams, although long-term vehicle costs for trams and trolleybuses are similar to diesel buses, as electrically-powered vehicles have a longer life span.

Transit would offer an attractive alternative to the private car

Parking and servicing provision on Red Route

By improving the quality of public transport, particularly by reducing journey times through segregation and the introduction of traffic priority measures, Transit would provide an attractive alternative for some people who currently use cars or would otherwise consider using private cars in the area in the future.

TfL recognises that the traffic priority measures required for Transit would marginally increase journey times for some private transport users on some roads and could take time to be accepted. However many of those car users affected by the traffic priority measures would also benefit from the improved public transport service offered in the area while some remaining car users would benefit from lower levels of highway traffic.`

Traffic calming in residential street

Parking restrictions – the evidence from Priority (Red) Routes

In locations where measures have been introduced to tackle road congestion, particularly through the control of parking, concerns have been raised by traders that such measures are likely to damage their businesses. This has been a major issue for the introduction of Red Routes in London and is likely also to be a concern if Transit is implemented.

A series of independent studies however, commissioned by the former Traffic Director for London, have shown that these fears are unfounded:

- in shopping centres where Red Routes have been introduced, more shopkeepers report buoyant or stable business than in previous years;
- the majority of shoppers (56%) arrive at Red Route centres by foot and 20% by car, unchanged from previous years and suggesting that fears about losing passing trade are unfounded;
- very few shoppers at Red Route centres (4%) cite parking as a problem;
- in a recent survey, 33% of traders interviewed said that they believed that Red Routes have a positive impact on their business, up from 13% in 1996.

In addition, alternative routes exist for any traffic displaced by Transit and in terms of journey time-savings, the benefits to public transport users of the traffic priority measures would exceed the costs to private users. However, further detailed work would be required to mitigate the effects of any private vehicle traffic diverting along unsuitable routes ("rat-running").

Transit would be cost effective

Using conventional benefit-cost analysis, the benefits of Transit outweigh the costs – even where a monetary cost is included for the (marginal) increased journey times experienced by some private transport users as a result of Transit. However, if traffic reduction is itself regarded as an objective, the journey time cost of Transit on private vehicle users should not form part of the project evaluation; the effect of the removal of this cost is to substantially increase the benefit-cost ratio for the project.

Conclusions on alignment

It is TfL's view that 12 km of the "reference alignment" considered in this study between North Greenwich and Abbey Wood has the potential to support a Transit service, whereas the remaining 4 km west of the Dome does not at present. The highest demand for Transit is forecast to be between North Greenwich and Thamesmead.

The main conclusions on the alignment are outlined below:

- The section of alignment between Greenwich station and North Greenwich does not appear to support a Transit service, on the basis of the information currently available to TfL. However, we are aware that considerable development may take place in East Greenwich and on the west side of the Greenwich Peninsular and a Transit and/or conventional bus service through these developments may eventually be justified. Safeguarding an alignment to the Transit specification would allow conventional buses to serve this corridor (if and when justified) and/or Transit to be extended westwards from North Greenwich to Greenwich station (if and when justified)
- Waterfront Transit should incorporate the 1.8 kms of Transitway already in place between the Millennium Dome and Peartree Way
- There are a limited number of Transit alignment options available between Peartree Way and the Woolwich Ferry roundabout
- Transit should incorporate two stops in Powis Street because of the volume of demand forecast to/from each of those stops
- The most direct alignment between Powis Street and the Royal Arsenal site would be along Green's End and serving a stop on the west side of Beresford Square. The advantages of this need to be balanced against options via Woolwich New Road which would provide a closer interchange with the existing Connex station but increase through journey times by over one minute

- There are a limited number of alignment options through the Royal Arsenal site. The "northern alignment" is shorter and Area 8J, for example, is likely to generate more intermediate (as well as through) demand. The northern alignment is therefore better suited to an intermediate mode. However TfL would propose part of the "southern alignment" in any case to be served by conventional buses
- From Thamesmead Town Centre to Abbey Wood Transit would take over part of an existing 2.4 kms dual carriageway.

Conclusions on technology

On the basis of the assumptions made in the evaluation, the Waterfront Transit scheme appears neither to require nor to justify the high start-up costs normally associated with tram technology. Furthermore, any potential connection via the proposed Thames Gateway Bridge if it proceeds to the (likely rubber-tyred) East London Transit system would suggest that the two systems should be implemented with the same technology, including homogenous fleets.

However, TfL is seeking to validate (or otherwise) the assumptions made in the evaluation about the diversion of utilities (which are particularly onerous for tram technology). TfL will therefore be carrying out a survey of statutory undertakings in parallel with the public consultation, using experience gained with the implementation of Croydon Tramlink.

TfL is also aware that the relative costs of rubber-tyred and tram technology are narrowing and will be receptive to suggestions from the private sector as to how Waterfront Transit might incorporate tram technology whilst avoiding the high start-up costs normally associated with it. The preferred mode will only be selected once the views of both the private and public sectors have been fully understood through consultation.

If Waterfront Transit proceeds, then whatever technology is eventually chosen, the Transitway must be segregated and generally capable of accommodating conventional buses as well as Transit vehicles.

Risk Analysis

An initial assessment was undertaken to identify and assess the possible risks to the scheme. The results of this exercise are set out overleaf.

Risk	Level	Explanation	
Recommendations	Modal recommendations	Low	The feasibility and evaluation studies have established that the choice of technology is secondary to the priority measures in determining benefits and meeting objectives.
	Traffic management and priority measures	High	The delivery of the traffic management, necessary parking and priority measures is high risk because they are the most critical component in determining the scheme benefits and little scope exists for reducing the measures as the economic justification for the significant investment required reduces sharply. To reduce this risk all commercial loading and servicing has been maintained and parking bays have been provided where space is available. Assessments of the impacts of these measures have shown that the overall impacts are relatively small.
External factors	The economy, impact of other policies, and development and regeneration assumptions	High on alignment near North Greenwich and Thamesmead, low elsewhere	There is a risk that the development aspirations are not achieved – or are exceeded, or that they are of a much lower or higher density than assumed. A result could be that the mode taken forward has too much or insufficient capacity on these routes. There is also a lack of understanding about the inter-relationship between regeneration and public transport which makes this difficult to forecast. Consequently, bus based improvements such as LBI and borough initiatives should be progressed in the short term with the longer term goal being the implementation of Transit. Also, potential demand levels should be monitored to ensure that adequate capacity could be provided via the Transit mode taken forward, or whether a higher capacity mode (e.g. tram) would be necessary.
	Change of political control	Low	There is political risk in that a change in local authority control could result in opposition to the measures being proposed. However, this is considered to be low as formal local authority support has been sought throughout the process.

Risk	Level	Explanation	
Public transport service planning assumptions	Service planning and interchange	Medium/High	Further work is required once the technology has been agreed, and at other stages during scheme development to optimise the service planning and interchange assumptions. There is a medium to high risk because the financial benefits are very sensitive to service planning assumptions, as are existing public transport users to proposed changes to bus services.
	Other public transport initiatives	Medium/High	An integrated approach to addressing the wider package of initiatives such as the London Bus Initiative and ticketing initiatives need to be taken forward in order that proposals that bring benefits in the short term are not delayed, and help "pave the way" for Transit. These could increase or decrease the benefits or costs of Transit.
	Revenue forecasts	Low	The majority of Transit demand would come from existing public transport users, and thus there is a relatively low risk to net revenues.
Technical specifications of Transit	Electronic guidance	High	This is a new technology and remains unproven in a passenger operating environment meaning that it is an area of huge uncertainty in terms of its costs and benefits and its implications on gaining access to pedestrianised areas.
	Utility removal	Medium	Utility removal for diesel bus options has assumed a much higher level and cost than is implemented in conventional bus priority and this has a major effect on the overall conclusions on these options.
	Vehicle renewal	Low	The period of life assumptions may over estimate the number of times a bus or trolleybus is renewed over the thirty year life period, but has little impact on the business case when discounting and the period of the scheme are taken into account.
	Depot costs	Low	Depot costs are an initial outlay and have been calculated to take into account the variances between modes as well as incrementally based on the number of additional vehicles required.
	Capacity assumptions	Low	Planning standards for the various technologies have been used to determine frequencies and it has been ensured that all the demand fits within the supply.

9 The Way Forward

Based upon the results of the work summarised in this report, TfL and the Local Authorities have decided to proceed to the next phase in the development of Waterfront Transit. The purpose of the consultation is to establish what level of support exists for Waterfront Transit from the public as well as potential private sector partners who might build, fund and operate the system. It will be used to help inform the formal decision to be taken by TfL and the Mayor as to whether to proceed with the development and implementation of the scheme, and the priority to be placed on it relative to other projects.

Preliminary public consultation

This study has shown that, under certain conditions, the overall benefits of Transit can outweigh any adverse impacts. However, it is intended that preliminary public consultation is carried out to seek views on the principles of the proposals. In particular, consultation will seek to explain the proposals and establish:

- Whether there is support for the principle of road space re-allocation in favour of Transit and vulnerable road users through the use of traffic management measures;
- Whether there is support for the proposed Waterfront Transit alignment (including options and extensions);
- The perceived advantages and disadvantages of the different vehicle-types under consideration for Transit – trams, buses or trolleybuses (possibly articulated) - which could be guided on all or part of the alignment.

It should be noted that the alignment offered for public consultation will be slightly different in parts to that described in detail in this document, reflecting a number of improvements which it has been possible to incorporate.

It should also be noted that much of the detailed planning work for Transit remains to be carried out, including the design of the relevant traffic management measures and the planning of the service patterns for Waterfront Transit, including accompanying changes to existing bus services. These issues will be addressed at a later date if it is clear that there is sufficient support to progress the project further.

Seeking expressions of interest from the private sector

The work completed to date has demonstrated that Waterfront Transit can be a cost-effective proposal. At the same time as preliminary public consultation, TfL will be seeking the views of potential funders and/or operators in the private sector of the transport industry on Transit. This will enable the Mayor and local authorities to decide whether to proceed, on the options available and to identify a preferred approach to progress any proposals through to implementation. Private sector involvement in similar projects in London, including Croydon Tramlink and the DLR extension to Lewisham has proved successful and has reduced the funds required from the public sector by between 40-70%.

The Transport and Works Act procedure

The Transport and Works Act 1992 (TWA) provides a method for promoters of new transport systems, including new railways, tramways, trolley vehicle systems and other guided transport systems, to gain powers to carry out works including construction, compulsory purchase and temporary acquisition. The legislation is designed to provide a planning procedure for these systems similar that used for the construction of new road schemes and including, where appropriate, a Public Inquiry.

The main stages of the procedure can be summarised as follows:

- **Pre-application consultation –** there is an expectation that wide publicity will be given to the proposals and to this end public meetings and exhibitions will be held at suitable locations. In addition, there is an obligation to consult a wide range of interested parties including affected property owners and statutory undertakers such as Utility companies.
- **Deposit of Application –** documents must be deposited describing the works and powers sought, as well as plans and an Environmental Statement. These documents must be made available for inspection at suitable locations such as town halls and libraries.
- **Objection period –** Objections may be made against an Application for a TWA Order by anyone and must be sent to the Secretary of State within six weeks of the date of the Application for the Order. Objections may be considered in correspondence, by means of a local hearing or through a Public Inquiry.
- **Negotiating period –** Negotiation between the promoter and objectors may result in some objections being removed. The length of the negotiation period will reflect the volume and complexity of the objections received.
- **Public Inquiry –** Where a Public Inquiry is held it will be presided over by an Inspector. The general principles of the inquiry are very similar to those for a road scheme and objectors may be heard in person and need not be professionally represented.
- **Determination of the Application –** Following the receipt of the Inspector's report the Secretary of State will determine the Application. The Secretary of State may grant or refuse the Works Order in totality and may require the promoter to alter the proposals before granting the Order.

Timescales for the TWA Order process are difficult to predict and depend crucially upon the complexity of the proposals and the number of objections received. As examples however, the TWA Order process to construct the Metrolink Light Rail extension to Ashton took 21 months from the deposit of the Application to receiving Ministerial consent, while the Merseyside Rapid Transit Proposals, which did not receive Ministerial consent, took 13 months from deposit to the time of receiving a Ministerial decision.

At this stage, TfL will be seeking the views of private sector companies will be sought with respect to:

- The types of vehicle that may be suitable for Greenwich Waterfront Transit
- Packaging of system (builder/operator)
- Concession arrangements
- Timing and involvement in the process
- Risk taking
- Funding options

Decision to proceed

The information from public consultation and the private sector, and the results from existing and further studies, will be used by the local authorities and the Mayor to decide whether they wish to proceed with the development and implementation of the scheme and its priority in the Mayor's programmes. If it is decided to proceed, two options are available for seeking powers to implement the scheme. Firstly, for any scheme not involving electric power or guidance, conventional planning and highway powers can be sought.

Alternatively, Transport and Works Act powers can be pursued. The latter would ensure that all the necessary highway powers are obtained and safeguarded. It would also help overcome the biggest risk to the scheme - namely the local authorities ability to deliver all the priority measures necessary for the scheme.

Seeking powers through the Transport and Works Act Order process would require carrying out further detailed design work and additional consultation along with a Public Inquiry if any objections to the schemes were received. This process would probably take two to three years, depending on the extent and nature of the scheme. This process and timescale also applies to the other intermediate mode proposals currently under consideration by TfL.

Deciding to work in partnership

Although it will be for the Mayor to decide which intermediate mode schemes, if any, should be progressed, local support will be essential for any scheme to be developed beyond this stage. If the local authorities or the Mayor are unable to support the proposals no scheme will proceed. Therefore, the local authorities are invited to demonstrate their commitment to these proposals for Transit and introduce policies and practical measures that will assist in the development of the project.

In addition, should there be agreement to proceed to the stage where construction powers are sought for Waterfront Transit, local authorities

would need to enter a formal partnership with TfL and the private sector prior to carrying out and preparatory work for any Transport and Works Act Order. TfL would also be encouraging each local authority to take a clear and unambiguous cross-party political decision to support and promote the project. This would reduce the risk of construction being disrupted by any political changes resulting from elections during the implementation phase of the project. These approaches were adopted successfully on Croydon Tramlink and were designed to encourage local ownership and ensure that real benefits were delivered to local residents and businesses. In TfL's opinion, local authority involvement in new transport projects is vital for their success and without such formal agreements for Waterfront Transit it will not be possible to proceed with the project.

In the interim, TfL will be vigorously pursuing bus priority, vehicle and service improvements in a way compatible with ultimate construction of Waterfront Transit. Local authority support for such improvements and others to improve bus travel in the area will be a visible indicator of commitment.

It is TfL's hope that local authorities will respond with vision to the opportunities, as well as challenges, that are offered by Waterfront Transit.