The Leeds Trolley Vehicle System Order
Business Case
Leeds NGT: Business Case Review
January 2014
Executive Summary

The Leeds New Generation Transport (NGT) project will be a 14.8km trolleybus network with lines to:

- Holt Park (North Line)
- Stourton (South Line)

The scheme includes Park & Ride sites on the North Line at Bodington and at the South Line terminus at Stourton.

NGT will provide a high quality, highly segregated, rapid transit service with high capacity, greater punctuality and faster journey times than bus services. It will significantly improve the quality of public transport in Leeds and provide an attractive alternative to private car travel.

NGT is being jointly promoted by the West Yorkshire Passenger Transport Executive (Metro) and Leeds City Council (LCC). It will open to passengers in early 2020.

On award of Programme Entry to the NGT Project, DfT committed capital funding of £173.5 million towards the investment cost of the trolleybus solution as specified in the funding approval. The Promoters will contribute further to this.

This document fulfils DfT’s requirements for a Business Case submission. It sets out NGT’s:

- Strategic Case
- Economic Case
- Financial Case
- Commercial Case
- Management Case

The Strategic Case sets out the scheme context and includes a description of the problems and issues which NGT will help to resolve. It sets out the scheme objectives and describes how the Preferred Option was developed.

The Strategic Case demonstrates that NGT will make a strong contribution to meeting national, regional and local policy objectives.
The Economic Case demonstrates the economic worth of the project. This includes a Cost Benefit Analysis which shows that with a Benefit Cost Ratio (BCR) of 2.96:1 the scheme represents strong value for money and will deliver a high level of benefit against the investment made.

The environmental impacts of NGT are also considered and it is shown that NGT has a neutral overall impact on almost all environmental sub-objectives with the exception of landscape/townscape, where a moderate adverse assessment has been recorded and noise, where NGT has a slight adverse impact.

Funding details are provided in the Financial Case, which highlights that sufficient funding is available for the scheme.

Procurement and contract details are included within the Commercial Case which explains how the Promoters envisage the scheme will operate and demonstrates why this will enable the optimal implementation of NGT.

The Management Case sets out how the Promoters will deliver NGT and demonstrates that the project is deliverable and feasible. The Promoters are working towards NGT being fully operational in 2020. A description of how project risks are being managed is also provided in the Management Case, which shows that project risks are being effectively managed and that procedures are in line with DfT requirements. This section also highlights the strong support for the scheme and describes the Communication Management Strategy which is being implemented to ensure all stakeholders are informed of relevant project information.

Finally, the document concludes with a Summary Case of the appraised NGT options outlining the many benefits of NGT and demonstrating the strong contribution that it will make to the future transport network in Leeds. It highlights the positive impact the scheme will have on encouraging modal shift and more sustainable travel, whilst helping to maximise the Leeds economy by enhancing its competitive position and facilitating future employment and population growth.
# New Generation Transport

## Business Case Review

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<td>Statutory Quality Partnership</td>
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<td>Strategic Task Overview</td>
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<td>Site Waste Management Plan</td>
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<td>Transport Economic Efficiency</td>
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<td>TUBA</td>
<td>Transport User Benefit Appraisal</td>
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<td>Transport and Works Act Order</td>
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<td>West Yorkshire Local Transport Plan</td>
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<tr>
<td>WYPTE</td>
<td>West Yorkshire Passenger Transport Executive ('Metro')</td>
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</table>
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1. Introduction

This Business Case Review


1.2. The 2009 submission of the New Generation Transport (NGT) Major Scheme Business Case (MSBC) is the most recent full business case submitted to the Department for Transport for the project. At that time the NGT Project included three radial routes extending to Bodington Park & Ride, St James’ Hospital and Stourton Park & Ride.

1.3. In March 2010, the Department for Transport granted Programme Entry status to a trolleybus scheme comprising a 14.8 km route from Holt Park (beyond Bodington) in the north through the city centre to Stourton Park & Ride in the south.

1.4. Following reassessment of the NGT value for money and funding case as part of the Coalition Government’s review of the transport major scheme programme, in July 2012 NGT secured re-entry into the DfT major scheme programme. The NGT Programme Entry (PE) Re-Approval is for the Holt Park to Stourton route.

1.5. Much of the supporting information in the MSBC had not changed and was therefore not updated for the PE Re-Approval Business Case submission. However, the Value for Money statement was updated and prior to this Review represented the most recent assessment of the position.

1.6. This Business Case Review has been undertaken for a number of reasons:

- To reflect changes in the wider project context, including policy, land-use/development, transport and the socio-economic context of Leeds
- To reflect changes in technology, particularly relating to the development of electric vehicles
- To reflect changes in the appraisal of the NGT Project following the detailed work that has been undertaken following:
  - The change in route between Balm Road bridge and the Stourton Park & Ride site
  - The updates to the design of the NGT Preferred Option undertaken since the PE Re-Approval submission
- To reflect changes to DfT appraisal guidance (WebTAG)
To bring together in one place a complete and contemporary appraisal of the Strategic, Economic, Financial, Commercial and Management Case of the NGT Project reflecting anything else that has changed since the last full MSBC submission in 2009, including:

- On-going development and refinement of the transport modelling framework (the Leeds Transport Model) and the resulting updates to the demand and revenue forecasts and the inputs to the economic appraisal
- Updated assessment of punctuality benefits
- Updated assessment of Wider Economic Impacts
- Updated Fares and Ticketing Strategy
- Updated costs and funding arrangements

The NGT Project

1.7. NGT will provide a high quality, highly segregated, rapid transit service with greater punctuality and faster journey times than existing bus services. This will increase passenger capacity on the corridor and provide a much needed step change in the quality of public transport in Leeds.

1.8. This Business Case Review sets out the strategic context for the proposed project and the processes by which alternative options have been identified and compared. It demonstrates that the NGT Preferred Option performs better than the considered alternatives and justifies the investment of public sector funding in the project.

1.9. A Transport and Works Act Order (TWAO) application for the Leeds Trolley Vehicle System - the NGT scheme - was made in September 2013 and in common with similar transport projects, subsequently in November 2013 the Secretary of State for Transport announced that a Public Inquiry into the application would be held. At the time of publication of this Business Case Review the timing of the Public Inquiry has not been announced; however it is expected to be in spring 2014.

1.10. If, following the Public Inquiry, TWAO powers are granted, then the NGT Project will move from a planning phase to procurement and further design, with the system expected to open for public use in 2020.

Promotors

1.11. The TWAO application is being jointly promoted by West Yorkshire Passenger Transport Executive (Metro) and Leeds City Council (LCC). The contact details for the Promoters are as follows:
As Metro and LCC are promoting the NGT scheme in partnership, a joint Project Team has been established for the development of the project.

Metro and LCC will use their complementary powers to promote the scheme efficiently. Metro and LCC have entered into a Joint Venture Agreement setting out the obligations required by the Promoters to progress the scheme up to the date of Full Approval. This reflects the cost sharing approach to the promotion of the scheme, the provision of resources to develop the scheme and deals with the identification of Council and Metro land required for the final alignment of NGT. The agreement allows for the Promoters to develop a further agreement dealing with implementation and operation of the scheme following full approval, including further detailed arrangements for the contribution of land.

Stakeholder Support

The Promoters have undertaken extensive stakeholder engagement and consultation throughout the development of the NGT project and this has been important in shaping the proposals.

While public engagement has taken place throughout all stages of the project, the main periods of formal public consultation can be summarised as follows:

- 2008: Feasibility stage
- 2009: Development of business case
- 2012/13: Development of Transport and Works Act Order submission

Engagement consisted of public exhibitions with additional feedback sought via the internet, through local interest group meetings and in response to printed materials which were widely distributed and also made available at local libraries.

Strong public support for significantly improving public transport on the NGT corridors has been demonstrated during the development of the NGT Project.
The main consultation exercise, which was undertaken to inform the development of the 2009 business case, found that 77% of respondents support the proposals. A number of key stakeholders have publicly stated their support for the NGT proposals.

Report Structure

1.18. This document is structured to conform to DfT guidance on the production of Major Scheme Business Cases, last updated in January 2013. The analysis presented within this document has been undertaken in line with DfT Transport Appraisal guidance published as WebTAG and DfT’s advice on Value for Money Assessment (Core Document E-3-26).  

1.19. The ‘Project Description’ in Sections 1 and 2 of this Business Case Review sets out an introduction to the proposed NGT Project, the project history and a summary of the specification of the Preferred Option.

1.20. The ‘Strategic Case’ in Sections 3-8 sets out the scheme context and includes a description of the problems and issues which NGT will help to resolve. It outlines the scheme objectives and the process of option generation explaining how the ‘Next Best’ and ‘Low Cost’ options were selected to be taken through to full appraisal. The Strategic Case demonstrates that NGT will make a strong contribution to meeting national and local policy objectives.

1.21. The ‘Economic Case’ comprising Sections 9-17 assesses the impacts, and resulting value for money, of each project option. The initial sections set out the processes of estimating capital and revenue costs and the forecasting undertaken to derive the likely demand, revenue and benefits each option would deliver. The latter sections examine the impacts that cannot be monetised, including the environmental, social and distributional effects of each option. This case concludes with a Value for Money Statement for each option demonstrating that the Preferred Option represents strong value for money and will deliver a high level of benefit against the investment made.

1.22. The ‘Financial Case’ comprises Sections 18-21 and sets out the affordability, funding arrangements and accounting issues for each project option. This case shows that sufficient funding is available for the NGT Project.

1.23. The ‘Commercial Case’ in Sections 22-23 describes the procurement strategy, including the approach to private sector involvement. It details the key assumptions that have been made, in terms of forms of contract that could be used in the appointment of a potential construction/operating concession and how the risks would be allocated under the various contract

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1 WebTAG 3.5.4 – Cost Benefit Analysis, Department for Transport, 2012
options available. This section also sets out the other potential procurement approaches.

1.24. The ‘Management Case’ comprises Sections 24-28 and sets out the delivery plans for the successful implementation of the Preferred Option. This case considers proposals for project governance, managing risk and engaging with key stakeholders. It also considers project planning arrangements and plans for obtaining the required legal powers and consents. Furthermore, the Management Case sets out the proposals for measuring impacts and evaluating the scheme, as well as the independent process approval which is being used to assure that the delivery plans are robust.

1.25. The ‘Summary Case’ comprises Section 29 and summarises the Preferred Option, Next Best Alternative and Low Cost Alternative presented in this Business Case Review.

Document References

1.26. Documents referenced within this Business Case Review are included in the Core Documents List and the relevant Core Document reference number is given in the format: Document Title (X-n-n) or similar.
2. Preferred Option Specification

Preferred Option Alignment

2.1. The Preferred Option considered in this Business Case Review and the subject of the Promoters’ application for TWAO powers is a high quality public transport system running from Holt Park to Stourton. Powered by overhead cables, modern single-articulated trolleybuses will carry up to 160 passengers serving NGT stops with step-free access to the vehicles.

2.2. The system has been designed to offer improved journey times to passengers by introducing a high level of priority over other traffic. This includes additional sections of dedicated NGT lanes and priority at existing and upgraded traffic signal junctions.

2.3. The Preferred Option has a 15km alignment illustrated in Figure 2.1 below. Although the line will generally operate as a single route, it is convenient to distinguish between the routes north and south of the city centre.

- The North Line is around 10km in length and runs from Holt Park district centre in the north to Leeds Bridge in the south via Headingley and Hyde Park through the University and Arena quarters, into the city centre via Park Row.

- The around 5km long South Line will continue south from Leeds Bridge to a new Park & Ride site at Stourton, running from Leeds city centre via Boar Lane through New Dock and Belle Isle. The majority of the NGT route will be segregated from highway traffic in lanes which are either dedicated to public transport or for the exclusive use of trolleybuses.

2.4. Safe and secure car parking will be provided for NGT customers at two new Park & Ride sites. On the North Line, Bodington Park & Ride will provide up to 850 spaces at a site on the A660 Otley Road. On the South Line, Stourton Park & Ride will provide a circa. 1,700 spaces at a site near junction 7 of the M62/M1. The Stourton Park & Ride site is extendable and could be expanded to up 2,300 spaces in future.

2.5. Technical specifications for the Preferred Option are available in the Core Documents relating to the Transport and Works Act Order Application (Category A).
Operations

2.6. The assumed operating pattern comprises two two-way NGT services, each operating on a frequency of five trolleybuses per hour:

- **Service 1**: Linking Holt Park in the north to Stourton in the south via Bodington, Headingley, Leeds city centre and Belle Isle
- **Service 2**: Linking Bodington in the north to Stourton in the south via Headingley, Leeds city centre and Belle Isle

2.7. This results in a core frequency of ten trolleybuses per hour between Bodington and Stourton. There will also be the facility for additional service in the peak of the peak.

2.8. It has been assumed that the vehicles are acquired through a leasing company which purchases the vehicles directly from the manufacturer. This option has been chosen as it gives greatest assurance that benefits associated with NGT reliability and journey quality are delivered. The Promoters of the scheme will make payments to the leasing company to cover the cost of making the vehicles available for service (reliability) and ensuring the vehicles are appropriately maintained (journey quality).

Powers Required

2.9. Powers required to deliver the scheme are being sought by way of an Order under the Transport and Works Act 1992 and an associated application for deemed planning consent under section 90(2A) of the Town and Country Planning Act 1990 and by way of contemporaneously applications for listed building and conservation area consent.

2.10. Listed Building Consent and Conservation Area Consent will be required for various aspects of the scheme, particularly in the city centre and in Headingley. Such additional consents are required where works affect a Listed Building or its curtilage, or take place within a Conservation Area.

Key Assumptions and Risks

2.11. Risk Management for the NGT Project is a key part of project delivery, and operates on the premise that risks occur across all project phases, therefore risk management must operate continually and consistently at all times.

2.12. Risk Management is applied on three levels:

- **Strategic Risk Management**: applied during the initial project phase and is concerned with risks which will influence the achievement of project objectives. Risks at this level are high-level and strategic
I Project Risk Management: undertaken throughout the project and focuses on project level risks to the point of operation, allowing the Project Team to create and manage risk contingencies

I Operational Risk Management: this will focus on the risks associated with the completed project once operational, and is considered as part of the project design process

2.13. Risk Registers have been developed for the project and provide a database of all project and strategic risks. The Risk Registers contain details of all risks identified, risk owners, risk probability, likely impact and proposed mitigation measures. Headline risks for the project are set out in Section 24.

Delivery Programme

2.14. The delivery programme is based on the assumption that the Public Inquiry into the Transport and Works Act Order application will be held in Spring 2014. The key project milestones are summarised in Table 2.1.

TABLE 2.1 KEY MILESTONES FOR THE NGT PROJECT *

<table>
<thead>
<tr>
<th>Milestone</th>
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<td>DfT Programme Entry</td>
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</tr>
<tr>
<td>TWAO application</td>
<td>September 2013 (complete)</td>
</tr>
<tr>
<td>Public Inquiry</td>
<td>May 2014</td>
</tr>
<tr>
<td>Secretary of State decision on TWAO</td>
<td>Spring 2015</td>
</tr>
<tr>
<td>DfT Conditional Approval</td>
<td>Summer 2016</td>
</tr>
<tr>
<td>Selection of preferred tenders</td>
<td>Autumn 2016</td>
</tr>
<tr>
<td>Full approval</td>
<td>Winter 2016</td>
</tr>
<tr>
<td>Contract award</td>
<td>Early 2017</td>
</tr>
<tr>
<td>Start of main construction</td>
<td>Early 2017**</td>
</tr>
<tr>
<td>Start of operations</td>
<td>Early 2020</td>
</tr>
</tbody>
</table>

Source: Metro, 2013

* Milestones correct as of January 2014

** Some Pre-construction works are scheduled to commence in 2015
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3. **Project Context**

3.1. The City of Leeds is located within the Metropolitan County of West Yorkshire. In terms of both area and population it is the largest district within the County. The city incorporates the Leeds urban area and a further 28 towns, market towns and district centres. Leeds city centre is also the key focus within the Leeds City Region, the area covering local authorities in North, South and West Yorkshire.

3.2. Figure 3.1 shows the location of the City within West Yorkshire and the Leeds City Region. The proposed NGT Project falls entirely within the City of Leeds district boundary.

**FIGURE 3.1  LOCATION OF LEEDS & ADJACENT AUTHORITIES IN THE CITY REGION**

Source: Steer Davies Gleave, 2013

**Overview**

3.3. Leeds is a growing city which has undergone transformational change over the last two decades. Following a historical dependence on the manufacturing industry, which fell into decline during the 1970s and 1980s, the city has become an important financial and business centre. Almost 30%
of employees working in the city are involved with the banking, finance and insurance sectors. This is 7% higher than the national average\(^2\).

3.4. The latest ONS Annual Population Survey shows that in the year 2012-3, Leeds accounted for 37% of employed people in West Yorkshire\(^3\).

3.5. The Leeds economy is forecast to grow over the next decade with Leeds accounting for 32% of net additional regional jobs over the period to 2023\(^4\). Growth within Leeds city centre, in terms of employment and economic activity, has been identified as a key driver for the future growth of the City Region. It is therefore important that the city’s transport system supports and facilitates such growth and helps to stimulate further economic activity.

**Project Scope**

3.6. The NGT Project is a 14.8 km public transport system that will run between the northern and southern edges of the city through the city centre. Approximately two thirds of the route between Bodington Park & Ride and Stourton Park & Ride will be segregated from general traffic. Powered by overhead cables, modern trolleybuses will carry up to 160 passengers. The NGT system will comprise dedicated lanes, cycle and pedestrian enhancements and junction and traffic signal priorities. NGT will incorporate major Park & Ride facilities.

3.7. NGT is one of the city’s key transformational projects. NGT is central to creating an integrated mass transport network for Leeds to support the city’s future development, transform public transport and offer a real and attractive alternative to travel by car.

3.8. NGT will be modern, accessible, energy efficient and clean, providing a high quality transport system that offers passengers improved journey times compared to existing buses and a frequent, punctual service. It will connect people to key employment sites, education, health and leisure facilities, acting as a catalyst and driver for economic growth and regeneration.

**NGT Corridors**

3.9. Two corridors within the City of Leeds have been identified for NGT:

- **North corridor:** From the north of the city, the corridor will run from Holt Park and a dedicated up to 850 space Park & Ride car park at Bodington, via Headingley and Hyde Park through the University and Arena quarters, into the city centre via Park Row.

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\(^2\) ONS Annual Business Inquiry Employee Analysis, ONS, 2008  
\(^3\) ONS Annual Population Survey, ONS, July 2012-June 2013  
\(^4\) Leeds Monthly Economic Briefing, Leeds City Council, November/December 2013
South corridor: From the south of the city, the corridor will operate from a dedicated 1,500 space (extendable to 2,200+ spaces) Park & Ride car park at junction 7 of the M621/M1 Stourton, running though Belle Isle and Hunslet to New Dock and Brewery Wharf and into Leeds city centre via Leeds Bridge and Boar Lane

3.10. The two corridors have been identified for different yet complementary reasons:

North corridor: The A660 is a highly congested radial route into the city experiencing significant peak delays with both inbound and outbound flows experiencing journey times to and from the city centre double those in non-congested conditions. This particularly occurs in the periods 08:00-09:00 and 17:00-18:00. There is no practical scope to increase road capacity on the A660 to either mitigate some of the congestion or to provide for traffic growth. NGT is an opportunity to materially increase person capacity, to reduce journey times and to improve public transport punctuality along the route. There is also strong potential for Park & Ride demand but for this to be realised the capacity, journey time and punctuality improvements along the route that NGT would provide are needed

South corridor: The south of the city is characterised by relatively high levels of deprivation, unemployment and low car availability. The south of the city is also a focus for efforts to promote redevelopment and regeneration. The south line is routed from the city centre through areas which would benefit from the improved access and connectivity that NGT will bring to the city centre; the largest concentration of employment opportunities in West Yorkshire and the location of tertiary education establishments alongside other important services. The south corridor provides an opportunity to improve the connectivity of major development sites south of the city centre, acting as a stimulant for growth and regeneration. The M621 has high flows and experiences congestion. Resultantly, there is strong potential for Park & Ride demand for those entering Leeds from the South East. Like the north corridor, for this to be realised frequent, speedy and punctual public transport links with appropriate capacity need to be provided
**Local Policy**

3.11. There are two key policies that provide context and direction for the NGT Project. These are the West Yorkshire Local Transport Plan 3 (WYLTP) (Core Document D-6-11)\(^5\) and Leeds’ Local Development Framework (LDF).

**West Yorkshire Local Transport Plan 3**

3.12. This is a statutory requirement that each Local Transport Authority (LTA) has a Local Transport Plan (LTP). West Yorkshire Integrated Transport Authority (WYITA) is the LTA for West Yorkshire. The third West Yorkshire Local Transport Plan (WYLTP) was adopted in April 2011 and it replaces the second Local Transport Plan (LTP2).

3.13. Each LTP must have a longer term strategy and shorter term delivery plan. WYLTP has a 15 year strategy for West Yorkshire’s transport networks to 2026. The plan is supported by a three year Implementation Plan for transport in West Yorkshire.

3.14. The overall vision of the WYLTP is:

- ‘Working together to ensure that West Yorkshire’s transport system connects people and places in ways that support the economy, the environment and quality of life.’

3.15. The WYLTP objectives are as follows:

- Economy: To improve connectivity to support economic activity and growth in West Yorkshire and the Leeds City Region
- Low Carbon: To make substantial progress towards a low carbon, sustainable transport system for West Yorkshire, while recognising transport’s contribution to national carbon reduction plans
- Quality of Life: To enhance the quality of life of people living in, working in and visiting West Yorkshire

3.16. WYLTP has a strong focus on improving connectivity to support economic growth. It recognises that although there have been improvements in public transport in recent years; it is still not reaching its full potential.

3.17. In the WYLTP NGT is recognised as a low carbon rapid transit system for the City Region. It states that the development of NGT is a priority activity over the three year period from April 2014.

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\(^5\) My Journey West Yorkshire Transport Plan, Metro, October 2012
Leeds’ Local Development Framework

3.18. The Local Development Framework (LDF) is the name given to the new system of Development Plans introduced by the Planning and Compulsory Purchase Act 2004. The LDF will replace the Unitary Development Plan (UDP). Rather than a single plan, the LDF takes the form of a portfolio of documents.

3.19. The Publication Draft Core Strategy sets out strategic level policies and vision to guide the delivery of development investment decisions and the overall future of the district. On 26th April 2013 Leeds City Council submitted the Publication Draft Core Strategy to the Secretary of State for examination and an Inspector has been appointed. The formal examination period began in October 2013 with a decision expected from the Inspector in spring 2014. Depending on the form of decision from the Inspector the document is likely to be adopted between spring and autumn 2014.

3.20. As the Council has submitted the Publication Draft Core Strategy for independent examination some weight can now be attached to the document and its contents, recognising that the weight to be attached may be limited by outstanding representations which have been made. There is a reasonable prospect that by the time of any NGT related examination at a Public Inquiry that the Core Strategy would have been adopted.

3.21. The representations received on the draft Core Strategy contained limited objections specific to NGT (three in total received at the pre-submission stage), with numerous comments in support and more on the need for a more extensive network. Likewise comments were received stating the need for more Park & Ride sites. The Inspector, in his agenda for the transport examination, did not include a section on the public transport strategy for the city, and specifically excluded NGT from discussions as it would be considered in detail as part of the Transport and Works Act Order (TWAO) submission.

Promoters’ Business Strategy

3.22. The Leeds NGT Project is jointly promoted by West Yorkshire Passenger Transport Executive and Integrated Transport Authority (known as ‘Metro’) and Leeds City Council (LCC) which have entered into a Joint Venture Agreement (JVA) (Core Document G-4-61)\(^6\) to set out their commitment to work together to promote, fund and procure the construction, operation and maintenance of NGT. In this JVA both parties have committed to joint collaboration and co-operation in order to meet shared objectives.

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\(^6\) Joint Venture Agreement, Metro and Leeds City Council, 18\(^{th}\) September 2013
3.23. In addition, both LCC and Metro have their own individual corporate planning processes and a summary of the business strategies for each organisation is provided below.

**Metro**

3.24. Metro is the Local Transport Authority for West Yorkshire with sole statutory responsibility for the Local Transport Plan, the transport plan for West Yorkshire. Metro works on behalf of the 2.1 million people of West Yorkshire, to plan and coordinate public transport services.

3.25. Metro has other specific responsibilities for local passenger transport services and information, freight movement, concessionary travel arrangements and mitigating the environmental impacts of transport.

3.26. Metro’s Corporate Plan has been superseded by the Implementation Plan for the WYLTP, with its objectives and priorities up to 2014 aligning with the first three years of the current Implementation Plan for the WYLTP.

3.27. The Implementation Plan is set out in relation to the four Local Transport Plan strategy themes (transport assets, travel choices, connectivity and enhancements) with a fifth theme covering essential supporting activities such as performance and financial management, governance and staff development that explains how Metro will oversee and manage the implementation of the WYLTP.

3.28. Consultation for developing the second WYLTP Implementation Plan has been completed. This will span between 2014 and 2017 with Metro’s Corporate Plan aligning to this to ensure successful delivery of the Implementation Plan over the three year period.

**Combined Authority**

3.29. In July 2012 the Leeds City Region agreed a City Deal with the Government that will give the City Region significantly devolved powers and funding for economic development, training, job creation and transport. A requirement of the City Deal is that the West Yorkshire councils of Bradford, Calderdale, Kirklees, Leeds and Wakefield come together to create a Combined Authority. A Combined Authority will be a combination of a Local Transport Authority and an Economic Prosperity Board and will assume the role currently carried out by the WYITA.

3.30. With the establishment of the Combined Authority, the WYITA will be dissolved and its powers property, rights and liabilities will be transferred to the Combined Authority.

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7 Metro website: www.wymetro.com
3.31. On 7th November 2013, the Department for Transport published its consultation document on the ‘Proposal to establish a Combined Authority for the area of West Yorkshire’. The Combined Authority is expected to come into existence in April 2014.

Leeds City Council

3.32. LCC has an overarching vision which sets out the business priorities for the Council. The Vision for Leeds 2011-2030 sets out the long term vision and aspirations for the city with the key aim of making Leeds the ‘best city in the UK’.

3.33. To realise this aim the Vision sets out the following key objectives:

- Leeds will be fair, open and welcoming
- Leeds’ economy will be prosperous and sustainable
- All Leeds’ communities will be successful

3.34. The Vision for Leeds 2011-2030 is supported by the City Priority Plan 2011-15 which identifies the outcomes/priorities to be delivered by the Council and its partners over the next four years. This also includes details of those indicators that will be used to measure progress against the Plan. The City Priority Plan covers the following key themes:

- Children and families
- Safer and stronger communities
- Health and wellbeing
- Sustainable economy and culture
- Housing and regeneration

3.35. A number of other corporate planning documents have also been developed to shape business activities and support the Vision for Leeds including:

- **The Best Council Plan 2013-17**: setting out the ambition for Leeds to be the best council and stating how the Council will adopt a new leadership style of civic enterprise to achieve this ambition. It includes a range of actions to improve services, change culture, work differently, become more enterprising and respond to financial environment

- **People Plan 2013-17**: setting out the Council’s priorities for its people across five themes – flexible, healthy, enabled engaged and performing – with the aim of enabling the council to achieve its ambition through its people

- **Financial strategy 2013-17**: setting out the annual financial plan, approved budget and revenue spend for the year
Socio-Economic Context

3.36. This section provides a summary of the socio-economic context for the NGT proposals (further detail is provided in standalone reports on the socio-economic characteristics of Leeds included in the Socio-Economic Appendix to the TWAO Application Environmental Statement (Core Document A-08e-4) and Strategic Fit Report (Core Document C-1-15). The data presented provides a picture of the wider context within which the NGT proposals are set.

Population

3.37. The City of Leeds population is just over three-quarters of a million people. As shown in Figure 3.2, in the last decade the population has grown, with a 4.9% increase observed between 2001 and 2011.

3.38. Using the ONS Sub-National Population Projections, it is projected that the population in Leeds will grow by a further 11.8% larger in the decade to 2021. This is higher than the projections for either England (8.6%) or Yorkshire and the Humber (7.0%) over the same period. By 2021, population in Leeds is forecast to reach approximately 840,000 people.

FIGURE 3.2 HISTORIC AND FUTURE GROWTH

Source: ONS Mid-Year Population Estimates, 2013

3.39. Table 3.1 shows that by area and population, the City of Leeds is the largest district in West Yorkshire. However, due to approximately 12% growth in the

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9 Strategic Fit Report, Steer Davies Gleave, 2014
10 Leeds Population Update, Leeds City Council, October 2012
Bradford District population since the 2001 Census, the population density in Bradford is now the highest in West Yorkshire with Leeds population density slightly below this level. Population density is mapped for West Yorkshire in Figure 3.3. The most densely populated parts of Leeds include areas towards the north and east of the city centre.

### TABLE 3.1 POPULATION DENSITY

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<th>Name</th>
<th>Total pop 2011</th>
<th>Square km</th>
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<td>2,029</td>
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<tr>
<td>Leeds District</td>
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<td>Calderdale District</td>
<td>203,826</td>
<td>364</td>
<td>560</td>
</tr>
</tbody>
</table>

Source: 2011 Census

### FIGURE 3.3 POPULATION DENSITY

Source: ONS 2010

3.40. The Core Strategy indicates that the city will need 74,000 new homes in the period 2012-2028 (Core Document D-1-1)\(^{11}\). The site allocations for nearly

\(^{11}\) Leeds City Council Core Strategy – Publication Draft, February 2012
half of these have already been agreed with the remaining 34,067 being subject to consultation with the public\textsuperscript{12}. As well as a growing population, factors such as household size and life expectancy influence the overall demand for additional housing stock. This includes land allocations along the NGT route which are shown later in Figure 3.15.

**Employment**

3.41. Home to almost 460,000 jobs and 395,000 employees\textsuperscript{13}, Leeds is the largest centre of employment within West Yorkshire and the Leeds City Region. Employment has increased significantly over the last three decades with the largest growth being seen in financial and business services. These sectors account for almost a third of all jobs in Leeds.

3.42. Almost 75% of all jobs (approximately 335,000) are located within the Leeds urban area. Key employment areas include the city centre and University precinct, which together account for just under half of all employment within the A6120 Outer Ring Road. Other important employment locations include St James’s Hospital, district centres like Headingley and sites around the Outer Ring Road.

3.43. Figure 3.4 shows the locations of the largest employers in Leeds, each accounting for more than 2,000 jobs.

\textsuperscript{12} [www.westyorkshireobservatory.org](http://www.westyorkshireobservatory.org), Population update March 2012

\textsuperscript{13} Leeds Monthly Economic Briefing, Leeds City Council, November/December 2013
3.44. Employment in Leeds is forecast to continue to grow at a faster rate than across West Yorkshire and the UK as a whole. This is shown in Table 3.2.

<table>
<thead>
<tr>
<th>Area</th>
<th>Total employment – number of jobs (000)</th>
<th>2013</th>
<th>2023</th>
<th>% change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leeds</td>
<td></td>
<td>462</td>
<td>507</td>
<td>9.7%</td>
</tr>
<tr>
<td>Leeds City Region</td>
<td></td>
<td>1,474</td>
<td>1,578</td>
<td>7.1%</td>
</tr>
<tr>
<td>Yorkshire and Humber</td>
<td></td>
<td>2,560</td>
<td>2,697</td>
<td>5.4%</td>
</tr>
<tr>
<td>UK</td>
<td></td>
<td>31,099</td>
<td>33,393</td>
<td>7.4%</td>
</tr>
</tbody>
</table>

Source: LCC, Leeds Economy briefing note, Issue 55, September 2013

3.45. The success of the Leeds economy means that there is net inward commuting with a total daily flow of commuters into Leeds from neighbouring districts of around 50,000 more than the flow out of Leeds\(^{14}\).

Economic Contribution

3.46. The contribution of an area to the economy is measured in terms of Gross Value Added (GVA), which is the sum of the value of all the goods and

\(^{14}\) Commuter Annual Population Survey, ONS, 2011
services produced. GVA data shows that the City of Leeds makes a greater contribution to the West Yorkshire economy than its population would suggest (Leeds accounting for 44% of West Yorkshire’s output in 2011 compared to only 34% of its population\textsuperscript{15}).

3.47. The City of Leeds has enjoyed economic growth over much of the last two decades, however, as a result of the recession, unemployment is a widespread issue for the city. The most recent Census information demonstrates Leeds has an unemployment rate of 6% which is higher than the national level\textsuperscript{16}. The Census definition is that the unemployed are people without a job and available to start work in the two weeks following the Census or had looked for work in the four weeks prior to the Census or were waiting to begin a job already obtained. Persons unemployed are expressed as a proportion of the economically active population.

3.48. The Census shows that certain Leeds wards have levels of unemployment which are higher than the English average. These include: Burmantofts & Richmond Hill, City and Hunslet, Gipton and Harehills, Killingbeck and Seacroft and Farnley and Wortley as shown in Figure 3.5.

FIGURE 3.5 UNEMPLOYMENT IN LEEDS

\textsuperscript{15} Table 3.5: GVA (constrained to headline NUTS2) at current basic prices, ONS
\textsuperscript{16} Census 2011
3.49. The number of people claiming Jobs Seeker Allowance (JSA) is also relatively high in the city with 5.1% of working aged population receiving JSA compared to 4.6% nationally in November/December 2013\textsuperscript{17}.

Deprivation

3.50. Deprivation is most commonly measured by the Index of Multiple Deprivation (IMD). The IMD combines a number of indicators, chosen to cover a range of economic, social and housing issues, into a single score for each output area in England. This allows each area to be ranked relative to one another according to their level of deprivation. In terms of district level IMD, Leeds ranks 97\textsuperscript{th} out of all 326 districts\textsuperscript{18}.

3.51. Deprivation across the district is not uniform and a detailed review of the scores of each Lower Super Output Area (LSOA) reveals that there are many parts of the district which are very deprived whilst others are relatively affluent. A number of areas are within the top 5% most deprived in the country and these are predominantly located to the south and east of the city centre as shown in Figure 3.6.

FIGURE 3.6 DEPRIVATION ACROSS LEEDS

Source: IMD 2010

\textsuperscript{17} Leeds Monthly Economic Briefing, Leeds City Council, November/December 2013
\textsuperscript{18} The English Indices of Deprivation 2010: Local Authority District Summaries, Department for Communities and Local Governments, 2011
Car Ownership

3.52. A greater proportion of Leeds residents (32%) do not own a car or van compared to the West Yorkshire and England average (29% and 26% respectively). Certain wards have a much lower car ownership than the district average, and so are more reliant on public transport. These wards include a number through which the proposed scheme will run, as set out in Table 3.3.

TABLE 3.3 CAR OWNERSHIP

<table>
<thead>
<tr>
<th>Ward/Area Name</th>
<th>% of households with</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No car or van</td>
</tr>
<tr>
<td>Hyde Park and Woodhouse</td>
<td>62%</td>
</tr>
<tr>
<td>Burmantofts and Richmond Hill</td>
<td>59%</td>
</tr>
<tr>
<td>City and Hunslet</td>
<td>59%</td>
</tr>
<tr>
<td>Gipton and Harehills</td>
<td>56%</td>
</tr>
<tr>
<td>City of Leeds district average</td>
<td>32%</td>
</tr>
<tr>
<td>West Yorkshire average</td>
<td>29%</td>
</tr>
<tr>
<td>England average</td>
<td>26%</td>
</tr>
</tbody>
</table>

Current and Future Transport Problems

3.53. This sub-section provides a summary of the transport problems and issues in Leeds. More detail can be found in the Strategic Fit Report (Core Document C-1-15)\textsuperscript{19}.

3.54. Leeds' transport geography is based on a number of radial routes into the city (Figure 3.7), with limited formal orbital routes.

\textsuperscript{19} Strategic Fit Report, Steer Davies Gleave, 2014
3.55. In the AM peak period (07:00 to 10:00) around 29% of commuting trips to Leeds city centre are made from within the Outer Ring Road and approximately 71% are from further afield. Car accounts for 45% of commuting trips during this period. The rest are made by bus (30%) and rail (25%)

3.56. Bus is the most important mode for commuting trips that start within the Outer Ring Road. It has a 59% mode share of these trips. This differs for trips that start outside the Outer Ring Road, where car is the largest mode with a 47% share. Data showing origin and mode of journeys to Leeds is shown in Table 3.4. This emphasises the requirement for Park & Ride as part of the NGT Project as a means to reduce the reliance on car to travel into the city centre from outside the Outer Ring Road.

---

20 Transport for Leeds Project 2008/9, Leeds City Council
### TABLE 3.4 ORIGIN AND MODE OF JOURNEYS IN AM PERIOD

<table>
<thead>
<tr>
<th>Origin of journey</th>
<th>Inside ORR</th>
<th>Outside ORR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total trips</td>
<td>17,232</td>
<td>41,476</td>
</tr>
<tr>
<td>Car mode share (%)</td>
<td>40%</td>
<td>47%</td>
</tr>
<tr>
<td>Bus mode share (%)</td>
<td>59%</td>
<td>18%</td>
</tr>
<tr>
<td>Rail mode share (%)</td>
<td>1%</td>
<td>35%</td>
</tr>
</tbody>
</table>

*Source: Leeds City Council analysis from 2008/9 Transport for Leeds Project*

#### Road Traffic

3.57. Congestion is a significant transport problem in Leeds. It occurs on the main roads to, from and around Leeds city centre during peak hours when the network operates at, or close to capacity. Queuing traffic which is a result of congestion on the network is closely related to concentrated levels of emissions from transport. This can result in adverse impacts to local air quality.

3.58. Congestion has been measured by comparing travel times with free-flow daytime travel times which have been derived from the minimum observed times for each segment between 07:00 and 19:00. Congestion is illustrated in Figure 3.8. The radial routes A61(N), A65, A660, A647, M621(E) and A62 all show levels of congestion delay where peak journey times are increased by between 80% and 100% because of congestion. The orbital routes of A6110/A647 and A6120 anticlockwise also show high levels of congestion delay.

3.59. Congestion is also prevalent at a number of junctions around the city which, in many cases, lie upon the most congested routes into the city centre shown in Figure 3.8 and Figure 3.9. These are considered to be the 50 worst congested junctions in West Yorkshire.
FIGURE 3.8 CONGESTED ROUTES IN LEEDS DISTRICT

Source: Leeds City Council

FIGURE 3.9 CONGESTED JUNCTIONS IN LEEDS

Source: Leeds City Council
3.60. Table 3.5 shows the most congested routed in Leeds in the 2011 to 2012 period. The worst affected routes are the A61 (N) and the A660. These routes experience high levels of congestion in both the morning and evening peak hours. Both show that congestion adds more than 100% to journey times in the morning and evening peak periods. It should be noted that due to road works on the A65, the results on this route may be unrepresentative.

### TABLE 3.5 ROUTES WHERE CONGESTION ADDS 80%+ TO JOURNEY TIMES

<table>
<thead>
<tr>
<th>Route</th>
<th>Level of Congestion Delay Inside ORR</th>
<th>Outside ORR</th>
</tr>
</thead>
<tbody>
<tr>
<td>A61 (N)</td>
<td>Over 100%</td>
<td>Over 100%</td>
</tr>
<tr>
<td>M621 (E)</td>
<td>Over 80%</td>
<td>-</td>
</tr>
<tr>
<td>A62</td>
<td>Over 80%</td>
<td>-</td>
</tr>
<tr>
<td>A647</td>
<td>Over 80%</td>
<td>-</td>
</tr>
<tr>
<td>A65 (south of Rawdon to IRR)</td>
<td>Over 100%</td>
<td>Almost 80%</td>
</tr>
<tr>
<td>A660</td>
<td>Over 100%</td>
<td>Over 100%</td>
</tr>
</tbody>
</table>

*Source: Leeds City Council*

3.61. Traffic data shows almost no marked growth in peak hour traffic (08:00 – 09:00) since 1990. It is considered that network capacity provides a constraint to future peak growth.

3.62. Growth has, however, been accommodated by peak spreading. In the AM peak period, there was a period of growth of inbound traffic between 1990 and 2006 but between 2006 and 2011 there has been a general decline in peak period traffic entering the city centre, as shown in Figure 3.10. The period of this decline overlaps the economic downturn as well as a period of high fuel prices. The most recent 2012 data indicates the traffic volumes are increasing.

3.63. Overall, two-way AM peak period volumes have shown an 11% increase between 1990 and 2012. This pattern of change across a similar period is broadly consistent with national trends, shown in Figure 3.11.
Outbound traffic flows in the morning peak period increased by 14.3% between 1990 and 2012 with a similar pattern of decrease over the 2006-2011 period of the economic downturn and high fuel prices seen in the AM inbound flows. This is a likely consequence of increased cross-city travel, greater travel to jobs located on the periphery of the city and increased city centre living. Two-way inter-peak (10:00 – 16:00) traffic growth of 8% has also occurred over the same period\(^{21}\).

FIGURE 3.11 AVERAGE ANNUAL DAILY FLOW FOR ALL ROADS IN GREAT BRITAIN

\(^{21}\) Leeds City Council Monitoring Data, 2013

\(^{22}\) Annual average daily flow (AADF) is the number of vehicles estimated to pass a given point on the road in a 24 hour period on an average day in the year
3.65. Recent updated information from the National Transport Model (NTM) forecasts growth in traffic on the non-strategic road network, comparable to the proposed scheme corridors, of 41.5% between 2010 and 2040 in the central forecast scenario. This is a result of improved vehicle efficiencies lowering driving costs and hence increasing demand. The central forecast scenario also indicates that over the same period, increases in traffic and congestion will lead to a reduction in vehicle speeds of 9%23.

The Cost of Travel

3.66. Between 2009 and 2012 and in line with national trends, the cost of public transport in West Yorkshire has increased substantially more than the cost of unleaded fuel. Across the same period, Metro monitoring data shows that in West Yorkshire all motoring costs stayed broadly constant in real terms with the cost of bus and rail travel continuing to exceed that of motoring and with bus fares increasing faster than RPI.

Car Parking

3.67. The parking hierarchy within the Leeds Parking Policy Supplementary Planning Document24, highlights that provision of short stay shopper and visitor parking is considered more important that commuter parking. This is creates a constraint on the future availability of long-stay parking in central areas of Leeds.

3.68. There are just over 5,500 parking spaces in the Leeds city centre ‘core’ area (broadly the area bounded by the A58(M) to the north and the One Way Loop to the south), operated by Leeds City Council25. Over 16,000 spaces are outside of Leeds City Council control with 3,200 long stay spaces permitted as temporary car parks through the City Centre Commuter Car Parking Policy (CCCPP)26. Available spaces are shown in Table 3.6.

3.69. Private car parking accounts for approximately three quarters of the total car parking in the city centre core area. Whilst LCC controls on-street parking, this only makes up a small proportion of the parking supply. Of the off-street car parks available to the public, LCC has control of less than one fifth of the spaces.

3.70. Excluding 142 Disabled and other specialised parking spaces27, LCC controls 26% of all car park spaces within the city centre core area. The proportion of permanent public off street parking in the core of the city centre (Inner Ring Road and river as boundary) controlled by LCC has been steadily

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23 Road Transport Forecasts, DfT, 2013
25 Annual Parking Report 2011/12, Leeds City Council
26 City Centre Commuter Car Parking Policy, Leeds City Council, July 2011
27 City Centre Disabled Bay Locations, Leeds City Council, May 2013
decreasing since 2007\textsuperscript{28}. LCC’s ability to influence patterns of travel demand directly through parking supply is therefore limited.

### TABLE 3.6 LEEDS CITY CENTRE CORE AREA CAR PARKING SUPPLY TO 2011/12

<table>
<thead>
<tr>
<th>Type of Parking</th>
<th>Within LCC Control</th>
<th>Outside LCC Control</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>On Street</td>
<td>2,407</td>
<td>0</td>
<td>2,407</td>
</tr>
<tr>
<td>Off Street</td>
<td>3,285</td>
<td>13,132</td>
<td>16,417</td>
</tr>
<tr>
<td>Temporary Parking</td>
<td>0</td>
<td>3,200</td>
<td>3,200</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>5,692</strong></td>
<td><strong>16,332</strong></td>
<td><strong>22,024</strong></td>
</tr>
</tbody>
</table>

*Source: LCC, 2013*

3.71. Planned developments in the city centre will lead to a reduction in parking as sites currently used for parking are developed. Depending on the new land uses and the scale of the development, this may result in an overall reduction in commuter parking. The 3,200 temporary spaces in the CCCCPP may also be removed in the future as they only have permission for 5 years of operation from the grant of planning permission. This will also affect the spaces available for commuter parking.

3.72. Over the longer term, a reduction in parking capacity is expected where car parks are replaced by development. It is expected that this will equate to the removal of 1,700 spaces over and above the 3,200 temporary spaces within the CCCCPP\textsuperscript{29}.

3.73. The cost and availability of parking was highlighted as an issue in the 2008 NGT public consultation exercise in Leeds. Approximately 20% of the sample felt that parking cost and availability was a problem, which increased to 45% and 33% respectively amongst those that usually travel to Leeds by car. This reinforces the position that the number of spare spaces in Leeds for people to park is limited.

### Bus Travel

3.74. Metro’s continuous survey programme shows that the levels of bus use in Leeds remains similar year on year. Metro data indicates that in the context of West Yorkshire, Leeds has the majority share of bus patronage (between 41% and 44% each month) which is consistent with the size of the district in West Yorkshire, the concentration of employment in the city centre, the socio-economic characteristic of the population and the population density. These factors all contribute to what is a strong bus market in Leeds.

3.75. LCC monitoring of cordon counts suggests that aggregate bus capacity (number of seats) is in excess of aggregate bus loadings. While this implies

\textsuperscript{28} City Centre Commuter Car Parking Policy, Leeds City Council, July 2011

\textsuperscript{29} City Centre Commuter Car Parking Policy, Leeds City Council, July 2011
that there is spare capacity on the bus network, the overall picture is not so straightforward, as many bus services in the heart of the peak on key radial routes experience significant on-board crowding. This results in passengers having to stand in cramped, narrow and busy buses. Loadings are not even, with some vehicles very busy and others with spare capacity.

3.76. This is a function of the road congestion and relatively high frequency bus service which leads to buses bunching together and arriving at the same time. This bunching is due to traffic delays, which lead to increased wait time at bus stops, more people boarding and hence longer dwell times. This further delays buses and following vehicles tend to pick up fewer passengers and therefore catch the preceding service.

3.77. A further consideration is that the cordon counts are measured over a two hour period, which means that peaks in crowding during the busiest hour are not fully represented.

3.78. Bus punctuality has improved on account of both the ‘YourNextBus’ Real Time Information system (which has led to increased operator focus on scheduling and schedule adherence) and Performance Improvement Partnerships (where operators, LCC and Metro have worked together to improve the punctuality of buses). These initiatives have resulted in further provision of bus priority and increased Traffic Light Priority measures.

3.79. In terms of bus punctuality for West Yorkshire, the most recent information indicates that 88.6% of buses run ‘on time’ (between 1 minute early and 5 minutes late). Whilst this is better than many areas, it falls short of the Traffic Commissioner's target for bus punctuality of 95%.

3.80. An analysis of bus journey punctuality in 2009 in the morning period on the proposed scheme routes is presented in Figure 3.12 which the Punctuality Index shows the deviation from scheduled bus journey times. The analysis shows that bus punctuality was a serious problem in 2009 on both the north and south sections of the NGT corridor.

3.81. A review of contemporary (2012) Automatic Vehicle Location (AVL) bus travel time data for the north of the city along the Otley Road corridor between West Park and the Merrion Centre reveals that 25% of services across a 7am-7pm typical day vary by more than five minutes from the mean travel time. The travel times are also more varied (less punctual) in the AM peak period. The more recent data confirms that unpunctual bus services remain a problem.

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30 MetroFacts, 2009-10
FIGURE 3.12 PUNCTUALITY INDEX FOR BUSES ON THE SCHEME CORRIDORS

Source: Automatic Vehicle Location (AVL) Data, Metro, 2009
3.82. Bus punctuality and reliability were highlighted as key issues during the 2008 NGT public consultation, with the second most commonly stated transport problem (after traffic congestion) being late (punctuality) or cancelled buses (reliability). Over one third of those who provided feedback said that the cost of bus fares was a problem and over one quarter felt that long bus journey times and crowding on buses were key problems.

3.83. The consultation also highlighted a desire for bus vehicle improvements with 85% of respondents saying that vehicles could be improved. The most common requests were for on-board information, cleaner vehicles and more environmentally friendly vehicles.

Rail Travel

3.84. A map of the rail routes into Leeds is presented as Figure 3.13. Rail serves a limited number of the radial corridors and there are few stations within the Outer Ring Road. Rail serves longer distance movements, which it is best suited to doing, from outlying areas such as Harrogate and York.

FIGURE 3.13 LEEDS RAIL NETWORK

Source: Steer Davies Gleave, 2013

3.85. Recent years have seen significant growth in rail trips using Leeds City Station. LCC data shows that 16,800 people arrived at Leeds City Station in a typical morning peak period in 2013, compared to 12,400 in 2004. The compound annual growth rate in passenger arrivals at the station between
2004 and 2013 is 3.5% p.a. and is illustrated in Figure 3.14. During the recession period, passenger arrivals at Leeds continued to increase up to 2009 in line with previous trends and then declined to 2012, but are now rising again.

3.86. The Northern Route Utilisation Strategy produced by Network Rail forecasts rail demand into Leeds to grow by up to 42% in the period 2011 to 2026\textsuperscript{31}.

**FIGURE 3.14 AM PEAK (07:30-09:30) PASSENGER ARRIVALS FOR LEEDS STATION**

Source: Leeds City Council Inbound Cordon Flows, 2013

**Conclusion**

3.87. Leeds is undergoing substantial land-use and transport change. However, the likely impact of not changing given the economic and socio-demographic growth in the city seen in recent years is that there will continue to be on-going problems caused by the demand for use of the transport network exceeding its capacity, particularly at peak times. Unless addressed this will make Leeds a less attractive destination for developers, employers and employees and ultimately, this will constrain the city’s future growth.

\textsuperscript{31} Rail Plan 7, West Yorkshire Local Transport Plan, April 2011
Future Development and Transport Infrastructure

Local Development Framework and Core Strategy

3.88. As already noted, the Leeds’ LDF is a collection of spatial strategy documents produced by Leeds City Council which establish the scale and location of local development. At the heart of the LDF is the Core Strategy, which is the key and compulsory development document guiding development and land use in the local planning authority area. The Core Strategy is the document from which all local development documents are established. The Core Strategy provides strategic policies until 2028.

Future Development

3.89. Over the past ten years, there has been significant regeneration and development within both LCC, the rest of Leeds and at other key locations within West Yorkshire. As part of the emerging LDF, there are a number of sites across the Leeds district which have been identified for major change. These are identified within Area Action Plans (AAPs), Planning Statements and Regeneration Priority Areas (RPAs):

- **Aire Valley Leeds AAP:** The Aire Valley will become an innovative new living and working community within a distinctive green environment. The intention is that it will be a national model for sustainable development, accommodating between 20,000 and 40,000 new homes and between 20,000 and 40,000 new jobs in addition to the existing 15,000 jobs (Core Document A-08a)\(^{32}\)

- **South Bank Planning Statement:** The South Bank Planning Statement was developed by Leeds City Council and adopted in October 2011 (Core Document D-6-6). It provides clarity for development aspirations for ‘common infrastructure’ (i.e. park and public realm elements). This is seen as a means to reconnect South Bank with the city centre and surrounding neighbourhoods

- **Regeneration Priority Areas:** A focus on areas where there are a concentration of neighbourhoods performing below city and national averages across a range of indicators to target issues that collectively cause under-performance amongst communities. Four RPAs are considered in Leeds; Inner South, East Leeds, Leeds Bradford Corridor (including West Leeds Gateway) and South Leeds

3.90. Land allocated for development within Leeds is identified within Figure 3.15. A number of residential and employment sites are planned along the length...

\(^{32}\) Leeds New Generation Transport Environmental Statement, Socio-Economic Technical Appendix K, Mott MacDonald, 2013
of the NGT route which together will increase transport demand in the NGT corridors.

3.91. The titled Strategic Fit Report (Core Document C-1-15)\textsuperscript{33} sets out how these major development sites are relevant in identifying the requirement for rapid transit in the City of Leeds.

**FIGURE 3.15 LAND ALLOCATED FOR DEVELOPMENT IN LEEDS**

![Land Allocation Map](source.png)

*Source: LCC, 2013*

**Proposed Transport Improvements**

3.92. A number of transport improvements are planned for Leeds in addition to the NGT Project, shown in Figure 3.16. Together these form a complementary package that will support and facilitate the city’s economic growth:

- **Leeds Station Southern Entrance (LSSE):** This will be an iconic new entrance opening in March 2015 which will benefit the 20% of passengers accessing origins/destinations to south of the city centre\textsuperscript{34}. Full approval for this scheme was granted on 31\textsuperscript{st} October 2013. LSSE will enhance rail access to an area which has undergone significant redevelopment in the last decade.

\textsuperscript{33} Strategic Fit Report, Steer Davies Gleave, 2014

\textsuperscript{34} http://www.wymetro.com/news/projects/projectdetails/leeds-southern-entrance/
Leeds NGT – Business Case Review

- **New Rail Stations:** Served by rail services between Leeds and Bradford. Forster Square, new stations are proposed at Kirkstall Forge and Apperley Bridge. The Kirkstall Forge station will support a large new housing development as well as provide rail access to Leeds city centre from the North West. The Apperley Bridge Station will provide rail connectivity to the centres of Leeds and Bradford for those on the outskirts of Bradford.

- **Rail Electrification:** Electrification is committed for the North TransPennine line between Manchester, Huddersfield, Dewsbury, Leeds and on to York and Selby. The replacement of diesel trains with electric traction will facilitate capacity improvements and improved journey times. There are also proposals for the electrification and upgrade of the Caldervale, Leeds-Harrogate-York and Leeds-Sheffield lines. Each would contribute to improved journey times for users and will help to promote modal shift to rail, easing congestion on some of the most crowded routes and encouraging the location of new employment to the city.

- **Cycle Network:** A network of cycle routes is planned to be delivered around the district. Many will contribute to improved connectivity for sustainable modes across the district whilst those within the City Centre Transport Strategy will enable links between the wider district and the city centre area. The recently awarded Cycle City Ambition Grant (CCAG) provides a capital investment for cycling in Leeds to March 2015 and will support enhanced connectivity from East Leeds to East Bradford, improved city centre cycle routes and a cross-city route of largely segregated provision.

- **Highway Improvements:** A Managed Motorway scheme has been introduced on the M62. Improvements are committed for the M621 and M1 by the Highways Agency to deliver capacity improvements and improved network management. A programme to integrate traffic management systems and traffic signal centres across West Yorkshire is also proposed. Improvements are also planned in the city centre including active traffic management on the Inner Ring Road and improvements to the Armley Gyratory and M621 corridor. A scheme to encourage economic development through the introduction of an orbital route from M1 Junction 46 to the west of A58 has also been proposed as well as improvements to the A6110 from M621 Junction 1 to the A647 Stanningley Bypass. Together these options will contribute to a more efficient movement of vehicles to new housing and employment and will support the reduction of congestion on problematic routes into the city.
Park & Ride: Proposals for a number of Park & Ride sites are being developed with the aim to reduce the number of vehicles travelling to the city centre on some of the most congested routes. Supported by fast, frequent, punctual and high quality links to the City Centre Park & Ride has the potential to support city centre transport and parking strategies when new attractors such as the Victoria Gate retail development open within the city centre. The following Park & Ride sites are being considered:

- A643 Elland Road (underway)
- A61 Alwoodley
- A64 Grimes Dyke
- Junction 45 of the M1
- East Leeds Parkway at Micklefield Station
- New Pudsey Rail Station Hub (underway)

Improved Bus Infrastructure: A combination of heavily trafficked routes and congested junctions in the city contribute to issues of poor punctuality and reliability for buses. New bus priority measures, Quality Bus Corridors (QBCs) and bus lanes in the worst affected areas of the city will improve access for local residents. Several schemes are proposed in the WYLTP primarily to the south and west of the city centre which are described below. Details on their status have been shown in brackets:

- A653 Leeds to Dewsbury Corridor with the creation of bus lanes and bus priority schemes (Tommy Wass scheme complete. A feasibility study is being undertaken to look at an outbound scheme near The Broadway on Dewsbury Road.)
- Additional bus facilities as part of the Leeds City Centre Package
- A647 Armley Road bus priority and signals (Outline scheme developed)
- Canal Street bus priority measures (completed May 2012)
- Roundhay Road Integrated Transport Scheme (Completed Dec 2013)

NGT Extended Network: Over the longer term a number of strategic extensions to the ‘core; NGT north and south line network are planned, which will offer further improvements to connectivity across the city

High Speed 2 (HS2): By 2033, HS2 will connect Leeds to London 50 minutes faster than is currently possible. The proposed HS2 station will be
located to the south of the city centre and is expected to support between 13,200 and 19,700 new jobs.\textsuperscript{35}

- **Non-Geographic Investments**: A range of investments are planned that will benefit transport users across the district. Smart-card ticketing will benefit regular and occasional users of public transport in terms of convenience and value to passengers. Metro’s SmartCard and Information Programme (SCIP) commenced in early 2012 and has now rolled out, across West Yorkshire through the MCard brand, over 500,000 smartcards. Further smartcards products are still in development with roll out of additional products planned over the next 18 months. ‘Smart enabling’ rail gates are planned to be installed at Leeds and Bradford rail stations for integration of the smartcard system into existing ticketing systems.

**FIGURE 3.16 DISTRICT-WIDE TRANSPORT DEVELOPMENTS**

![District-wide transport developments map](image)

Source: Steer Davies Gleave, 2013

**Inter-dependencies**

**Internal Factors**

3.93. Internal factors will contribute to the successful delivery of the scheme at the local scale. Most prominently, this is likely to be Metro and LCC’s

\textsuperscript{35} http://www.hs2.org.uk/phase-two/facts-figures#Costs benefits
management of the project going forward. Details of the measures and strategies employed for the project are documented within the Management Case.

External Factors

3.94. There are two external dependencies for the successful delivery of the project. These are:

- **The success of the TWAO:** The TWAO is required for the purpose of authorising the construction and operation of a trolley vehicle system in the city of Leeds. Without a TWAO the NGT Project cannot be delivered. Ultimately the level of acceptance for the scheme and the alternatives by the public and stakeholders will influence the degree to which the TWAO is successful. A stakeholder strategy has been used to engage and consult with local stakeholders throughout the lead up to the TWAO submission. This is available in Section 2: Stakeholders

- **Funding:** The DfT funding for the NGT Project is time constrained and the Department’s funding contribution is a fixed maximum contribution. If there are issues with deliverability then this may affect the DfT funding stream

Opportunities

3.95. A summary of problems and opportunities has been compiled following the review of the local demographic characteristics, transport provision and future plans. This is presented as Table 3.7.

Scheme Objectives

3.96. Scheme Objectives were developed following a policy review of local, regional and national objectives. This included the WYLTP, which set the policy context for the delivery of sustainable transport. A more detailed review is provided in the Strategic Fit Report (Core Document C-1-15)\(^{36}\).

3.97. The NGT Scheme Objectives have informed the selection of routes and vehicle technology, the approach to system specification and procurement as well as details of the design. Table 3.8 presents the Scheme Objectives and guidance on how quantitative and qualitative measures have been used to assess the degree to which the NGT proposals meet them.

3.98. The Scheme Objectives also fit with LCC’s corporate objectives such as those contained within the Leeds Core Strategy, part of the LDF.

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\(^{36}\) Strategic Fit Report, Steer Davies Gleave, 2014
<table>
<thead>
<tr>
<th>Item</th>
<th>Problems</th>
<th>Opportunities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public Transport Network</td>
<td>On-bus crowding and bus ‘bunching’ caused by traffic congestion</td>
<td>Provision of predominately segregated public transport and traffic management/UTMC measures to provide more reliable and punctual journeys</td>
</tr>
<tr>
<td></td>
<td>Unreliable bus journey times caused by congestion</td>
<td></td>
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<tr>
<td></td>
<td>Desire for better quality public transport vehicles, including those that are considered to be more environmentally friendly</td>
<td>Provision of high quality zero emission vehicles along the route</td>
</tr>
<tr>
<td></td>
<td>Increasing public transport demand from numerous developments</td>
<td>Provision of public transport services to areas which generate the highest demand</td>
</tr>
<tr>
<td>Highway Network</td>
<td>Highway congestion has economic and environmental impacts. Congestion is forecast to increase</td>
<td>Improved public transport will provide alternatives to car use which would result in fewer car trips and associated greenhouse gas emissions</td>
</tr>
<tr>
<td></td>
<td>Increased peak spreading due to a lack of highway capacity at peak times</td>
<td>A new high quality public transport system with Park &amp; Ride will provide an attractive alternative to the car</td>
</tr>
<tr>
<td></td>
<td>71% of commuting trips into Leeds City Centre originate from outside of the Outer Ring Road, 47% of these trips are made by car contributing to congestion levels</td>
<td></td>
</tr>
<tr>
<td>Social Equity</td>
<td>Need for regeneration in south Leeds</td>
<td>Provide public transport services to assist in the regeneration of pockets of deprivation</td>
</tr>
<tr>
<td></td>
<td>High levels of households without a car or van in central, south and east wards</td>
<td>Provision of improved public transport services to link people to employment opportunities</td>
</tr>
<tr>
<td></td>
<td>Costs of bus travel rising substantially more than car travel</td>
<td>Introduce a public transport system, where the public sector Promoters can influence fare levels</td>
</tr>
<tr>
<td>Economy</td>
<td>Limited opportunity to increase capacity of road and rail commuting into Leeds to support economic and employment growth</td>
<td>A new, high quality bus-based system supplemented with Park &amp; Ride will offer an attractive alternative to car and deliver a net increase in commuting capacity into the city</td>
</tr>
<tr>
<td></td>
<td>High levels of unemployment in central, south and east wards</td>
<td>Provision of improved public transport services to link people to employment opportunities</td>
</tr>
</tbody>
</table>
**Measures for Success**

3.99. Based on the Scheme Objectives, which are defined in terms of outcomes, a broad specification of the outputs required from public transport intervention on the northern and southern NGT corridors was developed and is set out below. This output specification has been used to ensure that outputs from all technology options considered are consistent and comparable, for example specified to deliver a similar increase in passenger capacity per hour through an appropriate combination of vehicle capacity and frequency.

3.100. Investment in public transport on the A660 and A61/M621 radial corridors into Leeds city centre must:

- Enhance the public transport service offer with improved: peak and interpeak travel times; consistency of frequency (punctuality); reliability; journey quality; and perceived passenger value for money
  
  *In response to public consultation findings and to achieve the fourth Scheme Objective, which is represented as conventional public sector ‘Value for Money’*

- Increase passenger capacity along the corridors where worthwhile with punctual, more comfortable public transport journeys
  
  *To achieve the first and second Scheme Objectives in terms of maximising the potential of the local economy and supporting the sustainable growth of Leeds city centre*

- Improve public transport links between communities from Holt Park to Belle Isle, and to the city centre, with jobs and services
  
  *To achieve the third and seventh Scheme Objectives in terms of supporting economic growth and contributing to enhanced quality of life*

- Support an increase in the energy efficiency of vehicles and reduction in adverse emissions at point of use
  
  *To achieve the fifth and sixth Scheme Objectives by reducing carbon emissions and minimising the impacts of transport on health and quality of life*

- Provide sufficient capacity and attractive public transport journeys (journey times, punctuality, journey quality) to make Park & Ride facilities at Stourton and Bodington attractive to car users
  
  *To achieve the first and second Scheme Objectives in terms of increasing person capacity into the city centre and responding to the pressures of growth on the transport network*
Constraints

3.101. Six key constraints to delivering the NGT Project have been identified as follows:

- **Affordability**: The promoters must be able to fund the scheme capital costs from its own and third party sources.

- **Deliverability**: The proven level of public and political support for alternatives influences delivery risk. DfT funding is also time constrained and therefore any differences in that delivery programme and risks associated with delivery to that programme must be taken into account.

- **Potential for System Expansion**: No unreasonable barrier to extending the scope of the system in the future, for example aiming to avoid proprietary technology which could limit competitive procurement of vehicles/infrastructure in the future.

- **Commercial Case**: The procurement for the option must be achievable competitively in line with EU regulations. Revenue received must also exceed operating costs and the extent to which the resulting revenue surplus will support scheme funding/expansion is also important.

- **Outcomes Realisation**: In terms of the level of influence which the Promoters would have in delivering the outputs and outcomes of the project which contribute to its value for money.

- **Value for Money**: Irrespective of whether funding is provided by DfT or locally, any scheme needs to provide the best value for money of all reasonable/relevant alternatives.
<table>
<thead>
<tr>
<th>Objective</th>
<th>Detail</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Maximise growth of the Leeds economy by enhancing its competitive position and facilitating future employment and population growth</td>
<td>In quantitative terms this means maximising the Net Present Value of the proposal – as conventional benefits form part of Objective 4, the focus here is on Wider Impacts. It also recognises the population/household growth pressures. In qualitative terms it is about ‘quality of life’ and ‘putting Leeds on the map’</td>
</tr>
<tr>
<td>2. Support and facilitate the sustainable growth of Leeds, recognising the importance of its city centre to the future economy of the Leeds City Region</td>
<td>This is about increasing person capacity into the city centre especially during peak periods, recognising the constraints on road capacity, car parking capacity and without further investment, rail capacity. This captures the spatial dimension of where we want growth to happen</td>
</tr>
<tr>
<td>3. Support and facilitate targeted regeneration initiatives and economic growth in the more deprived areas of Leeds</td>
<td>This is about improving the links between the more deprived areas of Leeds and employment/education opportunities, as well as explicitly supporting the delivery of other policy initiatives. This too has a spatial dimension, but it is more about the beneficiaries of growth</td>
</tr>
<tr>
<td>4. Improve the efficiency of the City’s public transport and road networks.</td>
<td>This is the conventional DfT Value for Money case measured as the quantity of user benefits (journey time, quality, but also reliability, option value etc.) and non-user benefits (impact on congestion). ‘Improve’ should be taken as relative to the Do-Minimum scenario rather than now</td>
</tr>
<tr>
<td>5. Reduce transport’s emissions of CO₂ and other greenhouse gases</td>
<td>This objective captures the global environmental impacts of the project in comparison to the Do-Minimum scenario</td>
</tr>
<tr>
<td>6. Promote quality of life through a safe and healthy built and natural environment</td>
<td>The impacts on the local environment incorporate townscape, local air quality, noise, safety etc. This objective captures making best use of existing assets. Again, the comparison is against the Do-Minimum scenario</td>
</tr>
<tr>
<td>7. Contribute to enhanced quality of life by improving access for all to jobs and services</td>
<td>Key services include but are not limited to hospitals, tertiary education (Universities, Leeds City College) and the railway station (access to national networks). ‘Improving’ should be taken as relative to the Do-Minimum scenario rather than now</td>
</tr>
</tbody>
</table>
4. Stakeholders

Introduction

4.1. The Promoters have undertaken extensive stakeholder engagement and consultation activities throughout the definition and development of the NGT Project. This has helped to inform the specification of the project, and has provided those who have a view on the proposals with an opportunity to provide meaningful input to the process.

4.2. As a result of the feedback that has been received through the consultation process, a number of changes have been made to the NGT Project design at various points in time. These changes are summarised in the Statement of Consultation (Core Document A-01-3)\(^{37}\) which forms part of the TWAO application submitted in September 2013.

Stakeholder Identification and Analysis

4.3. As part of the overall Communication Management Strategy (Core Document A-01-3)\(^{38}\), a wide range of stakeholders were contacted in the early stages of the development of the NGT Project. As the project has progressed the Promoters have continued to build and maintain constructive dialogue with stakeholders and have sought to reach new audiences.

4.4. Consultation and engagement has taken place with the following key categories of stakeholder:

- Politicians (e.g. local elected members and Members of Parliament)
- Affected landowners
- Residents Associations
- Businesses
- Disability groups
- Environmental bodies
- Transport interests (bus operators, cyclists, Network Rail, Highways Agency, taxi operators and emergency services)
- Interest groups (e.g. Civic Trust, community groups and local discussion groups)
- Statutory consultees

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\(^{37}\) Statement of Consultation, Metro and Leeds City Council, 2013

\(^{38}\) Statement of Consultation (Appendix 1), Metro and Leeds City Council, 2013
4.5. In addition a significant amount of public consultation has taken place and this is described in more detail in the Statement of Consultation (Core Document A-01-3)\(^{39}\) and is also summarised in 2.14 to 2.21.

**DfT Engagement**

4.6. Significant and regular engagement has taken place with the DfT throughout the development of the NGT Project. This has included regular dialogue and meetings on key project areas including demand forecasting, economic appraisal and procurement. In addition, DfT officers have undertaken a number of visits to Leeds to view the proposed routes.

4.7. After all transport major schemes were put on hold in summer 2010 following the election of the Coalition Government, the NGT Promoters worked with the DfT on the development and appraisal of a revised funding bid for the NGT Project (submitted in September 2011) and subsequently the updated Programme Entry Business Case (submitted in March 2012). Throughout this process detailed discussions on key project issues took place covering areas such as funding, value for money, demand forecasting methodology and procurement.

4.8. Following the reinstatement of Programme Entry Approval in July 2012, further detailed discussions have taken place with the DfT and such engagement is envisaged to continue as the NGT Project moves to an implementation phase.

**Public and Statutory Bodies**

4.9. A significant amount of consultation has taken place with public and statutory bodies throughout the development of the NGT Project to date.

4.10. In accordance with the Transport and Works (Application and Objections Procedure) (England and Wales) Rules 2006, Metro and LCC have carried out an Environmental Impact Assessment of the NGT Project. This involved consultation with the following environmental bodies:

- LCC as the Local Planning Authority
- Natural England
- Highways Agency
- Environment Agency (EA)
- English Heritage

4.11. The first formal Scoping Opinion was provided by the Secretary of State in August 2009, the second in November 2012 and the final Scoping Opinion in May 2013.

\(^{39}\) Statement of Consultation, Metro and Leeds City Council, 2013
4.12. During the preparation of the Environmental Statement, the Promoters liaised with relevant environmental bodies to address particular aspects of the design and development of the NGT Project.

4.13. When the TWAO application was submitted in September 2013 notices of the submission and copies of the documentation were distributed to statutory consultees.

Public Consultation

4.14. Throughout the life of the NGT project a wide range of consultation and engagement with the general public has taken place. While public engagement has taken place throughout all stages of the project, the main periods of formal public consultation can be summarised as follows:

- 2008: Feasibility stage
- 2009: Development of business case
- 2012/3: Development of Transport and Works Act Order submission

4.15. During 2008 and 2009 when the NGT Project development was in its early stages, two periods of formal public consultation were held to inform the development of the specification of the project in advance of the development and submission of a Major Scheme Business Case. In a formal consultation exercise undertaken in summer 2009, 77% of respondents supported the NGT proposals and 76% supported the use of electrically powered trolleybuses to operate the system.

4.16. Following the reinstatement of Programme Entry Approval in July 2012, further consultation took place to inform the proposals that were put forward in the TWAO application. This was largely focussed on those communities directly along the NGT route and included the distribution of approximately 52,000 leaflets to properties along the proposed route.

4.17. In addition since summer 2012, 26 public drop-in sessions/public meetings have been held and in total these had over 1,100 attendees. As a result of these events and following the distribution of leaflets, around 500 people have submitted feedback on the proposals since summer 2012.

4.18. An overview of the public consultation undertaken on the NGT Project to date is set out in the Statement of Consultation which was submitted as part of the September 2013 TWAO application.

Future Consultation and Stakeholder Management

4.19. The Promoters recognise that whilst a significant amount of consultation activity has been undertaken to date, there will continue to be extensive consultation as the NGT Project moves forward. The Promoters consider there to be great value in maintaining an open and constructive dialogue with
all stakeholders throughout the further development of the project, with the aim of seeking to identify appropriate and cost-effective solutions to specific concerns and ultimately adding value to the project.

4.20. Large scale consultation and communications exercises will generally take place at defined points in the programme; however, engagement with individuals and groups will continue to take place throughout the programme as required.

4.21. An overview of general communications and consultation activities proposed throughout the life of the NGT Project is provided as part of the Communications Management Strategy (Core Document A-01-3)\textsuperscript{40}. The detailed programme of activities for each project stage is developed at the outset of each stage.

\textsuperscript{40} Statement of Consultation (Appendix 1), Metro and Leeds City Council, 2013
5. Assessment of Alternatives

Introduction

5.1. From the outset, the Promoters have considered alternatives alongside development of the trolleybus based option. This has included consideration of technology or mode alternatives to trolleybus, and also design alternatives – such as alternative alignments within the NGT corridors. Both technology and design option selection processes were informed by the Scheme Objectives, presented in Table 5.1 of this Business Case Review, and specific funder appraisal requirements – particularly those of DfT, the majority funder of the scheme.

5.2. This section summarises the recent NGT Alternatives Review Report (Core Document C-1-1)\(^41\) which updates work undertaken over the life of the NGT Project’s development in light of current circumstances and more recently available and developing options. The development process for the trolleybus option which led to the design submitted for TWAO powers is described in the Design Rationale report (Core Document B-11)\(^42\).

The Need for Alternatives

5.3. To obtain the TWAO and to confirm the Government funding approval, among other things the Promoters must demonstrate that they have considered an appropriate and reasonable set of alternatives to the Preferred Option. They must set out the justification for promoting their Preferred Option in comparison to these alternatives. Irrespective of this formal requirement, the Promoters also need to have confidence that the Preferred Option is the best possible option that meets the Scheme Objectives and fits with the identified constraints.

5.4. Two alternatives are considered in more detail in this Business Case Review:

- The **Next Best Alternative** (NBA) is specified to deliver outputs and outcomes which are as comparable as is practicable to the Preferred Option. Its purpose is to confirm that any specific impacts of the Promoters’ choice of technology are justified relative to other ways of delivering the project benefits.

- The **Low Cost Alternative** (LCA) is specified to confirm that the scale of investment in the Preferred Option is justified, in particular that the majority of the benefits of the Preferred Option are not be delivered for the minority of the costs.

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\(^41\) NGT Alternatives Review Report, Steer Davies Gleave, 2014
\(^42\) Design Rationale Report, Mott Macdonald, 2013
**Alternative Identification and Selection**

5.5. A long list of available public transport options was prepared, including current, proven, transit options and a variety of options suggested to the NGT Project Team by third parties. Options considered included: track-based technologies; electric buses (with either internal or external power source); and conventional bus options.

5.6. Three stages were used to identify which options should form the NBA and LCA to the Preferred Option:

- An initial review identified which of the long-listed options was suitable for implementation on the north and south NGT corridors - taking into account both physical opportunities/constraints as well as potential service/capacity requirements.
- The second stage reviewed the performance of the shortlisted alternatives against the Scheme Objectives.
- Finally a review against delivery constraints identified alternatives which could not practicably be delivered and ruled these out.

**Option Identification and Filtering**

5.7. Five technology options were identified from a comprehensive long-list as being suitable for implementation on the NGT corridors:

- **Light Rail Transit (LRT or tram)** - steel wheeled electric vehicles operating on rails, powered by electricity from overhead lines and capable of operating both on street and fully segregated from traffic.

- **Ultra-Light Rail Transit (ULRT)** - a proposed lower cost light rail technology. The proponents of ULRT suggest that, in comparison with LRT, cost savings would result from ULRT requiring a shallower track construction for the lighter weight vehicles. Vehicles would have on-board energy storage rather than being powered from overhead lines.

- **Trolleybus** - rubber-tyred vehicles with motors powered by electricity from overhead lines. It offers a quiet and smooth ride, a high level of energy efficiency and zero emissions at point of use.

- **Catenary-free Electric Bus** - a relatively recent development taking advantage of improvements in on-board energy storage systems. The concept is based on vehicles equipped with batteries, fast charged at termini, and super-capacitors, which can be flash charged (e.g. for 20 seconds) at stops, which together allow reasonable lengths of operation without overhead lines.
- **Conventional Bus** - which could be diesel powered or use a diesel/electric hybrid power train

5.8. A comparable scheme for each of these technologies was set out to meet a generic set of requirements designed to improve public transport provision and capacity into Leeds on the NGT corridors. This specification was based on developing alternatives which made a significant contribution against the Scheme Objectives (Table 3.8). Following assessment against Scheme Objectives and Delivery Constraints (Paragraph 1.101) this ultimately led to the definition of the Preferred Option and Next Best Alternative considered in this Business Case Review. A LCA was also specified based on conventional bus technology.

**Alternatives Assessment against Objectives**

5.9. The second stage of review was a qualitative assessment against the defined Scheme Objectives using a four point scale ranging from neutral to strong beneficial. The specification of alternatives against a common system specification ensures that any differences in performance are fundamental to the technology rather than resulting from the scale (for example) of implementation. In summary:

- The **Light Rail Transit** (LRT) alternative performs well against the Scheme Objectives. However, the extent to which it could deliver its full potential of economic benefits is limited on the relative capacity and space constrained NGT corridors. In addition, to efficiently deliver the required passenger capacity on the corridors LRT would operate at a lower service frequency than the other alternatives, therefore resulting in longer passenger wait times

- The **Ultra-Light Rail Transit** (ULRT) alternative performs reasonably well against the Scheme Objectives. However, vehicles would be propelled by on-board power generation and therefore not be adverse emission free at point of use and the system would make a lesser contribution in terms of the objective to 'Reduce transport's emissions of CO\textsubscript{2} and other greenhouse gases'

- The **trolleybus** and **catenary-free electric bus** alternatives also perform well against the Scheme Objectives. In comparison to the ULRT alternative they are stronger in terms of reduced adverse air quality emissions. Their performance is better than the comparable bus and Low Cost Alternatives across a number of objectives

- The **comparable bus alternative** would be electrically propelled by on-board power for around half of its distance in service and diesel powered for the rest and would therefore make a lesser contribution to the
environmental objectives. It would offer little improvement in general ambience or ride quality from existing bus vehicles and therefore be less attractive than LRT or fully electric bus options as an alternative to private car use

The lower cost bus alternative would have more modest impacts and therefore would make a lower contribution against the majority of the Scheme Objectives. However, an improved bus system could still offer a reasonable performance against the objectives for less capital investment than other options

5.10. The LRT, trolleybus and catenary-free electric bus alternatives offer the overall best performance when considered across the Scheme Objectives. However, the assessment shows that the alternatives considered would all deliver the objectives to a degree.

Alternatives Assessment against Delivery Constraints

5.11. The final stage of the alternatives review was a qualitative assessment against the identified delivery constraints fundamental to successful delivery of a major public transport intervention. A scoring scale similar to the assessment against the Scheme Objectives was used, with the addition of a single ‘adverse’ score representing options which do not meet the requirements of a constraint. Such options were not considered any further in the review. In summary:

- The cost of the Light Rail Transit alternative significantly exceeds the funding available from national and local sources. Therefore this alternative was excluded because it does not meet the Affordability constraint

- An Ultra-Light Rail Transit alternative has not been proven at the scale of NGT and has limited and connected suppliers, restricting the likelihood of being able to procure competitively such a system. Therefore the implementation risk of this alternative cannot be accepted by the Promoters. This alternative was excluded because it does not meet the Deliverability constraint

- A trolleybus alternative meets the deliverability constraints. There are numerous trolleybus services in operation around the world as it is a proven technology

- Catenary free electric bus does not meet the deliverability constraints. Although prototype and trial operations are underway, at present it is unknown whether the commercial production of suitable catenary-free electric bus vehicles will commence within the NGT delivery timeframe
A comparable bus option meets the deliverability constraints, noting that this alternative can only be practicably developed within the powers of a Quality Contract Scheme (QCS) or with a Voluntary Partnership Agreement (VPA). There are considerable deliverability risks associated with the dependence on obtaining QCS powers or assuming that existing bus operators will sign a VPA which sufficiently protects the investment.

A lower cost bus alternative meets the deliverability constraints, although this option would be subject to the same service delivery limitations as the comparable bus alternative.

5.12. The review showed that the promoted trolleybus system offers the overall best performance of all identified alternatives, meeting the Scheme Objectives and delivery constraints. The two alternatives based on conventional bus technology also met the delivery constraints; however they make a smaller contribution to meeting Scheme Objectives than the trolleybus scheme. This is particularly so for the lower cost option. These two alternatives have been adopted as the NBA and LCA respectively and are quantitatively appraised within this Business Case Review.

Alternatives Considered

5.13. The review of alternatives confirmed that trolleybus is a justified choice of technology for Leeds NGT and recommends the adoption of ‘next best’ and ‘low cost’ alternatives based on established bus technology. Key attributes of each of the alternatives appraised in this Business Case Review are presented in the following paragraphs and summarised in Table 5.1.

Preferred Option

5.14. The Preferred Option considered in this Business Case Review and the subject of the Promoters’ application for TWAO powers is a fully wired single-articulated trolleybus system running from Holt Park to Stourton. The system has been specified with a high level of priority over other traffic, including through sections segregated from the general highway carriageway, additional sections of dedicated NGT lanes and priority given at existing and upgraded traffic signal junctions. The system will have permanence which will support redevelopment and regeneration.

5.15. Trolleybuses are rubber-tyred vehicles with motors powered by electricity from overhead wires. They are an energy efficient transport option, quiet in operation and zero-emission at the point of use. In comparison with conventional bus options, trolleybus vehicles are cheaper to run, longer lasting, and require less maintenance; they also offer better operational performance on gradients. They offer the potential for passengers to experience a higher quality journey than bus alternatives.
Next Best Alternative

5.16. The Next Best Alternative follows the same alignment as NGT and would benefit from the same level of priority. It would therefore have the same land and property take and therefore the same associated impacts. The vehicles specified are ‘plug-in hybrid’ technology, similar to existing hybrid bus vehicles but with additional on-board energy storage allowing them to run in zero-emission mode where required. This capability is considered to be fundamental to the case for successfully obtaining powers and permissions to operate the service on environmentally-sensitive sections of the route, for example to the east of the Arndale Centre in Headingley and through Millennium Square. Without these sections this alternative’s route would diverge from the Preferred Option to such an extent that it would be unlikely to retain DfT funding.

5.17. The application of plug-in hybrid technology to bus vehicles is a relatively recent development; however plug-in hybrid buses, including an 18 m articulated version, are expected to be in full commercial production by late 2015. It is considered reasonable to assume that articulated vehicles would be available within a timescale compatible with implementation of the NBA. Being an incremental improvement to existing proven hybrid bus vehicles means that there can be considerably more confidence that such vehicles would be available than any all-electric bus (for example battery based or catenary-free electric bus) vehicle; therefore this technology is a robust assumption for a the most closely comparable option to trolleybus.

Low Cost Alternative

5.18. The Low Cost Alternative is an on-highway improvement on the same north and south corridors as NGT. The specification includes smaller Park & Ride provision at Bodington and Stourton, limited upgraded infrastructure to give priority over other highway vehicles at key locations along the route. The vehicles specified are hybrid buses. The Park & Ride site at Bodington would be served by existing bus routes. A limited-stop Park & Ride service would be introduced between Stourton and the University of Leeds.

5.19. The Low Cost Alternative has been specified to meet the same objectives as the Preferred Option; however, the low cost bus option would be subject to a different affordability constraint, given that DfT funding would not be available. It is anticipated that a low cost bus option could be delivered for less than a £50 million locally sourced. A scheme developed within this budget is considered to be affordable (Core Document C-1-1)43. The level of benefit which could be realised by an option developed within the limited local funding available would be significantly less than the other options.

43 NGT Alternatives Review Report, Steer Davies Gleave, 2014
The table below summarizes the alternative options for the project.

<table>
<thead>
<tr>
<th>TABLE 5.1 SUMMARY OF ALTERNATIVE OPTIONS</th>
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<tbody>
<tr>
<td><strong>Infrastructure</strong></td>
</tr>
<tr>
<td>Power supply</td>
</tr>
<tr>
<td>Overhead line</td>
</tr>
<tr>
<td>Charging infrastructure at stops/depot/termini as required</td>
</tr>
<tr>
<td>None</td>
</tr>
<tr>
<td>Priority</td>
</tr>
<tr>
<td>Segregation or local highway widening to the extent possible/worthwhile</td>
</tr>
<tr>
<td>As Preferred Option</td>
</tr>
<tr>
<td>Local highway widening as worthwhile/affordable</td>
</tr>
<tr>
<td>Stops</td>
</tr>
<tr>
<td>Dedicated high specification stops</td>
</tr>
<tr>
<td>As Preferred Option</td>
</tr>
<tr>
<td>Improvements to existing bus stop facilities.</td>
</tr>
<tr>
<td>Park &amp; Ride</td>
</tr>
<tr>
<td>Stourton: up to 2,300 spaces</td>
</tr>
<tr>
<td>As Preferred Option</td>
</tr>
<tr>
<td>Bodington: up to 850 spaces</td>
</tr>
<tr>
<td>Stourton: 1,100 spaces</td>
</tr>
<tr>
<td>Bodington: 450 spaces</td>
</tr>
<tr>
<td>Depot</td>
</tr>
<tr>
<td>New depot within Stourton site</td>
</tr>
<tr>
<td>New or upgraded depot</td>
</tr>
<tr>
<td>No new depot</td>
</tr>
</tbody>
</table>

| **NGT Service**                          |
| Route/frequency                          |
| Holt Park to Stourton: 5 bphpd all day    |
| Bodington to Stourton (total): 10 bphpd all day |
| As Preferred Option                      |
| Commercially provided bus services on north line |
| Stourton to University of Leeds (Park & Ride) 8 bphpd all day |
| Journey time                             |
| Journey time saving compared with bus alternative |
| As Preferred Option                      |
| Journey time saving reduced to reflect lower level of priority |
| Stop dwell times removed from south line  |
| Park & Ride limited stop service         |
| Vehicles                                 |
| Trolleybus fleet                         |
| Articulated plug-in hybrid bus fleet      |
| Articulated hybrid bus fleet             |

| **Other services**                       |
| Existing bus                             |
| Services 1 and 6 between Holt Park and the city centre: no more than 3 services per hour at any time |
| As Preferred Option                      |
| As above                                 |
6. **Assessment against National Policy, Strategy and Objectives**

6.1. This section presents the external drivers for change alongside a summary of the national strategic context for the NGT Preferred Option, Next Best and Low Cost Alternatives, taking account of national policy, strategies and objectives. The scheme has been assessed against the following national level policy documents and their objectives/strategies:

- DfT Local Transport White Paper (2011)
- DfT Door to Door: A Strategy for Improving Sustainable Transport Integration (2013)

6.2. A more detailed description of the strategic fit is provided in the Core Document, the Strategic Fit Report (Core Document C-1-15).

**External Drivers for Change**

6.3. In the context of this Business Case Review, external drivers for change are considered to be wider, outside influences which come from the national level.

6.4. The main external drivers are contained within national policy. National policy provides the framework for local policy making.

6.5. The national policies which are applicable to transport are currently the Department for Transport (DfT) Local Transport White Paper (2011) and DfT Door to Door: A strategy for improving sustainable transport integration (2013).

6.6. The White Paper (2011) supports the direction of the regional and local efforts to provide transport for local people. It notes the significant steps forward that the Government have taken to decentralise spending powers to allow local authorities to decide what is best in their areas and the simpler mechanisms to allow local powers to fund local transport improvements. It is the framework to enable local delivery through Local Enterprise Partnerships (LEPs) such as the Leeds City Region.

6.7. Door to Door (2013) is a strategy which looks to address the entirety of door-to-door journeys to help reduce the complexities of travel, encourage the use of public transport and healthier modes and to reduce carbon. It brings together a number of actions and policies to show how the transport sector is delivering modal shift. It provides the direction for local policy to focus on the role of public transport in the local context.

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44 Strategic Fit Report, Steer Davies Gleave, 2014
6.8. Ultimately, both policies are supporting the strategic objective of sustainable and upward economic growth through the delivery of new transport infrastructure and improved transport efficiency at the local scale.

**Summary of Assessment against National Priorities**

6.9. There is one common theme covered in all the national policies and reflected in the NGT Project – low carbon transport. The NGT Preferred Option provides a strong fit with this whilst this is true to a lesser degree for the Next Best and Low Cost Alternatives. The Preferred Option therefore makes a more significant contribution to the objectives within the national policies.

6.10. Table 6.1 provides a summary of how the NGT Project fits with national policy.
<table>
<thead>
<tr>
<th>National Policy</th>
<th>Goals and Frameworks</th>
<th>NGT Preferred Option alignment with policy</th>
<th>Next Best Alternative alignment with policy</th>
<th>Low Cost Alternative alignment with policy</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DfT Local Transport White Paper (2011)</strong></td>
<td>There are opportunities and benefits for choosing low carbon modes over private vehicles</td>
<td>Delivers mode shift from private car and has lowest net emissions</td>
<td>To a lesser extent than Preferred Option as lower mode shift from private car. Higher net emissions than Preferred Option</td>
<td>Lowest forecast levels of mode shift. Higher net emissions than NBA</td>
</tr>
<tr>
<td></td>
<td>Make door-to-door journeys using alternative modes</td>
<td>Delivers mode shift from private car and improves public transport accessibility</td>
<td>To a lesser extent than Preferred Option as lower mode shift from private car</td>
<td>Lowest forecast levels of mode shift. Lowest improvement in public transport accessibility</td>
</tr>
<tr>
<td><strong>DfT Door to Door: A Strategy for Improving Sustainable Transport Integration (2013)</strong></td>
<td>Make use of current and new technologies to give travellers access to the information they need to plan sustainable door-to-door journeys</td>
<td>Provision of RTI at stops and on vehicle</td>
<td>Provision of RTI at stops and on vehicle</td>
<td>Provision of RTI at stops</td>
</tr>
<tr>
<td></td>
<td>Improve ticketing choices and payment options so that more people can travel with a single transaction across multiple modes of transport</td>
<td>Customer service assistants and simplified and smart ticketing</td>
<td>Customer service assistants and simplified and smart ticketing</td>
<td>No change from Do-Minimum ticketing</td>
</tr>
<tr>
<td></td>
<td>Increase choice through better connectivity and efficiency on transport</td>
<td>Improved public transport connectivity to and through Leeds city centre, key employment areas and services</td>
<td>Improved public transport connectivity to and through Leeds city centre, key employment areas and services</td>
<td>Small improvement to public transport connectivity</td>
</tr>
<tr>
<td></td>
<td>Make it easier to change between different modes of transport during a journey</td>
<td>Will offer multi-modal ticketing. Interchange with national rail</td>
<td>Will offer multi-modal ticketing. Interchange with national rail</td>
<td>Will offer multi-modal ticketing. Interchange with national rail</td>
</tr>
</tbody>
</table>

Leeds NGT – Business Case Review
7. **Assessment against Local and Regional Policy, Strategy and Objectives**

**Introduction**

7.1. In the context of this Business Case Review, internal drivers for change are the suite of locally determined policies. This section presents the internal drivers for change alongside the assessment of the NGT Preferred Option and the Next Best/Low Cost Alternatives against plans and policies at the local level. The assessment has taken account of the following policy documents:

- West Yorkshire’s 3rd Local Transport Plan 2011-2026 (2011) (Core Document D-6-11)
- Leeds City Region Transport Vision and Investment Plan (2011)
- Leeds Local Development Framework (on-going)
- The Leeds City Region Local Enterprise Partnership Plan (2011) (Core Document D-4-4)
- West Yorkshire Transport Fund Plus (G-4-26)

7.2. The Core Document, the Strategic Fit Report (Core Document C-1-15) provides a more detailed analysis of the local strategic context for the NGT Project.

**Internal Drivers for Change**

7.3. Internal drivers are considered to be issues which affect Leeds at a local scale or at a wider, sub-national scale such as Leeds in the context of the Leeds City Region.

7.4. Leeds is the key city in the Leeds City Region. Despite the recent economic downturn, the outlook for the city is one of upward growth in terms of its population and economy. However, there are potential constraints to successful, continued upward growth.

7.5. The city experiences a number of transport problems, partly influenced by large levels of inward commuting, including congestion on the radial road networks. This has an economic impact as well as adversely affecting bus reliability and punctuality for public transport users, as well as creating environmental impacts. The number of people travelling by train is increasing, contributing to on-train crowding.

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45 Strategic Fit Report, Steer Davies Gleave, 2014
7.6. Leeds is also a location of focus for future land-use and transport development and therefore looking ahead, it is likely to see the current transport problems worsened by increases in residents, employers and employees coming to the city to the point where Leeds ceases to meet its full economic potential.

7.7. As a major and growing employment location and destination for retail and other trip making, Leeds faces a challenge to provide the additional capacity that will be needed to encourage and facilitate future growth.

Summary of Assessment against Local Level Policies

7.8. There are many common themes between local level policies and NGT, demonstrating a strong strategic fit for the scheme. Whilst this is the case for the Preferred Option, Next Best and Low Cost Alternatives, the Preferred Option makes a greater contribution to meeting the objectives set out in local plans and policies.

7.9. A summary of how the NGT Project will meet local objectives is provided in Table 7.1 overleaf.

Summary of Assessment against Scheme Objectives

7.10. Table 7.2 provides an assessment of how the Preferred Option and Next Best and Low Cost Alternatives meet the Scheme Objectives.
### Table 7.1 Strategic Fit Against Local Level Plans/Policies

<table>
<thead>
<tr>
<th>Local Level Plans</th>
<th>Policies/Objectives</th>
<th>NGT Preferred Option alignment with policy</th>
<th>Next Best Alternative alignment with policy</th>
<th>Low Cost Alternative alignment with policy</th>
</tr>
</thead>
<tbody>
<tr>
<td>West Yorkshire’s Third Local Transport Plan 2011-2026 (2011)</td>
<td>Economy: To improve connectivity to support economic activity and growth in West Yorkshire and the Leeds City Region</td>
<td>Improved public transport connectivity to and through Leeds city centre and key employment areas. Increases employment</td>
<td>Improved public transport connectivity to and through Leeds city centre and key employment areas. Lower increase in employment than Preferred Option</td>
<td>Small improvement to public transport connectivity. Negligible increase in employment.</td>
</tr>
<tr>
<td></td>
<td>To make substantial progress towards a low carbon, sustainable transport system for West Yorkshire, while recognising transport's contribution to national carbon reduction plans</td>
<td>Delivers mode shift from private car and has lowest net emissions</td>
<td>To a lesser extent than Preferred Option as lower mode shift from private car. Higher net emissions than Preferred Option</td>
<td>Lowest forecast levels of mode shift. Higher net emissions than NBA.</td>
</tr>
<tr>
<td></td>
<td>Quality of Life: To enhance the quality of life of people living in, working in and visiting West Yorkshire</td>
<td>Improved public transport connectivity to and through Leeds city centre, key employment areas and services. Zero emissions at point of use, safe and secure, enhanced pedestrian and cycling facilities and improved public realm</td>
<td>Improved public transport connectivity to and through Leeds city centre, key employment areas and services. Safe and secure, enhanced pedestrian and cycling facilities and improved public realm</td>
<td>Small improvement to public transport connectivity to employment areas and services.</td>
</tr>
<tr>
<td>Leeds Vision (2011-2030) 2011</td>
<td>Leeds will be fair, open and welcoming</td>
<td>Accessible to all</td>
<td>Accessible to all</td>
<td>Accessible to all</td>
</tr>
<tr>
<td></td>
<td>Leeds’s economy will be prosperous and sustainable</td>
<td>A new high quality public transport system will encourage and facilitate economic growth in Leeds. Greatest impacts on local employment</td>
<td>As Preferred Option but resulting in smaller impact on economic growth</td>
<td>Smallest impact on economic growth</td>
</tr>
<tr>
<td></td>
<td>All Leeds’s communities will be successful</td>
<td>Provides greater public transport connectivity to areas of deprivation</td>
<td>Provides greater public transport connectivity to areas of deprivation</td>
<td>Provides limited improvement in public transport connectivity</td>
</tr>
</tbody>
</table>
### Leeds City Region Transport Vision and Investment Plan (2011)

<table>
<thead>
<tr>
<th>Local Level Plans</th>
<th>Policies/Objectives</th>
<th>NGT Preferred Option alignment with policy</th>
<th>Next Best Alternative alignment with policy</th>
<th>Low Cost Alternative alignment with policy</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Provide a high quality transport system that will connect all our core centres within the city region to each other</td>
<td>Provides improved public transport infrastructure that facilitates interchange with other modes</td>
<td>Provides improved public transport infrastructure that facilitates interchange with other modes</td>
<td>Improvements in connectivity only for Park &amp; Ride users</td>
</tr>
<tr>
<td></td>
<td>Provide a high quality transport system that will connect our population to core centres, to employment sites, education, training, retail and leisure facilities within the city region</td>
<td>Improved public transport connectivity to and through Leeds city centre, key employment areas and services. High quality system</td>
<td>Improved public transport connectivity to and through Leeds city centre, key employment areas and services. Quality system</td>
<td>Small improvement to public transport connectivity</td>
</tr>
<tr>
<td></td>
<td>Provide a high quality transport system that will connect our core centres to other city regions in the UK – most importantly Sheffield, Manchester and London</td>
<td>Provides improved public transport infrastructure that facilitates interchange with other modes. High quality system</td>
<td>Provides improved public transport infrastructure that facilitates interchange with other modes. Quality system</td>
<td>Improvements in connectivity only for Park &amp; Ride users</td>
</tr>
<tr>
<td></td>
<td>Provide a high quality transport system that will connect our core centres to international airports and ports serving the city region</td>
<td>Provides improved public transport infrastructure that facilitates interchange with other modes. High quality system</td>
<td>Provides improved public transport infrastructure that facilitates interchange with other modes. Quality system</td>
<td>Improvements in connectivity only for Park &amp; Ride users</td>
</tr>
<tr>
<td></td>
<td>Provide a high quality transport system that will provide choice and ensure that the growth in car use is minimised</td>
<td>High quality system delivers mode shift from private car</td>
<td>Quality system delivers lower mode shift from private car to a lesser extent than Preferred Option</td>
<td>Lowest forecast levels of mode shift</td>
</tr>
</tbody>
</table>

### Leeds Local Development Framework (LDF) (Ongoing)

<table>
<thead>
<tr>
<th>Local Level Plans</th>
<th>Policies/Objectives</th>
<th>NGT Preferred Option alignment with policy</th>
<th>Next Best Alternative alignment with policy</th>
<th>Low Cost Alternative alignment with policy</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>In reflecting the role of Leeds as a strategic transport hub (including Leeds City Station and Leeds Bradford Airport), serving existing communities and in planning for new growth, sustainable forms of development are delivered (which include public transport as an integral part)</td>
<td>A new high quality public transport system to help encourage and facilitate sustainable redevelopment and regeneration in Leeds. Visible permanence improves business confidence for long term investment</td>
<td>A new quality public transport system to help encourage and facilitate sustainable redevelopment and regeneration in Leeds</td>
<td>Negligible impact</td>
</tr>
<tr>
<td>Local Level Plans</td>
<td>Policies/Objectives</td>
<td>NGT Preferred Option alignment with policy</td>
<td>Next Best Alternative alignment with policy</td>
<td>Low Cost Alternative alignment with policy</td>
</tr>
<tr>
<td>-------------------</td>
<td>---------------------</td>
<td>------------------------------------------</td>
<td>------------------------------------------</td>
<td>------------------------------------------</td>
</tr>
<tr>
<td><strong>Leeds City Centre</strong></td>
<td>Leeds City Centre will remain a successful destination for the people of Leeds and beyond, with a vibrant commercial, leisure and cultural offer</td>
<td>Provides greater public transport connectivity to city centre</td>
<td>Provides greater public transport connectivity to city centre</td>
<td>Small improvement to public transport connectivity</td>
</tr>
<tr>
<td><strong>The Leeds City Region Local Enterprise Partnership Plan (2011)</strong></td>
<td>A substantial and continued decrease in carbon emissions</td>
<td>Delivers mode shift from private car and has lowest net emissions</td>
<td>To a lesser extent than Preferred Option as lower mode shift from private car. Higher net emissions than Preferred Option</td>
<td>Lowest forecast levels of mode shift. Higher net emissions than NBA</td>
</tr>
<tr>
<td></td>
<td>An absolute increase in GVA growth per annum, with the aim of achieving a minimum of 2.6% per year in the period up to 2030</td>
<td>A new high quality public transport system will encourage and facilitate economic growth in Leeds. Greatest impacts on local employment</td>
<td>As Preferred Option but resulting in smaller impact on economic growth</td>
<td>Smallest impact on economic growth</td>
</tr>
<tr>
<td></td>
<td>An absolute increase in employment rate in each area per annum, with the aim of returning to pre-recession employment rate for the city region by 2016, creating in the order of 60,000 jobs</td>
<td>A new high quality public transport system will encourage and facilitate economic growth in Leeds. Greatest impacts on local employment</td>
<td>As Preferred Option but resulting in smaller impact on economic growth</td>
<td>Smallest impact on economic growth</td>
</tr>
<tr>
<td><strong>West Yorkshire Transport Fund Plus</strong></td>
<td>Deliver a transformational change to the economic landscape by investing in transport measures that will support and shape future decisions on employment and other land uses such as the location of new houses</td>
<td>A new high quality public transport system to help encourage and facilitate sustainable redevelopment and regeneration in Leeds. Visible permanence improves business confidence for long term investment</td>
<td>A new quality public transport system to help encourage and facilitate sustainable redevelopment and regeneration in Leeds</td>
<td>Negligible impact</td>
</tr>
</tbody>
</table>
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**TABLE 7.2  ASSESSMENT AGAINST SCHEME OBJECTIVES**

<table>
<thead>
<tr>
<th>Objective</th>
<th>Assessment</th>
</tr>
</thead>
</table>
| Maximise growth of the Leeds economy by enhancing its competitive position and facilitating future employment and population growth | The **Preferred Option** will serve areas of deprivation in south Leeds, as well as currently congested corridors, improving their attractiveness as places to live.  
Reduced and more punctual travel times to the city centre will make it a more attractive option to public transport users and will help to widen the labour market catchment area for businesses and decreased business-to-business travel times which will increase the benefits of agglomeration to the Leeds economy. The capacity increase provided by the system will help support and facilitate future employment and population growth (NGT capacity will be up to 1,600 passengers per hour per direction).  
The flagship NGT trolleybus system will be positive for Leeds. The trolleybus system, including the wires and trolley vehicles, will be a sign both figuratively and visually, of permanent investment. This will give confidence to developers and employers when they make decisions about where to invest  
The **Next Best Alternative** has a lesser impact than the Preferred Option and it will not deliver the same sense of permanence as it does not include the OLE  
The **Low Cost Alternative** represents an incremental improvement over the existing situation. However it is unlikely to influence location decisions in favour of Leeds as a place to invest in the same way as the Preferred Option because it does not signal the levels of permanence that the Preferred Option would |
| Support and facilitate the sustainable growth of Leeds, recognising the importance of its City centre to the future economy of the Leeds City Region | The **Preferred Option** will provide a change in capacity into the city centre, as detailed below:  
- NGT has a planned core capacity of 1,600 pphpd on each of the north and south corridors  
- Bodington Park & Ride site capacity is up to 850 spaces  
- Stourton Park & Ride site capacity is up to 2,300 spaces  
- Junction improvements and highway measures support NGT services at various locations, for example Hyde Park corner  
- NGT services will increase person capacity into the city centre  
The **Next Best Alternative** will provide a similar level of capacity to the Preferred Option, however because it is forecast to be less attractive to passengers this would not be utilised to the same extent  
The **Low Cost Alternative** will provide a more limited increase in capacity into the city centre, as detailed below:  
- The additional Park & Ride service has a planned core capacity of up to 1,100 pphpd between Stourton and the University of Leeds  
- Bodington Park & Ride site capacity is 450 spaces in the LCA  
- Stourton Park & Ride site capacity is 1,100 spaces in the LCA  
- Junction improvements and highway measures support LCA services at a small number of locations, for example Hyde Park |
<table>
<thead>
<tr>
<th>Objective</th>
<th>Assessment</th>
</tr>
</thead>
</table>
| Support and facilitate targeted regeneration initiatives and economic growth in the more deprived areas of Leeds | The **Preferred Option** and **Next Best Alternative** improve the connection between more deprived areas, and employment/economic opportunities including the introduction of a new cross city link connecting for example south Leeds to the Universities and further north:  
  - Bodington journey time to city centre without NGT 34 minutes, with NGT 20 minutes  
  - Stourton journey time to city centre without NGT 18 minutes, with NGT 14 minutes  
  - Bus journey times within the NGT corridor reduce  
  
The **Low Cost Alternative** delivers only a small improvement to public transport connectivity  

| Improve the efficiency of the City’s public transport and road networks. | The **Preferred Option** is forecast to deliver £701m of public transport passenger journey time benefits and generate a revenue surplus of £457m in present values. Approximately 25% of its demand is new to public transport. Public transport punctuality will also improve, generating £84m of additional passenger benefits  
  
The **Next Best Alternative** is forecast to deliver £389m of public transport passenger journey time benefits and generate a revenue surplus of £314m in present values. Approximately 20% of its demand is new to public transport. Public transport punctuality will also improve, generating £60m of additional passenger benefits  
  
The **Low Cost Alternative** is forecast to deliver £36m of public transport passenger journey time benefits and to generate a revenue surplus of £16m in present values  

| Reduce transport’s emissions of CO₂ and other greenhouse gases          | The **Preferred Option** delivers a carbon reduction benefit of £6.2m PV over the appraisal period  
  
The **Next Best Alternative** delivers a carbon reduction benefit of £5.6m PV over the appraisal period  
  
The **Low Cost Alternative** results in a carbon reduction disbenefit of £1.3m PV over the appraisal period |
Leeds NGT – Business Case Review

<table>
<thead>
<tr>
<th>Objective</th>
<th>Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Promote quality of life through a safe and healthy built and natural environment</strong></td>
<td>The <strong>Preferred Option</strong> electrically powered trolleybuses will be clean and quiet, however the segregated sections of alignment will introduce a source of noise where currently there is none. Rationalisation of the existing bus network and mode shift will result in a decrease in roadside noise and air quality emissions. There will be improvements to facilities for pedestrians and cyclists. The <strong>Next Best Alternative</strong> plug-in diesel-electric hybrid vehicles would only be in full electric (local emission free) operation for around half of the route and therefore would result in increased noise and air quality emissions in some areas. Rationalisation of the existing bus network and mode shift (although less than the Preferred Option) will result in a decrease in roadside noise and air quality emissions. There will be improvements to facilities for pedestrians and cyclists. The <strong>Low Cost Alternative</strong> would result in improved fuel efficiency, reduced noise and air quality emissions for existing services on the north corridor where diesel-electric hybrid vehicles would be specified.</td>
</tr>
</tbody>
</table>
| **Contribute to enhanced quality of life by improving access for all to jobs and services** | The **Preferred Option**, and **Next Best Option** will serve key services and employment areas including:  
  - The city centre  
  - Leeds General Infirmary  
  - University of Leeds  
  - Leeds Beckett (formerly Metropolitan) University  
  - Leeds College  
  - Leeds Arena  
  - Trinity Leeds  
  - Leeds City Station  
  - New Dock including the Royal Armouries  
  - The Tetley  
  - Regeneration sites in south Leeds  
  The **Low Cost Alternative** will serve the same areas but offer a limited improvement in connectivity. The south corridor Park & Ride service will only connect Stourton to some of these areas and does not stop elsewhere in south Leeds. |
Contribution to Delivering WYLTP Targets

7.11. WYLTP (2011-2026) includes targets which demonstrate how its objectives (described in Table 3.8) are being met. Those which NGT can contribute towards are shown in Table 7.3. NGT would be contributing to these targets from the middle of the WYLTP period.

**TABLE 7.3 CONTRIBUTION TO WYLTP TARGETS**

<table>
<thead>
<tr>
<th>WYLTP Key Indicator</th>
<th>WYLTP Target (2026)</th>
<th>Contribution of NGT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Journey Time Punctuality</td>
<td>To increase the proportion of the network where peak journey time variability is equivalent to the inter-peak Bus: From 33% to 50%</td>
<td>High level of segregation for NGT and other priority measures (e.g. priority at traffic signals) will help to ensure levels of punctuality are high</td>
</tr>
<tr>
<td>Access to Employment</td>
<td>To increase the proportion from the baseline figure of 71% to 75%</td>
<td>Improved linkages between residential areas and employment opportunities in the north and south of the city through high frequency services with greater reliability</td>
</tr>
<tr>
<td>Mode Share</td>
<td>To keep the total number of car trips at 2011 levels To increase the proportion of trips made by sustainable modes from 33% to 41%</td>
<td>High quality image, increased punctuality and provision of strategic Park &amp; Ride sites will help to increase public transport’s modal shift</td>
</tr>
<tr>
<td>Emission of CO₂ from Transport</td>
<td>To achieve a reduction of 30% between base year and 2026 in line with the national target</td>
<td>Potential to reduce CO₂ emissions as a result of mode shift from highway and reduced diesel bus km in favour of more efficient central energy production</td>
</tr>
<tr>
<td>All road casualties-people killed or seriously injured</td>
<td>To cut the number of KSI by 50% between the 2005-09 baseline and 2026</td>
<td>Highway accidents are influenced by the number of vehicle km on the road network. The net effect will be a balance between increases from vehicle reassignment and decreases from mode shift. Improvements in pedestrian and cyclist facilities will reduce local accident rates.</td>
</tr>
<tr>
<td>Satisfaction with transport</td>
<td>To increase the combined satisfaction score from 6.6 to 7.0 by 2017</td>
<td>To review thereafter</td>
</tr>
</tbody>
</table>
8. Powers and Consents

Introduction

8.1. The NGT Project will require the following powers and consents:

- Authority to construct, operate and maintain the permanent infrastructure
- Planning permission
- Listed building and conservation area consent
- Compulsory purchase powers, including powers to fix overhead line electrical equipment to buildings
- Powers to modify highways
- Traffic regulation controls
- Powers to operate NGT as a transport undertaking
- Railway possessions and associated consents

Transport and Works Act Powers

8.2. The majority of the powers listed above can be obtained for the trolleybus option and are being sought by way of an Order made using the provisions of the Transport and Works Act 1992, an associated application for deemed planning consent under section 90(2A) of the Town and Country Planning Act 1990 and by way of contemporaneous applications for listed building and conservation area consent.

8.3. No TWAO has yet been made for a trolleybus system, but the making of such orders for this purpose is expressly contemplated by the Act. In many respects it will be similar to those TWAOs already granted for tram schemes in various parts of the country.

8.4. The NGT Project does not fall within the scope of a nationally significant infrastructure project that requires a Development Consent order under the Planning Act 2008.

Highways Act Powers

8.5. Neither the next best nor the low cost alternative option, being based on unguided conventional bus technology, would be eligible for Transport and Works Act powers. Those of the powers listed above which are required for either option would instead be obtained under the Highway Act 1980 and the Road Traffic Regulation Act 1984.

8.6. Of note is that powers for segregated sections of alignment would be obtained in effective isolation, each on its own merits. In contrast powers for
under the Transport and Works Act would be obtained as what is effectively a single decision for the whole system.

Other Powers Required

8.7. Listed Building Consent and Conservation Area Consent will be required for various aspects of the scheme, particularly in the city centre and in Headingley. Such additional consents are required where works affect a Listed Building or its curtilage, or take place within a Conservation Area.

8.8. A Statutory Quality Partnership (SQP) or a Quality Contract under the Transport Act 2000 may be desirable as part of the arrangements to govern the relationship between Metro and LCC (as the NGT Promoters) and the bus operators. Such an arrangement could define the quality of bus facilities and services to be provided by operators and restrict access to transport facilities provided by LCC. Likewise, it may also be desirable for there to be a ticketing scheme under the Transport Act 2000.

8.9. Any SQP or ticketing scheme may relate purely to NGT vehicles or extend to other categories of buses.

8.10. Other ancillary consents may also be required for the purposes of the NGT works. These include:

- Protected species licences e.g. to disturb any bats roosting in property or trees interfered with by the NGT works
- Consents from the Environment Agency for any works interfering with a main river
- Approval from LCC under the Control of Pollution Act 1974 to specified noise levels in relation to construction activities

Process for Obtaining Powers

8.11. The process for obtaining a TWAO and associated section 90(2A) Planning Direction is governed by the Transport and Works (Applications and Objections Procedure), (England and Wales) Rules 2006 and the Transport and Works (Inquiries Procedure) Rules 2004. In essence, the process involves:

- An application to the Secretary of State, supported by plans and other prescribed documents. The Promoters made their application on 19th September 2013
- Contemporaneous advertisement and notifications to statutory stakeholders and interested parties
- A forty two day objection period. This closed on 31st October 2013
8.12. In common with other major Transport and Works applications to date, a public local inquiry is required. This was confirmed by the DfT on 28th November 2013. Special Parliamentary Procedures may also apply, if required.

8.13. Listed Building and Conservation Consents were applied for in the conventional way to LCC as the Local Planning Authority. Since the applications were made contemporaneously with the TWAO application, they were subject to automatic call-in by the Secretary of State for Communities and Local Government. It was confirmed by the Department for Communities and Local Government that they will be determined contemporaneously with the TWAO.

8.14. The other powers and consents referred to above, will be applied for under the various applicable statutory regimes. It is envisaged that this will take place after the TWAO has been obtained, as has happened on other TWAO schemes. The exception will be the protected species licences which may need to be determined contemporaneously with the TWAO application.

8.15. The TWAO and all other powers and consents have been applied for jointly by Metro and LCC. However, it is possible that responsibility for obtaining some ancillary consents could be delegated to a concessionaire.

**Next Best and Low Cost Alternatives**

8.16. Consideration has been given to the powers and consents necessary to build and then operate the next best and low cost alternatives:

- The NBA would not be eligible for a TWAO and so use of LCC highways and planning powers would be needed. Operation would be secured using either a Voluntary Partnership Agreement or Quality Contract Scheme
- Low Cost Alternative – the LCA would be delivered through use of LCC highways and planning powers. Operation of the Park & Ride service from
Stourton would be secured by a bus service tender. Services from Holt Park would be provided by bus operators on a commercial basis.
New Generation Transport

Business Case Review

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9. **Overview**

**Purpose of this Section**

9.1. The purpose of this section is to describe the Economic Case for the Leeds New Generation Transport Project (the NGT Project). This has been refreshed in preparation for the Transport and Works Act Order (TWAO) Application and Public Inquiry, which is expected to commence in spring 2014.

9.2. The NGT Project is a proposed major public transport initiative comprising the delivery of new infrastructure, vehicles and services along two public transport corridors (north and south) in the City of Leeds, West Yorkshire. The objectives, vision and rationale underpinning this project are described in the Strategic Case.

9.3. The NGT Project is being jointly promoted by West Yorkshire Passenger Transport Executive (known as Metro) and Leeds City Council (LCC).

**Options included in the Economic Case**

9.4. The Preferred Option for the NGT Project involves the implementation of a new partially segregated electric trolleybus scheme between Holt Park in the north of Leeds and Stourton in the south.

9.5. In line with DfT guidance and good practice, two alternatives to the Preferred Option have been assessed in this Economic Case. These are:

- **The Next Best Alternative**: which consists of a high quality articulated plug-in hybrid diesel-electric bus on the same, partially segregated, route as the Preferred Option

- **The Low Cost Alternative**: which is based on a hybrid diesel-electric bus operating in the same public transport corridors as the Preferred Option, but without segregation

9.6. Throughout this Economic Case the Preferred Option, Next Best Alternative and Low Cost Alternative are compared against a Do-Minimum scenario. This scenario includes committed infrastructure changes and forecasts underlying conditions (through the lifespan of the project) that are expected to materialise if NGT is not implemented.

**Approach and Structure of the Economic Case**

9.7. This Economic Case describes the **cost** estimates and the forecast **benefits** of implementing the Preferred Option, Next Best Alternative and Low Cost Alternative. This is used to inform the **Value for Money** assessment of each option.
Costs, Demand and Revenue

9.8. The net costs of the Preferred Option and alternatives are formed of three components:

- The **Investment Costs**, which include the capital (new infrastructure) and infrastructure renewal costs for the Preferred Option or alternatives over the Appraisal Period. These costs are described in Section 10.

- The **Operating Costs**, which describe the costs of operating the Preferred Option or alternatives’ new services, supplying and maintaining its vehicles and maintaining infrastructure. Any savings in operating costs arising from the subsequent rationalisation of conventional bus passenger services along the NGT Route are also taken into account. These costs are described in Section 11.

- The forecast change in **revenue** over the Appraisal Period. This includes additional revenue from Preferred Option and alternatives and changes to revenue from other modes such as bus, rail and road (parking). This is estimated by forecasting demand for each mode and combining these forecasts with assumptions on expected fares (which also influence demand). Demand and revenue forecasts are provided in Section 12.

Benefits and Costs (Impacts)

9.9. The benefits and costs of the Preferred Option and alternatives have been monetised by undertaking an economic appraisal of all three options described above; following published Department for Transport (DfT) Transport Analysis Guidance (WebTAG). Journey time, user charge, vehicle (highway) operating cost and indirect tax benefits in comparison to the Do-Minimum scenario have been calculated from model outputs using Transport User Benefit Appraisal (TUBA) software, as specified by DfT in its guidance.

9.10. The outputs of this economic appraisal include both positive (benefits/revenues) and negative (disbenefits/costs) impacts of each option. The outputs of this exercise along with an assessment of those positive and negative impacts that cannot be readily monetised are presented in each option’s Appraisal Summary Table (AST) as well as in the following sections:

- The Economic Impacts are described in Section 13.

- The Environmental Impacts are described in Section 14.

- The Social Impacts are described in Section 15.

- The Public Accounts Impacts (impacts on the transport budget and revenues raised from tax) are described in Section 16.
Value for Money

9.11. The overall Value for Money for each option included in this Economic Case is summarised in the Value for Money Statement, which forms Section 17 of this document. That section shows how the Benefit Cost Ratio has been calculated, describes the tests used to ensure the robustness of the approach of the appraisal and states the DfT Value for Money category for each of the options considered in the Economic Case, taking into consideration both monetised and non-monetised impacts.

Key Assumptions

9.12. The key assumptions of the cost and revenue estimates of the Preferred Option and alternatives are set out in Sections 10, 11 and 12.

9.13. The key assumptions relating to the economic appraisal of the Preferred Option, which is described in Sections 13, 14, 15 and 16, are set out below. The alternatives have been assessed on the same basis for comparability.

- The NGT Project will open in early 2020, with a phasing assumption of 42% of full year operating costs (this includes running during testing and commissioning) in 2019/2020

- Impacts are assumed to ramp up from 70% in Year 1 to 100% in Year 4, increasing by 10% each year

- In line with DfT guidance, the period over which the scheme has been appraised (the Appraisal Period) is assumed to cover 60 years from February 2020 (opening) to February 2080 inclusive

- In line with current DfT guidance, monetised impacts are presented in 2010 market prices and summarised in Present Value (PV) terms

- In line with HM Treasury guidance, the discount rate applied in generating Present Values for this scheme has been set at 3.5% per annum for 30 years from 2013 and then at 3.0% to 2079/80

- Based on HM Treasury Green Book guidance, capital costs have been uplifted by 29% to account for Optimism Bias (OB)
10. **Investment Costs**

**Introduction**

10.1. This section describes the forecast capital and infrastructure renewal costs of each of the options considered in the NGT Business Case over the Appraisal Period.

**Methodology and Key Assumptions**

10.2. Since the Programme Entry submission in March 2012, the design of the Preferred Option has been further developed to reflect changes in its context and circumstances. The design for the Preferred Option reflects the increased detail of the design stage ‘Design Freeze 7’, as submitted with the TWAO application in September 2013.

10.3. The Cost Plan for the scheme, which is presented in this section, has been updated to reflect this design stage and is based on quantities, measured from the current design drawings with the aid of associated reports/survey information, and contemporary rates for particular items which are either benchmarked or built up from first principles.

10.4. The market rates utilised within the estimating process have been collated from key sources, namely:

- Project Team and associated advisor experience
- Historic project records
- Cost estimators’ experience of past projects of a similar nature
- Direct quotations from the market place
- Franklin and Andrews Economic Research Unit

10.5. All rates have been benchmarked and appropriate adjustments have been made to ensure that they are applicable to the NGT Project.

10.6. Some items included within the Cost Plan are provisional (for example electromagnetic compatibility protection measures) as the project has not yet reached the level of detailed design where such information will become available. In such cases reasonable allowance has been made for the purposes of economic appraisal.

10.7. At the current design stage, the construction programme does not lend itself to the detailed pricing of contractor’s preliminaries. Therefore a percentage addition has been applied to the base estimate to reflect the likely costs of the preliminaries, overheads and profit and also include an allowance for temporary traffic management. This uplift is derived from the Project Team’s experience with construction projects of a similar size and nature.
10.8. In addition to preliminaries, allowances have been included for the following elements of the project cost:

- Land acquisition and compensation
- Professional advisors and Promoters’ management costs
- Advanced Reference Design
- Traffic Regulation Orders
- Testing and commissioning costs
- On-board ticketing costs
- Monitoring and evaluation costs

10.9. All capital costs are presented in Q2 2013 prices unless otherwise stated. For appraisal purposes and the calculation of the Benefit Cost Ratio, these costs have been indexed to the appraisal price base year (2010).

10.10. Life cycle replacement (renewals) cost estimates have been derived for the full 60 year Appraisal Period based on the Design Freeze 7 capital expenditure costs for the Preferred Option and equivalents for the Next Best Alternative and Low Cost Alternative. In preparing estimates for infrastructure renewal costs, the Design Team has reviewed all of the major work items and their respective design lives to determine at what frequency they (or parts thereof) require replacement.

Treatment of Inflation

10.11. A number of components within the investment costs are expected to change over the lifespan of the scheme at differing rates. Inflation assumptions for the components listed below have been made based on previous patterns of change and expectations of future economic conditions:

- Construction at RPI (0% real)
- Renewals at 1.0% p.a. above RPI

Quantification of Risk

10.12. A Quantified Risk Assessment (QRA) has been undertaken to calculate the probable financial impact of risks associated with the project’s costs. The QRA has been produced using a Monte Carlo simulation, with 20,000 iterations to ensure convergence. Outputs from this process include costs that have a 50% (p50) and 80% (p80) probability of not being exceeded. The p50 risk has been adopted for the purposes of estimating scheme costs and within the economic appraisal. QRA values for the Next Best and Low Cost alternatives have been pro-rated from the Preferred Option result on the basis of total capital cost.
Approach to Delivering Cost Certainty

10.13. The Promoters have introduced a number of measures to deliver the highest possible level of certainty around the Preferred Option’s capital expenditure. These measures include:

- Undertaking a programme of QRA workshops, to reflect developments to the project cost plan (as summarised above)
- Developing the engineering design in specific areas to enable more cost certainty
- Regularly scrutinising the project’s costs
- Value Engineering workshops to ensure the most efficient design is achieved

10.14. As a result of these measures, the capital expenditure for the project is considered to be further advanced than most projects at this stage of their development. The Promoters believe that the scope for costs to change significantly before Full Approval is therefore appropriately minimised, assuming that timing of the delivery of the Preferred Option does not materially change.

Preferred Option

Capital Cost Estimate

10.15. A number of assumptions have been made in preparation of the capital cost estimate in order to provide a complete estimate rather than excluding items. The main assumptions are:

- Disposal of the excavated material has been categorised into three categories, inert, non-hazardous and hazardous based on the ground investigation studies in each area
- 50% of fill required it taken from earthworks stock piles on site. The remaining 50% is imported.
- Stourton Park & Ride is based on initial construction of circa. 1,700 spaces with the new depot also located at the same site
- Existing street lighting will be removed and new street lighting will be as combined poles with the overhead line equipment
- 28 stops are provided along the preferred route (consisting of 2 platforms per stop)
- There is no allowance for any works to structures other than re-waterproofing to Woodhouse East Bridge. No work is envisaged at Leeds Bridge and Balm Road Bridge
10.16. The risk adjusted estimate of the capital cost of the Preferred Option, which includes allowances for inflation, is provided in Table 10.1.

<table>
<thead>
<tr>
<th>TABLE 10.1 PREFERRED OPTION CAPITAL COST SUMMARY</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cost Item</strong></td>
</tr>
<tr>
<td>Construction Cost</td>
</tr>
<tr>
<td>Development Costs</td>
</tr>
<tr>
<td>Land Acquisition and Compensation</td>
</tr>
<tr>
<td>TROs, Testing/Commissioning, Monitoring &amp; Evaluation</td>
</tr>
<tr>
<td>Utilities</td>
</tr>
<tr>
<td><strong>Project Costs at Q2 2013 Prices</strong></td>
</tr>
<tr>
<td>Risk</td>
</tr>
<tr>
<td><strong>Project Costs &amp; Risk at Q2 2013 Prices</strong></td>
</tr>
<tr>
<td>Inflation</td>
</tr>
<tr>
<td><strong>Total Scheme Costs</strong></td>
</tr>
</tbody>
</table>

*Source: Mott MacDonald, 2013*

10.17. Trolleybus vehicles are assumed to be leased and therefore costs are included within the operating costs, detailed within Section 11 of this document.

Infrastructure Renewal Cost Estimate

10.18. The major items that will require renewal during the 60 year life span of the Preferred Option are summarised as follows:

- 100% of traffic signals at new junctions will require replacement every 15 years, based on an average of 8 or 16 signals depending on the size of the junction
- Renewal of Passenger Information Displays at each NGT stop every 10 years
- Replacement of 2 shelters at each NGT stop every 20 years
- Replace 50% of overhead line equipment (contact wire and droppers) every 17 years
- Replacement of all hand held ticket machines (1 per vehicle plus 5 spares) every 7 years
- The fleet of vehicles will be renewed at 12 yearly periods with the first renewal seeing an increase in the fleet by 5 vehicles to accommodate future year forecast demand

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46 Costs at 2010 prices are used in the economic appraisal
10.19. New structures have been designed to have a design life of over 60 years and will therefore not require total replacement during the appraisal period.

10.20. The renewals costs are presented in Figure 10.1.

**FIGURE 10.1 INFRASTRUCTURE RENEWALS COSTS – PREFERRED OPTION**

![Cost (£000s Q2 2013 prices) vs Scheme Year](image)

*Source: Mott MacDonald, 2013*

**Next Best Alternative**

**Capital Cost Estimate**

10.21. The Next Best Alternative is based on the Preferred Option but includes the following difference:

- No overhead line equipment is required to power the vehicles
- Charging stations provided at necessary points along the route for charging of the vehicles
- Street lighting will be taken down where necessary and reused. As there is no overhead line equipment combined OLE and street lighting is not possible
- A more cost-effective depot location is possible for the Next Best option and therefore the extent of the earthworks required for the preferred option is not required

10.22. All general assumptions have been kept the same for this option as for the Preferred Option to ensure that the options are comparable.

10.23. The risk adjustment for the Next Best Alternative is based on the risk calculated for the Preferred Option assuming that risk is proportional to
capital cost. Given that this option includes the use of an emerging technology and less established delivery powers this is considered to be a conservative assumption. The risk adjusted estimate of the capital cost of the Next Best Alternative, which includes allowances for inflation, is provided in Table 10.2.\footnote{Costs at 2010 prices are used in the economic appraisal.}

**TABLE 10.2  NEXT BEST ALTERNATIVE CAPITAL COST SUMMARY**

<table>
<thead>
<tr>
<th>Cost Item</th>
<th>£000</th>
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<tbody>
<tr>
<td>Construction Cost</td>
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<td>Land Acquisition and Compensation</td>
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<td>Utilities</td>
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<td>Risk</td>
<td>£21,237</td>
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<td><strong>Project Costs &amp; Risk at Q2 2013 Prices</strong></td>
<td>£200,065</td>
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<td>Inflation</td>
<td>£25,759</td>
</tr>
<tr>
<td><strong>Total Scheme Costs</strong></td>
<td>£225,824</td>
</tr>
</tbody>
</table>

*Source: Mott MacDonald, 2013*

Infrastructure Renewal Cost Estimate

10.24. The major items that will require renewal during the 60 year life span of the Next Best Alternative are summarised as follows:

- 100% of traffic signals at new junctions (due to the NBA Project) will require replacement every 15 years, based on an average of 8 or 16 signals depending on the size of the junction
- Renewal of passenger information displays every 10 years
- Replacement of 2 shelters at each stop every 20 years
- Replacement of all hand held ticket machines (1 per vehicle plus 5 spares) every 7 years
- The fleet of vehicles will be renewed at 12 yearly periods

10.25. The renewals costs are presented in Figure 10.2.
Low Cost Alternative

Capital Cost Estimate

10.26. The Low Cost Alternative differs from the Preferred Option in that it involves less new carriageway construction (as the routes predominantly run on the existing highway network). This results in reduced costs for site clearance, modifications to signalised junctions, drainage, footways and kerbs.

10.27. Other major differences between the Low Cost Alternative and the Preferred Option are that no Overhead Line equipment, sub-stations or charging stations are required. There is also no requirement for a depot and the Park & Ride sites are both approximately 50% smaller.

10.28. The risk adjusted estimate of the capital cost of the Low Cost Alternative, which includes allowances for inflation, is provided in Table 10.3.

10.29. All general assumptions for the Low Cost Alternative have been kept the same as the Preferred Option to ensure that the options are comparable.
TABLE 10.3  LOW COST ALTERNATIVE CAPITAL COST SUMMARY

<table>
<thead>
<tr>
<th>Cost Item</th>
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<td>Development Costs</td>
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<td>Land Acquisition and Compensation</td>
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<td>Utilities</td>
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<td><strong>Project Costs at Q2 2013 Prices</strong></td>
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<td>Risk</td>
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<td><strong>Project Costs &amp; Risk at Q2 2013 Prices</strong></td>
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<td>Inflation</td>
<td>£6,957</td>
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<tr>
<td><strong>Total Scheme Costs</strong></td>
<td>£59,888</td>
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</table>

Source: Mott MacDonald, 2013

Infrastructure Renewal Cost Estimate

10.30. The major items that will require renewal during the 60 year life span of the Low Cost Alternative are summarised as follows:

- Renewal of passenger information displays in each shelter every 10 years
- Replacement of 2 shelters at each stop every 20 years

10.31. The renewals costs are presented in Figure 10.3.

**FIGURE 10.3  INFRASTRUCTURE RENEWALS COSTS – LOW COST ALTERNATIVE**

Source: Mott MacDonald, 2013
11. Operating Costs

Introduction

11.1. This section of the Business Case Review describes the on-going (annual) costs of operating services, supplying and maintaining vehicles and infrastructure over the Appraisal Period.

11.2. Costs have been estimated for the Preferred Option, Next Best Alternative and Low Cost Alternative. These estimates have been prepared on a directly comparable basis, whilst taking the different specifications into account.

Methodology and Key Assumptions

11.3. The service operating cost assumptions for all options are provided in Core Document C-1-10.48

11.4. The key source of these operating cost parameters is Croner’s Operation Costings for Transport Management Manual.49 This has been supplemented and updated with local knowledge as well as experience and expertise available within the Project Team.

11.5. Representative operating cost assumptions for trolleybus vehicles have been sourced from manufacturers’ information and specifications.

Treatment of Inflation

11.6. A number of components within the operating costs are expected to change over the lifespan of the scheme at differing rates. Inflation assumptions for the components listed below have been made within the economic appraisal, based on previous patterns of change and expectations of future economic conditions:

- Fuel at RPI (0% real)
- Labour at 1.0% p.a. real (above RPI)
- Other costs at RPI (0% real)

11.7. These inflation rates have been benchmarked against similar operating cost models and found to be broadly consistent.

Operating Costs of the Preferred Option

Description

11.8. The proposed procurement scenario for the Preferred Option is to let a stand-alone trolleybus operating concession. This would see NGT being introduced in addition to existing bus services. The pattern of existing

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48 NGT Operating Cost Report, Steer Davies Gleave, 2014
49 Published in November 2006
services has been considered and a possible long-term operator reaction has been assumed.

Leasing agreement

11.9. It has been assumed that the vehicles are acquired through a leasing company which purchases the vehicles from the manufacturer. This option has been chosen as it gives greatest assurance that benefits associated with NGT reliability and journey quality are delivered. The Promoters of the scheme will make payments to the leasing company to cover the cost of making the vehicles available for service (reliability) and ensuring the vehicles are appropriately maintained (journey quality).

11.10. The leasing contract will also include a service quality regime in which the Promoters would pay additional sums to the contractor subject to the attainment of pre-defined key performance indicators. For the purpose of this Economic Case it has been assumed that the Promoters will pay an additional 10% of the maintenance costs to the leasing company to incentivise this service.

11.11. Although this option is more expensive, over the life of the project, than purchasing the vehicles directly from the manufacturer, the Promoters consider that it gives greater assurance that NGT benefits will be realised and is therefore preferred.

Operating Strategy

11.12. The assumed operating pattern comprises two NGT services, each operating on a frequency of five trolleybuses per hour per direction:

- **Service 1**: Linking Holt Park in the north to Stourton in the south via Bodington, Headingley, Leeds city centre and Belle Isle
- **Service 2**: Linking Bodington in the north to Stourton in the south via Headingley, Leeds city centre and Belle Isle

11.13. This results in a core frequency of ten trolleybuses per hour between Bodington and Stourton. There will also be an enhanced service in the peak of the peak period defined as Monday-Friday 08:00-09:00 and 17:00-18:00. This service caters for the higher level of demand forecast during these times.

11.14. The operating pattern would be split into two phases. The first phase assumes one additional peak direction service. The second phase assumes three additional services in the peak of the peak period (4 in total) between Bodington and Stourton to accommodate the forecast increase in demand. Phase 2 would require additional vehicles and would be introduced in scheme year 12 when the vehicles are assumed to be replaced.

11.15. It has been estimated that 20 vehicles will be required in Phase 1 and 25 vehicles in Phase 2. This includes provision for spare vehicles.
11.16. Both services will provide links between key locations such as the University of Leeds and the railway station. They will also connect the Stourton and Bodington Park & Ride sites with the city centre and, in doing so, will offer a wider range of alighting options for the Park & Ride market.

11.17. This operating strategy is assumed to be the most likely outcome at this juncture. However, it should be noted that alternative service patterns are possible and could be adopted if it were demonstrated that they would deliver improved economic and financial performance in the future.

11.18. Figure 11.1 presents an indicative pattern of service frequency across the day and week, which has been used as the basis of estimating operating costs. This includes the additional peak services, which would be introduced in Year 12.

11.19. The Promoters believe that this operating pattern will provide links between key trip generators and attractors whilst offering an appropriate balance between serving the commuter and shopping/leisure markets.

**FIGURE 11.1 SERVICE FREQUENCY PATTERN**

![Service frequency by Time of Day: NGT](source: Steer Davies Gleave, 2014)

**Bus Network Rationalisation**

11.20. The proposed NGT service will operate parallel to existing bus services. The eventual reaction of incumbent bus operators to NGT will be determined by those operators and not by the Promoters. However, it is clear that the introduction of NGT will lead to changes in service provision and accordingly a long-term view of likely changes to incumbent operators’ bus networks has been assumed for this Business Case Review. For each corridor the pattern
of existing services has been considered and a possible operator reaction has been assumed.

11.21. On the South Route, the degree of replication between NGT and existing routes is not considered sufficient for any service rationalisation to be likely.

11.22. On the North Route, the degree of replication between NGT and existing services is much greater:

- **Service 1** from Holt Park to Beeston runs parallel with the NGT Route between Bodington and the city centre. It has been assumed that the frequency would be reduced to no more than three buses per hour in any time period for the section between Holt Park and the city centre. Service 1 would still run at its existing frequency between the city centre and Beeston.

- **Service 6** from Holt Park to the city centre also runs parallel to NGT for the majority of the route. For this service, it is assumed that the frequency would be reduced to no more than three buses per hour in any time period.

11.23. The bus network rationalisation will reduce the number of vehicles required on Service 1 and Service 6 by ten vehicles.

11.24. Figure 11.2 presents the current and proposed frequencies for services 1 and 6 in the peak period.

**FIGURE 11.2 PEAK FREQUENCIES FOR BUS SERVICES 1 AND 6**

![Diagram showing current and proposed frequencies for bus services 1 and 6.]

*Source: Steer Davies Gleave, 2014*
11.25. Operating cost savings are expected to arise from the removal of parallel bus services on the North Route. These savings have been included in the Operating Cost Model and the economic appraisal. A sensitivity test showing the impact of bus service rationalisation is presented within Section 17.

Fares and Ticketing Strategy

11.26. A summary of the full fares and ticketing strategy is outlined in Table 11.1 with further details set out in Core Document C-1-6. The key components of the fares and ticketing strategy have been developed in line with the overall objectives of the NGT Project. The fares and ticketing specification utilises (and is dependent upon) the current preferred procurement route for the scheme.

<table>
<thead>
<tr>
<th>Current Recommendation</th>
<th>Key Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ticketing Mechanism</strong></td>
<td></td>
</tr>
<tr>
<td>Two-stage fare system, single smartcard tickets. Separate fare may be levied on Park &amp; Ride.</td>
<td>Does not penalise interchange trips within NGT network.</td>
</tr>
<tr>
<td>Bespoke ‘products’ for target markets e.g. Students/University.</td>
<td>Addresses issue of short distance trips</td>
</tr>
<tr>
<td>Detail of Park &amp; Ride ticketing strategy to be informed by further work.</td>
<td>Informed by further market analysis and fit with scheme objectives.</td>
</tr>
<tr>
<td><strong>Ticket Vending Options</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Off-Board</strong></td>
<td>Aim to maximise off-vehicle ticket sales options.</td>
</tr>
<tr>
<td>Newsagents/travel centres/internet</td>
<td>Minimise impact of TVMs at stops – cost impact, visual impact, operational – e.g. queuing.</td>
</tr>
<tr>
<td>Limited number of Ticket Vending Machines (TVMs) at key stops</td>
<td></td>
</tr>
<tr>
<td><strong>On board</strong></td>
<td>Tickets on-board should be available, but users encouraged to pay off-board though higher on-board pricing.</td>
</tr>
<tr>
<td>Tickets sold at higher price on-board. No driver sales</td>
<td></td>
</tr>
<tr>
<td><strong>Customer service and revenue protection staff</strong></td>
<td>Meet quality objective of NGT through providing enhanced customer care.</td>
</tr>
</tbody>
</table>

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50 NGT Fares and Ticketing Paper, Steer Davies Gleave, 2014
<table>
<thead>
<tr>
<th>Current Recommendation</th>
<th>Key Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td>- customer case/info</td>
<td>Meet equity objectives through added real/perceived security.</td>
</tr>
<tr>
<td>- security benefits</td>
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</tr>
<tr>
<td>- sell tickets</td>
<td></td>
</tr>
<tr>
<td>- revenue protection</td>
<td></td>
</tr>
</tbody>
</table>

**Ticket Validation**

| Smartcard readers at every door. | Simplicity – only swipe ‘in’ – consistent with flat fare structure. |
| Swipe ‘in’ only.                 | Customer service and revenue protection staff provided with smartcard enabled handheld ticket vending machines to check that tickets are validated |

**Smartcards**

| System ticketing will use smartcard technology. | Smartcard technology offers convenience and more efficient boarding for passengers, and operational efficiencies. |
|                                                | Metro’s SmartCard and Information Programme commenced in early 2012 and has now issued over 500,000 smartcards across West Yorkshire. Further smartcards products are planned to be rolled out over the next 18 months |

**Fares regulation & decision making**

| Approach to be refined as procurement process develops. | Preferred procurement route (TWAO) provides the Promoters with the ability to set and control system specific fares. |
|                                                        | Consideration is being given to process by which decision on fares are taken to ensure balance between political accountability and flexibility/ responsiveness. |

*Source: Steer Davies Gleave, 2014*

11.27. It has been assumed that on-vehicle staff will provide ticket retail, revenue protection, information and general customer service on each trolleybus vehicle. It is expected that moving away from Driver Only operation will provide punctuality, journey time and passenger benefits.
Operating Costs and Savings

11.28. A breakdown of the resulting annual cost of operating NGT services is set out in Table 11.2 and Table 11.3. Two tables have been provided to reflect the two different phases of service patterns (described in 11.14) that will be delivered during the Appraisal Period.

11.29. The total operating cost for Phase 1 is £5.2m per year (2010 prices consistent with the price base for the economic appraisal) of which 84% is staff costs and the remainder service costs (the split in Phase 2 is very similar).

11.30. Table 11.2 and Table 11.3 include the cost saving to bus operators from rationalising services 1 and 6. It is assumed that these reductions would not result in any savings to the general overhead costs. Depreciation and notional interest are included in these costs because they are financed by a private sector operator, unlike NGT vehicles which are assumed to be leased.

11.31. These issues, along with other characteristics associated with the operation of diesel buses, yield a different split between staff and non-staff operating costs when compared to the trolleybus service. In summary, 53% of the savings arising from bus service rationalisation are attributed to savings in staff (driver) costs and 13% are attributed to savings in maintenance costs.

TABLE 11.2 PREFERRED OPTION ANNUAL OPERATING COSTS AND SAVINGS (PHASE 1)

<table>
<thead>
<tr>
<th>Cost Item (2010 prices)</th>
<th>Incurred Cost (£m)</th>
<th>Avoided Cost (£m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fuel (or electricity)</td>
<td>£0.24</td>
<td>£0.09</td>
</tr>
<tr>
<td>Oil</td>
<td>n/a</td>
<td>£0.00</td>
</tr>
<tr>
<td>Tyres</td>
<td>£0.09</td>
<td>£0.03</td>
</tr>
<tr>
<td>Maintenance</td>
<td>£0.39</td>
<td>£0.17</td>
</tr>
<tr>
<td>Insurance</td>
<td>£0.12</td>
<td>£0.06</td>
</tr>
<tr>
<td>Vehicle depreciation and notional interest</td>
<td>n/a</td>
<td>£0.25</td>
</tr>
<tr>
<td>Tax</td>
<td>£0.00</td>
<td>£0.01</td>
</tr>
<tr>
<td>Drivers’ salary and associated costs</td>
<td>£1.59</td>
<td>£0.63</td>
</tr>
<tr>
<td>Customer service/revenue protection</td>
<td>£0.90</td>
<td>n/a</td>
</tr>
<tr>
<td>Staff training</td>
<td>£0.19</td>
<td>£0.04</td>
</tr>
<tr>
<td>Administration staff and sundries</td>
<td>£1.70</td>
<td>n/a</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>£5.23</strong></td>
<td><strong>£1.27</strong></td>
</tr>
<tr>
<td><strong>Net Operating Costs</strong></td>
<td><strong>£3.96</strong></td>
<td></td>
</tr>
</tbody>
</table>

Source: Steer Davies Gleave, 2014
11.32. The maintenance profile costs have been calculated on an annual basis at Q2 2013 prices. The route assumed is the Design Freeze 7 preferred trolleybus route including new Park & Ride sites at Bodington and Stourton.

11.33. All costs have been estimated by separating the work items into specific maintenance disciplines. The costs are calculated using a method which takes into account the number of staff required for each maintenance item, the number of hours required per item and the assumed frequency of maintenance.

11.34. The work disciplines and the types of maintenance work included in the costs are assumed as follows:

- Overhead Line Equipment (OLE) Maintenance
- Off Route Infrastructure Maintenance (on fully segregated sections of route)
- Bridges and Structures
- Signalling and Systems
- Sub-stations
Depots and Stops

Heavy Vehicle Maintenance

11.35. Based on the assumptions outlined above, the infrastructure maintenance cost per annum for the Preferred Option is £2.0m (Q2 2013 prices).

Operating Costs of the Next Best Alternative

Description

11.36. The Next Best Alternative would be procured in a similar way as the Preferred Option as a stand-alone operating concession, utilising a Quality Contract rather than the TWAO concession powers of the Preferred Option. It would be introduced in addition to existing bus services. The operator reaction is also assumed to be the same as the Preferred Option.

Leasing Agreement

11.37. As for the Preferred Option, vehicles would be acquired through a leasing company which purchases the vehicles directly from the manufacturer. The Promoters would make lease payments which would be lower per vehicle than in the Preferred Option since the hybrid diesel-electric vehicles have a lower purchase price and lower renewal costs than trolleybuses.

11.38. The leasing contract will include a service quality regime in which the Promoters would pay additional sums to the contractor subject to the attainment of pre-defined key performance indicators. For the purpose of this Economic Case it has been assumed that the Promoters will pay an additional 10% of the maintenance costs to the leasing company to incentivise this service.

Operating Strategy

11.39. For the purposes of developing operating cost estimates, it has been assumed that the service pattern would be the same as NGT (see 2.6). However, unlike the Preferred Option, this service frequency is sufficient to meet the forecast Next Best Alternative demand in all time periods and therefore no additional services are required in the peak of the peak period.

11.40. The Next Best Alternative will require 24 plug-in hybrid diesel-electric vehicles including an allowance for spares and charge time at each end of the route. This alternative requires more vehicles than the Preferred Option due to the additional charge time.

Bus Network Rationalisation

11.41. The Next Best Alternative has the same route as the Preferred Option and therefore the same operator response has been assumed for both options.

Operating Costs and Savings

11.42. Annual operating costs for the Next Best Alternative are set out in Table 11.4. The total cost of £5.5m per annum (in 2010 prices) is higher than the
Preferred Option. This is due to the hybrid diesel-electric vehicles requiring charge time before each service therefore increasing the number of staff required to operate the service. Fuel costs are also higher since hybrid vehicles use diesel fuel (and consume oil) as well as electricity.

**TABLE 11.4** NEXT BEST ALTERNATIVE ANNUAL OPERATING COSTS AND SAVINGS

<table>
<thead>
<tr>
<th>Cost Item (2010 prices)</th>
<th>Incurred Cost (£m)</th>
<th>Avoided Cost (£m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fuel (or electricity)</td>
<td>£0.28</td>
<td>£0.09</td>
</tr>
<tr>
<td>Oil</td>
<td>£0.00</td>
<td>£0.00</td>
</tr>
<tr>
<td>Tyres</td>
<td>£0.09</td>
<td>£0.03</td>
</tr>
<tr>
<td>Maintenance</td>
<td>£0.39</td>
<td>£0.17</td>
</tr>
<tr>
<td>Insurance</td>
<td>£0.14</td>
<td>£0.06</td>
</tr>
<tr>
<td>Vehicle depreciation and notional interest</td>
<td>n/a</td>
<td>£0.25</td>
</tr>
<tr>
<td>Tax</td>
<td>£0.00</td>
<td>£0.01</td>
</tr>
<tr>
<td>Drivers’ salary and associated costs</td>
<td>£1.65</td>
<td>£0.63</td>
</tr>
<tr>
<td>Customer service/revenue protection</td>
<td>£1.02</td>
<td>n/a</td>
</tr>
<tr>
<td>Staff training</td>
<td>£0.22</td>
<td>£0.04</td>
</tr>
<tr>
<td>Administration staff and sundries</td>
<td>£1.70</td>
<td>n/a</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>£5.50</strong></td>
<td><strong>£1.27</strong></td>
</tr>
<tr>
<td><strong>Net Operating Costs</strong></td>
<td><strong>£4.23</strong></td>
<td></td>
</tr>
</tbody>
</table>

*Source: Steer Davies Gleave, 2014*

**Infrastructure Maintenance Costs**

11.43. The Next Best Alternative differs from the Preferred Option in terms of maintenance works for the following reasons:

- No overhead line equipment maintenance teams required
- Heavy maintenance to the trolleybus poles and high voltage contactors would not be required

11.44. The annual cost for maintenance works under this option is £1.6m (Q2 2013 prices).

**Operating Costs of the Low Cost Alternative**

**Description**

11.45. The Low Cost Alternative assumes a quality partnership between the bus operators and the Promoters which would retain Service 1 and Service 6 and introduce a new Park & Ride service to Stourton. All services would be
upgraded to use hybrid diesel bus vehicles rather than standard double-decker/articulated buses.

11.46. It is estimated that six hybrid diesel-electric buses (including spares) would be required for the new Park & Ride service.

Leasing Agreement

11.47. There would be no leasing agreement in this option since vehicles would be provided by the bus operator.

Operating Strategy

11.48. The frequency of Service 1 and Service 6 would be retained in this option. The new Park & Ride service would link Stourton Park & Ride to the University of Leeds with a service frequency of 8 buses per hour per direction throughout the day. All services would be Driver Only Operation.

11.49. Additionally, this service has less segregation than the Preferred Option and Next Best Alternative and is therefore assumed to have longer journey times.

Bus Network Rationalisation

11.50. As the Low Cost Alternative is an upgrade to existing bus services, there is no potential for associated bus service rationalisation.

Operating Costs and Savings

11.51. Annual operating costs for the Low Cost Alternative are set out in Table 11.5. The total cost of £1.6m per annum (in 2010 prices) is significantly lower than the Preferred Option and Next Best Alternative since this alternative utilises existing services and requires less investment in infrastructure.

11.52. Upgrading Service 1 and Service 6 to use hybrid diesel-electric vehicles increases operating costs by £0.1m per year. This includes savings made in fuel and tax costs (since hybrid vehicles are more efficient) and additional depreciation costs since hybrid vehicles have a higher purchase price.

11.53. The new Park & Ride service increases operating costs by £1.5m per year of which 52% is staff costs and the remainder service costs.
### TABLE 11.5  LOW COST ALTERNATIVE ANNUAL OPERATING COSTS AND SAVINGS

<table>
<thead>
<tr>
<th>Cost Item (2010 prices)</th>
<th>Incurred Cost (£m)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Park &amp; Ride</td>
</tr>
<tr>
<td>Fuel (or electricity)</td>
<td>£0.08</td>
</tr>
<tr>
<td>Oil</td>
<td>£0.00</td>
</tr>
<tr>
<td>Tyres</td>
<td>£0.03</td>
</tr>
<tr>
<td>Maintenance</td>
<td>£0.39</td>
</tr>
<tr>
<td>Insurance</td>
<td>£0.03</td>
</tr>
<tr>
<td>Vehicle depreciation and notional interest</td>
<td>£0.18</td>
</tr>
<tr>
<td>Tax</td>
<td>£0.00</td>
</tr>
<tr>
<td>Drivers’ salary and associated costs</td>
<td>£0.69</td>
</tr>
<tr>
<td>Customer service/revenue protection</td>
<td>n/a</td>
</tr>
<tr>
<td>Staff training</td>
<td>£0.10</td>
</tr>
<tr>
<td>Administration staff and sundries</td>
<td>n/a</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>£1.52</strong></td>
</tr>
<tr>
<td><strong>Net Operating Costs</strong></td>
<td><strong>£1.61</strong></td>
</tr>
</tbody>
</table>

*Source: Steer Davies Gleave, 2014*

### Infrastructure Maintenance Costs

11.54. The annual cost for maintenance works on the Low Cost Alternative is £0.7m (in Q2 2013 prices). This cost is less than the Preferred Option and Next Best Alternative since the route runs mainly on existing carriageway. Maintenance to overhead line equipment and a depot are also not required.
12. Demand and Revenue Forecasting

Introduction

12.1. This section of the Economic Case summarises the forecast demand and revenues of NGT and the associated alternatives, which have been generated using the Leeds Transport Model (LTM). The first part of this section describes how the demand and revenue forecasts were prepared for each option. The second part provides a summary of the results.

12.2. Development and refinement of LTM has continued since Programme Entry Reapproval. The updates applied have included addressing comments received from DfT on the forecasting framework.

Demand Forecasting

12.3. Demand forecasting was undertaken with the aid of a modelling structure comprising public transport, highway and mode choice sub-models (see Core Document C-1-351). Future year forecasts were derived using a demand growth tool, which is documented in Core Document C-1-852.

12.4. Models were prepared for the Preferred Option, the Next Best Alternative and the Low Cost Alternative. The impact of each ‘Do-Something’ option on demand and revenue was assessed by comparing the results against a Do-Minimum model representing the future situation without NGT in place, but including other schemes completed since the model base year (2008) and committed future schemes.

12.5. In each case, the model forecasts demand and revenue for 2016 and 2031. Forecasts for the scheme opening year of 2020 are interpolated from these model years. LTM forecasts represent three time periods:

- AM peak (07:00-10:00)
- Inter-peak (10:00-16:00)
- PM peak (16:00-18:00 for public transport, 16:00-19:00 for highway)

Overview of Demand Forecasting Process

12.6. Figure 12.1 illustrates the model structure within the LTM, comprising:

- **Demand Model** which determines the additional travel demand. This incorporates a choice model as set out in Figure 12.2, which distributes this demand by time of day, by mode and by destination. The model shows how demand changes between the Base Year and each forecast year.

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51 Leeds Transport Model Update Report, Aecom, 2014
52 Leeds Transport Model – Forecasting and NGT Central Case Report, Aecom, 2014
- **Sub-Mode Choice Model** which splits demand between existing public transport and public transport services that are new and of significantly higher quality.

- **Public Transport (PT) Assignment Model** to determine the public transport services used and therefore the generalised cost of travel for each public transport sub-mode (bus/rail and in Do-Something only, NGT including the public transport element of Park & Ride) for input to the Demand Model, Sub-Mode Choice Model and Parking Model.

- **Highway Assignment Model** to determine the highway routes used and the resulting generalised cost for input to the Demand Model and Parking Model.

- **Parking Model** which allocates parking demand to locations within the city centre as well as Park & Ride sites on the edge of the urban area.

**FIGURE 12.1 STRUCTURE OF THE LEEDS TRANSPORT MODEL (LTM)**

The same approach is applied to the Next Best Alternative. All of the processes are applied to the Low Cost Alternative with the exception of the Sub-Mode Choice Model, which is not appropriate since this alternative is an improvement to existing bus services.
Fare Assumptions

12.8. The following fare assumptions were adopted in the demand forecasting process:

- Fares increase in real terms at 3% per annum until 2014 and then at 1% thereafter
- Parking charges increase in real terms at 2% per annum until 2014 and then at 1% thereafter
- The shortest existing bus fare stage is not replicated for NGT (see Fares and Ticketing Strategy Table 11.1 for further information)

Forecasting Mode Shift

12.9. The Demand Model component of the LTM comprises a hierarchical logit structure and is applied incrementally for the following scenarios:

- **Do-Minimum bus and car demand**: The mode choice model is applied incrementally on the reference case demand (demand prior to impacts of travel costs) to forecast Do-Minimum public transport and car demand. This forecasts the mode shift and other demand effects of the ‘background’ changes in the relative costs of travel by car and public transport between the Base Year (2008) and the forecast years.
Do-Something NGT, bus and car demand: The mode choice model is applied incrementally on the Do-Minimum forecasts to forecast NGT, bus and car demand using the change in costs between the Do-Minimum and NGT models.

12.10. This method is also applied in the Sub-Mode Choice Model, which splits public transport demand between existing public transport and higher quality public transport services such as NGT.

Data Sources and Model Validation

12.11. The Demand Model determines additional total transport demand. This corresponds to demand totals in DfT’s NTEM 6.2 for the Leeds Authority area. The distribution of demand growth is taken from local planning forecasts (this is described in Core Document C-1-853).

12.12. Parameters for the mode choice model (within the Demand Model) and Sub-Mode Choice Model are based on the results of a Stated Preference (SP) survey carried out in 2008 (see Core Document C-4-2454) which investigated how travellers in Leeds valued a wide range of journey attributes.

12.13. The survey results were also used in the Public Transport Assignment Model. For example, the survey showed how passengers value new facilities, which will be introduced with NGT such as superior quality bus stops including CCTV, electronic service information and higher quality lighting and shelters.

12.14. Further details are provided in Core Document C-2-855 and Core Document C-1-356.

12.15. The major source of public transport data was provided by the Voyager public transport model, which forms part of the LTM. The Voyager model was constructed from a series of passenger interview surveys on all bus services in Leeds and passenger counts showing the number of people boarding and alighting these services.

12.16. The Base Year model was validated against independent bus passenger counts. The counts data verified that the demand flows in the base year public transport model meet the validation criteria outlined in WebTAG Unit 3.10.2. The model was calibrated against journey time data estimated from the on-board Automatic Vehicle location (AVL) data underpinning the West Yorkshire Real Time Information System. Further information about the Base Year Public Transport model validation can be found in Core Document C-1-357 and Core Document C-2-958.

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53 Leeds Transport Model – Forecasting and NGT Central Case Report, Aecom, 2014
54 Appendix 24: Stated Preference, Steer Davies Gleave, 2008
55 Appendix 8: LTM Public Transport Model Validation Report, Aecom, 2011
56 Leeds Transport Model Update Report, Aecom, 2014
57 Leeds Transport Model Update Report, Aecom, 2014
12.17. The major source of highway data was provided by the SATURN highway model, which forms part of the LTM. The SATURN model has been developed using an extensive programme of roadside interview surveys and traffic counts covering the main traffic movements within the Leeds urban area. Forecast traffic growth and committed highway infrastructure schemes have been added to the model to produce future year model versions for 2016 and 2031.

12.18. The Parking Model forecasts future parking usage based on current levels of demand obtained from survey data. Surveys were undertaken in 2009 at private and public car parks in the city centre and in 2013 at three key main Park & Ride sites on the edge of Leeds. The survey results showed average daily occupancy at each site.

12.19. The Parking Model is described in Core Document C-2-6\(^59\) and Core Document C-1-3\(^57\).

Run-Times

12.20. Run-times for the Preferred Option and associated alternatives have been estimated using a bespoke Run Time Assessment Model, which takes account of the level of congestion and the level of priority expected under each option. This model also predicts the future year run-times for buses on the corridors both with and without NGT.

12.21. The Run Time Assessment Model methodology is described in Core Document C-1-13.\(^60\)

12.22. Table 12.1, Table 12.2 and Table 12.3 show the forecast journey times for the Preferred Option compared to bus for the three modelled time periods. The forecast run-times for buses, if the NGT Project was not implemented, are provided for comparison.

12.23. In all time periods, this shows that NGT has a shorter run-time than bus due to increased segregation and priority at junctions. Between Bodington and Leeds, bus journey times are also improved with NGT as buses benefit from increased segregation shared with NGT. Between Belle Isle and Leeds, bus journey times are slightly longer.

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\(^59\) LTM Demand Model Validation Report, Aecom, 2011

\(^60\) Runtime Assessment Note, Steer Davies Gleave, 2013
12.24. It has been assumed that run-times for the Next Best Alternative would be the same as the Preferred Option since this would use the same alignment and would be given the same level of priority at junctions.

12.25. Run-times for the Low Cost Alternative would be longer than the Preferred Option since the new services would mainly run within highway traffic.

Representing the Impact of NGT

12.26. The addition of NGT services is represented by their inclusion in the Public Transport Assignment Model. This model provides travel costs for the Demand Model and Sub-Mode Choice Model, where mode shift to NGT is forecast. The bus network is rationalised in the Public Transport Assignment Model as described earlier in this document.
12.27. The impact of NGT on highway users is assessed by applying the resulting highway design/capacity changes within the Highway Assignment model. This model transfers the cost change to the Demand Model and the Parking Model. Iterations of the model allow the representation of the impact of highway travellers choosing to use improved public transport (or vice versa).

12.28. The Park & Ride element of the NGT Project is accounted for in the Parking Model, which allows suitable trips to be assigned to the new Park & Ride sites.

12.29. Any trip allocated to a Park & Ride site is split into two components; the highway trip to the site represented in the Highway Assignment Model and the public transport trip from the Park & Ride site represented in the Public Transport Assignment Model.

12.30. A description of the models in the LTM and the methodology can be found in the following documents:

   1. LTM Demand Model Validation Report (Core Document C-2-6)\textsuperscript{61}
   2. LTM Highway Model Validation Report (Core Document C-2-7)\textsuperscript{62}
   3. LTM Public Transport Model Validation Report (Core Document C-2-8)\textsuperscript{63}
   4. LTM Forecasting and NGT Central Case Report (Core Document C-1-8)\textsuperscript{64}

12.31. The changes that have been made to the LTM since the March 2012 submission and the impact of these changes are described in Core Document C-1-3.\textsuperscript{65}

**Demand and Revenue Forecasting Results – Preferred Option**

12.32. The market for NGT (the demand that could use the system) is drawn from three sources:

1. **Existing public transport demand:** NGT users who transfer from existing public transport services including bus and rail

2. **Park & Ride demand:** NGT users who transfer from car but access NGT by car using the sites at Bodington or Stourton

3. **Transfer demand:** NGT users who transfer from car and access NGT either by walking or by other public transport services. Also, NGT users who transfer from Active Modes (includes walking and cycling)

12.33. Table 12.4 and Table 12.5 summarise the 2016 demand and revenue forecasts for the Preferred Option. For each time period, the demand and revenue forecasts represent an average hour in that period.

\textsuperscript{61} LTM Demand Model Validation Report, Aecom, 2011
\textsuperscript{62} LTM Highway Model Validation Report, Aecom, 2011
\textsuperscript{63} Appendix 8: LTM Public Transport Model Validation Report, Aecom, 2011
\textsuperscript{64} Leeds Transport Model – Forecasting and NGT Central Case Report, Aecom, 2014
\textsuperscript{65} Leeds Transport Model Update Report, Aecom, 2014
TABLE 12.4 NGT PREFERRED OPTION DEMAND FORECASTS 2016

<table>
<thead>
<tr>
<th>NGT Demand Source</th>
<th>AM Peak Hour</th>
<th>Interpeak Average Hour</th>
<th>PM Peak Hour</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transfer from existing P&amp;R Sites</td>
<td>23</td>
<td>4</td>
<td>13</td>
</tr>
<tr>
<td>New P&amp;R Trips from car</td>
<td>507</td>
<td>329</td>
<td>342</td>
</tr>
<tr>
<td>Transfer from Bus</td>
<td>1,190</td>
<td>1,426</td>
<td>1,574</td>
</tr>
<tr>
<td>Transfer from Rail</td>
<td>119</td>
<td>75</td>
<td>155</td>
</tr>
<tr>
<td>Existing Bus trips that Interchange with NGT</td>
<td>391</td>
<td>593</td>
<td>531</td>
</tr>
<tr>
<td>Existing Rail trips that Interchange with NGT</td>
<td>214</td>
<td>122</td>
<td>220</td>
</tr>
<tr>
<td>New PT Trips from car/active modes</td>
<td>151</td>
<td>346</td>
<td>533</td>
</tr>
<tr>
<td><strong>Total NGT demand</strong></td>
<td><strong>2,595</strong></td>
<td><strong>2,895</strong></td>
<td><strong>3,368</strong></td>
</tr>
</tbody>
</table>

Source: Aecom, 2014

TABLE 12.5 NGT PREFERRED OPTION REVENUE FORECASTS 2016

<table>
<thead>
<tr>
<th>NGT Demand Source</th>
<th>AM Peak Hour</th>
<th>Interpeak Average Hour</th>
<th>PM Peak Hour</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total NGT Demand</td>
<td>2,595</td>
<td>2,895</td>
<td>3,368</td>
</tr>
<tr>
<td>Total NGT Revenue</td>
<td>£4,986</td>
<td>£3,417</td>
<td>£5,172</td>
</tr>
<tr>
<td>Average Yield</td>
<td>£1.92</td>
<td>£1.18</td>
<td>£1.54</td>
</tr>
</tbody>
</table>

Source: Aecom, 2014

12.34. The resulting average yield per NGT passenger is £1.92 in the AM peak, £1.18 in the inter-peak and £1.54 in the PM peak using projected year 2016 fares in 2010 prices. These values reflect the proportion of concessionary travellers in each time period and are considered to be credible in comparison to existing bus fares over similar distances.

Demand and Revenue Forecasting Results – Next Best Alternative

12.35. The market for the Next Best Alternative is drawn from the same five sources as the Preferred Option (see 12.32).

12.36. Table 12.6 and Table 12.7 summarise the 2016 demand and revenue forecasts for the Next Best Alternative. For each time period, the demand and revenue forecasts represent an average hour in that period.
TABLE 12.6  NEXT BEST ALTERNATIVE DEMAND FORECASTS 2016

<table>
<thead>
<tr>
<th>NBA Demand Source</th>
<th>AM Peak Hour</th>
<th>Interpeak Average Hour</th>
<th>PM Peak Hour</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transfer from existing P&amp;R Sites</td>
<td>13</td>
<td>2</td>
<td>7</td>
</tr>
<tr>
<td>New P&amp;RTrips from car</td>
<td>364</td>
<td>224</td>
<td>247</td>
</tr>
<tr>
<td>Transfer from Bus</td>
<td>946</td>
<td>1,145</td>
<td>1,318</td>
</tr>
<tr>
<td>Transfer from Rail</td>
<td>51</td>
<td>87</td>
<td>27</td>
</tr>
<tr>
<td>Existing Bus trips that Interchange with NBA</td>
<td>208</td>
<td>360</td>
<td>295</td>
</tr>
<tr>
<td>Existing Rail trips that Interchange with NBA</td>
<td>103</td>
<td>65</td>
<td>115</td>
</tr>
<tr>
<td>New PT Trips from car/active modes</td>
<td>94</td>
<td>162</td>
<td>388</td>
</tr>
<tr>
<td><strong>Total NBA demand</strong></td>
<td><strong>1,779</strong></td>
<td><strong>2,045</strong></td>
<td><strong>2,397</strong></td>
</tr>
</tbody>
</table>

*Source: Aecom, 2014*

TABLE 12.7  NEXT BEST ALTERNATIVE REVENUE FORECASTS 2016

<table>
<thead>
<tr>
<th>NGT Demand Source</th>
<th>AM Peak Hour</th>
<th>Interpeak Average Hour</th>
<th>PM Peak Hour</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total NGT Demand</td>
<td>1,779</td>
<td>2,045</td>
<td>2,397</td>
</tr>
<tr>
<td>Total NGT Revenue</td>
<td>£3,426</td>
<td>£2,401</td>
<td>£3,673</td>
</tr>
<tr>
<td>Average Yield</td>
<td>£1.93</td>
<td>£1.17</td>
<td>£1.53</td>
</tr>
</tbody>
</table>

*Source: Aecom, 2014*

12.37. The resulting average yield per scheme passenger is £1.93 in the AM peak, £1.17 in the inter-peak and £1.53 in the PM peak using projected year 2016 fares in 2010 prices, very similar to the Preferred Option as would be expected. These values reflect the proportion of concessionary travellers in each time period.

**Demand and Revenue Forecasting Results – Low Cost Alternative**

12.38. Table 12.8 and Table 12.9 summarise the 2016 demand and revenue forecasts for the additional Park & Ride service in the Low Cost Alternative. For each time period, the demand and revenue forecasts represent an average hour in that period.
12.39. The resulting average yield per Park & Ride service passenger is £1.43 in the AM peak, £1.20 in the inter-peak and £2.44 in the PM peak using projected year 2016 fares in 2010 prices. These values reflect the proportion of concessionary travellers in each time period. The average yields are higher than the Preferred Option because the Park & Ride service does not pick up short distance trips; they are considered to be credible.

### Annualisation of Demand and Benefits

12.40. In order to use the demand and revenue forecasts in the Economic Appraisal, they need to be annualised to be consistent with other inputs. Separate annualisation factors have been calculated for each time period, based on the number of times that period occurs in a year. Further information about the annualisation process is provided in Core Document C-1-2.66

12.41. Table 12.10 shows the annualisation factors for public transport and highway. Park & Ride annualisation factors have been based on the same values as derived for public transport trips.

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66 Annualisation Report, Aecom, 2014
12.42. The LTM forecasts demand which is directly equivalent to a 12 hour weekday period (07:00-19:00). Other factors are applied to account for time outside this period, allowing for the material difference in vehicle type and/or journey purpose splits at these times.

12.43. For freight travel, the adjustments vary by vehicle type since the proportion of trips made at the weekend compared to a 12 hour weekday varies depending on the type of vehicle. These adjustments are shown in Table 12.11.

**TABLE 12.11  ANNUALISATION FACTORS ADJUSTMENT – FREIGHT**

<table>
<thead>
<tr>
<th>Vehicle Type</th>
<th>12hr &gt; 24hr</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light Goods Vehicles</td>
<td>1.63</td>
</tr>
<tr>
<td>Ordinary Goods Vehicles (Class 1)</td>
<td>1.37</td>
</tr>
<tr>
<td>Ordinary Goods Vehicles (Class 2)</td>
<td>1.36</td>
</tr>
</tbody>
</table>

Source: Aecom, 2013

12.44. For highway car travel and public transport travel, the annualisation factors differ by journey purpose since the amount of trips made at the weekend compared to a 12 hour weekday also varies by journey purpose. These adjustments are shown in Table 12.12 and Table 12.13.

**TABLE 12.12  ANNUALISATION FACTORS ADJUSTMENT – HIGHWAY (CAR)**

<table>
<thead>
<tr>
<th>Vehicle Type</th>
<th>12hr &gt; 24hr</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commuting</td>
<td>2.22</td>
</tr>
<tr>
<td>Education</td>
<td>1.92</td>
</tr>
<tr>
<td>NW Other HB</td>
<td>1.92</td>
</tr>
<tr>
<td>NW Other NHB</td>
<td>1.92</td>
</tr>
<tr>
<td>Business HB</td>
<td>1.26</td>
</tr>
<tr>
<td>Business NHB</td>
<td>1.26</td>
</tr>
</tbody>
</table>

Source: Aecom, 2013
TABLE 12.13  ANNUALISATION FACTORS ADJUSTMENT – PUBLIC TRANSPORT

<table>
<thead>
<tr>
<th>Vehicle Type</th>
<th>12hr &gt; 24hr</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commuting</td>
<td>2.09</td>
</tr>
<tr>
<td>Education</td>
<td>1.82</td>
</tr>
<tr>
<td>NW Other HB</td>
<td>1.82</td>
</tr>
<tr>
<td>NW Other NHB</td>
<td>1.82</td>
</tr>
<tr>
<td>Business HB</td>
<td>1.24</td>
</tr>
<tr>
<td>Business NHB</td>
<td>1.24</td>
</tr>
</tbody>
</table>

Source: Aecom, 2013

Annual Demand and Revenue Forecasts

12.45. Annualised demand and revenue estimates for the Preferred Option are presented in Table 12.14. Comparative forecasts for the Next Best Alternative and Low Cost Alternative are set out in Table 12.15. The Low Cost Alternative shows demand and revenue for the additional Park & Ride service only for comparability.

TABLE 12.14  NGT PREFERRED OPTION DEMAND AND REVENUE FORECASTS 2016

<table>
<thead>
<tr>
<th>Demand Source</th>
<th>Weekday peak periods (m)</th>
<th>Interpeak and off-peak (m)</th>
<th>Annual (m) Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transfer from existing P&amp;R Sites</td>
<td>0.02</td>
<td>0.01</td>
<td>0.04</td>
</tr>
<tr>
<td>New P&amp;R Trips from car</td>
<td>0.57</td>
<td>0.92</td>
<td>1.48</td>
</tr>
<tr>
<td>Transfer from Bus</td>
<td>1.73</td>
<td>3.97</td>
<td>5.69</td>
</tr>
<tr>
<td>Transfer from Rail</td>
<td>0.17</td>
<td>0.21</td>
<td>0.38</td>
</tr>
<tr>
<td>Existing Bus trips that Interchange with NGT</td>
<td>0.57</td>
<td>1.65</td>
<td>2.22</td>
</tr>
<tr>
<td>Existing Rail trips that Interchange with NGT</td>
<td>0.28</td>
<td>0.34</td>
<td>0.62</td>
</tr>
<tr>
<td>New PT Trips from car/active modes</td>
<td>0.39</td>
<td>0.96</td>
<td>1.35</td>
</tr>
<tr>
<td>Total Demand</td>
<td>3.73</td>
<td>8.05</td>
<td>11.79</td>
</tr>
<tr>
<td>Total Revenue</td>
<td>£6.51</td>
<td>£9.51</td>
<td>£16.02</td>
</tr>
<tr>
<td>Average Yield</td>
<td>£1.74</td>
<td>£1.18</td>
<td>£1.36</td>
</tr>
</tbody>
</table>

Source: Aecom, 2014
### TABLE 12.15  ALTERNATIVES COMPARATIVE DEMAND AND REVENUE FORECASTS 2016

<table>
<thead>
<tr>
<th>Demand Source</th>
<th>Preferred Option (m)</th>
<th>Next Best Alternative (m)</th>
<th>Low Cost Alternative (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transfer from existing P&amp;R Sites</td>
<td>0.04</td>
<td>0.02</td>
<td>0.01</td>
</tr>
<tr>
<td>New P&amp;R Trips</td>
<td>1.48</td>
<td>1.03</td>
<td>0.33</td>
</tr>
<tr>
<td>Transfer from Bus</td>
<td>5.69</td>
<td>4.59</td>
<td>0.00</td>
</tr>
<tr>
<td>Transfer from Rail</td>
<td>0.38</td>
<td>0.30</td>
<td>0.00</td>
</tr>
<tr>
<td>Existing Bus trips that Interchange with NGT</td>
<td>2.22</td>
<td>1.31</td>
<td>0.00</td>
</tr>
<tr>
<td>Existing Rail trips that Interchange with NGT</td>
<td>0.62</td>
<td>0.32</td>
<td>0.00</td>
</tr>
<tr>
<td>New PT Trips from car/active modes</td>
<td>1.35</td>
<td>0.72</td>
<td>0.00</td>
</tr>
<tr>
<td><strong>Total Demand</strong></td>
<td><strong>11.79</strong></td>
<td><strong>8.29</strong></td>
<td><strong>0.34</strong></td>
</tr>
<tr>
<td><strong>Total Revenue</strong></td>
<td><strong>£16.02</strong></td>
<td><strong>£11.21</strong></td>
<td><strong>£0.47</strong></td>
</tr>
<tr>
<td><strong>Average Yield</strong></td>
<td><strong>£1.36</strong></td>
<td><strong>£1.35</strong></td>
<td><strong>£1.37</strong></td>
</tr>
</tbody>
</table>

*Source: Aecom, 2014*
13. Economic Impacts

Introduction

13.1. This section is the first of four that describe the results of the Value for Money assessment that has been undertaken to identify and where feasible, quantify and/or monetise:

- The benefits and disbenefits of the Preferred Option (and alternatives)
- The costs of the Preferred Option (and alternatives)

13.2. The process has been undertaken for all three options described in this Business Case Review, comprising the Preferred Option, Next Best Alternative and Low Cost Alternative.

13.3. This section summarises the performance of the Preferred Option and associated alternatives against the following Economic Objectives:

- Impact on Business Users and Transport Providers
- Reliability Impact on Business Users
- Regeneration
- Wider Impacts

13.4. Where possible, the impact of each objective has been monetised for use in the economic appraisal. If a quantitative assessment is not available, DfT’s standard scoring system has been applied to describe the predicted economic impacts of the Preferred Option (and alternatives). This system works by assigning one of the following qualitative scores to each of the economic objectives included in this appraisal process:

- Strong adverse
- Moderate adverse
- Slight adverse
- Neutral
- Slight beneficial
- Moderate beneficial
- Strong beneficial

Impact on Business Users and Transport Providers

Introduction

13.5. The impact of the Preferred Option and its associated alternatives has been assessed in accordance with WebTAG Unit 3.5.2. This section summarises
the impact on Business Users and Transport Providers. The impact on Commuting and Other Users is covered in Section 15.

Methodology

13.6. The impact on business users and transport providers has been considered separately for:

- Public Transport users (bus, rail and NGT)
- Road users (business cars, light goods vehicles and heavy goods vehicles)
- Transport Providers (scheme operator, bus operator, rail operator, vehicle leasing company and construction contractor(s))

13.7. Public transport and highway benefits have been calculated using the Transport User Benefit Appraisal (TUBA) software based on outputs from the LTM. This method is described in Core Document C-1-17.\(^{67}\)

13.8. Business users have a high value of time so any time benefits/disbenefits to this user group have a material impact on the economic appraisal, even though the proportion of users travelling for business is significantly less than the proportion of users travelling for other purposes.

13.9. The impact on public transport users includes changes in travel time and changes to user charges (fares).

13.10. The road user impact includes changes in travel time (including time savings derived in the parking model), vehicle operating costs derived from TUBA and changes in user charges (parking costs). Vehicle operating costs increase if journey distances increase since longer trips use more fuel and therefore cost more to the user.

13.11. The impact on Transport Providers includes the cost of building and operating the scheme; purchasing, maintaining and renewing vehicles; and changes to operator revenue. Certain costs, including revenue are balanced by grant funding from the public sector because the Promoters have elected to take revenue risk for NGT services.

13.12. Parking model impacts are derived in the parking model, described in Core Document C-2-6\(^{68}\) and Core Document C-1-3.\(^{69}\)

13.13. The infrastructure investment costs included in the appraisal of all three options have been derived including an assumption of 6% contractors’ profit, which would remain in the private sector as an economic benefit. The operating costs also assume a 5% profit on operating costs and a 10% uplift on costs to account for a service incentive regime.

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67 TUBA Application Report, Aecom, 2014
68 LTM Demand Model Validation Report, Aecom, 2011
69 Leeds Transport Model Update Report, Aecom, 2014
The Do-Minimum Scenario

13.14. This includes the impact of committed infrastructure changes and underlying conditions that are expected to materialise if NGT is not implemented, for example the demand effects of the ‘background’ changes in the relative costs of travel by car and public transport between the Base Year (2008) and the forecast years. A list of transport infrastructure ‘supply’ changes included within highway and public transport model Do-Minimum scenarios can be found in Core Document C-1-8.\(^70\)

Impacts of the Preferred Option

Public Transport Users

13.15. Business Public Transport users are forecast to benefit from the improvements to the transport system resulting from the introduction of NGT. Although the proportion of public transport users travelling for business is fairly small, business users have a high value of time so still have a material impact on the value for money assessment.

13.16. Passengers switching to NGT will benefit from a faster, more frequent and more punctual service which is of higher quality than existing bus services. NGT will be largely segregated from highway traffic resulting in a more punctual service with an assumed average wait time of three minutes on the core section of route.

13.17. Some of the additional segregation will be available to bus services resulting in benefits for bus users as well as NGT users.

13.18. Some users will disbenefit from the rationalisation of existing bus services. The services which will be reduced run parallel with NGT over the majority of their length, therefore this impact will be restricted to a limited number of stops which are less used. These impacts have been included within the model and therefore are taken into account in the economic appraisal.

13.19. Rail users will benefit from less crowding (in the peak period) as some passengers switch from rail to NGT. The LTM outputs which are used within the TUBA analysis represent a combined public transport mode; all rail passenger impacts are included within the economic appraisal combined with bus passenger impacts.

13.20. The impact of the Preferred Option on public transport users is presented in Table 13.1. This shows that public transport users receive a disbenefit from higher user charges with the Preferred Option. This is expected to be caused by users switching from existing bus services to NGT and paying a higher fare either because they are travelling a short distance (NGT has been modelled as having higher fares for short-hop trips) or because they interchange onto an NGT service incurring a second fare.

\(^70\) Leeds Transport Model – Forecasting and NGT Central Case Report, Aecom, 2014
**Road Users**

13.21. In the main, any disbenefit caused by reallocation of capacity from highway to public transport and priority to NGT at some junctions will be offset by mode shift from highway to public transport. The net impact is a modest time disbenefit to road users and a small increase in vehicle km travelled.

13.22. Road user charges decrease slightly in the Preferred Option since mode shift from car to NGT (or NGT Park & Ride) reduces the demand for city centre parking which increases capacity allowing users to switch to an alternative car park with potentially lower charges.

13.23. The impact of the Preferred Option on road users is presented in Table 13.1.

**TABLE 13.1 BUSINESS USER IMPACT BY MODE – PREFERRED OPTION**

<table>
<thead>
<tr>
<th>2010 Prices PV (000)</th>
<th>Road Users</th>
<th>Public Transport Users</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Travel Time</td>
<td>-£38,760</td>
<td>£20,562</td>
<td>-£18,198</td>
</tr>
<tr>
<td>Vehicle Operating Costs</td>
<td>-£3,756</td>
<td>0</td>
<td>-£3,756</td>
</tr>
<tr>
<td>User Charges</td>
<td>£659</td>
<td>-£1,282</td>
<td>-£623</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>-£41,858</td>
<td>£19,280</td>
<td>-£22,578</td>
</tr>
</tbody>
</table>

*Source: Steer Davies Gleave, 2014*

**Transport Providers**

13.24. The NGT Operator impact includes the cost of building and operating NGT, which is received in a grant from the public sector. The operator is assumed to receive 5% profit on operating costs and a 10% uplift on costs to account for a service incentive regime. Estimated construction costs include a 6% profit which is retained by the contractor. The net impact on the NGT operator is positive.

13.25. The expected revenue from the NGT service is not included in the figures below but is instead shown in the Public Accounts Impacts (Section 16).

13.26. The current assumption is that a vehicle leasing company will purchase, renew and maintain the trolleybuses. The purchase and renewals costs will be covered by lease payments which the leasing company will receive from the Promoters. It is assumed that annual maintenance costs are charged to the Promoters directly. The manufacturer is assumed to make 6% profit on vehicle costs and the leasing company 10% profit on maintenance costs, in addition to the leasing charges. The net impact on the leasing company is positive.

13.27. When NGT is introduced, it is forecast to abstract revenue from existing bus operators. The Promoters have elected to take revenue risk for NGT services and therefore this revenue is transferred to the public sector. In response to revenue abstraction, it has been assumed that the existing bus network will be rationalised and that the bus operators will partially offset the
impact by reducing their Operating Costs. The net impact on bus operators is negative.

13.28. It is assumed that any loss of private sector rail revenue arising from abstraction from rail will accrue to Central Government. These impacts will be captured by DfT’s rolling refranchising programme.

13.29. The impact on Transport Providers is summarised in Table 13.2. This shows that the net impact of NGT on transport providers is a benefit of £33m PV.

**TABLE 13.2 IMPACT ON TRANSPORT PROVIDERS – PREFERRED OPTION**

<table>
<thead>
<tr>
<th>2010 Prices PV (000)</th>
<th>NGT</th>
<th>Bus</th>
<th>Rail</th>
<th>Leasing Company</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revenue</td>
<td>-£300,663</td>
<td>-£38,579</td>
<td>-£339,242</td>
<td></td>
<td>-£339,242</td>
</tr>
<tr>
<td>Operating Costs</td>
<td>-£127,435</td>
<td>£33,700</td>
<td></td>
<td>-£26,345</td>
<td>-£120,080</td>
</tr>
<tr>
<td>Investment Costs</td>
<td>-£223,958</td>
<td></td>
<td></td>
<td>-£50,201</td>
<td>-£274,159</td>
</tr>
<tr>
<td>Grant/Subsidy</td>
<td>£383,861</td>
<td>£38,579</td>
<td></td>
<td>£110,064</td>
<td>£532,505</td>
</tr>
<tr>
<td>Net Business Impact</td>
<td>£32,468</td>
<td>-£266,963</td>
<td>£0</td>
<td>£33,518</td>
<td>-£200,976</td>
</tr>
</tbody>
</table>

*Source: Steer Davies Gleave, 2014*

**Impacts of the Next Best Alternative**

**Business Public Transport Users**

13.30. The Next Best Alternative will benefit public transport users by offering a faster, more frequent and more reliable service compared to existing bus services. The benefits will be less than the Preferred Option since the service offered, operating as a conventional diesel bus for around half of the route distance, will be perceived as lower quality than NGT.

13.31. Some users will disbenefit from the rationalisation of existing bus services, which is assumed with the scheme over the longer term. The level of rationalisation assumed is the same as for the Preferred Option.

13.32. Rail users will benefit from less crowding due to mode shift from rail to NBA but this will be to a lesser extent than the Preferred Option.

**Road Users**

13.33. The disbenefits to road users travelling for business are slightly less for the Next Best Alternative compared to the Preferred Option. However, these disbenefits only represent a small proportion of the total benefits (-£42m out of £448m PV total benefit in the Preferred Option and -£32m out of £181m PV in the Next Best Alternative) so this change has little effect on the Business Case for each option. Estimating such small impacts also approaches the limits of accuracy of the model.

13.34. The impact on business users is presented in Table 13.3.
The Next Best Alternative introduces additional services, which would be funded by the Promoters, who would retain the revenue. The Promoters would benefit from lower investment costs in comparison to the Preferred Option due to reduced infrastructure investment and a lower purchase price per vehicle. However, the scheme would be perceived as lower quality than the Preferred Option and therefore attract fewer passengers and generate less revenue.

The expected revenue from this service is not included in the figures below but is instead shown in the Public Accounts Impacts (Section 16).

The scheme operators would benefit from reduced Operating Costs but would also generate less profit (assumed to be 5% of Operating Costs) from these services.

As with the Preferred Option, this alternative allows participating bus services to use some of the new segregated sections. This is expected to reduce bus journey times and therefore increase revenue to the bus operator.

The impact on the rail operator differs from the Preferred Option since rail revenue increases with the scheme, the generative impact of improved services to/from Leeds City Station outweighing the loss to Park & Ride in this case.

The impact on Transport Providers is presented in Table 13.4. This shows that the net impact of the Next Best Alternative scheme on business travellers is a benefit of £32m PV.
TABLE 13.4  IMPACT ON TRANSPORT PROVIDERS – NEXT BEST ALTERNATIVE

<table>
<thead>
<tr>
<th>2010 Prices PV (000)</th>
<th>Scheme</th>
<th>Bus</th>
<th>Rail</th>
<th>Leasing Company</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revenue</td>
<td>-£251,957</td>
<td>£9,519</td>
<td></td>
<td></td>
<td>-£242,438</td>
</tr>
<tr>
<td>Operating Costs</td>
<td>-£130,256</td>
<td>£33,700</td>
<td>-£25,870</td>
<td>-£122,426</td>
<td></td>
</tr>
<tr>
<td>Investment Costs</td>
<td>-£202,659</td>
<td></td>
<td>-£40,011</td>
<td>-£242,671</td>
<td></td>
</tr>
<tr>
<td>Grant/Subsidy</td>
<td>£364,787</td>
<td>-£9,519</td>
<td>£80,317</td>
<td>£435,585</td>
<td></td>
</tr>
<tr>
<td>Net Business Impact</td>
<td>£31,872</td>
<td>-£218,257</td>
<td>£0</td>
<td>£14,436</td>
<td>-£171,950</td>
</tr>
</tbody>
</table>

Source: Steer Davies Gleave, 2014

Impacts of the Low Cost Alternative

Public Transport Users

13.41. The Low Cost Alternative introduces a Park & Ride option on the NGT corridors but unlike the Preferred Option and Next Best Alternative, this option provides no significant improvements in quality or service reliability. Journey times are expected to improve slightly with this option but the improvements are modest since the new services will not be segregated from highway traffic. The benefits to public transport users are therefore limited.

Road Users

13.42. The disbenefits to road users will be less than the Preferred Option since the Low Cost Alternative has significantly less infrastructure. Improvements in radial capacity at key junctions will lead to increases in journey length and time for orbital movements, for example where turns are banned. The introduction of a new Park & Ride service would also result in increased congestion to some extent. The overall impact on road users is presented in Table 13.5.

TABLE 13.5 IMPACT ON BUSINESS USERS – LOW COST ALTERNATIVE

<table>
<thead>
<tr>
<th>2010 Prices PV (000)</th>
<th>Road Users</th>
<th>Public Transport Users</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Travel Time</td>
<td>-£28,907</td>
<td>£1,698</td>
<td>-£27,209</td>
</tr>
<tr>
<td>Vehicle Operating Costs</td>
<td>-£2,029</td>
<td>£0</td>
<td>-£2,029</td>
</tr>
<tr>
<td>User Charges</td>
<td>-£6</td>
<td>-£117</td>
<td>-£123</td>
</tr>
<tr>
<td>Total</td>
<td>-£30,942</td>
<td>£1,581</td>
<td>-£29,361</td>
</tr>
</tbody>
</table>

Source: Steer Davies Gleave, 2014
Transport Providers

13.43. The scheme operator will benefit from reduced Operating and Investment costs with this option but the revenue generated by the scheme will be significantly less than the other options.

13.44. The impact on Bus Operators will be significantly less than the Preferred Option since operators will receive additional revenue from Service 1 and Service 6 rather than a reduction in revenue due to rationalisation. The operating costs will increase but the cost of operating the additional Park & Ride service to Stourton will be subsidised by local government.

13.45. The impact on rail operators will be minimal since few passengers are expected to switch from rail to Service 1, Service 6 or the new Park & Ride service.

13.46. The impact on Transport Providers is presented in Table 13.6. This shows that the net impact of the Low Cost Alternative scheme on business travellers is a benefit of £8m PV.

<table>
<thead>
<tr>
<th>2010 Prices PV (000)</th>
<th>Scheme</th>
<th>Bus</th>
<th>Rail</th>
<th>Leasing Company</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revenue</td>
<td>£386</td>
<td>-£2,532</td>
<td></td>
<td>-£2,146</td>
<td></td>
</tr>
<tr>
<td>Operating Costs</td>
<td>-£42,094</td>
<td>-£2,094</td>
<td></td>
<td>£0</td>
<td>-£44,188</td>
</tr>
<tr>
<td>Investment Costs</td>
<td>-£53,442</td>
<td></td>
<td></td>
<td>£0</td>
<td>-£53,442</td>
</tr>
<tr>
<td>Grant/Subsidy</td>
<td>£103,649</td>
<td>£2,532</td>
<td></td>
<td>£0</td>
<td>£106,181</td>
</tr>
<tr>
<td>Net Business Impact</td>
<td>£8,113</td>
<td>-£1,708</td>
<td></td>
<td>£0</td>
<td>£6,405</td>
</tr>
</tbody>
</table>

Source: Steer Davies Gleave, 2014

Reliability Impact on Business Users

Introduction

13.47. NGT (and the Next Best Alternative) is anticipated to improve the reliability of bus services in the NGT corridors. This is due to increased segregation, junction priority and improved ticketing arrangements some of which will be available to bus services as well as NGT.

13.48. This section presents the reliability benefits of the Preferred Option as well as the Next Best and Low Cost alternatives on Business Users.

Methodology

13.49. A study was undertaken on behalf of Metro and LCC, in parallel to the preparation of the 2009 Major Scheme Business Case, investigating the levels of travel time punctuality on bus services in Leeds and how they could improve as a result of the NGT Project.
13.50. The study examined day-to-day variations in travel times on bus services in Leeds, based on information from the Automatic Vehicle Location (AVL) system which was introduced to provide data for Real Time Information displays. For each route, segments between consecutive stops were analysed for each departure throughout the day.

13.51. This analysis was combined with Stated Preference research undertaken in 2008 examining travellers’ attitudes to punctuality, (see Core Document C-4-24 for further information).

13.52. The joint knowledge from these studies was applied to the demand and travel time data from the Leeds Transport Model to calculate the impact of the Preferred Option and associated alternatives on punctuality. TUBA was used to monetise these passenger punctuality benefits. The methodology is explained in Core Document C-1-11.

13.53. Reliability also has an impact on other highway users such as private cars, goods vehicles and existing bus services. This impact has been assessed qualitatively for each option.

The Do-Minimum Scenario

13.54. Bus punctuality was the second most common transport problem stated in responses to the 2008 consultation exercise. This validated the Stated Preference research which derived high values for ‘bus earliness at origin’ and ‘lateness at destination’ which represent punctuality in the NGT forecasts.

13.55. If no major transport scheme is implemented, general punctuality is expected to continue to deteriorate on the NGT corridors as congestion increases over time. This is discussed further in Section 3. The existing bus priority measures on the NGT corridors do not isolate buses from this effect to any great degree.

Impacts of the Preferred Option

13.56. It is considered that signalised junction improvements included within the NGT Project will increase reliability for road users. This will benefit goods vehicles as well as road users travelling for business (either by car or by public transport).

13.57. NGT will also improve reliability of existing bus services due to the increase in segregation and the change in priority allocation at some junctions. The punctuality of bus services on the corridor has been forecast using the method described above and the punctuality benefits to business users has been quantified. The analysis shows that the Preferred Option will generate £2m PV of punctuality benefits to business users over the appraisal period. The punctuality benefits for Commuting and Other Users are presented in Section 15 (Reliability Impact on Commuting and Other Users).

72 NGT Punctuality Report, Steer Davies Gleave, 2014
Impacts of the Next Best Alternative

13.58. The Next Best Alternative offers the same improvements in road infrastructure as the Preferred Option and is therefore expected to offer similar improvements in reliability to road users travelling for business although somewhat reduced in scale because less mode shift is forecast.

13.59. The punctuality of existing bus services has been assessed in the same way as the Preferred Option using the same travel time data. The Next Best Alternative is expected to generate £2m PV of punctuality benefits to business users.

Impacts of the Low Cost Alternative

13.60. The design of the Low Cost alternative includes key junction improvements from the Preferred Option, but because of the limited mode shift forecast for this option it is not expected to improve reliability for road users. Existing bus services will not benefit from increased segregation. The qualitative impact assessment is assessed as neutral.

Regeneration

Introduction

13.61. LCC has a long standing policy to promote neighbourhood regeneration across the city, with a particular focus on deprived neighbourhoods to the south of the city centre.

13.62. A number of sites across Leeds have been identified for major change. These are identified within the following Area Action Plans (AAPs), Planning Statements and Regeneration Priority Areas (RPAs):

- **Aire Valley Leeds AAP**: The Aire Valley will become an innovative new living and working community within a distinctive green environment. The intention is that it will be a national model for sustainable development, accommodating between 20,000 and 40,000 new jobs in addition to the existing 15,000 jobs, and between 20,000 and 40,000 new homes

- **South Bank Planning Statement**: The South Bank Planning Statement was developed by LCC and adopted in October 2011. It provides clarity for development aspirations for ‘common infrastructure’ (i.e. park and public realm elements). This is seen as a means to reconnect South Bank with the city centre and surrounding neighbourhoods

- **Leeds RPAs**: These focus on areas where there is a concentration of neighbourhoods performing below city and national averages and are designed to target issues that collectively cause under-performance amongst communities. Four RPAs have been designated in Inner South Leeds, East Leeds, Leeds Bradford Corridor (including West Leeds Gateway) and South Leeds
13.63. The NGT Route will pass through and directly serve:

- The Leeds South Bank area, which lies to the south-east of Leeds City Station
- The western part of the Aire Valley Leeds AAP
- The north-eastern part of the South Leeds RPA
- The New Dock regeneration area, which hosts a number of growing commercial outlets and visitor attractions (e.g. the Royal Armouries Museum)

13.64. Additionally, NGT will provide access to (as yet undeveloped) available employment land at Stourton Park and will serve a number of housing sites in the south of the city.

13.65. Whilst improvements in public transport at these locations are expected to support regeneration, it should be noted that many of these sites already enjoy reasonable access to public transport. Even though the impact of NGT is expected to be beneficial for this sub-objective, the benefits have been assumed to be modest for the purposes of the Value for Money assessment.

Methodology

13.66. High-level analysis in Core Document C-1-15\textsuperscript{73} identifies the NGT Project as a catalyst for growth especially for the southern parts of the city. This analysis has been complemented with a high level study, which has identified the locations that are likely to benefit, in regeneration terms, from the implementation of NGT.

The Do-Minimum Scenario

13.67. Some regeneration within the Leeds City Region will take place regardless of NGT, as a result of a range of economic initiatives that are being implemented at a national and local level. For example, the Aire Valley Leeds Enterprise Zone in the Temple Newsam Ward (which is part of the AAP but will not be served by the proposed NGT Route) is expected to develop even if NGT is not delivered.

13.68. The Promoters believe that the cancellation of the NGT Project, which has attracted significant attention and interest in recent years, could send a signal to investors that Leeds is not committed to long term investment in its infrastructure and reduce the scope for regeneration across the Leeds City Region (particularly on the South Route).

Impacts of the Preferred Option

13.69. The Preferred Option will connect a number of key regeneration opportunity sites on the South Route to the city centre with a frequent, reliable and high quality public transport service. There is a high degree of confidence that the

\textsuperscript{73} Strategic Fit Report, Steer Davies Gleave, 2014
implementation of NGT will attract investment to these sites enabling faster and higher quality regeneration to take place in one of the more deprived parts of Leeds. However, it is recognised that on its own NGT may not be enough to cause regeneration to start, even though it should bring it forward in time.

13.70. For this reason, the qualitative impact of the Preferred Option on this sub-objective is assessed as **slight beneficial**.

**Impacts of the Next Best Alternative**

13.71. Whilst the perception of the quality of the service provided by this option will not be as high as the Preferred Option, it is likely that the introduction of segregation and new high quality stops along the South Route will nevertheless attract some investment towards these sites. The perceived permanence of this alternative (compared to the Preferred Option) would likely be less as the vehicles procured for this option could be redeployed elsewhere.

13.72. The qualitative impact of this alternative on this sub-objective is assessed as **slight beneficial**.

**Impacts of the Low Cost Alternative**

13.73. The perceived permanence of this option is likely to be significantly lower than the Preferred Option and Next Best Alternative as the dedicated Park & Ride service on the South Route would introduce limited connections between regeneration sites and could be scaled back/removed with limited notice. There would be no visible indicators of the NGT Route. Furthermore, the Promoters believe that its implementation would be interpreted as a cancellation of the NGT Project. As with the Do-Minimum scenario, this alternative could potentially send a signal to investors that Leeds is not committed to long term investment in its infrastructure, and reduce the scope for regeneration across the Leeds City Region. The qualitative impact of this alternative on this sub-objective is therefore assessed as **neutral**.

**Wider Impacts**

**Introduction**

13.74. Wider Impacts of a transport project include changes to agglomeration, labour supply, competition and productivity, and are driven by the change in generalised transport costs\(^\text{74}\) that result from the project. For instance, a project such as NGT may be expected to reduce travel times to a highly productive area such as Leeds city centre, and thereby attract more businesses and workers to the area to increase productivity further.

\(^{74}\) i.e. the sum of monetary and non-monetary costs of a journey, including elements such as time, distance and fare
Methodology

13.75. The interactions between transport and the economy were calculated using the West Yorkshire Urban Dynamic Model (UDM), (which simulates how population and employment evolve over time as a result of changing transport conditions) using input data on transport demand and costs from the Leeds Transport Model.

13.76. The impact of the Preferred Option and its associated alternatives on this sub-objective has been assessed in accordance with WebTAG Unit 3.5.14. In line with WebTAG, Wider Impacts are not included in the calculation of the central case Benefit Cost Ratio for the purposes of this appraisal.

13.77. The wider impacts assessed are:

- Agglomeration
- Labour supply
- Competition
- Productivity

13.78. Core Document C-1-18\textsuperscript{75} provides further information about how Wider Impacts have been calculated for each option.

The Do-Minimum Scenario

13.79. In the absence of new investment in transport, travel costs would continue to rise due to increases in congestion, crowding on the railways, fares and fuel costs. Modelling showed that in this case employment would be severely constrained and the Leeds City Region would be prevented from reaching its potential in terms of employment and economic growth.

Impacts of the Preferred Option

13.80. Introducing NGT reduces the cost in terms of both time and money to travel between key locations. This increases the attractiveness of these locations as both places to live and work. The Preferred Option forecasts an increase of 3,687 jobs in the Leeds District by 2031.

13.81. Conventional cost-benefit analysis does not include the value of wider impacts attributable to agglomeration, labour supply, imperfect competition and moves to more productive jobs. These benefits have been estimated using the outputs of the UDM, indicating a potential 29% increase in economic benefits when wider impacts are taken into account. Based on this, wider impacts account for £115m PV (in 2010 prices) and increase the User Benefits from £396m PV to £511m PV.

13.82. GVA is forecast to increase in Leeds, and although there will be some reduction in surrounding areas, there is a net positive national effect.

\textsuperscript{75} Wider Economic Impacts Report, Steer Davies Gleave, 2014
13.83. Net national taxation revenues are forecast to increase by £5.8m PV due to the Wider Impacts of the Preferred Option.

Impacts of the Next Best Alternative

13.84. Wider Impacts have been calculated based on generalised cost and demand data from the Leeds Transport Model. The generalised cost for travel includes in-vehicle time, wait time, walk time, boarding time and transfer time. The Next Best Alternative has the same run-time and uses the same route as the Preferred Option but is a lower quality service and therefore has a higher generalised cost (passengers perceive time spent on a lower quality service as longer than on a higher quality service). The Next Best Alternative also attracts less demand than the Preferred Option. As a result, Wider Impacts for the Next Best Alternative are expected to be slightly less than the Preferred Option.

13.85. If we assume that wider impacts have the same impact in the Next Best Alternative as the Preferred Option, these impacts would account for £41m PV (in 2010 prices) and increase the User Benefits from £143m PV to £184m PV.

Impacts of the Low Cost Alternative

13.86. The Low Cost Alternative involves the upgrade of existing services and an additional Park & Ride service between Stourton and Leeds city centre. Although this will reduce travel times for some passengers, the impacts are not sufficient to generate benefits to the wider economy in the same way as the Preferred Option and Next Best Alternative. Therefore Wider Impacts have not been assessed for this option.
14. Environmental Impacts

Introduction

14.1. This section presents the appraisal of the environmental effects of the Preferred Option, the Next Best Alternative (NBA) and the Low Cost Alternative (LCA). The impact of each is assessed against the Do-Minimum scenario, a future scenario representing conditions without implementation of the Do-Something options.

14.2. The impact of each scenario is appraised for the WebTAG environmental objectives of:

- Noise
- Air Quality
- Greenhouse Gases
- Landscape & Townscape
- Visual Amenity
- Historic Environment
- Biodiversity
- Water Environment

Supporting Technical Information

14.3. The information on which the appraisal presented in this Business Case Review is based is drawn from the different volumes of the Leeds Trolley Vehicle System Order Environmental Statement (ES) (Core Document A-08b)\(^76\) and the Supplement to the Environmental Statement (Core Document B-1)\(^77\). The ES is a statutory supporting document for the TWAO application and sets out the detailed Environmental Impact Assessments (EIAs) undertaken for the Preferred Option. Not all of these assessments are relevant to the DfT WebTAG requirements for environmental appraisal set out within this Business Case Review.

14.4. The EIAs in the ES assess the impacts of the Preferred Option (with mitigation) compared with the baseline conditions for each environmental objective. The ES scoring system reports the impacts qualitatively as positive or negative, ‘significant’ or ‘not significant’.

14.5. The ES assessment takes account of the mitigation measures and the use of Best Practicable Means working, both of which can result in reduced

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\(^76\) Environmental Statement, Mott MacDonald, 2013
\(^77\) Leeds New Generation Transport – Supplement to the Environmental Statement, Mott MacDonald, 2014
environmental impact. In this context, Best Practicable Means working is the minimum level of mitigation to be employed in the construction phases of infrastructure projects and contributes to making the works as environmentally acceptable as possible.

**Appraisal Methodology**

14.6. To ensure compatibility between the ES and WebTAG approaches, a review has been undertaken of the methodologies used for the derivation of the ES. The review has highlighted that for all cases, the methods applied for the ES were scoped and subsequently approved by the DfT. From this it can be inferred that the applied methods are sufficient to meet the required standard for transport appraisal.

14.7. Out of seven environmental areas that form part of the transport appraisal, the ES assessments of Biodiversity, Noise and Air Quality directly reference methods which reflect those required by WebTAG. The Landscape/Townscape, Heritage and Water Environment approaches do not refer directly to WebTAG but show stages in their methodology which have a similar structure to those in WebTAG.

14.8. The ES Greenhouse Gases methodology differs from those specified in WebTAG in that only the ‘scheme-owned’ emissions of the scheme are accounted for in the ES assessment. The ES does not consider indirect changes in emissions which come from the reduction in the number of buses operating post NGT, whereas this is an important consideration in the WebTAG appraisal method. Therefore, in addition to considering the ES assessment, the quantitative assessment of greenhouse gas emissions undertaken as part of the economic appraisal for this Business Case Review has also been considered.

14.9. In this Business Case Review, the ES assessment scores have been mapped to the WebTAG standard seven point qualitative scoring scale. Where necessary, supporting information from the ES has been used to refine ES scores (e.g. positive: significant) into the appropriate WebTAG categories (e.g. large beneficial or moderate beneficial). In these cases a summary of the supporting information used is documented in this Business Case Review.

14.10. The ES scores are mapped to WebTAG scores as shown in Table 14.1.
TABLE 14.1  SCORE ALIGNMENT BETWEEN ES AND WEBTAG

<table>
<thead>
<tr>
<th>WebTAG Scoring</th>
<th>ES Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Large Adverse</td>
<td>Significant</td>
</tr>
<tr>
<td>Moderate Adverse</td>
<td></td>
</tr>
<tr>
<td>Slight Adverse</td>
<td></td>
</tr>
<tr>
<td>Neutral</td>
<td>Not significant</td>
</tr>
<tr>
<td>Slight Beneficial</td>
<td></td>
</tr>
<tr>
<td>Moderate Beneficial</td>
<td></td>
</tr>
<tr>
<td>Large Beneficial</td>
<td>Significant</td>
</tr>
</tbody>
</table>

14.11. The ES scores are specific to each environmental objective and each phase (construction or operation) of the NGT Project and consider the effect of mitigation, long term enhancements and best practice working.

14.12. For this Business Case Review, in addition to mapping the construction and operation scores from the ES to the WebTAG scale, an overall impact score for each environmental objective is assessed based on the balance of impacts over the construction and operational phases.

14.13. The remainder of this section provides, for each WebTAG environmental objective:

- A summary of the key baseline conditions and forecast environmental impacts for the Do-Minimum, and then for each Do-Something scenario
- A summary of the relevant information from the ES for the construction and operational phases
- A WebTAG qualitative appraisal score based on the information and analysis from the ES (and in the case of Greenhouse Gases, the quantitative assessment that supports the Economic Case)
- The overall impact assessed as a balance of the construction and operational impacts

14.14. The ES documents the technical assessment of the Preferred Option, but not the NBA or LCA. The impacts of the NBA and LCA stated in this Business Case have therefore been assessed relative to the Preferred Option.

Noise

Introduction

14.15. Transport projects have the potential to increase or decrease noise if they result in changes to traffic flow. Electric and hybrid alternatives to conventional diesel buses can reduce noise impacts from bus services. Creating new roads, traffic routes or public transport routes can increase exposure to traffic-related noise.
14.16. Increases in noise have been shown to be detrimental to vulnerable groups, for example children with regards to concentration when learning. Noise is therefore assessed at sensitive receptors considered to be affected by noise change. For the assessment of permanent impacts, sensitive receptors within 600 m of a road where there is the possibility of a change of 1 dB $L_{A_{10,18h}}$\textsuperscript{76} upon scheme opening or 3 dB $L_{A_{10,18h}}$\textsuperscript{79} in the long term are identified and the projected change in noise levels is calculated.

Methodology

14.17. The methodology used for assessing noise impacts is described in the TWAO document for Noise (Core Document A-08e-2)\textsuperscript{80}. The Supplement to the Environmental Statement (Core Document B-1)\textsuperscript{81} sets out the impact of noise from the scheme as a result of using the most recent revision of traffic modelling data for noise calculations.

14.18. Noise surveys were undertaken in 2009 and 2013 along the route to provide a suitable representation of the baseline noise climate at locations selected to be representative of individual or groups of noise sensitive properties or premises.

14.19. The Calculation for Road Traffic Noise (CRTN) methodology, Federal Transit Administration (North America) methodology (implemented within acoustic modelling software) and the most up to date traffic data have been used to calculate and compare traffic noise levels with (do something) and without (do minimum) the NGT Project in operation in the baseline and future assessment years, 2020 and 2035 respectively.

14.20. The noise impacts of each scenario are described by the change in noise levels corresponding with forecasts changes in traffic for the relevant transport links. Assuming other factors remain unchanged, changes in daily flows need to be substantial to result in what would be considered for this assessment a significant change in noise level. :

- A change in noise level of 1 dB $L_{A_{10,18h}}$ results from a 25% increase or 20% decrease in traffic flow
- A change in noise level of 3 dB $L_{A_{10,18h}}$ results from a 100% increase or 50% decrease in traffic flow

14.21. Impacts from the segregated sections of the NGT route would consist of intermittent short-term events due to the characteristics of the proposed NGT service (frequency of vehicle movements along the route). Such noise is similar in nature to that from railways and light rapid transit systems, where

\textsuperscript{76} Noise is increased by 1dB for 10% of the 18 hour period
\textsuperscript{79} Noise is increased by 3dB for 10% of the 18 hour period
\textsuperscript{80} Technical Appendix I – Noise and Vibration, Mott MacDonald, 2013
\textsuperscript{81} Leeds New Generation Transport – Supplement to the Environmental Statement, Mott MacDonald, 2014
the daily (energy) average noise level $L_{Aeq}$ over an 18 hour period 06:00 to 24:00 is usually used for the purpose of assessment.\(^{82}\)

14.22. In order to assess the impact of changes in noise levels from roads including those shared with NGT vehicles, in such a way that is compatible with the assessment on segregated sections, the ES assessment has broadly followed the DMRB procedure for highways but uses $L_{Aeq}$ levels instead of $L_{A10}$ levels for the period 06:00 to 24:00 (which is the proposed operating period of the NGT service). The DMRB assessment of road traffic noise uses CRTN to calculate the level of noise from road traffic. The methodology makes no provision for changes to the noise emitting characteristics of the vehicle fleet, for example due to electric or hybrid vehicles.

14.23. Key sensitive receptors were identified by

- Observation during site walkovers and survey work
- Reference to mapping and aerial photography
- Reference to noise mapping produced by the Department for Environment Food and Rural Affairs (DEFRA, 2013)
- Reference to the ES for the Supertram scheme (Symonds Travers Morgan Ltd., 2006), a previous rapid transit scheme considered for the City of Leeds
- Consultation with LCC

14.24. The key sensitive receptors adjacent to the North Route were identified as:

- Mill Hill Chapel and Queens Hotel in the City Square area
- St Anne’s Cathedral and the Henry Moore Institute in the Cookridge Street area
- Millennium Square currently under consideration for designation as a Quiet Area
- Leeds Museum and colleges in the area of Cookridge Street
- University of Leeds campus
- Residential properties and the University of Leeds in the area of Woodhouse Lane and Blenheim Walk
- Residential properties in the Woodhouse Moor and Hyde Park Corner area
- Residential properties adjacent to Headingley Lane, Otley Road and Otley Old Road

\(^{82}\) Department of Transport, Calculation of Railway Noise, 1995
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- Rose Court pre-school on Headingley Lane
- St Chad’s Parish Centre, Far Headingley
- St Columba’s Church, centres for the Guide Dogs for the Blind Association and Leeds
- Society for Deaf and Blind People and the residential property of Headingley Castle in the Shire View area
- Headingley Hall Residential Care Home and residential properties adjacent to the alignment on the proposed segregated section of the NGT in Headingley
- Lawnswood School
- Holy Name Catholic Primary School and Church in Cookridge
- Residential properties adjacent to Holdale Approach

14.25. The key sensitive receptors adjacent to the South Route were identified as:
- Residential properties in the area of Pitfall Street, Bowman Lane and Chadwick Street
- St Joseph’s Roman Catholic School and residential properties in the area of Whitfield Way in Hunslet
- Hunslet Methodist Church
- Residential properties on Winrose Grove and Belle Isle Road

The Do-Minimum Scenario

14.26. Between the base year and the forecast opening year of 2020, traffic growth is forecast. Without NGT this increase in traffic would in turn increase noise. However, for the ES no formal assessment has been made of the number of dwellings or other receptors that would experience a change in noise between now and 2020. Nonetheless, given the forecast changes in traffic flow this is likely to be small if not negligible.

Impacts of the Preferred Option

Construction

14.27. The Preferred Option has been assessed with regard to temporary, short-term noise impacts in the construction period. The assessment takes account of suitable mitigation measures. The impacts of the construction phase will include noise from:
- Demolition and site clearance
- Construction of stops, traffic signals, and retaining structures
Pavement and highways works including the Park & Ride facilities

OLE (Overhead Line Equipment) installation

Modifications to existing structures

Depot and sub-station construction

14.28. The ES results show that for the construction phase there are no significant residual effects. Construction noise will be controlled by way of management plans and under Section 61 agreements between contractors and LCC.

14.29. The Preferred Option construction phase impact on noise is assessed to be neutral.

Operation

14.30. The noise impacts of the Preferred Option have been assessed for both scheme opening year (2020) and for a future year (2035) with the appropriate mitigation measures. These include:

- Selection of a transport mode (electric trolleybus) which is inherently quiet compared with other road based modes of public transport (e.g. conventional diesel bus)

- Provision of new road surfaces throughout the NGT route where trolleybuses and buses will run upon existing highways. This measure will minimise the potential for noise and vibration due to imperfections in the road surface such as pot-holes and raised iron works, both from the NGT vehicles and other heavy vehicles using the route where there is shared running

- Use of grass track running where practical. This has been reported within the European Commission SILENCE project to reduce noise from trams by between 2 and 5 dB

- Location of ancillary facilities such as traction transformer compounds remote from residential receptors where practicable

- Specification of traction transformer containers and vents sufficient to control noise emission to appropriate level

- Commitment to an on-going programme of maintenance to the route during the lifespan of the scheme to ensure that noise and vibration impacts from the NGT vehicles remain controlled

14.31. The operational impacts of the Preferred Option on noise will be:

- Changes in traffic flows on local public highways

- Movement of trolleybuses along new segregated off-highway sections
Movement of private cars and trolleybuses accessing the Park & Ride facilities

Maintenance and operational movements at the proposed depot

14.32. In total there are 4415 dwellings and 69 sensitive receptors that have been identified as potentially experiencing a change in noise experience due to NGT.

14.33. For the opening year of 2020, a reduction of up to 3 dB $L_{A10,18h}$ is projected for some 752 dwellings and 20 other receptors and reduction of more than 3 dB $L_{A10,18h}$ is projected for 160 dwellings and two other sensitive receptors.

14.34. For the same opening year of 2020, an increase in noise of up to 3 dB $L_{A10,18h}$ is projected for 2,902 dwellings and 34 sensitive receptors along the route. Increases of greater than 3 dB $L_{A10,18h}$ are anticipated for some 433 dwellings and eight other sensitive receptors.

14.35. A comparison of NGT in 2035 against the 2020 Do-Minimum indicates that 411 dwellings and 16 sensitive receptors are projected to experience a reduction in noise of up to 3 dB $L_{A10,18h}$. A further 160 dwellings and 2 sensitive receptors are projected to experience a decrease in noise of more than 3 dB $L_{A10,18h}$. Some 2,992 dwellings and 39 sensitive receptors are projected to experience an increase in noise of up to 3 dB $L_{A10,18h}$ and a further 559 dwellings and eight other receptors are projected to experience an increase in noise levels more than this.

14.36. The difference in the number of affected properties between 2020 and 2035 is a result of background traffic growth over the period. This has the effect of increasing traffic noise and therefore increasing the noise experienced by properties in the Do-Minimum. In turn this decreases the number of properties which would experience the benefits of the Preferred Option (changing traffic flows on the network or car transfer to NGT) and adverse impacts from the project.

14.37. The ES does not account for the removal of diesel buses from the network when the project is operational. However, this effect is in-scope for this WebTAG assessment and so has been considered in the analysis presented here. Also, as already noted, the ES does not account for a greater proportion of the car fleet being electric or hybrid vehicles.

14.38. In the opening year of 2020, just over 3% of in-scope dwellings experience very large beneficial impacts from noise with just under 8% experiencing very large adverse impacts from noise. Over the longer period between the 2020 Do-Minimum and 2035 future year, only 1.4% of dwellings experience moderate to large adverse impacts from noise.

14.39. On balance, the Preferred Option operational phase impact on noise is assessed to be slight adverse with electric vehicles removing the noise from diesel buses and due to transfer of car traffic to NGT. However, larger
scale beneficial changes on the network afforded by NGT are countervailed by background traffic growth.

**Overall Impact**

14.40. Overall, the Preferred Option is assessed as having a **slight adverse** impact on noise because:

- During construction, many of the impacts on noise can be mitigated through appropriate measures and there are no significant residual effects
- During operation, moderate or large negative effects are expected for 63 dwellings and five other receptors

**Impacts of the Next Best Alternative**

**Construction**

14.41. The NBA will have similar construction impacts to the Preferred Option. The NBA construction phase impact on noise is therefore assessed to be **neutral**.

**Operation**

14.42. The NBA will have similar operational impacts on noise to the Preferred Option. However, because modal shift is forecast to be lower, traffic flows will be slightly higher in the NBA. Also, the diesel-electric hybrid bus vehicles specified in the NBA will be noisier when they operate in diesel mode (around half of the route length) than the Preferred Option vehicles.

14.43. On balance, the NBA operational phase impact on noise is assessed to be **slight adverse**.

**Overall Impact**

14.44. Overall, the NBA is assessed as having a **slight adverse** impact because:

- During construction, many of the impacts on noise can be mitigated through appropriate measures and there are no significant residual impacts
- During operation, moderate or large negative effects are expected

**Impacts of the Low Cost Alternative**

**Construction**

14.45. The construction activities for the LCA will be limited to the construction of the Park & Ride facilities with limited works along the highway network and without construction of segregated sections. With correct mitigation, it is expected that the construction phase will have a less intense impact if Best Practicable Means working is applied as a minimum.
Therefore, on balance, the LCA construction phase impact on noise is assessed to be **neutral**.

**Operation**

There will be no significant changes in traffic flow due to modal shift. The hybrid diesel-electric vehicles will emit similar levels of noise to the current buses on the corridors. The NBA operational phase impact on noise is assessed to be **neutral**.

**Overall Impact**

Overall, the LCA is assessed as having a **neutral** impact because in both phases, the impacts on noise are not expected to differ from those without the project.

**Social and Distributional Impacts**

The SDI of the Preferred Option and the associated alternatives have been assessed against this sub-objective in accordance with WebTAG Unit 3.17. The guidance specifies that the impact of noise should be considered across different income groups and for children less than 16 years old.

The operational impacts associated with the Preferred Option are identified in the ES as changes in road traffic flows, movement of trolleybuses along existing roads and new off-highway sections and access of vehicles to Park & Ride sites. This Business Case Review also considers the change in movements of conventional buses from the assumed bus network rationalisation, which is not included within the ES.

The Preferred Option will reduce noise from bus vehicle movements along the existing traffic route by introducing quieter vehicles. However, noise from the passage of vehicles along the new segregated sections of the route will expose the closest receptors to this new source of noise. These areas include sections in Headingley at the rear of the Arndale Centre on the North Route and through Whitfield Square in the South Route. Noise along these sections will be transient and limited, because of the use of electric vehicles.

Additional noise from the Preferred Option on the non-segregated sections will be a negligible contributor to growing levels of noise from increasing volumes of background traffic growth.

The scheme will result in changes in traffic noise across the highway network where traffic patterns alter in response to the introduction of Preferred Option infrastructure within the highway network. It is forecast that reductions in highway capacity from the proposal as will be offset by modal shift from private vehicles to NGT.

Noise impacts to sensitive receptors have been explicitly considered in the ES. The noise impacts from operations and noise reductions from the NGT vehicles are dispersed along the route. The reallocation of highway traffic
from modal shift and changes in network capacity to NGT is also dispersed over a wide area.

14.57. Significant residual adverse noise effects will be eliminated through mitigation and design. The redesign of some sections of public highway will result in reduced road traffic noise, for example in the vicinity of the University, the southern end of Blenheim Walk and a section at Woodhouse Moor.

14.58. The impact of noise from the Preferred Option following mitigation is neither concentrated nor significant at any point on the route with additional noise being limited to the segregated sections and transient in nature. Resultantly, there are no concentrated or significant impacts on vulnerable groups specified in the guidance.

14.59. Introduction of NBA infrastructure within the highway network would have the same impact on highway capacity however this option results in increased congestion as forecast modal shift is lower than for the Preferred Option. Changes in traffic on the highway network will result in changes to noise but these will be widely distributed. The impact on vulnerable groups would not be concentrated or significant.

14.60. The LCA does not include any new segregated sections of infrastructure and therefore does not introduce new sources of noise to any receptor. The junction improvements included within the LCA would increase radial highway capacity although some modal shift is forecast particularly on the North Route. The outcome of this would be the lowest changes to traffic on the highway network of the options considered and accordingly, the smallest change in noise levels. The impact to vulnerable groups with this option is therefore not concentrated or significant.

**Air Quality**

Introduction

14.61. Transport projects have the potential to affect air quality through changes in the geographical distribution and/or amount of air pollutant emissions, during construction and operation.

14.62. The primary air quality issue in the construction phase is dust emissions and their effect on loss of amenity and/or nuisance caused by, for example, soiling of buildings and vegetation or reduced visibility.

14.63. During the operational phase, the Preferred Option will alter parts of the existing road network which will change the traffic flow characteristics on those roads. Modal shift will also contribute to flow changes on the wider road network. This can result in changes to the levels of air pollution emissions, where these emissions occur and therefore, local air quality.

14.64. The main pollutants of interest emitted by road transport are oxides of nitrogen (NOx) and fine particulate matter (most commonly found in the
forms PM$_{10}$ (particles with an aerodynamic diameter of ten microns or less) and PM$_{2.5}$ (particles with an aerodynamic diameter of 2.5 microns or less).

14.65. The ES does not assess the air quality changes associated with the projected reduction in bus vehicle km on the network. Also it does not assess changes in air quality due to a larger proportion of the car fleet being made up of hybrid or electric powered vehicles.

Methodology

14.66. The methodology used for assessing air quality impacts is described in the TWAO document for Air Quality (Core Document A-08c-1)$^{83}$. The Supplement to the Environment Statement (Core Document B-1)$^{84}$ sets out the impacts of the NGT Scheme. The ES assessed the air quality impacts of the NGT Project through:

- A qualitative assessment of the impacts of construction dust and emissions on people within 350 metres of the construction areas. This approach aligns with guidance issued by the Institute of Air Quality Management (IAQM)

- A quantitative assessment of air quality impacts across Leeds in the operational phase for an opening year 2020 with and without the NGT Project, using an atmospheric dispersion model that takes traffic flows from the Leeds Transport Model as inputs

14.67. The following criteria have been applied to determine which areas require detailed assessment using dispersion modelling, based on the guidance presented within the DMRB:

- New roads
- Roads where alignment will change by 5 m or more
- Roads with changes in flows of 1,000 Annual Average Daily Traffic (AADT) or more
- Roads with changes in Heavy Duty Vehicle (HDV) flows of 200 AADT or more
- Roads with changes in daily average traffic speeds of 10 km/h or more
- Roads within 200 m of existing AQMAs or areas of concern identified by LCC

14.68. Air quality has been assessed at 59 discrete receptors which represent locations where changes in ambient concentrations as a result of the NGT Project are likely to be greatest and, where relevant, they represent similar

$^{83}$ Technical Appendix A – Air Quality, Mott MacDonald, 2013
$^{84}$ Leeds New Generation Transport – Supplement to the Environmental Statement, Mott MacDonald, 2014
receptors in the same area. In addition to the assessment of discrete receptors above, changes in pollutant concentrations have been predicted across the modelled study area. This process uses a large number of single points, each of which represent a residential property.

14.69. The assessment for this Business Case Review, relies upon the technical information reported in the ES, and then compares the difference in air quality impact between the Do-Minimum and each Do-Something scenario to score the impact according to the seven point WebTAG scale.

14.70. The ES documents the technical assessment of the Preferred Option, but not the NBA or LCA. The impacts of the NBA and LCA stated in this Business Case Review have therefore been assessed relative to the Preferred Option.

The Do-Minimum Scenario

14.71. Leeds has six Air Quality Management Areas (AQMAs) which have been declared due to exceedances of NO$_2$ annual mean objectives in residential areas. The air quality objectives are specified by the Department for Environment, Food and Rural Affairs (DEFRA) and reflect UK and EU air quality limits, with the AQMAs implemented through orders specified by LCC.

14.72. The NGT route does not pass through any of these LCC AQMAs although three are sited within 1 km of the proposed route. These are:
- 2-28 (evens only), Burmantofts Street and 19 to 23 (odds only), Haselwood Close
- 11-25 Ladybeck Close
- Caspar Apartments, 55 North Street

14.73. Monitoring data from LCC indicates that concentrations of NO$_2$ at roadside and kerbside monitoring locations are high and at five locations, above the level specified in the AQMA air quality objectives, even though they are not declared as AQMAs. This includes Headingley. PM$_{10}$ concentrations at roadside locations remain below AQMA air quality objectives.

14.74. Though not part of the ES assessment, there will also be a reduction in traffic through Headingley (which currently has air quality in excess of AQMA thresholds) which will result in lower emissions.

14.75. For the ES, background air quality for the do-minimum has been assessed by dividing Leeds into 1 km grid squares and modelling the air quality in each. Specified receptors have been defined and in the Do-Minimum they experience the modelled air quality in the grid square that they are located. Modelled data indicates that for the opening year of 2020 in the Do-Minimum scenario, annual mean background NO$_2$, PM$_{10}$ and PM$_{2.5}$ concentrations at all the discrete receptors are projected to be below the relevant AQMA air
quality objectives. This indicates that the major contribution to ambient pollutant concentrations is from road traffic emissions.

**Impact of the Preferred Option**

**Construction**

14.76. Construction dust emissions are expected from dust raising activities associated with excavation, handling of spoil, loading and unloading of trucks and the movement of vehicles around the construction sites and onto the local road network.

14.77. Contractors will have to accord by the NGT Project’s Code of Construction (CoCP) Practice to utilise measures to reduce the dust raising potential of construction activities, and ensure there are no significant effects on air quality from construction dust.

14.78. It is expected that the following actions will be in place to help reduce the impact of the construction phase:

- The A660 Otley Road/Headingley Lane/Woodhouse Lane will be used as the main access route for construction traffic on the North Route. Otley Old Road will be used to access the sections between Otley Road and Holt Park. In order to access the A660 construction traffic will be directed on the A6110/A6120 Outer Ring Road. Traffic will be directed from the west via M621 Junction 1, and traffic from the north and east via M1 Junction 46 or A1(M) Junction 45 via the A64 York Road

- All construction workers will arrive at either the northern or southern construction compounds (locations to be confirmed when contractor is in place) and then be transported to the various construction sites via minibus

- All deliveries for the North Route will be made to the northern site compound. Some larger materials will be stored at Stourton and brought north when required

- Construction traffic heading into the city to the main construction compounds will use the existing motorways and A roads

- Vehicle movements within the city centre will be small and spread across the whole route of the proposed scheme. The anticipated maximum number of vehicles associated with these movements will be approximately 20 per day for each work site of which there are six for the South Route and ten for the North Route

14.79. Construction traffic emissions will produce ambient concentrations of NO$_x$, fine particles and other combustion related pollutants which are considered ‘ambient’ and covered by local AQMA air quality objectives. The temporary
nature of the site plant results in emissions which are of negligible significance.

14.80. The ES states that the overall residual effect from the construction phase is minor adverse and not significant following implementation of appropriate mitigation measures. This result is based on the dust raising potential being ‘low’ for the duration of the construction period but a conservative receptor ‘sensitivity’ described as high to reflect property types such as healthcare centres and residential properties within 350 metres of the construction boundary.

14.81. The overall significance of the construction phase of the proposed scheme is considered not to be significant. No additional mitigation over and above that stated within the ES and CoCP is considered necessary for the purposes of the air quality assessment.

14.82. On account of the short duration of the construction phase and the degree to which mitigation measures have been applied, the Preferred Option construction phase impact on air quality is assessed as having a neutral impact.

Operation

14.83. With the Preferred Option changes to the existing road network will change the distribution and level of traffic flows. Modal shift, from road traffic to public transport will result in decreases to traffic flows.

14.84. The difference between modelled levels for annual mean NO₂, PM₁₀ and PM₂.₅ concentrations between the Do-Minimum and Do-Something cases at all receptors will have a negligible (58 receptors) or slight adverse (1 receptor) affect at worst. This single receptor is located at Norville Terrace, Headingley.

14.85. In the Preferred Option, modelled annual mean NO₂, PM₁₀ and PM₂.₅ concentrations are all projected to be well below the relevant AQMA air quality objectives at all discrete receptors for the opening year of 2020.

14.86. Some of the modelled receptors experience an improvement in air quality, at others air quality is worse. In all cases the impact of the change is assumed as negligible.

14.87. Overall, the proposed scheme is projected to improve air quality at more residential properties than it causes a deterioration (464 properties against 198 properties respectively) although the change is not considered significant.

14.88. The Preferred Option operational phase is therefore assessed as having a neutral impact on air quality.
**Overall Impact**

14.89. Overall, the Preferred Option is assessed as having a neutral impact on air quality because:

- The construction effects will be mitigated to a high degree and will only occur for a short duration
- Air quality emissions in the operational phase will not be significantly different to in the Do-Minimum scenario

14.90. The neutral overall score for the Preferred Option is the result of an assessment of the scheme in isolation. However, NGT is just one part of a package of sustainable transport schemes and measures that taken together will reduce transport-related emissions in the city when compared to the Do-Minimum.

**Impacts of the Next Best Alternative**

**Construction**

14.91. The NBA would have similar levels of infrastructure to the Preferred Option and is therefore also assessed as having a neutral impact on air quality.

**Operation**

14.92. In the operational phase, changes to the distribution and levels of traffic flows across the road network would be similar to the Preferred Option. However, levels of modal shift are forecast to be lower.

14.93. The hybrid diesel-electric vehicles specified in the NBA would produce emissions not present in the Preferred Option for those sections where it operates under diesel power (around half of the route distance).

14.94. However, neither of these effects is considered to contribute to a significant difference in air quality compared to the Do-Minimum scenario.

14.95. The NBA operational phase is therefore assessed as having a slight adverse impact on air quality.

**Overall Impact**

14.96. Overall, the NBA is assessed to have a slight adverse impact on air quality because:

- The construction effects will be mitigated to a high degree and will only occur for a short duration
- Those locations that experience increased air quality emissions in the operational phase due to re-routing of traffic will not be offset by modal shift
Impacts of the Low Cost Alternative

**Construction**

14.97. In the LCA, the construction period is expected to be shorter and less intensive than the Preferred Option.

14.98. A shorter construction period will reduce the duration and scale for the production of dust and site emissions. With site specific planning constraints to mitigate the impacts of the construction period, any impact on air quality will be minimised.

14.99. The LCA construction phase is therefore assessed to have a neutral impact on air quality.

**Operation**

14.100. In the operational phase, changes to the distribution and levels of traffic flows across the road network would be lesser in scale than the Preferred Option or NBA.

14.101. The modal shift from the LCA is forecast to be the lowest of all Do-Something scenarios.

14.102. The hybrid diesel-electric vehicles specified in the LCA would produce emissions not present in the Preferred Option. In the South Route this would lead to an increase in emissions compared to the Do-Minimum. However, in the North Route emissions would be lower than in the Do-Minimum since the service level is assumed not to change and some diesel operation would be replaced by hybrid operation.

14.103. The LCA operational phase is therefore assessed as having a neutral impact on air quality.

**Overall Impact**

14.104. Overall, the LCA is assessed as having a neutral impact on air quality because:

- A shorter duration and scale of works is expected as part of the construction phase
- Hybrid diesel-electric buses on the South Route would produce emissions above those in comparison to the Do-Minimum

**Social and Distributional Impacts**

14.105. The SDI of the Preferred Option and the associated alternatives have been assessed against this sub-objective in accordance with WebTAG Unit 3.17. The guidance specifies that the impact of air quality should be considered across different income groups and for children less than 16 years old.

14.106. The reallocation of highway capacity to NGT and modal shift along the route will change the distribution and level of traffic flows and congestion on the
existing network. This will change the quantity and pattern of air quality emissions over the wider highway network.

14.107. Results of the dispersion modelling undertaken for the ES show that at discrete receptors the number of properties where air quality will improve with the Preferred Option is greater than the number where it deteriorates. The assumed rationalisation of the bus network (not included within the ES) would reduce air quality emissions on the North Route. However, both positive and negative changes are negligible within the overall context.

14.108. Changes in air quality resulting from the Preferred Option are therefore not considered to be sufficiently concentrated or significant on the societal groups specified within guidance.

14.109. As a result of lower forecast modal shift on the corridor, the NBA would not reduce air quality emissions to the same extent as the Preferred Option. Although plug-in hybrid vehicles would run under diesel power for around half of the route length, electric operation would be specified favouring the most sensitive locations. Changes in air quality resulting from the NBA are not considered to be sufficiently concentrated or significant on the societal groups specified within guidance.

14.110. The impact of the LCA on air quality emissions will be modest with the lowest levels of modal shift forecasted. Changes in air quality resulting from the LCA are not considered to be concentrated or significant on the societal groups specified within guidance.

**Greenhouse Gases**

**Introduction**

14.111. Transport projects have the potential to change emissions of greenhouse gases (GHG) during construction and operation.

14.112. Carbon Dioxide (CO₂) is the main GHG emitted from transport and is used as the key indicator in WebTAG of the impacts of transport on climate change.

14.113. The NGT Project has the potential to lead to GHG emissions through four sources:

- Construction related emissions (Source 1) - the use of materials, construction plant and construction transport
- Operational emissions through traction energy (Source 2) and infrastructure (Source 3) (e.g. new stops and Park & Ride)
- Transport network effects (Source 4) - indirect effects from changes in capacity and changes in travel patterns. Changes in the wider network may also influence GHG emissions from other network users
14.114. The ES does not assess the GHG changes associated with the reduction in bus vehicle km on the network. This would be representative of the changes in CO₂ from replacing diesel vehicles with hybrid and electric powered vehicles.

Methodology

14.115. The ES assessed the GHG impacts of the NGT Project through:

- A qualitative assessment of changes in GHG emissions during the construction phase located at main construction areas

- A quantitative assessment of changes in GHG emissions during the operational phase limited to the route corridor. This used Power Demand Modelling outputs from the National Grid and traffic data from the LTM which estimates GHG emissions based on the flow, speeds and composition of traffic on each road

14.116. For each scenario, the changes to the traffic flows that arise from the specific changes to the transport network have been modelled, and the resulting changes to emissions of GHG calculated.

14.117. No specific resources or receptors are addressed in the ES as the ‘effects’ are defined as the change in carbon emissions caused by the NGT Project and these cannot be readily attributed to specific climate impacts or the specific locations where any impact may occur.

14.118. The assessment considers a range of sources of GHG which will arise from the NGT Project including:

- Scheme-Owned Emissions: These are where activities of the project lead to emissions of GHG

- Not Scheme-Owned Emissions: This is where the effects of the project lead to GHG emissions, but they are not controlled by the project

- Direct Emissions: Where GHG emissions occur directly from the activities of the project, e.g. from fuel combustion

- Indirect Emissions: Where activities of the project lead to GHG emissions elsewhere or where the project is not in control of the entity that causes the activity, such as grid electricity generation or effects on the wider transport network

14.119. The assessment for this Business Case Review, relies upon the technical information reported in the ES, and then compares the difference in GHG emissions between the Do-Minimum and each Do-Something scenario to score the impact according to the seven point WebTAG scale.
14.120. The ES documents the technical assessment of the Preferred Option, but not the NBA or LCA. The NBA and LCA have been scored in this Business Case Review relative to the impact of the Preferred Option.

14.121. A separate monetised assessment of the Do-Something a scenarios impact on GHG was undertaken using DfT’s TUBA (Transport User Benefits Appraisal) software and is detailed within the Economic Case.

The Do-Minimum Scenario

14.122. According to figures published by the Department of Energy and Climate Change (DECC), total emissions of CO₂ have been in decline over recent years in Leeds despite the growth in population. Emissions from the transport sector in Leeds have only declined marginally which is in line with national trends.

14.123. The trend of declining levels of CO₂ in Leeds in recent years is likely to continue in the Do-Minimum scenario. Transport emissions are likely to decline over time with the move towards cleaner vehicles both for private travel and for public transport. This trend is not specific to Leeds.

Impact of the Preferred Option

Construction

14.124. Construction traffic, site plant and the use of materials are the sources of GHG emissions during the construction phase of the Preferred Option. More specifically, the construction activities which are expected to result on GHG emissions are:

- Park & Ride sites at Stourton to the south and Bodington to the north
- Depot building at the location of the Stourton Park & Ride site
- Construction of ten substations along the route
- Construction of an off highway section
- Construction of the on highway sections
- Construction of 28 trolleybus stops and associated platforms
- Construction of overhead power lines
- Adjustment to existing junctions as a result of the proposed scheme
- Additional roadwork to adjust existing road layouts

14.125. Considered over the lifetime of the project, these emissions will be small.

14.126. GHG emissions through the implementation of design measures and the CoCP throughout the construction phase can help to reduce GHG emissions. The following measures are taken from the CoCP:
Ensuring that the engines of all vehicles and plant on site are not left running unnecessarily

Requiring that plant will be well maintained, with routine servicing of plant and vehicles to be completed in accordance with the manufacturers recommendations and records maintained for the work undertaken

Avoiding the use of diesel or petrol powered generators and using mains electricity or battery powered equipment

Maximising energy efficiency (this may include maximising vehicle utilisation by ensuring full loading and efficient routeing)

On road vehicle drivers will be required to switch off their vehicle’s engines when stationary to prevent exhaust emissions

Development of a Site Waste Management Plan (SWMP) which will identify materials that can be reused and recycled

Development of an Energy Management Plan to identify how energy use will be minimised during the construction works

Development of a Travel Plan to make transport movements as efficient as possible

14.127. These measures all strive to make the construction process as efficient as possible with a heavy emphasis on minimising energy use throughout. These measures will contribute to minimising the impact of the construction phase as far as possible. Any emissions from the construction phase are likely to be of lower magnitude than operational emissions when considered over the operational life of the scheme. The overall impact on GHG emissions will be insignificant.

14.128. The Preferred Option construction phase is therefore assessed as having a neutral impact on GHG emissions.

**Operation**

14.129. During the operational phase of the Preferred Option, emissions arise from powering the trolleybuses as well as from changes in flows on the transport network.

14.130. In the Preferred Option changes to the existing road network will change the distribution and level of traffic flows. Changes on the network include:

- Transfer of some current journeys from bus or car to NGT
- Priority lane sharing with other buses resulting in more efficient operation
- Fewer diesel buses operating on the North Route
- Changes to traffic flows and routeings
14.131. These changes will influence the pattern of travel in Leeds and changes in the number of journeys as well as the speed of vehicles on certain parts of the network will lead to changes in the GHG emissions profile.

14.132. Grid-produced electricity necessary to operate the trolleybuses and infrastructure will lead to emissions of GHG at the point of generation.

14.133. The trolleybus depot will be powered through electricity and heated via natural gas. Both will directly produce GHG emissions.

14.134. Changes in GHG emissions due to these effects are predicted to be small in comparison with existing sources of emissions in the area. Emissions associated with NGT’s traction energy represent an increase of around 0.2% of the 2011 transport-related carbon emissions in Leeds. Emissions from supporting infrastructure are forecast to be around a tenth of those associated with traction energy.

14.135. The Preferred Option is not predicted to lead to significant changes in GHG emissions from traffic on the road transport network. Excluding the reduction in GHG emissions that will come about due there being fewer buses operating in the North Route, the changes brought about the scheme on GHG are equivalent to 0.1% of the total transport related CO$_2$e emissions in Leeds in 2011.

14.136. The Preferred Option operational phase is therefore assessed as having a neutral impact on GHG emissions.

**Overall Impact**

14.137. Overall, the Preferred Option is assessed as having a neutral impact on GHG emissions because:

- Emissions during the construction phase are not significant
- Changes in GHG emissions during the operational phase are small in comparison with existing sources of emissions in the area

14.138. The neutral overall score for the Preferred Option is the result of an assessment of the scheme in isolation. However, NGT is just one part of a package of sustainable transport schemes and measures that taken together will reduce transport-related GHG emissions in the city when compared to the do-minimum.

**Impacts of the Next Best Alternative**

**Construction**

14.139. The NBA would have similar levels of infrastructure to the Preferred Option and is therefore also assessed as having a neutral impact on GHG emissions.
**Operation**

14.140. In the operational phase, changes to the distribution and levels of traffic flows across the road network would be similar to the Preferred Option. However, levels of modal shift are forecast to be lower.

14.141. The hybrid diesel-electric vehicles specified in the NBA would produce GHG emissions above those in the Preferred Option due to diesel operation of the vehicles for around half of their distance in service.

14.142. The NBA operational phase is therefore assessed as having a **neutral** impact on GHG emissions with the small levels of diesel emissions contributing negligibly to total GHG emissions from traffic.

**Overall Impact**

14.143. Overall, the NBA is assessed to have a **neutral** impact on GHG emissions. Even though hybrid diesel-electric vehicles employed in the NBA would produce some GHG emissions along the route these would be negligible in the entirety of the GHG emissions from all vehicles.

**Impacts of the Low Cost Alternative**

**Construction**

14.144. In the LCA, the construction period is expected to be shorter and less intensive than the Preferred Option. After mitigation the level of GHG emissions during construction is expected to be very small.

14.145. The LCA construction phase is therefore assessed to have a **neutral** impact on GHG emissions.

**Operation**

14.146. In the operational phase, changes to the distribution and levels of traffic flows across the road network would be lesser in scale than the Preferred Option.

14.147. The modal shift from the LCA is forecast to be the lowest of all Do-Something options.

14.148. The hybrid diesel-electric vehicles specified in the LCA would produce GHG emissions above those in the Preferred Option due to some diesel operation of the vehicles but these would be negligible in the entirety of the GHG emissions from all vehicles.

14.149. The LCA operational phase is therefore assessed as having a **neutral** impact on GHG emissions

**Overall Impact**

14.150. Overall, the LCA is assessed as having a **neutral** impact on GHG emissions. Even though hybrid diesel-electric vehicles would cause a slight increase in
GHG emissions on the route above those expected in the Preferred Option these would be minor in the scope of total traffic emissions.

**Landscape/Townscape**

**Introduction**

14.151. Transport projects have the potential to have an impact upon landscape and townscape in both construction and operational phases.

14.152. The ES determines the likely effects of the NGT Project on the landscape/townscape resource and visual receptors within a defined area. Visual effects refer to the changes in the composition of views and the effects of those changes on the visual receptors e.g. residents, users of recreational space, business users etc.

14.153. Landscape/townscape impacts are changes in the fabric, character and quality of the landscape/townscape, which may in turn affect the perceived character and value ascribed to the landscape/townscape.

14.154. Effects can include direct effects upon specific landscape/townscape elements (such as loss of buildings, trees or areas of grass) or indirect effects on the landscape/townscape character and, importantly, designated areas such as Conservation Areas.

14.155. Though these aspects are relevant to this assessment, development effects upon the setting of particular townscape heritage features such as ancient monuments or listed buildings are more fully described in the section on Historical Environment to avoid double counting in the appraisal of the project.

**Methodology**

14.156. The methodology for assessing landscape/townscape impacts is set out in the TWAO Document for Landscape/Townscape (Core Document A-08e-1)\(^{85}\).

14.157. The ES assessed the impacts for landscape/townscape through:

- Desk studies and site surveys
- Splitting the route into smaller character areas for the North Route (29 areas), South Route (15 areas) and three sports pitch character areas adjacent to the route
- Assessing for temporary construction phase effects as well as the permanent appearance of areas along the alignment following completion of the NGT Project
- Looking at permanent effects at years 1 and 15 of operations taking into consideration mitigation measures

\(^{85}\) Technical Appendix H - Landscape, Townscape and Visual Amenity, Mott MacDonald, 2013
14.158. The spatial scope of the assessment is based on the zone of theoretical visual influence. The boundary of this is determined by the limits of a pedestrian’s eyelevel view across the proposed route.

14.159. There are a number of visual receptors along and around the route which have views of the NGT Project. These have been categorised in groups of decreasing sensitivity:

- People residing at properties with views of the proposed development = ‘high sensitivity’
- Users of outdoor recreational facilities including public rights of way, and public realm = ‘moderate sensitivity’
- People engaged in outdoor sport or recreation = ‘moderate sensitivity’
- Travellers on roads, lanes and railway lines within and around the study area = ‘low sensitivity’
- Occupiers of business and commercial properties = ‘low sensitivity’

14.160. By combining the assessment of the magnitude of the NGT Project on visual receptors and the sensitivity of the visual receptors, scores for the impact of the proposals have been provided on a ‘major’ to ‘slight/negligible’ scale as to their impact on landscape/townscape. Mitigation measures have then been considered to ascertain the residual effects of the NGT Project on landscape/townscape. The residual effects can be both beneficial or adverse depending on the nature of the development and the enhancement proposed.

14.161. The assessment for this Business Case Review, relies upon the technical information reported in the ES, and then compares the difference in landscape/townscape impacts between the Do-Minimum and each Do-Something scenario to score the impact according to the seven point WebTAG scale.

14.162. The ES documents the technical assessment of the Preferred Option, but not the NBA or LCA. The NBA and LCA have been scored in this Business Case Review relative to the impact of the Preferred Option.

The Do-Minimum Scenario

14.163. The NGT route runs through or close to a number of Conservation Areas, Tree Preservation Orders, Open Spaces and Urban Green Corridors. These have been considered in the assessments.

14.164. The Do-Minimum is likely to see a number of development schemes coming forward including regeneration sites to the south of the river such as the Yorkshire Chemicals site and the Tetley’s Brewery site. This together with an anticipated increase in traffic and bus operating levels will lead to an increase in traffic over time and so increase the adverse impact that vehicles
have on the landscape/townscape in the NGT corridor. Existing mature trees along the route will generally not be replaced as they age and become diseased, dying or dangerous.

14.165. While some elements of this will have a slight adverse impact on the landscape/townscape, ultimately redevelopments such as around the Tetley’s site should be anticipated to lead to a slight benefit.

Impact of the Preferred Option

Construction

14.166. Construction impacts typically include an increase in the size of highway infrastructure, mature tree loss, building demolition, the presence of site compounds and major land change at the Park & Ride sites. These vary by the section of route assessed with 14 character areas affected in the north and six character areas in the south.

14.167. During construction, impacts will be minimised through the use of the CoCP and management plans (i.e. working hours, careful storage of site materials hoardings etc.). Works throughout the area will be phased into sections in order to minimise the extents of the effects during the construction phase.

14.168. The ES reports that a number of temporary significant negative impacts are expected from the construction phase. These are impacts which have a major or moderate negative effect on the existing landscape/townscape character during construction such as loss of amenity from removal of trees and verges. As re-planted landscaping matures, the impact to the landscape/townscape will reduce.

14.169. On account of the duration of the construction period, the assumption that appropriate mitigation will be in place and the varied scale of impacts in each character area, the Preferred Option construction phase is assessed as having a major/moderate adverse impact on landscape/townscape in the ES. This is a ‘worst-case’ score with the expectation that impacts will range from slight adverse up to major/moderate adverse depending on location.

14.170. On balance, the Preferred Option construction phase impact on landscape/townscape is assessed to be moderate adverse which provides the most central score based on the scale of impacts given in the ES.

Operation

During operation, potential impacts include:

- Visual effects associated with NGT movements
- Visual effects of new permanent infrastructure such as new stops, bus lanes, and OLE
- Changes in the overall townscape character as a result of the above
Changes in landscape character and landscape settings (Park & Ride sites)

14.171. In the operational phase post-mitigation 15 years after opening, the impacts of some of the significant negative effects of construction are reduced with the maturing of the planting and landscaping from the construction phase. The overall effect is reported as slight beneficial in the ES where mitigation has improved landscape/townscape. However, this is not possible for all effects and the ES reports that significant adverse effects remain in some places along the route.

14.172. OLE and remodelled junctions would result in adverse impacts to landscape/townscape. There are also impacts associated with the change in some areas where grass verges are utilised for part of the route or where the character of an area has been altered by the presence of NGT, such as through some off-line sections. These are shown as significant moderate adverse effects in the ES. Again, effects are variable throughout the different character areas of the route. Over time, changes to views in the first year will become part of the accepted street view and materials and features will become part of the existing vernacular.

14.173. Some of the highest adverse effects are associated with the loss of green space where the Park & Ride sites are situated. Substantial landscaping to include planting, ponds and earth moulding has been included to screen the sites over long distance views of development. By year 15 of operations, these measures will mature and therefore contribute to buffering and increasing the variety of habitats in those areas. This contributes to reducing the significance of the impacts of the Park & Ride sites on landscape/townscape to moderate or slight adverse.

14.174. The Preferred Option operational phase is therefore assessed as having a moderate adverse impact on landscape/townscape. The score reflects that mitigation and enhancement measures are assumed to be in place; however, the impact of the OLE remains significant. Moderate adverse is a ‘worst-case’ score with the expectation that impacts will range from slight beneficial up to moderate adverse depending on location.

**Overall impact**

14.175. Overall, the Preferred Option is assessed as having a moderate adverse impact on landscape/townscape because:

- Significant negative impacts are likely in the construction phase
- OLE is a negative impact on local landscape/townscape and will be there for the lifetime of the project

14.176. The score reflects a ‘worst-case’ value on the understanding that impacts are varied across all character areas with some elements of mitigation creating beneficial effects through to some moderate adverse effects.
Impacts of the Next Best Alternative

Construction

14.177. All impacts which are associated with the Preferred Option construction phase, apart from the installation of OLE are also relevant in the NBA.

14.178. It is considered that this would reduce the ES scoring to slight adverse if the appropriate mitigation measures are still utilised.

14.179. The NBA construction phase is therefore assessed as having a moderate adverse impact on landscape/townscape.

Operation

14.180. Physically this option is very similar to the Preferred Option only the motive power of the buses is different with plug-in hybrid diesel-electric buses being used which do not require OLE. Charging points would be required instead.

14.181. The absence of OLE in the NBA removes a significant negative effect on landscape/townscape compared with the Preferred Option. However, impacts associated with the change in some areas where grass verges are utilised for part of the route or where the character of an area has been altered by the presence of the NBA such as through some off-line sections will remain. These were assessed as significant moderate adverse impacts in the ES for the Preferred Option. The same scale of impacts is therefore assumed here.

14.182. The NBA operational phase is therefore assessed as having a slight adverse impact on landscape/townscape.

Overall Impact

14.183. Overall, the NBA is assessed to have a slight adverse impact on landscape/townscape because:

- The construction effects will not be as extensive due to the exclusion of OLE installation and any effects would be temporary

- The impact of the NBA on landscape/townscape in the operational phase is significantly reduced because of the absence of OLE however adverse impacts to grass verges in the off-line sections will remain

Impacts of the Low Cost Alternative

Construction

14.184. The LCA primarily uses existing unmodified highway, smaller Park & Ride facilities and does not involve construction of off highway sections. Therefore tree removal and demolitions are minimised in the construction phase with site specific planning constraints being applied to provide the appropriate levels of mitigation alongside Best Practicable Means. This is assumed to include tree replacement where necessary but the overall scale of
enhancements may not be fully equivalent to those within the Preferred Option.

14.185. The LCA construction phase is therefore assessed to have a \textit{slight adverse} impact on landscape/townscape.

\textbf{Operation}

14.186. A standard hybrid diesel-electric bus will be used in the LCA negating the requirement for OLE and charging points. There will also be less landscape/townscape impact than the Preferred Option due to smaller Park & Ride sites and use of existing highway infrastructure.

14.187. The impact on landscape/townscape is therefore judged to be similar to the existing conditions.

14.188. The LCA operational phase is therefore assessed as having a \textit{neutral} impact on landscape/townscape.

\textbf{Overall Impact}

14.189. Overall, the LCA is assessed as having a \textit{neutral} impact on landscape/townscape because:

\begin{itemize}
  \item Fewer impacts are expected in the construction phase with Best Practicable Means and site specific planning constraints in place for mitigation and enhancement purposes
  \item No additional infrastructure that might have an impact on the character of the landscape/townscape is required to operate the buses in the LCA
\end{itemize}

\textbf{Heritage of Historic Resources (Historic Environment)}

\textbf{Introduction}

14.190. The assessment of the historic environment includes consideration of scheduled monuments, listed buildings, historic battlefields, registered historic parks and gardens and non-designated features of national, regional or local archaeological, historical or architectural interest and value along the NGT corridors. These features include archaeological remains, historic buildings, historic townscapes, designed landscapes and public spaces. Heritage also includes the sense of identity and place which any combination of these features can provide.

14.191. The ES describes the existing baseline resources in the study area and also sets out where ground disturbance might disrupt previously unrecorded remains. Indirect and secondary impacts arising from the OLE and stops are also taken into consideration and their impact upon the setting of historic resource.

14.192. The ES assessment also takes into consideration the indirect and secondary impacts arising from the conclusions of other disciplines notably, townscape
and visual amenity with respect to the impact of the visual effects of OLE and new NGT stops on the setting of the historic resource. Other resources which serve to enhance the historic setting include arboriculture with respect to loss of trees and the resulting impact on the character, appearance and setting of the Conservation Areas and listed buildings; noise and vibration; traffic and transport with respect to impacts on the amenity of either listed buildings or the various Conservation Areas. These impacts have not been included within this section as they would result in double counting in the appraisal of the project and are instead presented in the Landscape/Townscape section.

Methodology

14.193. A full methodology for assessing impacts on Heritage of Historic Resources is located in the TWAO Document for Historic Environment (Core Document A-08c-7)\(^86\). Further information for this section has been extracted from the Supplement to the Environmental Statement (Core Document B-1)\(^87\).

14.194. The historic environment assessment includes research of historic environment records, cartographic sources, published and unpublished reports relating to sites within 500 metres of the centre line of the NGT corridor. This provides the spatial scope for the purpose of gathering National Heritage List and West Yorkshire Archaeology Advisory Service and Historic Environmental Records data.

14.195. The assessment for this Business Case Review, relies upon the technical information reported in the ES, and then compares impact on the historic environment of each Do-Something scenario compared to the Do-Minimum to score the impact according to the seven point WebTAG scale.

14.196. The ES documents the technical assessment of the Preferred Option, but not the NBA or LCA. The NBA and LCA have been scored in this Business Case Review on the basis of their relative impact to the Preferred Option.

The Do-Minimum Scenario

14.197. The proposed route passes a number of listed buildings of which 53 front onto the NGT corridor. A total of 51 applications have been made for Listed Building Consent for the attachment of OLE building fixings and ten applications for Listed Building consent for works affecting the curtilage or setting of a listed structure. NGT passes adjacent to two registered parks and gardens and is located within 500 metres of a Scheduled Monument, although these designations are unlikely to be directly affected by the project.

14.198. Within 500 metres of the route are also a significant number of listed buildings and a number of buildings considered to make a positive

\(^{86}\) Technical Appendix G - Historic Environment, Mott MacDonald, 2013
\(^{87}\) Leeds New Generation Transport – Supplement to the Environmental Statement, Mott MacDonald, 2014
contribution to the character of some historic areas. Further to this are areas of historic public open space and locally important archaeological interest.

14.199. The Do-Minimum scenario comprises no material transport investment and is unlikely to affect the baseline conditions of the historic environment.

14.200. Considering that no substantial change is predicted, the impact on the historic environment of the Do-Minimum is minimal and therefore interpreted as not significant.

Impact of the Preferred Option

Construction

14.201. The Preferred Option would include the installation of OLE, including the attachment of building fixings to historic buildings, and requiring land take for on-road widening associated with the operation of NGT. Some land take is within Conservation Areas and consideration is required of the impact on the wider setting of the historic environment resources.

14.202. During construction, there are a wide range of possible construction impacts which can have an impact upon the visual amenity of historic environments. In brief these are as follows:

- Partial loss or damage of buildings and above/below ground archaeological remains
- Relocation of listed boundary structures and unlisted buildings and structures within a Conservation Area
- Removal of some negative contributions within Conservation Areas. For instance, this might relate to the removal of poor quality aesthetic elements around historic ruins which could be improved by landscaping elements of the Preferred Option
- Temporary alteration or visual intrusion of the historic character of an area
- Introduction of trolleybuses within currently pedestrianised areas (Millennium Square)
- Temporary access issues to historical sites
- Compromised sites from physical or visual intrusion

14.203. The ES indicates that the details of the fixing for OLE is not yet available at this design stage however it is understood that it normally consists of an expanding bolt into the façade of the building from the outside. With the exception of the bolt they cause no building damage as the stress applied to façade is within the reserve strength of a normally sound building. A waterproof sealer prevents water penetration damage.
14.204. To reduce the negative impact of construction on the historic environment a number of mitigation measures are planned as part of the CoCP. The removal of historic boundaries will be replaced through replanting and landscaping which will prevent visible joins being seen. The ES shows that in many cases, mitigation will mean that impacts are not considered to be significant.

14.205. Mitigation measures in the construction phase will reduce the impact to the historic environment by ameliorating negative aesthetic impacts.

14.206. The Preferred Option construction phase is assessed as having a neutral impact on the historic environment.

**Operation**

14.207. Operation will result in a number of effects that are expected to range from adverse to beneficial. Such impacts are dependent upon the location of the route and the historic character of the surrounding area.

14.208. Adverse effects are likely to arise from increased visual intrusion to buildings with historical importance through the introduction of OLE and other required infrastructure, alteration to the historic character or setting of a building or place and increased dust, noise, pollution and vibration which may detrimentally affect the fabric of historic resources.

14.209. The introduction of OLE fixings to listed buildings is considered to have a low impact in the context of current levels of traffic, traffic managements and other street clutter. OLE will have a minor adverse effect to the settings of listed buildings. The installation of new stops will be mitigated by sensitive urban realm design.

14.210. The introduction of new NGT alignments (such as in Headingley) with associated traffic activity and lighting etc. will be intrusive and at variance with the current form, context and pattern of the historic setting. The impact of NGT vehicles through this area will be moderate on a heritage asset of medium value. The significance of the effects of this impact are considered moderate adverse at Year 1 reducing to minor adverse, possibly neutral by Year 15. The impacts by Year 15 will be dependent upon the extent to which replanting and landscaping has managed to reduce or remove any noise and visual intrusions on the conservation area and effectively restore the wooded character of the corridor, thus re-integrating it back into the form and pattern of the landscape.

14.211. The introduction of a substation close to the Old Red Lion Public House on the route of the South Route will have an impact on the special architectural and historic character of the surrounding area. Through appropriate townscape and landscape design, there is no significant residual effect.

14.212. The ES states that following mitigation measures, there will be no residual effects upon the historic environment.
14.213. With negative impacts being mitigated as far as possible and becoming part of the local visual amenity over time alongside long term beneficial impacts to the fabric of historic resources, the Preferred Option operational phase is therefore assessed as having a **neutral** impact on the historic environment.

**Overall Impact**

14.214. Overall, the Preferred Option is assessed as having a **neutral** impact on the historic environment because the majority of impacts can be mitigated in both the construction and operational phases.

Impacts of the Next Best Alternative

**Construction**

14.215. There would be a similar number of key impacts as with the Preferred Option such as loss of the same mature trees and soft landscaping in Conservation Areas, visual impact and disruption during re-alignment work, demolition of listed and Conservation Area boundary walls noise and intrusion in registered parks and gardens and visual intrusion associated with the need for charging stations on the route corridors. It is assumed the same scale of mitigation and enhancement measures in the Preferred Option would be applied to reduce negative impacts to the historic environment.

14.216. The NBA construction phase is therefore assessed as having the same impact in as the Preferred Option which is assessed as **neutral** on the historic environment.

**Operation**

14.217. The impact of the NBA would be similar to the Preferred Option, except that the NBA would not require OLE including building fixings.

14.218. With negative impacts being mitigated as far as possible and becoming part of the local visual amenity over time alongside long term beneficial impacts to the fabric of historic resources, the NBA operational phase is therefore assessed as having a **neutral** impact on the historic environment.

**Overall Impact**

14.219. Overall, the NBA is assessed as having a **neutral** impact on the historic environment because the majority of impacts can be mitigated in both the construction and operational phases.

Impacts of the Low Cost Alternative

**Construction**

14.220. There are no significant effects predicted as the route follows the existing highway. There is potential for a slight adverse effect on the setting and amenity of registered parks and gardens from noise and visual intrusion however, this is assumed to be short-lived.
14.221. The LCA construction phase is therefore assessed as having a **neutral** impact on the historic environment.

**Operation**

14.222. The LCA comprises the use of a hybrid diesel-electric vehicle, but with no provision required for charging of the vehicle’s batteries. No overhead catenary or OLE building fixings would be required, and no off highway route is proposed. The Park & Ride sites at Stourton and Bodington would also be reduced in size.

14.223. Air pollutants and vibrations associated with the existing situation will not differ from the Do-Minimum. This will continue to have some slight impact to the fabric of historic buildings.

14.224. The LCA operational phase is therefore assessed as having a **neutral** impact on the historic environment.

**Overall Impact**

14.225. Overall, the LCA is assessed as having a **neutral** impact on the historic environment because there is no change to the indirect impacts of noise and air pollution on heritage assets but it has been assumed that there would be no adverse impacts associated with OLE and charging points of the other options.

**Biodiversity**

*Introduction*

14.226. Biodiversity has been assessed under the ES heading of ‘ecology’. For the ES ecological features were assessed using criteria set out by the Institute of Ecology and Environmental Management.

14.227. In the ES ‘ecology’ includes consideration of the presence of legally protected or rare species, large populations of relatively uncommon or threatened species, species rich assemblages, and presence of sites or habitat features designated for their nature conservation interest.

14.228. An assessment of the impact of the NGT Project has been undertaken for what are considered to be ecologically important receptors along the NGT route.

*Methodology*

14.229. A full methodology for biodiversity is in the TWAO Document for Ecology (Core Document A-08d)\(^88\).

14.230. A series of protected species surveys for bats, breeding birds, otters, badgers and reptiles were undertaken in 2009, 2012 and 2013. Desk study data from West Yorkshire Ecology was also acquired and analysed in 2013.

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\(^{88}\) Technical Appendix D-Ecology, Mott MacDonald, 2013
14.231. The value or potential value of an ecological resource or feature has been determined within a defined geographical context. Values were assigned through professional judgement and the effects described using WebTAG compliant terminology.

14.232. The assessment for this Business Case Review, relies upon the technical information reported in the ES, and then compares the difference in biodiversity impact between the Do-Minimum and each Do-Something scenario to score the impact according to the seven point WebTAG scale.

14.233. The ES documents the technical assessment of the Preferred Option, but not the NBA or LCA. The NBA and LCA have been scored in this Business Case Review relative to the impact of the Preferred Option.

The Do-Minimum Scenario

14.234. The proposed route runs mainly through urban environment of largely built up areas, amenity grassland and hard-standing. There are areas of higher ecological importance, such as the off highway sections at Headingley Hill and the Park & Ride sites at Stourton and Bodington. These areas host broadleaved semi-natural woodland and improved and semi-improved neutral grassland.

14.235. A number of important ecological receptors have been identified in the proximity to the proposed route:

- Two designated sites of national importance and two of local importance within 2 km of the route (Middleton Woods Local Nature Reserve and Meanwood Valley Local Nature Reserve, Leeds and Liverpool Canal Site of Special Scientific Interest and Breary Marsh Site of Special Scientific Interest and Local Nature Reserve)

- Local and less than local important habitats throughout the project for common species of bats and breeding birds

- Within 2 km of the alignment are 20 bird species listed as Schedule 1. Schedule 1 birds are birds and their young, for which it is an offence to intentionally or recklessly disturb at, on or near an active nest. Breeding birds are of low value and of local importance and Schedule 1 birds nesting are of high value and of regional importance

14.236. The ES reports that the impact on biodiversity in the Do-Minimum scenario is minimal and of no significance.

Impact of the Preferred Option

Construction

14.237. During construction no works will occur on any of the designated sites. It is expected that works will remove areas of habitat including trees and grassland particularly around the off-line section in Headingley and the Park
& Ride sites at Stourton and Bodington. The ES describes this as resulting in a minor adverse effect due to the loss of foraging and roosting habitat for bats and breeding birds.

14.238. By following the Construction Environmental Management Plan (CEMP), the replanting of trees and other habitats, including the designated ecology mitigation area in Headingley and works being carried out to minimise the effects on protected species, the overall construction footprint of NGT according to the ES will be a minor beneficial impact on ecology. To a degree, this result is based on the removal of invasive species which will enhance local habitats.

14.239. During the works, mitigation will have a minor negative impact which is a significant residual effect on bird species but would only be significant if nesting Schedule 1 birds were identified on the route.

14.240. The Preferred Option construction phase is therefore assessed to have a slight adverse impact on biodiversity. This is based on the negative effects for some habitats over the short term, the benefits afforded to some habitats by the mitigation measures and the significance of the impacts increasing only if Schedule 1 birds are disturbed.

**Operation**

14.241. The ES reports that in the operational phase, mitigation measures, tree planting and grassland re-planting will improve potential breeding and foraging areas for bats and birds. This results in a minor beneficial effect. The improved quality of these areas will also provide increased breeding and foraging potential which will be of significant benefit to Species 1 birds. Planned lighting will be placed to avoid protected species.

14.242. The Preferred Option operational phase is therefore assessed to have a slight beneficial impact on biodiversity, based on the benefits to habitats brought about by the mitigation and enhancement measures included as part of the Preferred Option.

**Overall Impact**

14.243. On balance, with the correct mitigation measures, the Preferred Option is assessed to have a slight beneficial impact on biodiversity because there are long term habitat improvements afforded by the mitigation measures in both phases which outweigh any short term negative impacts of the construction phase.

**Impacts of the Next Best Alternative**

**Construction**

14.244. The construction phase of the NBA will have similar key impacts to the Preferred Option on biodiversity.
14.245. The NBA construction phase is therefore also assessed as having a slight adverse impact on biodiversity.

**Operation**

14.246. The NBA and Preferred Option would have similar impacts on biodiversity in the operational phase.

14.247. The NBA operational phase is therefore assessed as having a slight beneficial impact on biodiversity.

**Overall Impact**

14.248. Overall, the NBA is assessed to have a slight beneficial impact on biodiversity because of the balance of long term benefits from the operational phase over any short term adverse impacts of the construction phase.

**Impacts of the Low Cost Alternative**

**Construction**

14.249. During the construction phase of the LCA, impacts on biodiversity will be significantly reduced relative to the Preferred Option, because there will be no offline sections and limited disturbances to current habitats and bat roosts. There would therefore be a negligible impact on biodiversity.

14.250. It is assumed that the overall intensity and scale of works for construction of the Low Cost Option would include site specific planning constraints and the use of Best Practicable Means to reduce the impacts which occur in this phase.

14.251. The LCA construction phase is therefore assessed as having a neutral impact on biodiversity.

**Operation**

14.252. The LCA does not include any additional segregated sections as it is assumed that it would use the existing carriageway and bus lanes. The long-term impact on habitats would therefore be minimal. Park & Ride facilities would provide some scope to incorporate new features for protected species.

14.253. It is assumed that site specific planning constraints and Best Practicable Means would ensure that this option would not result in adverse impacts and may offer some benefits to local habitats and species.

14.254. The LCA operational phase is therefore assessed as having a neutral impact on biodiversity.
**Overall Impact**

14.255. Overall, the LCA is assessed to have a **neutral** impact on biodiversity because mitigation measures or enhanced environments in either the construction or operational phase will reduce adverse impacts.

**Water Environment**

**Introduction**

14.256. The NGT Project is within an area which includes the River Aire and its tributaries. NGT will cross the river and its floodplain in the centre of Leeds. There are no groundwater Source Protection Zones in the area. These are areas such as wells and springs for public drinking water supply considered to show risk of contamination from activities causing pollution.

14.257. The water environment which is located within the vicinity of the proposed NGT Project has been assessed to determine whether there will be any effects on local water features, including rivers, streams, ponds and aquifers.

14.258. Potential effects on surface water, groundwater, changes to water quality, changes in groundwater levels and flood risk have been assessed.

**Methodology**

14.259. The methodology that was used for assessing the impacts on the water environment is located in the TWAO Document for Water Resources (Core Document A-08e-7)\(^{89}\).

14.260. The ES assessed the impacts on the water environment of the NGT Project through:

- A desk study and site visits to establish the baseline conditions
- An assessment of the value of resources/receptors and the type and magnitude of effect, to establish the significance of the proposed development, taking into account planned mitigation

14.261. The spatial scope for the impacts of the NGT Project have considered:

- Surface waters and drainage within 250 m of the proposed scheme, recognising that any significant downstream effects could potentially extend further
- Aquifers within 250 m of the proposed scheme
- Groundwater abstractions which are within 250 m of the proposed scheme

14.262. The assessment for this Business Case Review, relies upon the technical information reported in the ES, and then compares the difference in water

\(^{89}\) Technical Appendix N- Water Resources, Mott MacDonald, 2013
environment impact between the Do-Minimum and each option to score the impact according to the seven point WebTAG scale.

14.263. The ES documents the technical assessment of the Preferred Option, but not the NBA or LCA. The NBA and LCA have been scored in this Business Case Review relative to the impact of the Preferred Option.

The Do-Minimum Scenario

14.264. Due to the urban nature of the surrounding environment, nearby surface water features are minimal, with some historical watercourses culverted below ground level.

14.265. The NGT North Route is proposed to run predominantly along high ground, between the valley of the River Aire and Mosely/Carlton/Oil Mill Beck, a tributary of the River Aire and the valley of the Adel Beck/Meanwood Beck.

14.266. The nearest watercourse to the South Route is the River Aire, flowing in a north-west to south-east direction beneath the route at Leeds Bridge. At Balm Road a culverted watercourse runs under the road to the River Aire. Stourton Beck flows across the location of the proposed Stourton Park & Ride site.

14.267. In total, there are four surface water discharge consents within 250 metres of the proposed route which are all combined sewer overflow discharges. Three of these are located in the city centre and discharge upstream of the route at Leeds Bridge, one discharges downstream of the project in Stourton. There are no surface water abstractions.

14.268. The bedrock and superficial deposits that underlie the route are aquifers with permeable layers that are capable of supporting water supplies at a local rather than strategic scale.

14.269. There are three licensed groundwater abstractions within 250 metres of the route. There are no private water supplies (Protected Rights) in the vicinity of the project. There is one consent for discharge to groundwater. There are no Source Protection Zones within 250 metres of the route.

14.270. It is not considered that there would be any material change to this baseline due to the Do-Minimum scenario.

Impact of the Preferred Option

Construction

14.271. During construction there is potential for localised spillage and run-off of contaminating materials into surface watercourses and groundwater. The key impacts that may occur are as follows:

I General use and storage on site of raw materials (for example, fuels and aggregates) during the construction works, which could cause potential contamination of surface water and groundwater
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- Direct discharges (accidental or otherwise) of drainage or effluent from construction sites to groundwater or surface waters
- The potential for groundwater pollution from construction works through mobilisation of existing contaminants as a result of construction
- Use of water for construction purposes, potentially affecting the availability of water for other functions
- Temporary discharge of seepage water from dewatering of excavations, which may be required where groundwater is found to be shallow
- Increased sedimentation of surface watercourses as a result of construction site run-off
- Increased flood risk due to construction works within the fluvial floodplains

14.272. During the construction phase, the impacts of the Preferred Option can be managed through advice from the Pollution Prevention guidelines and good practice guides such as the Construction Industry Research and Information Association, Guide to Good Practice in Control of Water Pollution from Construction Sites and the Guide to Controlling Water Pollution from Linear Construction Projects. These are included within the CoCP and will be used to instruct site staff.

14.273. With these measures in place, the ES therefore assesses this phase as not having significant effects on water.

14.274. The Preferred Option construction phase is therefore assessed as having a neutral impact on the water environment.

Operation

14.275. The ES describes the possible effects to water resources as:

- Changes to quality of surface water and groundwater quality, as a result of contaminants from abrasion associated with the NGT vehicles
- Changes to quality of surface water and groundwater quality, related to leakage/spillage of hydrocarbons, arising from changes in traffic densities and distribution
- Changes in the recharge to groundwater and discharge to surface water drainage (flow rate and volume) due to the construction of permanent hardstanding
- Changes in the recharge to groundwater and discharge to surface water drainage (flow rate and volume) due to the construction of artificial sports pitches and installation of under drainage on existing grass pitches
- Use of water to operate the scheme and associated operations
14.276. A wide number of specific design elements have been identified and incorporated into mitigation to reduce these impacts. These include:

- Water efficient technology in new building’s
- Green roof at Stourton Depot for reducing surface runoff
- Increased capacity of sewers in some locations
- Interceptors for oil/fuel drips at the car parks
- Restricted new runoff rates from widened carriageways
- Attenuating water discharges to the rate of greenfield run off on new impermeable surfaces
- Approved licenses to supply water for construction purposes

14.277. Following implementation of the proposed mitigation the impacts are not considered to be significant.

14.278. At the Park & Ride sites there is the potential to enhance the water environment through retention basins. These will create a more diverse habitat and space for vegetation growth.

14.279. The Preferred Option operational phase is assessed as having a neutral impact on the water environment.

**Overall Impact**

14.280. Overall, the Preferred Option is assessed as having a neutral impact on the water environment because:

- The construction effects will be mitigated to a high degree and will only occur for a short duration
- Following proposed mitigation the operational phase impacts are not considered to be significant

**Impacts of the Next Best Alternative**

**Construction**

14.281. The NBA would have similar levels of infrastructure to the Preferred Option and is therefore also assessed as having a neutral impact on the water environment.

**Operation**

14.282. During the operational phase most impacts would be the same as for the Preferred Option.
14.283. Provided that the depot development properly mitigates any flood risk, then the NBA scenario is assessed to have a **neutral** impact on the water environment.

**Overall Impact**

14.284. Overall, the NBA is assessed to have a **neutral** impact on the water environment because:

- The construction effects will be mitigated to a high degree and will only occur for a short duration
- Following proposed mitigation the operational phase impacts are not considered to be significant

**Construction**

14.285. The infrastructure requirements of the LCA are materially reduced relative to the Preferred Option. This means that there is less conversion of grassed areas to impermeable surfacing, especially at the Park & Ride sites. The reduced construction also minimises the risk of pollution to water bodies from construction run-off or spillages of contaminating materials.

14.286. The LCA construction phase is therefore assessed as having a **neutral** impact on the water environment.

**Operation**

14.287. The LCA comprises the use of hybrid diesel-electric vehicles, which will slightly reduce the concentration of pollutants in highway run-off than current vehicles due to the hybrid engine functionality. The concentration of pollutants in highway run-off relative to the Preferred Option. However, this effect will not be significant.

14.288. The LCA operational phase is therefore assessed as having a **neutral** impact on the water environment.

**Overall Impact**

14.289. Overall, the LCA is assessed as having a **neutral** impact on the water environment because:

- The construction effects will be mitigated to a high degree and will only occur for a short duration
- Following proposed mitigation the operational phase impacts are not considered to be significant

**Summary of Results**

14.290. The outcome for the environmental impacts for the Preferred Option, NBA and LCA are shown in Table 14.2. The results are based on the seven point scale WebTAG scores justified above.
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<tr>
<td>Overall</td>
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<td>Neutral</td>
<td>Neutral</td>
<td>Moderate Adverse</td>
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<td><strong>Next Best Alternative</strong></td>
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<td><strong>Low Cost Alternative</strong></td>
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<tr>
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<td>Overall</td>
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15. **Social Impacts**

**Introduction**

15.1. This section summarises the performance of the Preferred Option and associated alternatives against the following Social Objectives:

- Travel Time Impact on Commuting and Other Users
- Reliability Impact on Business Users
- Physical Activity
- Journey Quality
- Accidents
- Personal Security
- Access to Services
- Personal Affordability
- Severance
- Option Values

15.2. Where possible, the impact of each objective has been monetised within the economic appraisal. If a quantitative assessment is not available, the impact has been assessed using DfT’s standard scoring system. This system is described in Section 13, (see 13.4).

15.3. As specified in WebTAG, the Social and Distributional Impacts of each option are considered for the following sub-objectives:

- Travel Time Impact on Commuting and Other Users

15.4. Further information on these objectives is provided in a number of additional Core Documents, which are referenced in this section.
Travel Time Impact on Commuting and Other Users

Introduction

15.6. The impacts of the Preferred Option and its associated alternatives have been considered separately for different user groups. This section summarises the impact on Commuting and Other Users. The impact on Business Users and Transport Providers is covered in Section 13.

15.7. The impacts of the Preferred Option, Next Best Alternative and Low Cost Alternative have been assessed in accordance with WebTAG Unit 3.5.2.

Methodology

15.8. Commuting and Other includes commuters, education and leisure travellers. The impact on Commuting and Other users has been appraised for:

- Public Transport users (bus)
- Road users (private cars and light goods vehicles)

15.9. Benefits have been calculated using the Transport User Benefit Appraisal (TUBA) software based on outputs from the LTM. This method is described in Core Document C-1-1790.

15.10. Some road user benefits are derived in the parking model, (see Core Document C-2-691 and Core Document C-1-392).

The Do-Minimum Scenario

15.11. This includes the impact of committed infrastructure changes and underlying conditions that are expected to materialise if the NGT Project is not implemented, for example the demand effects of the ‘background’ changes in the relative costs of travel by car and public transport between the Base Year (2008) and the forecast years. A list of transport infrastructure ‘supply’ changes included within highway and public transport model Do-Minimum scenarios can be found in Core Document C-1-893.

Impacts of the Preferred Option

Public Transport Users

15.12. The impact on Commuting and Other users who use public transport is similar to the impact on business users described in Section 13, (see Impact on Business Users and Transport Providers).

15.13. The total travel time benefit to Commuting and Other Users is significantly higher than the benefit to business users, because although Commuting and Other Users have a lower value of time there is materially more demand in this category.

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90 TUBA Application Report, Aecom, 2014
91 LTM Demand Model Validation Report, Aecom, 2011
92 Leeds Transport Model Update Report, Aecom, 2014
93 Leeds Transport Model – Forecasting and NGT Central Case Report, Aecom, 2014
Road Users

15.14. Road users receive travel time benefits due to reduced demand for city centre parking meaning less time is required to find a parking space and the walk time to/from the car park space is likely to be less.

15.15. The overall impact differs from the impact on business road users who disbenefit from the Preferred Option. This is due to Business Users receiving a travel time disbenefit and Commuting and Other users receiving a travel time benefit.

15.16. The travel time impact includes disbenefits from the reallocation of capacity on the highway and benefits from the parking model (which includes Park & Ride and city centre parking). Commuting and Other users receive similar disbenefits but benefit more from increased parking capacity (due to Park & Ride and mode shift to public transport) than Business Users. Goods vehicles (defined as OGV1 and OGV2) in particular do not park in public car parks and therefore receive no parking benefit.

15.17. The impacts on Commuting and Other users for the Preferred Option are presented in Table 15.1.

**TABLE 15.1 TRAVEL TIME IMPACT BY MODE – PREFERRED OPTION**

<table>
<thead>
<tr>
<th>2010 Prices PV (£000)</th>
<th>Road Users</th>
<th>Public Transport Users</th>
<th>Sub Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Travel Time - Commuting</td>
<td>£419</td>
<td>£349,621</td>
<td>£350,040</td>
</tr>
<tr>
<td>Travel Time - Other</td>
<td>£4,495</td>
<td>£331,116</td>
<td>£335,611</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>£4,914</strong></td>
<td><strong>£680,737</strong></td>
<td><strong>£685,651</strong></td>
</tr>
</tbody>
</table>

Source: Steer Davies Gleave, 2014

15.18. The present value of Commuting and Other transport economic efficiency benefits for the Preferred Option is £686m, which is made up of £681m PV of public transport benefits and £5m PV of highway traveller benefits.

Impacts of the Next Best Alternative

Public Transport Users

15.19. The Next Best Alternative will have a similar impact on Commuting and Other Users as Business Users. This impact is described in Section 13, (see Impact on Business Users and Transport Providers).

15.20. The total travel time benefit to Commuting and Other Users is significantly higher than the benefit to business users, because although Commuting and Other Users have a lower value of time there is materially more demand in this category.
**Road Users**

15.21. Commuting road users receive travel time disbenefits in the Next Best Alternative due to increased congestion. The Next Best Alternative is less attractive than the Preferred Option so the increased parking capacity due to mode shift from car to public transport is not sufficient to offset these disbenefits. The overall impact is negative.

15.22. Road users travelling for other purposes also have fewer benefits due to mode shift from car to public transport compared to the Preferred Option but have a slightly higher benefit overall.

15.23. The impacts on Commuting and Other users for the Next Best Alternative are presented in Table 15.2.

### TABLE 15.2 TRAVEL TIME IMPACT BY MODE – NEXT BEST ALTERNATIVE

<table>
<thead>
<tr>
<th></th>
<th>2010 Prices PV (000)</th>
<th>Road Users</th>
<th>Public Transport Users</th>
<th>Sub Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Travel Time - Commuting</td>
<td>-£4,410</td>
<td>£196,169</td>
<td>£191,759</td>
<td></td>
</tr>
<tr>
<td>Travel Time - Other</td>
<td>£6,139</td>
<td>£183,622</td>
<td>£189,761</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>£1,729</strong></td>
<td><strong>£379,791</strong></td>
<td><strong>£381,520</strong></td>
<td></td>
</tr>
</tbody>
</table>

*Source: Steer Davies Gleave, 2014*

15.24. The overall present value of benefits to Commuting and Other Users is £382m PV for the Next Best Alternative, which is made up of £380m PV of public transport benefits and £2m PV of highway traveller benefits.

**Impacts of the Low Cost Alternative**

**Public Transport Users**

15.25. The Low Cost Alternative offers a more frequent service for passengers travelling on the NGT corridors but unlike the Preferred Option and Next Best Alternative, this option provides no significant improvements in quality or service reliability. The benefits to public transport users are therefore limited.

**Road Users**

15.26. The Low Cost Alternative will have a similar impact on Commuting and Other Road Users as Business Road Users. This impact is described in Section 13, (see Impact on Business Users and Transport Providers).

15.27. The impacts on Commuting and Other users for the Low Cost Alternative are presented in Table 15.3.
TABLE 15.3 TRAVEL TIME IMPACT BY MODE – LOW COST ALTERNATIVE

<table>
<thead>
<tr>
<th>2010 Prices PV (000)</th>
<th>Road Users</th>
<th>Public Transport Users</th>
<th>Sub Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Travel Time - Commuting</td>
<td>-£4,455</td>
<td>£21,607</td>
<td>£17,153</td>
</tr>
<tr>
<td>Travel Time - Other</td>
<td>-£8,957</td>
<td>£12,898</td>
<td>£3,941</td>
</tr>
<tr>
<td>Total</td>
<td>-£13,412</td>
<td>£34,506</td>
<td>£21,094</td>
</tr>
</tbody>
</table>

Source: Steer Davies Gleave, 2014

15.28. The overall present value of benefits to Commuting and Other Users is £21m PV for the Low Cost Alternative, which is made up of £35m PV of public transport benefits and -£13m PV of highway traveller benefits.

Social and Distributional Impacts

15.29. The Social and Distributional Impacts (SDI) of the Preferred Option and its alternatives have been assessed against this sub-objective in accordance with WebTAG Unit 3.17. The guidance specifies that the distribution of user benefits should be considered across different income groups.

15.30. The Preferred Option will generate benefits and disbenefits to both public transport and highway users. These have differing spatial and temporal distributions and therefore the project could have an impact on different income groups in different ways.

15.31. The South Route passes through some of the highest levels of deprivation in the district. The North Route is generally less deprived than the South Route but there are areas with relatively high levels of deprivation at the northern end of the North Route.

15.32. The public transport benefits resulting from the introduction of NGT in the south are relatively evenly distributed across the area and therefore do not result in a concentrated impact.

15.33. The assumed rationalisation of the existing bus network would disbenefit some public transport passengers from locations between Bodington and Holt Park and on the Tinshill Loop. These disbenefits occur in areas of relatively high deprivation in comparison to the rest of the North Route.

15.34. Overall, the benefits of the Preferred Option are significant but are not concentrated in areas of either high deprivation or low deprivation.

15.35. The introduction of Preferred Option infrastructure within the highway network will result in a change in highway capacity. The degree to which any reduction in highway capacity leads to additional traffic congestion depends in part on the extent to which mode shift from private car to NGT reduces traffic flows on the corridor. The current design has been through a process of refinement, with attention having been given to those junctions with a particular influence on capacity and therefore on highway user journey time impacts.
15.36. This has contributed to highway user disbenefits being significantly reduced from Programme Entry Re-approval stage, although they have not yet been fully eliminated. However, the scale of the remaining highway disbenefits is now sufficiently small that they make no material contribution on the overall economic appraisal of the scheme.

15.37. Overall, the material public transport user benefits for the Preferred Option are distributed across the area served by NGT. The highway disbenefits are not significant.

15.38. For the NBA, the distribution of public transport benefits will be similar to the Preferred Option, but lower in scale as fewer passengers are forecast to receive them. As a result of lower mode shift on the corridor, the NBA results in a net increase in highway congestion, however it only contributes a small amount to the overall net benefit.

15.39. The LCA includes some of the key junction improvements which reduce existing congestion on the corridor on radial routes. Beneficiaries of these will not be concentrated in any single area. Public transport benefits will be more limited in scale than for the Preferred Option or NBA on the North Route, although there would be no reduction in service frequency north of Bodington. On the South Route the benefit of the new service would only be received by users of the Park & Ride site.

**Reliability Impact on Commuting and Other Users**

**Introduction**

15.40. NGT (and the Next Best Alternative) is expected to improve the reliability of bus services in the NGT corridors. This is due to increased segregation, junction priority and improved ticketing arrangements, some of which will be available to participating bus services as well as NGT.

15.41. This section presents the reliability impact of the Preferred Option as well as the Next Best and Low Cost alternatives on Commuting and Other Users.

**Methodology**

15.42. The impact of reliability on Commuting and Other is assessed in the same way as Business Users. This is described in Section 13 - Reliability Impact on Business Users. An explanation of the method of calculating punctuality benefits is provided in Core Document C-1-11.94

The Do-Minimum Scenario

15.43. This is the same as for business users and is discussed in Section 15 - Reliability Impact on Business Users.

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94 NGT Punctuality Report, Steer Davies Gleave, 2014
Impact of the Preferred Option

15.44. It is considered that the improvements in signalling given through the design of NGT will deliver an increase in reliability to road users.

15.45. Existing bus operators will benefit from the increased segregation and the reallocation of priority from road to public transport at some junctions on the corridors. The Preferred Option is expected to generate £82m PV of punctuality benefits to Commuting and Other users.

15.46. Combined with the benefits for business users, NGT is forecast to generate £84m PV of punctuality benefits in the 60 year appraisal period. These benefits have been included in the economic appraisal for NGT.

Impact of the Next Best Alternative

15.47. The Next Best Alternative offers the same improvements in road infrastructure as the Preferred Option and is therefore expected to offer the same improvements in reliability.

15.48. The impact on existing bus services has been calculated in the same way as the Preferred Option using the same travel time data. This shows that the Next Best Alternative is expected to generate £58m PV of punctuality benefits to Commuting and Other users.

15.49. Combined with the benefits for business users, the Next Best Alternative is forecast to generate £60m PV of punctuality benefits in the 60 year appraisal period. These benefits have been included in the economic appraisal for the Next Best Alternative.

Impacts of the Low Cost Alternative

15.50. Unlike the Preferred Option or the Next Best Alternative, the Low Cost Alternative would not deliver improvements in road infrastructure beyond standard maintenance. The change in reliability for road users and existing bus operators is expected to be minimal. The qualitative impact assessment is assessed as neutral.

Physical Activity

Introduction

15.51. It is recognised that people who use public transport tend to walk further, which has a beneficial effect on physical fitness. Relatively small amounts of regular walking and cycling can lead to significant improvements in physical fitness and overall wellbeing.

Methodology

15.52. The impact of the Preferred Option and its associated alternatives on this sub-objective has been assessed in accordance with WebTAG Unit 3.3.12.
The methodology for the assessment of this sub-objective is provided in Core Document B-9.95

The Do-Minimum Scenario

15.53. At the time of writing, there are no committed plans to improve existing pedestrian or cyclist infrastructure along the NGT Route. It has therefore been assumed that that there would be no impact on this sub-objective under the Do-Minimum scenario.

Impact of the Preferred Option

15.54. The Preferred Option includes the provision of segregated cycle facilities along the segregated bus lanes, which will make cycling safer and more attractive. Along some parts of the route, existing cycle lanes are being removed, but in general they are replaced by wider, shared use bus and/or NGT lanes. There will also be facilities for cycle parking at key stops. Overall, there is an increase in cycle provision along the NGT route.

15.55. Pedestrians will benefit from improved footways, though some footways will also be narrowed and additional controlled crossing points that have been incorporated into new signals. This will encourage walking along the corridors.

15.56. Physical activity will increase due to mode shift when passengers switch from private vehicles to public transport. Some of these benefits may be offset by some users shifting from cycling and walking to NGT.

15.57. The overall impact of the Preferred Option on physical activity is considered to be slight beneficial.

Impact of the Next Best Alternative

15.58. The Next Best Alternative offers the same increase in cycle provision along the route as the Preferred Option. However the level of mode shift from car to public transport will be less since the scheme is less attractive.

15.59. The overall effect on physical activity has also been assessed as slight beneficial.

Impact of the Low Cost Alternative

15.60. It is anticipated that the Low Cost Alternative would not encourage material modal shift from private vehicle to public transport. The design does not include the introduction of significant additional segregation and existing cycling facilities will not change.

15.61. The impact of the Low Cost Alternative on physical activity has therefore been assessed as neutral.

95 Transport Assessment (Chapters 6 and 7), Mott Mac Donald, 2013
Journey Quality

Introduction

15.62. It is recognised by the DfT that the experience of a poor quality journey has more of an impact on travellers than a high quality journey, which is often taken for granted. This section considers the impact of each option on journey quality, as experienced by users.

Methodology

15.63. The impact of the Preferred Option and its associated alternatives on this sub-objective has been assessed in accordance with WebTAG Unit 3.3.13.

15.64. Journey quality is assessed by considering traveller care, traveller views in terms of extent, quality visibility and traveller stress factors. For the purposes of the NGT Project a quantified measure of journey quality was derived, based on the results of the Stated Preference (SP) survey carried out in 2008, Core Document C-4-24.96

15.65. It is assumed that journey quality does not include any impacts of changes in journey time and provision of information at bus stops, which have been assessed in other sections of this Economic Case under other WebTAG sub-objectives.

The Do-Minimum Scenario

15.66. The Do-Minimum scenario assumes standard bus vehicles of mixed age and quality will continue to operate on existing routes, which will not be enhanced. Some vehicles may be articulated whilst others will be double-decker or single-decker vehicles. The quality of existing bus journeys on the NGT Route under the Do-Minimum scenario will continue to be variable and, particularly in the case of older vehicles, is unlikely to be sufficient to attract mode shift to public transport.

Impacts of the Preferred Option

15.67. The Preferred Option has been designed to deliver an improvement in quality compared to existing bus services with enhanced vehicles and associated infrastructure.

15.68. The trolleybus vehicles will be electrically powered, which will significantly reduce the amount of internal vehicle noise and vibration compared to existing bus services (which are diesel powered).

15.69. The infrastructure design offers better road conditions and smoother ride quality due to less interaction with other road users. There will also be a positive impact on other road users where improvements are made on sections of the NGT Route that are shared with other users.

96 Appendix 24: Stated Preference, Steer Davies Gleave, 2008. Journey quality was included in the assumptions of the public transport assignment model (see 12.13) but cannot be easily extracted from the journey time impacts.
15.70. During construction, there will be short term adverse effects on journey quality due to the installation of temporary surfaces and diversions, which are likely to disturb local road conditions.

15.71. The impact of the Preferred Option on journey quality has been assessed as strong beneficial.

Impact of the Next Best Alternative

15.72. The Next Best Alternative is expected to offer similar benefits to the Preferred Option in terms of infrastructure but the benefit associated with new vehicles would be reduced.

15.73. The hybrid buses would run on a combination of diesel and electricity so there would be engine and exhaust noise and vibration for around half of the vehicles distance in service, which will be felt by passengers. The improvement in quality in comparison to existing buses will therefore be less than the Preferred Option.

15.74. As with the Preferred Option, there will be short term adverse effects on journey quality during construction.

15.75. The overall impact of the Next Best Alternative on journey quality has been assessed as moderate beneficial.

Impact of the Low Cost Alternative

15.76. The Low Cost Alternative is expected to offer slight benefits to passengers due to a new fleet of hybrid vehicles, which will increase passenger comfort. However, with the exception of standard maintenance and renewals, there are no plans to upgrade any road infrastructure on the NGT Route in this option so the impact on traveller stress would not change.

15.77. Minimal construction works would be required for this option so the short term adverse effects observed in the Preferred Option and Next Best Alternative would be less of an issue.

15.78. The impact of the Low Cost Alternative on journey quality has been assessed as neutral.

Accidents

Introduction

15.79. This section assesses each option against the objective of reducing accidents and casualties.

Methodology

15.80. The quantification of casualties is based on the amount of vehicle km travelled. This includes Preferred Option or alternative service km (where integrated with general traffic) and the change in highway km for existing bus services and private vehicles. The forecast change in vehicle km is an output from the Highway Assignment Model in the LTM (see Section 12).
15.81. The predicted change in future collisions and resulting casualties has been calculated from the methodology set out in the Design Manual for Roads and Bridges Volume 13 (last updated June 2006). Accident and casualty changes have been monetised in accordance with the same sources and have been updated to 2010 prices consistent with the economic appraisal.

The Do-Minimum Scenario

15.82. An assessment and mapping of accident clusters between January 2008 and December 2012 along the NGT Route is provided in Core Document B-9.97

15.83. Traffic will continue to grow in the Do-Minimum scenario. As it is assumed that there will be no change in the accident rate, accident numbers will also increase.

Impacts of the Preferred Option

15.84. The demand forecasts show that the Preferred Option will lead to a net increase of around 10.3m annual vehicle km on the highway network by 2031. The majority of this is due to the increase in private vehicle km though this allows for changes in NGT and bus km. The increase in private vehicle km is due to road users travelling further because of reallocation of capacity from highway to NGT.

15.85. This would lead to a net increase in accidents over the Appraisal Period. This represents a cost of £25m PV. As pedestrian and cycle flows are not modelled within the LTM, this value excludes the accident benefits that will result from the enhanced cycle and pedestrian facilities that are integral to the NGT scheme.

Impacts of the Next Best Alternative

15.86. The demand forecasts show that the Next Best Alternative will lead to a net increase of around 11.2m annual vehicle km on the highway network by 2031. This will lead to a net increase in accidents over the Appraisal Period. In discounted monetised terms in line with current DfT appraisal guidance, this represents a cost of £26m PV over the Appraisal Period.

Impact of the Low Cost Alternative

15.87. The demand forecasts show that the Low Cost Alternative will lead to a net increase of around 2.9m annual vehicle km on the highway network by 2031. This will lead to a net increase in accidents over the Appraisal Period. In discounted monetised terms in line with current DfT appraisal guidance, this represents a cost of £9m PV over the Appraisal Period.

Social and Distributional Impacts

15.88. The SDI of the Preferred Option and the associated alternatives have been assessed against this sub-objective in accordance with WebTAG Unit 3.17.

97 Transport Assessment (Chapter 10), Mott Mac Donald, 2013
The guidance specifies that the changes in accidents should be considered for children less than 16 years old, young adults aged 16 to 25 years and older people aged 70 years and above.

15.89. The economic appraisal for the Preferred Option shows that there will be an increase in accidents as part of the scheme. This is a result of an increase in vehicle km on the network resulting from the introduction of the Preferred Option which will alter traffic flows on some key corridors.

15.90. The Preferred Option design includes provision for pedestrian and/or cycle crossings at a number of new and upgraded traffic signal locations. There will be an overall net gain in cycle infrastructure, although in some locations sections of cycle lanes will be lost. Some footways also need to be narrowed, although minimum standards will be met.

15.91. The economic appraisal does not include accident benefits from the enhanced cycle and pedestrian facilities that are included within the design of the Preferred Option. Such reductions in accidents have the potential to benefit the vulnerable groups which are specified in the guidance and may enhance conditions in areas where cycling and walking is more prominent amongst those groups such as near residential homes, colleges, schools, universities and student residential areas.

15.92. Changes in accidents from the Preferred Option will be dispersed over the highway network therefore the impact on key social groups will not be significant or concentrated.

15.93. With the NBA there will be less modal shift resulting in lower reductions to vehicle km on the highways than in the Preferred Option. In combination, this would contribute to increased accidents but these would not be significant and are unlikely to be concentrated on vulnerable groups.

15.94. With the LCA, the degree of change of traffic on the highway network with the schemes in place will be much lower than with the Preferred Option and it will have the lowest levels of modal shift of all options. The LCA will also have fewest enhancements to cycle and pedestrian facilities which would not contribute to significant changes in vehicle km and therefore to accidents.

**Personal Security**

**Introduction**

15.95. Personal security is a major factor in delivering a high quality public transport system, particularly for vulnerable travellers such as children, women and elderly people. Concern for personal security is not necessarily confined to the time spent on board the bus; indeed people often report this is the safest part of their journey. Instead, the concern could be apprehension associated with walking to or waiting at the stop.
Methodology

15.96. The impact of the Preferred Option and its associated alternatives on this sub-objective has been assessed in accordance with WebTAG Unit 3.4.2.

The Do-Minimum Scenario

15.97. Most public transport services on the North Route are covered by in-vehicle CCTV systems. A small number of busier bus stops are also equipped with CCTV and it is expected that more will be equipped over time. There are no changes expected over the Appraisal Period that would have a significant impact on perceived levels of security in the Do-Minimum scenario.

Impacts of the Preferred Option

15.98. The specification of the Preferred Option builds on current best practice for transport systems and incorporates many features which aim to provide a safe and secure environment for passengers. Effective lighting will be used at and within the vicinity of stops, along with CCTV and help points at strategic locations in the stop layout to maintain personal security. The Preferred Option design will also include appropriate landscaping and material finishes improving visibility.

15.99. Passenger safety will be further improved by on-vehicle staff who will be present on NGT services. There will also be additional security staff, included as part of the administration staff costs presented in Table 11.2 and Table 11.3.

15.100. The Preferred Option is assessed as having a strong beneficial impact on personal security.

Impacts of the Next Best Alternative

15.101. As with the Preferred Option, the Next Best Alternative includes measures to enhance personal security when using the system. Improvements are also proposed for existing CCTV, lighting systems and landscaping, with the addition of help points at sensitive locations.

15.102. The Next Best Alternative will also provide customer service/revenue protection staff and additional security staff, similar to the Preferred Option.

15.103. The Next Best Alternative is assessed as having a strong beneficial impact on personal security.

Impact of the Low Cost Alternative

15.104. The Low Cost Alternative will provide some new stops but makes best use of current transport facilities. There are no assumed improvements to facilities, which would enhance personal security needs.

15.105. The Low Cost Alternative is assessed as having a neutral impact on personal security.
Social and Distributional Impacts

15.106. The SDI of the Preferred Option and the associated alternatives have been assessed against this sub-objective in accordance with WebTAG Unit 3.17. The guidance specifies that personal security should be considered for children less than 16 years old, older people aged 70 years and above and those with disabilities.

15.107. All three options will encourage public transport use, which generates greater exposure to personal security issues than private car use. Of note is the proposed Headingley Centre stop, located on a segregated alignment away from existing pedestrian and other activity areas, and therefore more isolated than other stops. This area is characterised by a significant student population with correspondingly reduced scope for above average levels of children under 16 years and people over 70 years old or significant concentrations of people with disabilities.

15.108. The locations and design of all new stops on the route aim to mitigate security issues, for example by ensuring they are well lit and with good visibility to reduce perceptions of poor security. CCTV will be provided at stops and on vehicles.

15.109. The impacts of the Preferred Option and NBA will be significant and largely concentrated at stops. However, with the regular distribution of stops along the route, it is considered that the impact will not have bias towards or against any of the groups that the guidance specifies.

15.110. With the LCA, there will be modest benefits above the existing situation resulting from improvements to existing bus stops. These will be distributed along the route and not significant.

Access to Services

Introduction

15.111. Access to services includes access to the public transport network and access to the highway network (measured in terms of car availability).

15.112. For public transport, accessibility is estimated using factors such as travel speeds, wait time, crowding, fares, number of interchanges and quality. Although most of these factors are already accounted for in the economic appraisal, this section presents the information in such a way that accessibility can be assessed directly.

Methodology

15.113. The impact of the Preferred Option and its associated alternatives on this sub-objective has been assessed in accordance with WebTAG Unit 3.6.3.

15.114. Analysis has been undertaken to understand accessibility of the following sites on the NGT corridors by public transport:

- Holt Park
15.115. The analysis was based on data from the National Public Transport Data Repository\(^98\) and Experian data (2011).

The Do-Minimum Scenario

15.116. Given the extent of the city, access to services has been assessed by considering the number of households within 10 minutes journey time of the above sites by public transport (rather than the standard 60 minutes).

15.117. Without NGT, it is estimated that 13,449 households which have no car available can access the above sites within 10 minutes. There are no committed plans to create any new transport links and therefore there will be no access improvements for those not currently served within the Do-Minimum.

Impacts of the Preferred Option

15.118. NGT will provide quicker public transport links and a new north to south link across the city centre. The analysis shows that an additional 1,248 households with no car available will be within 10 minutes travel time (by public transport) of the above sites when NGT is introduced. This will increase the number of households within 10 minutes to 14,697.

15.119. The scheme is also expected to improve connectivity for new developments, particularly on the South Route.

15.120. The impact of this option on access to services has been assessed as moderate beneficial.

Impacts of the Next Best Alternative

15.121. The Next Best Alternative route is the same as the Preferred Option and has the same journey times. Therefore the improvement in accessibility will be the same as the Preferred Option.

15.122. The impact of this option on access to services has therefore been assessed as moderate beneficial.

Impacts of the Low Cost Alternative

15.123. The Low Cost Alternative runs on the same route as the Preferred Option on the North Route so will improve access for some areas not currently served.

\(^98\) National Public Transport Data Repository available at: [http://data.gov.uk/dataset/nptdr](http://data.gov.uk/dataset/nptdr)
However, since this option is not segregated, journey times will be longer compared to other options.

15.124. Although the new Park & Ride service in the Low Cost Alternative creates a link from Stourton to the University of Leeds, it can only be specified to allow boarding at the site or else would be in competition with existing services.

15.125. The impact of this option on access to services has therefore been assessed as **neutral**.

Social and Distributional Impacts

15.126. The SDI of the Preferred Option and the associated alternatives have been assessed against this sub-objective in accordance with WebTAG Unit 3.17. The guidance specifies that the accessibility should be considered for children less than 16 years old, older people aged 70 years and above, those with disabilities, those of Black and Ethnic Minority origin, households without access to a car, households with dependent children, young adults aged between 16 and 25 years and across different income groups.

15.127. The Preferred Option and NBA will materially improve public transport links along and between the North and South Routes. Although the assumed bus network rationalisation will reduce the frequency of some existing services north of Bodington there will remain a reasonable frequency and no existing connections will be lost; therefore the adverse impact on accessibility is not expected to be significant.

15.128. The options will enhance access to employment, leisure, services and education opportunities along the route. Further, the options will improve access to key future developments in the south of the city at Aire Valley Leeds and Leeds South Bank. In particular, but not exclusively, there will be benefits to areas of low car ownership levels in the south and to areas of the North Route with higher than average numbers of young people.

15.129. The LCA will not change the combined frequency of public transport services on the North Route. On the South Route the proposed additional service will only serve Park & Ride users, with stops away from Stourton being drop-off only northbound and pick-up only southbound. It therefore will not improve accessibility for households without access to a car and the benefits will be dispersed beyond the corridor and therefore neither concentrated nor significant.

**Personal Affordability**

Introduction

15.130. There is evidence that the costs of travel can, in some cases, be a major barrier to the mobility of certain groups of people. Any increases in travel costs could therefore have particularly acute effects on these groups.

15.131. This section presents the impact of the Preferred Option and its associated alternatives on personal affordability.
Methodology

15.132. The impact of the Preferred Option and its associated alternatives on this
sub-objective has been assessed in accordance with WebTAG Unit 3.6.4. The benefits arising from changes in vehicle operating costs and user
charges have been assessed in line with WebTAG Unit 3.5.2.

The Do-Minimum Scenario

15.133. The Do-Minimum scenario does not include any plans to change fares
beyond the usual increases due to inflation and other factors. It does include
the introduction of smart ticketing but this is not expected to structurally
change fares.

15.134. The Do-Minimum scenario assumes no additional changes in vehicle
operating costs to road users or changes in parking costs.

Impacts of the Preferred Option

15.135. The approach to fares for the Preferred Option is described in the fares and
ticketing strategy, which is summarised in Table 11.1 of this document and
described in Core Document C-1-6.99

15.136. NGT fares will use a two stage fare system and will offer a fare broadly equal
to the conventional bus network for the majority of passengers. The
exception to this is passengers who currently make short distance trips and
currently pay the lowest bus fare; any such passengers who choose to use
NGT will pay more, as the lowest fare stage is not replicated.

15.137. The Preferred Option is forecast to have a negative impact on public
transport user charging for Commuting and Other Users. This is due to
passengers choosing to travel by NGT and in some cases paying a higher
fare for this service relative to their do minimum option, for example for a
short distance trip and/or because of interchanging from a conventional bus
service. Despite higher user charges, the overall impact on Commuting and
Other public transport users is still positive due to the significant travel time
benefits (shown in Table 15.1).

15.138. Road user charges decrease in the Preferred Option since mode shift from
car to NGT (or NGT Park & Ride) reduces the demand for city centre parking
which increases capacity allowing users to switch to an alternative car park
with potentially lower charges. Road user operating costs increase slightly
due to reallocation of highway capacity on the corridors. The overall impact
on road users is positive.

15.139. The impact of the Preferred Option on personal affordability is forecast to be
-£66m PV (2010 prices). The affordability impact by mode is presented in
Table 15.4.

99 NGT Fares and Ticketing Paper, Steer Davies Gleave, 2014
TABLE 15.4  AFFORDABILITY IMPACT BY MODE – PREFERRED OPTION

<table>
<thead>
<tr>
<th>2010 Prices PV (000)</th>
<th>Road Users</th>
<th>Public Transport Users</th>
<th>Sub Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vehicle Operating Costs - Commuting</td>
<td>-£7,715</td>
<td>£0</td>
<td>-£7,715</td>
</tr>
<tr>
<td>Vehicle Operating Costs - Other</td>
<td>-£3,308</td>
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<td>-£3,308</td>
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<tr>
<td>User Charges - Commuting</td>
<td>£13,172</td>
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<td>-£48,598</td>
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<tr>
<td>User Charges - Other</td>
<td>£30,831</td>
<td>-£37,260</td>
<td>-£6,428</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>£32,981</strong></td>
<td><strong>-£99,030</strong></td>
<td><strong>-£66,049</strong></td>
</tr>
</tbody>
</table>

*Source: Steer Davies Gleave, 2014*

Impacts of the Next Best Alternative

15.140. The Next Best Alternative will have the same fares strategy as the Preferred Option and is also forecast to have a negative impact on public transport user charging for Commuting and Other Users for the reasons stated above. As in the Preferred Option, this disbenefit is offset by significant travel time benefits (shown in Table 15.2) but to a lesser extent than the Preferred Option.

15.141. Road user charges decrease but less than in the Preferred Option since this option has less mode shift from car to public transport and therefore less impact on city centre parking demand. Road user operating costs increase due to increased congestion on the corridors. The overall impact is positive.

15.142. The impact of the Next Best Alternative on personal affordability is forecast to be -£43m PV (2010 prices). The affordability impact by mode is presented in Table 15.5.

TABLE 15.5  AFFORDABILITY IMPACT BY MODE – NEXT BEST ALTERNATIVE

<table>
<thead>
<tr>
<th>2010 Prices PV (000)</th>
<th>Road Users</th>
<th>Public Transport Users</th>
<th>Sub Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vehicle Operating Costs - Commuting</td>
<td>-£7,879</td>
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<td>-£7,879</td>
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<tr>
<td>Vehicle Operating Costs - Other</td>
<td>-£2,430</td>
<td>£0</td>
<td>-£2,430</td>
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<tr>
<td>User Charges - Commuting</td>
<td>£8,886</td>
<td>-£36,805</td>
<td>-£27,919</td>
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<tr>
<td>User Charges - Other</td>
<td>£16,167</td>
<td>-£21,403</td>
<td>-£5,236</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>£14,745</strong></td>
<td><strong>-£58,208</strong></td>
<td><strong>-£43,463</strong></td>
</tr>
</tbody>
</table>

*Source: Steer Davies Gleave, 2014*

Impacts of the Low Cost Alternative

15.143. The Low Cost Alternative will retain the existing fares on Service 1 and 6. The new Park & Ride service will offer similar fares to the conventional bus network. Some existing bus passengers may pay slightly more for the Park & Ride service resulting in some user charge disbenefits. However this is significantly less than the Preferred Option and the Next Best Alternative. As
in the Preferred Option, this disbenefit is offset by travel time benefits (shown in Table 15.3) but to a lesser extent than the Preferred Option.

15.144. Road user charges decrease but less than in the Preferred Option since this option has less mode shift from car to public transport and therefore less impact on city centre parking demand. Road user operating costs increase due to increased congestion on the corridors. The overall impact is positive.

15.145. The impact of the Low Cost Alternative on personal affordability is forecast to be £16m PV (2010 prices). The affordability impact by mode is presented in Table 15.6.

### TABLE 15.6 AFFORDABILITY IMPACT BY MODE – LOW COST ALTERNATIVE

<table>
<thead>
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<th>2010 Prices PV (000)</th>
<th>Road Users</th>
<th>Public Transport Users</th>
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</tr>
</thead>
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<td>Vehicle Operating Costs - Commuting</td>
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<td>£330</td>
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<tr>
<td>Vehicle Operating Costs - Other</td>
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<td>-£1,631</td>
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<td>User Charges - Commuting</td>
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<td>User Charges - Other</td>
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<td>-£595</td>
<td>£15,060</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>£18,928</strong></td>
<td><strong>-£3,144</strong></td>
<td><strong>£15,784</strong></td>
</tr>
</tbody>
</table>

*Source: Steer Davies Gleave, 2014*

Social and Distributional Impacts

15.146. The SDI of the Preferred Option and the associated alternatives have been assessed against this sub-objective in accordance with WebTAG Unit 3.17. The guidance specifies that the distribution of user benefits should be considered across different income groups.

15.147. The proposal is that most fares for NGT Services will be set at a level broadly equivalent to conventional buses. Concessionary passes will be accepted. The NGT market is anticipated to be medium to longer distance trips, with wider stop spacing than the existing bus network. Consistent with this, the lowest current fare will not be available for NGT. Any passengers choosing to use NGT for short distances and/or interchanging with NGT (which in some circumstances will require paying an additional fare) would pay more than the current fare. However an option to use conventional bus services will remain.

15.148. The impact on personal affordability is represented as ‘user charges’ within the economic appraisal and has little influence on the overall scale of benefit. It is therefore considered that there are no significant or concentrated impacts from affordability on different income groups from any of the options considered within this Business Case Review.

15.149. The LCA proposes no changes to the existing fare structures which are currently operating on the bus network. It is therefore considered that there
are no significant or concentrated impacts from affordability on different income groups under the alternative options.

**Severance**

**Introduction**

15.150. Severance predominantly affects pedestrians and cyclists and is caused when they are deterred from making journeys to the extent that they have to reorganise their activities.

**Methodology**

15.151. The impact of the Preferred Option and its associated alternatives on this sub-objective has been assessed in accordance with WebTAG Unit 3.6.2 and the Design Manual for Roads and Bridges.

15.152. For each option, this section describes the impact of severance on pedestrians and cyclists.

**The Do-Minimum Scenario**

15.153. The Do-Minimum scenario includes committed infrastructure developments. Some of these developments could include an upgrade of pedestrian and cycling facilities. However, it has been assumed that no upgrades are made in the Do-Minimum scenario.

**Impacts of Preferred Option**

15.154. The Preferred Option includes additional traffic signals and pedestrian crossings which will aid pedestrian and cycle movements. Some footways will be narrowed but minimum standards will be met. Informal crossings will be upgraded to Equality Act 2010 (successor to the Disability Discrimination Act 1995) standards, reducing severance for those pedestrians with mobility or visual impairments.

15.155. Although some sections of cycle lanes will be lost (e.g. Headingley Hill), there will be a net gain in cycle provision.

15.156. The impact of the Preferred Option on severance is deemed as being **strong beneficial**.

**Impacts of the Next Best Alternative**

15.157. The Next Best Alternative would deliver the same improvements to pedestrians and cyclists as the Preferred Option. Therefore the impact on severance has been assessed as **strong beneficial**.

**Impacts of the Low Cost Alternative**

15.158. The Low Cost Alternative involves significantly less construction work than the Preferred Option and is expected to have very little impact on pedestrian and cyclist movement. Therefore the impact on the severance sub-objective has been assessed as **neutral** for this option.
Social and Distributional Impacts

15.159. The SDI of the Preferred Option and the associated alternatives have been assessed against this sub-objective in accordance with WebTAG Unit 3.17. The guidance specifies that severance should be considered for children less than 16 years old, older people aged 70 years and above, those with disabilities and households without access to a car.

15.160. The Preferred Option design includes provision for pedestrian and/or cycle crossings at a number of new and upgraded traffic signal locations which will reduce existing severance resulting from the width and high vehicle flows of the current highway layout.

15.161. In some locations sections of cycle lanes will be lost, however, there will be an overall net gain in cycle infrastructure. Some footways also need to be narrowed, although minimum standards will be met.

15.162. On balance, the Preferred Option is expected to significantly reduce overall severance along the route. The benefits will be concentrated at new cycling/pedestrian facilities but these are spread along the NGT route and therefore will benefit the societal groups specified in the guidance to a similar degree.

15.163. The NBA will have similar pedestrian and cycle improvements and the benefits of this will also be significant and dispersed along the route, benefitting all societal groups.

15.164. The LCA will have fewer cycle and pedestrian improvements than the other options and therefore the benefits will not be as significant.

Option Values

Introduction

15.165. This sub-objective relates to how someone views a service available to them, even if they do not necessarily intend to use it. For example, someone living near to a new railway station might value the fact that the station and services are available to them in case of unforeseen circumstances. Non-use values may also be held by those who do not intend to use a service, but value its availability for other people or for other various reasons.

Methodology

15.166. The impact of the Preferred Option and its associated alternatives on this sub-objective has been assessed in accordance with WebTAG Unit 3.6.1.

15.167. This sub-objective is assessed qualitatively but is based on the number of households that are affected by the introduction or withdrawal of any public transport service. According to WebTAG, any option that provides an additional service to more than 1,000 households is considered to have a strong beneficial impact on this sub-objective.
The Do-Minimum Scenario

15.168. Residents living along the existing corridors currently have access to public bus services as well as private highway transport (e.g. car and cycle) options. A small number of residents near the North Route can access rail services at Burley Park and Headingley stations.

Impacts of the Preferred Option

15.169. Analysis\textsuperscript{100} has been carried out to assess the number of households that will have access to the Preferred Option.

15.170. This showed that there are 34,464 households within 0.6 km of the NGT route and many more households would be in scope for Park & Ride.

15.171. The impact of the Preferred Option on Option Values has been assessed as \textbf{strong beneficial} since there are more than 1,000 households who will have access to a new transport option.

Impacts of Next Best Alternative

15.172. The Next Best Alternative uses the same route as the Preferred Option. Therefore the impact on Option Values has been assessed as \textbf{strong beneficial} due to the large number of households who will have access to a new transport option.

Impacts of the Low Cost Alternative

15.173. The bus based improvements which form the Low Cost Alternative will not provide a new transport option. The Park & Ride sites will however, and the geographical catchment of potential users is broadly the same as under the Preferred Option.

15.174. Since the Park & Ride catchment is greater than 1,000 households, the Low Cost Alternative has been assessed as \textbf{strong beneficial} for this option.

\textsuperscript{100} Data Source: Experian Mosaic 2011
16. Public Accounts Impacts

Introduction

16.1. The distribution of impacts between Government and society is a key issue in the justification of Government action on a scheme. This section quantifies the impact on the Broad Transport Budget (comprising local and national budgets) as well as indirect impacts on tax revenue.

16.2. The impact has been assessed separately for the Preferred Option, Next Best Alternative and Low Cost Alternative.

Cost to Broad Transport Budget (Local)

Introduction

16.3. This section summarises the impact on the local government transport budget, including the impact on the Promoters – Metro and Leeds City Council. The Promoters have elected, after careful consideration, to take revenue risk for the NGT Project. Therefore NGT revenues are received by local government and operating costs, including lease payments for trolleybus vehicles, are paid to the private sector contracted service operator. The local contribution, a proportion of the initial investment costs, and all future investment in infrastructure renewals are paid as grants to the private sector.

Methodology

16.4. The impact of the Preferred Option and its associated alternatives on the broad local transport budget has been assessed in accordance with WebTAG Unit 3.5.1. The data used to assess the operating and investment cost impacts has been sourced from the latest estimates for costs described in Sections 10 and 11, treated in accordance with WebTAG Unit 3.5.9. Forecast NGT revenue is based on the analysis described in Section 12 of this document.

Do-Minimum Scenario

16.5. The economic appraisal represents the change between Do-Minimum and Do-Something conditions; therefore Do-Minimum costs can influence the analysis only where they would no longer be incurred following implementation of the Do-Something (and would offset the costs of the scheme). There is no committed investment which would not be incurred with the implementation of the NGT Project.

16.6. A higher level of highway maintenance is proposed on the North and South Routes on sections where NGT services will run with or directly adjacent to traffic. The annual maintenance costs included within the economic appraisal have been estimated to represent the additional costs of this maintenance and therefore an estimate of the Do-Minimum highway maintenance costs is not required.
Impacts of the Preferred Option

16.7. Under the Preferred Option, the local government transport budget will be affected by the following:

- NGT revenue
- NGT maintenance costs (infrastructure)
- Grant to NGT Operator
- Grant to vehicle leasing company
- Promoters staff costs
- Changes in revenue generated by highway users (principally through LCC owned car parks)

16.8. The Preferred Option will have an impact on the local government transport budget, amounting to £51m PV in 2010 prices. The broad transport budget for the Preferred Option is shown in Table 16.1.

Impacts of the Next Best Alternative

16.9. The Next Best Alternative would have the same infrastructure costs and the vehicles would be leased in the same way as the Preferred Option.

16.10. Under the Next Best Alternative, the local government transport budget would be affected by the following:

- NBA revenue
- NBA maintenance costs (infrastructure)
- Grant to NBA Operator
- Grant to vehicle leasing company
- Promoters staff costs
- Changes in revenue generated by highway users (principally through LCC owned car parks)

16.11. The Next Best Alternative will have an impact on the local government transport budget, amounting to £37m PV in 2010 prices. The broad transport budget for the Next Best Alternative is shown in Table 16.2.

Impact of the Low Cost Alternative

16.12. The Low Cost Alternative would have a significantly lower impact on the local government transport budget since it would be operated by forming a quality partnership with a bus operator. The revenue would be retained by the operator who would use this to operate and maintain the vehicles.
16.13. Under the Low Cost Alternative, the local government transport budget would be affected by the following:

- Revenue from additional Park & Ride service
- Grant to bus Operator
- Changes in revenue generated by highway users (principally through LCC owned car parks)

16.14. The Low Cost Alternative will have an impact on the local government transport budget, amounting to £127m PV in 2010 prices. The broad transport budget for the Low Cost Alternative is shown in Table 16.3.

**Cost to Broad Transport Budget (National)**

**Introduction**

16.15. This section summarises the impact on the Central Government transport budget. On award of Programme Entry to the NGT Project DfT committed capital funding of £173.5 million towards the investment cost of the trolleybus solution as specified in the funding approval.

**Methodology**

16.16. The impact of the Preferred Option and its associated alternatives on the broad national transport budget has been assessed in accordance with WebTAG Unit 3.5.1. The data used to assess the investment cost impacts has been sourced from the latest estimates for costs described in Section 2, treated in accordance with WebTAG Unit 3.5.9.

16.17. It is assumed that any impacts arising from abstraction from rail will be accrued by Central Government since they will be captured by DfT’s rolling refranchising programme.

**The Do-Minimum Scenario**

16.18. No investment or operating cost impact on Central Government budgets is assumed as part of the Do-Minimum scenario.

**Impacts of the Preferred Option**

16.19. Under the Preferred Option, the Central Government transport budget will be affected by the following:

- Central Government’s share of the NGT Project’s Capital Costs
- Subsidy payments to rail operator to offset the modest NGT revenue abstraction (captured through the refranchising process)

16.20. The Preferred Option will have an impact on the Central Government transport budget, amounting to £202m PV in 2010 prices. The broad transport budget for the Preferred Option is shown in Table 16.1.
Impacts of the Next Best Alternative

16.21. Under the Next Best Alternative, the Central Government transport budget will be affected by the following:
   - Central Government’s share of the NBA Project’s Capital Costs
   - Subsidy payments to rail operator to offset the NBA revenue abstraction (captured through the refranchising process)

16.22. The Next Best Alternative will have an impact on the Central Government transport budget, amounting to £138m PV in 2010 prices. The broad transport budget for the Next Best Alternative is shown in Table 16.2.

Impacts of the Low Cost Alternative

16.23. With the Low Cost Alternative, the Central Government transport budget would be affected by the following:
   - Subsidy payments to rail operator to offset the NBA revenue abstraction (captured through the refranchising process)

16.24. It is assumed that Central Government does not contribute towards the capital costs for the Low Cost Alternative.

16.25. The Low Cost Alternative will have an impact on the Central Government transport budget, amounting to £3m PV in 2010 prices. The broad transport budget for the Low Cost Alternative is shown in Table 16.3.

Indirect Tax Revenues

Introduction

16.26. This section summarises the impact on tax revenues collected by Central Government. For all travellers this includes the receipt of fuel duty, which is influenced by the number of trips made, level of congestion and distance travelled. For Commuting and Other Users this also includes VAT receipts on fuel on the basis that consumer spending on untaxed public transport fares reduces the level of spend on taxed goods. Businesses can reclaim VAT and therefore the level of indirect tax received by Central Government is not affected by changes in business traveller public transport use.

Methodology

16.27. The impact on indirect tax revenues has been assessed using the same method applied to calculate the travel time, personal affordability and revenue impacts described in sections 13 and 15 of this Economic Case.

The Do-Minimum Scenario

16.28. Indirect tax is assumed to reduce in the future Do-Minimum scenario as it includes an allowance for an increase in the proportion of road users with electric vehicles. This will reduce the fuel duty received by Central Government.
Impacts of the Preferred Option

16.29. Under the Preferred Option, tax revenues would be affected by the following:

- An increase in spending on public transport fares
- Less highway travel but slightly longer journeys due to reallocation of highway capacity

16.30. The Preferred Option will have an impact on tax revenues, amounting to an increase of £13m PV in 2010 prices. Tax revenues for the Preferred Option are shown in Table 16.1. For comparison, annual fuel duty collected by HM Treasury is in excess of £25 billion.

Impacts of the Next Best Alternative

16.31. With the Next Best Alternative, tax revenues would be affected by the following:

- An increase in spending on public transport fares
- Less highway travel but slightly longer journeys due to reallocation of highway capacity

16.32. The Next Best Alternative will have an impact on tax revenues, amounting to less than £1m PV in 2010 prices. Tax revenues for the Next Best Alternative are shown in Table 16.2.

Impacts of the Low Cost Alternative

16.33. With the Low Cost Alternative, tax revenues would be affected by the following:

- An increase in spending on public transport fares
- Marginally less highway travel slightly longer journeys due to reallocation of highway capacity

16.34. The Low Cost Alternative will have an impact on tax revenues, amounting to £4m PV in 2010 prices. Tax revenues for the Low Cost Alternative are shown in Table 16.3.
Leeds NGT – Business Case Review

Public Accounts Tables

TABLE 16.1 PUBLIC ACCOUNTS TABLE– PREFERRED OPTION

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<th></th>
<th>ALL MODES</th>
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<th>BUS and COACH</th>
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<tr>
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<td>TOTAL</td>
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<td>£13,265</td>
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<td></td>
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<td>Central Government Funding: Non-Transport</td>
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<tr>
<td>Indirect Tax Revenues</td>
<td>£13,071</td>
<td></td>
<td>-£9,555</td>
<td>(9)</td>
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<td></td>
<td></td>
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<tr>
<td>Broad Transport Budget</td>
<td>£151,512</td>
<td>(10) = (7) + (8)</td>
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<tr>
<td>Wider Public Finances</td>
<td>£13,071</td>
<td>(11) = (9)</td>
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</tbody>
</table>

Notes: Costs appear as positive numbers, while revenues and ‘Developer and Other Contributions’ appear as negative numbers

All entries are discounted present values in 2010 prices and values

Source: Steer Davies Gleave, 2014
### Table 16.2: Public Accounts Table – Next Best Alternative

<table>
<thead>
<tr>
<th>Local Government Funding</th>
<th>ALL MODES TOTAL</th>
<th>INFRASTRUCTURE</th>
<th>ROAD</th>
<th>BUS and COACH</th>
<th>RAIL</th>
<th>OTHER</th>
</tr>
</thead>
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<td>£40,155</td>
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<tr>
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<td>£0</td>
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<td>Grant/Subsidy Payments</td>
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<td>£80,317</td>
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<td><strong>£80,317</strong></td>
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#### Central Government Funding: Transport

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</thead>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
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<tr>
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<tr>
<td>Developer and Other Contributions</td>
<td>£0</td>
<td>£0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grant/Subsidy Payments</td>
<td>£138,432</td>
<td>£147,951</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td><strong>NET IMPACT</strong></td>
<td><strong>£138,432</strong></td>
<td><strong>£0</strong></td>
<td><strong>£147,951</strong></td>
<td><strong>-£3,519</strong></td>
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<td><strong>£0</strong></td>
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</table>

#### Central Government Funding: Non-Transport

<table>
<thead>
<tr>
<th>Source: Steer Davies Gleave, 2014</th>
</tr>
</thead>
</table>

#### Notes:
- Costs appear as positive numbers, while revenues and ‘Developer and Other Contributions’ appear as negative numbers.
- All entries are discounted present values in 2010 prices and values.

#### Source:
Steer Davies Gleave, 2014
### TABLE 16.3  PUBLIC ACCOUNTS TABLE – LOW COST ALTERNATIVE

<table>
<thead>
<tr>
<th>Local Government Funding</th>
<th>ALL MODES TOTAL</th>
<th>ROAD INFRASTRUCTURE</th>
<th>BUS and COACH</th>
<th>RAIL</th>
<th>OTHER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revenue</td>
<td>£211</td>
<td></td>
<td>£16,655</td>
<td>-16,444</td>
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<tr>
<td>Operating Costs</td>
<td>£15,770</td>
<td></td>
<td>£15,770</td>
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<td></td>
</tr>
<tr>
<td>Investment Costs</td>
<td>£6,902</td>
<td></td>
<td>£6,902</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Developer and Other Contributions</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grant/Subsidy Payments</td>
<td>£103,649</td>
<td>£103,649</td>
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<td></td>
</tr>
<tr>
<td>NET IMPACT</td>
<td>£126,531 (7)</td>
<td>£16,655</td>
<td>£109,877</td>
<td>£0</td>
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</table>

**Central Government Funding: Transport**

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<thead>
<tr>
<th></th>
<th>ROAD INFRASTRUCTURE</th>
<th>BUS and COACH</th>
<th>RAIL</th>
<th>OTHER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revenue</td>
<td>£0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating Costs</td>
<td>£0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Investment Costs</td>
<td>£0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Developer and Other Contributions</td>
<td>£0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grant/Subsidy Payments</td>
<td>£2,532</td>
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<tr>
<td>NET IMPACT</td>
<td>£2,532 (8)</td>
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**Central Government Funding: Non-Transport**

<table>
<thead>
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<th>ROAD INFRASTRUCTURE</th>
<th>BUS and COACH</th>
<th>RAIL</th>
<th>OTHER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indirect Tax Revenues</td>
<td>£3,982 (9)</td>
<td>£1,548</td>
<td>£2,433</td>
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</tbody>
</table>

**TOTALS**

- **Broad Transport Budget**: £129,063 (10) = (7) + (8)
- **Wider Public Finances**: £3,982 (11) = (9)

Notes: Costs appear as positive numbers, while revenues and ‘Developer and Other Contributions’ appear as negative numbers

All entries are discounted present values in 2010 prices and values

Source: Steer Davies Gleave, 2014
17. Value for Money Statement

Introduction

17.1. This section summarises the costs and benefits for all of the options considered in this Economic Case and comments on the Value for Money (VfM) offered by each option. It also provides a summary of a number of sensitivity tests that have been undertaken on the Preferred Option to assess the robustness of the modelling and appraisal process.

Calculation of the Benefit Cost Ratio

Introduction

17.2. This section presents the Transport Economic Efficiency (TEE) tables and an Analysis of Monetised Costs and Benefits (ACMB) table for each option, which sets out the calculation of the Benefit Cost Ratio (BCR).

Transport Economic Efficiency

17.3. The TEE table for the Preferred Option is presented in Table 17.1. The present value of TEE impacts to commuters, others and business users, forming the majority of the benefit in the economic appraisal, is £396 m over the Appraisal Period for the Preferred Option.

17.4. The TEE table for the Next Best Alternative is presented as Table 17.2 and for the Low Cost Alternative as Table 17.3. The present value of TEE impacts for the Next Best and Low Cost alternatives are £143 m and £14 m respectively.

Analysis of Monetised Costs and Benefits

17.5. The results of the economic appraisal undertaken for NGT and the alternatives are shown in Table 17.4. This includes benefits associated with:

- Greenhouse Gases (described in Section 14 – Environmental Impacts)
- Accidents (described in Section 15 – Social Impacts)
- Commuting, Other and Business Users and Providers (taken from Transport Economic Efficiency tables - Table 17.1, Table 17.2 and Table 17.3)
- Reliability (described in Section 15 – Social Impacts)

The costs and indirect tax revenues are taken from the Public Accounts tables (Table 16.1, Table 16.2 and Table 16.3 Public Accounts Table – Low Cost AlternativeTable 16.3).
### TABLE 17.1

#### TEE TABLE: PREFERRED OPTION (£000)

<table>
<thead>
<tr>
<th></th>
<th>ALL MODES</th>
<th>ROAD</th>
<th>BUS and COACH</th>
<th>RAIL</th>
<th>OTHER</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>User benefits</strong> (P)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Travel time</td>
<td>£350,040</td>
<td>£419</td>
<td>£349,621</td>
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<tr>
<td>Vehicle operating costs</td>
<td>-£7,715</td>
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<td>-£81,770</td>
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<tr>
<td>User charges</td>
<td>-£46,598</td>
<td>£19,172</td>
<td>-£61,770</td>
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<tr>
<td>During Construction &amp; Maintenance</td>
<td>£0</td>
<td>£0</td>
<td>£0</td>
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<tr>
<td><strong>NET NON-BUSINESS BENEFITS: COMMUTING</strong></td>
<td>£293,728</td>
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</table>

<table>
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<th>ROAD</th>
<th>BUS and COACH</th>
<th>RAIL</th>
<th>OTHER</th>
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<tbody>
<tr>
<td><strong>User benefits</strong> (P)</td>
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<tr>
<td>Travel time</td>
<td>£335,611</td>
<td>£4,495</td>
<td>£331,116</td>
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<tr>
<td>Vehicle operating costs</td>
<td>-£3,308</td>
<td>-£3,308</td>
<td>-£378</td>
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<tr>
<td>User charges</td>
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<td>-£37,260</td>
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<tr>
<td>During Construction &amp; Maintenance</td>
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<td>£0</td>
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<tr>
<td><strong>NET NON-BUSINESS BENEFITS: OTHER</strong></td>
<td>£325,875</td>
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#### Business

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<th>BUSINESS</th>
<th>FREIGHT</th>
<th>PASSENGERS</th>
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<tr>
<td><strong>User benefits</strong> (P)</td>
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<tr>
<td>Travel time</td>
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<td>£0</td>
<td>£0</td>
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</tr>
<tr>
<td><strong>Subtotal</strong></td>
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<td>£339,042</td>
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<td>Developer contributions</td>
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<td>-£223,554</td>
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</table>

Notes: Benefits appear as positive numbers, while costs appear as negative numbers. All entries are discounted present values, in 2010 prices and values.

Source: Steer Davies Gleave, 2014
### TABLE 17.2 TEE TABLE: NEXT BEST ALTERNATIVE (£000)

#### Non-business: Commuting

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<th>User benefits</th>
<th>ALL MODES</th>
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<th>BUS and COACH</th>
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<th>OTHER</th>
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#### Non-business: Other

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<td>User charges</td>
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#### Business

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<th>OTHER</th>
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<tr>
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<td>Vehicle operating costs</td>
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<tr>
<td>User charges</td>
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<tr>
<td>During Construction &amp; Maintenance</td>
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<tr>
<td><strong>SUBTOTAL</strong></td>
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<td>Revenue</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Investment costs</td>
<td>£242,671</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grant/subsidy</td>
<td>£435,585</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>SUBTOTAL</strong></td>
<td>£177,950</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other business impacts</td>
<td>£195,064</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### TOTAL

| Present Value of Transport Economic Efficiency | £142,993 |

**Notes:** Benefits appear as positive numbers, while costs appear as negative numbers. All entries are discounted present values, in 2010 prices and values.

Source: Steer Davies Gleave, 2014
### TABLE 17.3

**TEE TABLE: LOW COST ALTERNATIVE (£000)**

<table>
<thead>
<tr>
<th>Non-business: Commuting</th>
<th>MODES</th>
<th>ROAD</th>
<th>COACH</th>
<th>RAIL</th>
<th>OTHER</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>User benefits</strong></td>
<td>TOTAL</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Travel time</td>
<td>£17,153</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vehicle operating costs</td>
<td>£230</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>User charges</td>
<td>£22,025</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>During Construction &amp; Maintenance</td>
<td>£0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>NET NON-BUSINESS BENEFITS: COMMUTING</strong></td>
<td>£19,507</td>
<td>£449</td>
<td>£19,059</td>
<td>£0</td>
<td>£0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Non-business: Other</th>
<th>Modes</th>
<th>ROAD</th>
<th>COACH</th>
<th>RAIL</th>
<th>OTHER</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>User benefits</strong></td>
<td>TOTAL</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Travel time</td>
<td>£3,941</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vehicle operating costs</td>
<td>-£1,631</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>User charges</td>
<td>£15,063</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>During Construction &amp; Maintenance</td>
<td>£0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>NET NON-BUSINESS BENEFITS: OTHER</strong></td>
<td>£17,370</td>
<td>£5,068</td>
<td>£12,303</td>
<td>£0</td>
<td>£0</td>
</tr>
</tbody>
</table>

### Business

<table>
<thead>
<tr>
<th>User benefits</th>
<th>Goods</th>
<th>Business &amp; Passengers</th>
<th>Freight</th>
<th>Passengers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Travel time</td>
<td>-£5,003</td>
<td>-£23,905</td>
<td>£1,698</td>
<td></td>
</tr>
<tr>
<td>Vehicle operating costs</td>
<td>-£8,957</td>
<td>-£4,116</td>
<td></td>
<td></td>
</tr>
<tr>
<td>User charges</td>
<td>-£1,631</td>
<td>-£1,117</td>
<td></td>
<td></td>
</tr>
<tr>
<td>During Construction &amp; Maintenance</td>
<td>£0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td>-£25,078</td>
<td>-£23,905</td>
<td>£1,581</td>
<td>£0</td>
</tr>
</tbody>
</table>

### Private sector provider impacts

<table>
<thead>
<tr>
<th>Revenue</th>
<th>Operating costs</th>
<th>Investment costs</th>
<th>Grant/subsidy</th>
</tr>
</thead>
<tbody>
<tr>
<td>-£2,146</td>
<td>-£4,116</td>
<td>-£5,003</td>
<td>-£106,181</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td>£302</td>
<td>£4,116</td>
<td>£106,181</td>
</tr>
</tbody>
</table>

### Other business impacts

| Developer contributions | £0 |     |     |     |
| **NET BUSINESS IMPACT** | -£22,956 |     |     |     |

### TOTAL

**Present Value of Transport Economic Efficiency**

£13,922

(6) = (1a) + (1b) + (5)

Notes: Benefits appear as positive numbers, while costs appear as negative numbers.
TABLE 17.4  ANALYSIS OF MONETISED COSTS AND BENEFITS

<table>
<thead>
<tr>
<th>Source: Steer Davies Gleave, 2014</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Preferred Option</th>
<th>Next Best Alternative</th>
<th>Low Cost Alternative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Noise</td>
<td>Not Valued</td>
<td>Not Valued</td>
<td>Not Valued</td>
</tr>
<tr>
<td>Local Air Quality</td>
<td>Not Valued</td>
<td>Not Valued</td>
<td>Not Valued</td>
</tr>
<tr>
<td>Greenhouse Gases</td>
<td>£6,332</td>
<td>£5,598</td>
<td>-£1,724</td>
</tr>
<tr>
<td>Journey Ambience</td>
<td>Not Valued</td>
<td>Not Valued</td>
<td>Not Valued</td>
</tr>
<tr>
<td>Accidents</td>
<td>-£25,430</td>
<td>-£26,419</td>
<td>-£8,502</td>
</tr>
<tr>
<td>Economic Efficiency: Consumer Users (Commuting)</td>
<td>£293,728</td>
<td>£155,961</td>
<td>£19,507</td>
</tr>
<tr>
<td>Economic Efficiency: Consumer Users (Other)</td>
<td>£325,875</td>
<td>£182,095</td>
<td>£17,370</td>
</tr>
<tr>
<td>Economic Efficiency: Business Users and Providers</td>
<td>-£223,554</td>
<td>-£195,064</td>
<td>-£22,956</td>
</tr>
<tr>
<td>Wider Public Finances (Indirect Taxation Revenues)</td>
<td>-£13,071</td>
<td>-£159</td>
<td>-£3,982</td>
</tr>
<tr>
<td>Option Values</td>
<td>Not Valued</td>
<td>Not Valued</td>
<td>Not Valued</td>
</tr>
<tr>
<td>Reliability</td>
<td>£84,232</td>
<td>£59,694</td>
<td>£0</td>
</tr>
<tr>
<td>Present Value of Benefits (see notes) (PVB)</td>
<td>£448,111</td>
<td>£181,706</td>
<td>£164</td>
</tr>
<tr>
<td>Broad Transport Budget</td>
<td>£151,512</td>
<td>£175,878</td>
<td>£129,063</td>
</tr>
<tr>
<td>Present Value of Costs (see notes) (PVC)</td>
<td>£151,512</td>
<td>£175,878</td>
<td>£129,063</td>
</tr>
<tr>
<td>OVERALL IMPACTS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Net Present Value (NPV)</td>
<td>£296,599</td>
<td>£5,828</td>
<td>-£128,900</td>
</tr>
<tr>
<td>Benefit to Cost Ratio (BCR)</td>
<td>2.96</td>
<td>1.03</td>
<td>0.00</td>
</tr>
</tbody>
</table>

Note: This table includes costs and benefits which are regularly or occasionally presented in monetised form in transport appraisals, together with some where monetisation is in prospect. There may also be other significant costs and benefits, some of which cannot be presented in monetised form. Where this is the case, the analysis presented above does NOT provide a good measure of value for money and should not be used as the sole basis for decisions.
17.6. The results set out in Table 17.4 show that the Preferred Option has a Benefit to Cost Ratio (BCR) of to 2.96:1.

17.7. The BCRs for the Next Best and Low Cost Alternative are 1.03 and 0.00 respectively.

Robustness of Approach

Introduction

17.8. A number of sensitivity tests have been undertaken to test the robustness of the modelling and appraisal processes presented in this Economic Case. These include:

- Testing assumptions regarding background growth
- Testing assumptions regarding service frequency and fares
- Testing assumptions regarding run-time
- Testing assumptions regarding operator reaction
- Undertaking sensitivity tests on the economic appraisal

Changes in background growth

17.9. As suggested in DfT guidance, a range of modelled sensitivity tests have been undertaken for the Preferred Option to illustrate the impact of changes in background growth assumptions. The results of these tests are presented in Table 17.5.

| TABLE 17.5   MODELLED SENSITIVITY TESTS – BACKGROUND GROWTH |
|--------------|------------------|------------------|
| Source: Steer Davies Gleave, 2014 |

<table>
<thead>
<tr>
<th></th>
<th>Net Present Value (£m)</th>
<th>Benefit to Cost Ratio (BCR)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preferred Option</td>
<td>£297</td>
<td>2.96</td>
</tr>
<tr>
<td>Low background growth</td>
<td>£238</td>
<td>2.50</td>
</tr>
<tr>
<td>High background growth</td>
<td>£376</td>
<td>4.38</td>
</tr>
</tbody>
</table>

17.10. These tests demonstrate that the value for money of the NGT Project Preferred Option is not critically dependent on the assumed background growth. Even with low background growth, the BCR remains well above 2.

Changes in service frequency/fares

17.11. A range of modelled sensitivity tests have been undertaken for the Preferred Option to illustrate the impact of changes within the operator’s control. This includes changes in service frequency assumptions shown in Table 17.6 and fare assumptions shown in Table 17.7.
17.12. The service frequency test in Table 17.6 shows the impact of reducing the service frequency to 8 buses per hour per direction in the operating cost model. This test reduces the BCR showing that this frequency is not sufficient to cater for the latent demand for NGT services and therefore would not deliver the same level of user benefits as the central case.

17.13. The fare tests in Table 17.7 show that if the NGT fare was increased by 25%, the demand for NGT would be reduced and the scheme would not deliver the same level of benefit to users. Therefore the BCR would also be reduced.

17.14. If the NGT fare were the same as conventional bus, the test indicates that the BCR would be higher. However this reduction in fares is forecast to increase demand to a level which could not be catered for with a service frequency of 10 buses per hour per direction. Therefore the service frequency would need to be increased which would increase capital, operating and renewals costs and reduce the BCR.

<table>
<thead>
<tr>
<th>TABLE 17.6  MODELLED SENSITIVITY TESTS – FREQUENCY</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Source:</strong> Steer Davies Gleave, 2014</td>
</tr>
<tr>
<td>Preferred Option (10 bph per direction)</td>
</tr>
<tr>
<td>8 bphpd on both services (+ additional peak services)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TABLE 17.7  MODELLED SENSITIVITY TESTS – FARES</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Source:</strong> Steer Davies Gleave, 2014</td>
</tr>
<tr>
<td>Preferred Option</td>
</tr>
<tr>
<td>25% Premium on NGT fare</td>
</tr>
<tr>
<td>NGT fare same as conventional bus</td>
</tr>
</tbody>
</table>

Changes in Run-time

17.15. A sensitivity test has been carried out for the Preferred Option to illustrate the impact of increasing NGT run-time. The result of this test is presented in Table 17.8.
TABLE 17.8 MODELLED SENSITIVITY TESTS – NGT RUN-TIME

<table>
<thead>
<tr>
<th></th>
<th>Net Present Value (£m)</th>
<th>Benefit to Cost Ratio (BCR)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preferred Option</td>
<td>£297</td>
<td>2.96</td>
</tr>
<tr>
<td>Reduced NGT run time advantage - increase by 10%</td>
<td>£192</td>
<td>2.07</td>
</tr>
</tbody>
</table>

Source: Steer Davies Gleave, 2014

17.16. In this test, it is assumed that NGT run-time is increased by 10% for the entire 60 year appraisal period. This increases NGT run-times by 1-3 minutes. With this change, NGT still remains between 3 and 10 minutes faster than competing bus services based on the run-times presented in Table 12.1, Table 12.2 and Table 12.3. The lower BCR for this test demonstrates that the proposed measures to reduce NGT run-time, such as segregation and advanced priority at some junctions, are necessary and the costs for these measures are justified in order to deliver the level of user benefit forecast in the central case.

Changes in Operator reaction

17.17. The Preferred Option includes an assumed rationalisation of bus services operating in parallel to NGT. This rationalisation is believed to represent an outcome of acceptable probability, given the length of Appraisal Period being considered and is expected to be more likely than a ‘no operator response’ outcome. Further information about these assumptions can be found in Section 11.

17.18. A sensitivity test has been undertaken to show the performance of NGT without this rationalisation. The results set out in Table 17.9 show that although the assumed bus rationalisation has a beneficial impact on the case, the BCR is only slightly less than the Central Case. In appraisal terms the operating cost savings achieved considerably outweigh any further loss in revenue – which is believed to increase the likelihood of these changes being implemented in practice.

TABLE 17.9 IMPACT OF ASSUMED BUS NETWORK RATIONALISATION

<table>
<thead>
<tr>
<th></th>
<th>Operating Cost Savings (£m PV)</th>
<th>Net Present Value (£m)</th>
<th>Benefit to Cost Ratio (BCR)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preferred Option</td>
<td>£35.6</td>
<td>£297</td>
<td>2.96</td>
</tr>
<tr>
<td>Preferred Option Excluding Bus Rationalisation</td>
<td>£0</td>
<td>£353</td>
<td>2.94</td>
</tr>
</tbody>
</table>

Source: Steer Davies Gleave, 2014

Appraisal Sensitivity Tests

17.19. Table 17.10 sets out a range of tests undertaken within the appraisal to demonstrate the sensitivity of the Preferred Option to key assumptions. Two broad types of test were undertaken: the first identifying the impact of a fixed
percentage change in the parameter; the second the level of change required to effectively force the appraisal into a 'no net benefit' position (where the NPV = £0m and the BCR = 1.0:1).

17.20. Both types of test demonstrate sensitivity to selected parameters and do not represent a full forecast under these conditions. For example, a test which reduces NGT revenue does not include the corresponding reduction in demand and/or fare and the associated impacts of this. Reduced fares could make the service more attractive and increase demand, which could in turn increase revenue.

17.21. The tests undertaken demonstrate that the Preferred Option is robust to changes in key appraisal parameters. Even with significant (25%) increases in capital or operating costs the BCR for this option remains above 2. Punctuality benefits are considered to be a robust addition to the economic case and consistent with WebTAG. Nonetheless even if they were excluded entirely the BCR remains above 2.

17.22. The BCR drops below 2 if NGT revenue is reduced by 25%. However this only shows the impact of reducing NGT revenue and does not include the associated increase in bus revenue if fewer passengers are switching from bus to NGT.

17.23. The importance of public transport user benefits is shown in the 'PT Impacts – 25%' test since this test also causes the BCR to drop below 2. This shows that the costs associated with implementing measures such as segregation to ensure user benefits are justified.
**TABLE 17.10 APPRAISAL SENSITIVITY TESTS (BCR)**

<table>
<thead>
<tr>
<th>Preferred Option</th>
<th>2.96</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capital Costs + 15%</td>
<td>2.40</td>
</tr>
<tr>
<td>Capital Costs + 25%</td>
<td>2.14</td>
</tr>
<tr>
<td>Capital Costs Increase to NPV = 0</td>
<td>230% increase</td>
</tr>
<tr>
<td>Operating Costs + 15%</td>
<td>2.43</td>
</tr>
<tr>
<td>Operating Costs + 25%</td>
<td>2.19</td>
</tr>
<tr>
<td>Operating Costs Increase to NPV = 0</td>
<td>290% increase</td>
</tr>
<tr>
<td>Capital, Operating and Renewals Costs +15%</td>
<td>2.01</td>
</tr>
<tr>
<td>Capital, Operating and Renewals Costs +25%</td>
<td>1.66</td>
</tr>
<tr>
<td>Capital, Operating and Renewals Costs Increase to NPV = 0</td>
<td>70% increase</td>
</tr>
<tr>
<td>NGT Revenue -15%</td>
<td>2.24</td>
</tr>
<tr>
<td>NGT Revenue -25%</td>
<td>1.81</td>
</tr>
<tr>
<td>PT Impacts -15%</td>
<td>2.36</td>
</tr>
<tr>
<td>PT Impacts -25%</td>
<td>1.96</td>
</tr>
<tr>
<td>No Road User Impacts</td>
<td>2.98</td>
</tr>
<tr>
<td>Road User Impacts +100%</td>
<td>2.93</td>
</tr>
<tr>
<td>No Punctuality Benefits</td>
<td>2.40</td>
</tr>
<tr>
<td>Twice Punctuality Benefits</td>
<td>3.51</td>
</tr>
<tr>
<td>Increased vehicle lease cost</td>
<td>2.57</td>
</tr>
<tr>
<td>10% Operator Profit, 15% Operator Incentive</td>
<td>2.80</td>
</tr>
<tr>
<td>Remove additional peak services</td>
<td>3.30</td>
</tr>
<tr>
<td>Optimism Bias 40%</td>
<td>2.62</td>
</tr>
<tr>
<td>Inclusion of Wider Impacts</td>
<td>3.72</td>
</tr>
</tbody>
</table>

*Source: Steer Davies Gleave, 2014*

### Value for Money

#### Introduction

17.24. This section provides the assessment of the Value for Money (VfM) of the Preferred Option and alternative options. This includes an assessment of VfM against DfT objectives, a summary of the overall performance of each option and a comparison between options in terms of VfM.
Value for Money against Government Objectives

17.25. Table 17.11 shows the assessment of VfM of each option against Government objectives. A comparison of the assessment against NATA sub-objectives is presented in Table 17.12, Table 17.13 and Table 17.14.

17.26. Across Central Government objectives, it can be seen that the Preferred Option outperforms the Next Best Alternative and Low Cost Alternative.

Preferred Option

17.27. The monetised impacts deliver a strong economic performance with a Benefit to Cost Ratio of 2.96:1 and an NPV of £297m. A range of sensitivity tests have been undertaken on the Preferred Option and these demonstrate that the central case assessment is robust and the underlying assumptions are reasonable.

17.28. The non-monetised impacts associated with economic and social objectives are Slight Beneficial or Strong Beneficial in all cases. For Landscape and Townscape (assessed together) a moderate adverse assessment is recorded and slight adverse for noise. For the other environmental sub-objectives, the Preferred Option will have a neutral overall impact or better and there will be little change from the existing situation.

17.29. It is concluded that the Preferred Option represents high value for money as defined in DfT guidance with a Benefit Cost Ratio comfortably in excess of 2:1 and extremely unlikely to reduce below 2:1 if non-monetised impacts are taken into account.

Next Best Alternative

17.30. The monetised impacts of the Next Best Alternative show that this alternative is significantly lower value for money than the Preferred Option with a Benefit Cost Ratio of 1.03:1.

17.31. The non-monetised impacts demonstrate that the Next Best Alternative has similar environmental impacts to the Preferred Option except for Landscape/Townscape where the impact is slightly reduced due to replacing the Overhead Lines Equipment with charging stations and for Air Quality where impacts are slightly worse because of lower forecast levels of modal shift. The Next Best Alternative also has similar social impacts to the Preferred Option with the exception of journey quality where the Next Best Alternative is less beneficial. This is due to this option using hybrid diesel electric vehicles which have a lower ride quality due to engine and exhaust noise during diesel operation (around half of the distance in service).

Low Cost Alternative

17.32. The Low Cost Alternative is less value for money than both the Preferred and Next Best Alternative options and has a Benefit Cost Ratio of 0.00:1. The non-monetised impacts show that there are similar environmental
impacts to the current situation with only the Park & Ride aspects of the scheme having a slight adverse impact on the landscape/townscape. The Low Cost Alternative shows similar social impacts to the NBA apart from accidents and accessibility. This is due to low forecasts of modal shift removing fewer vehicle km from the road and the scheme only having accessibility benefits for car users with the LCA services being drop-off only northbound and pick-up only southbound.

Conclusion

17.33. The economic performance of the three options shows that the Promoters’ selection of the Preferred Option is justified on this basis; as it is clearly the best option. Although this option requires more funding in total than either alternative, it is noted that it is the only option which represents economic Value for Money.

17.34. Against all sections of the Value for Money case, the Preferred Option of Leeds New Generation Transport is the superior option. While the Next Best and Low Cost alternatives offer some benefits for less investment and with less environmental impact in some areas, both have extremely poor economic performance and therefore could not be justified for implementation.
### TABLE 17.11  APPRAISAL SUMMARY TABLE – COMPARISON OF OPTIONS

<table>
<thead>
<tr>
<th></th>
<th>Preferred Option</th>
<th>Next Best Alternative</th>
<th>Low Cost Alternative</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Economy</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Business Users &amp; Transport Providers</td>
<td>-£223,554</td>
<td>-£195,064</td>
<td>-£22,956</td>
</tr>
<tr>
<td>Reliability impact on business users</td>
<td>£2,444</td>
<td>£1,854</td>
<td>Neutral</td>
</tr>
<tr>
<td>Regeneration</td>
<td>Slight Beneficial</td>
<td>Slight Beneficial</td>
<td>Neutral</td>
</tr>
<tr>
<td>Wider Impacts</td>
<td>£115,000</td>
<td>£41,000</td>
<td>Neutral</td>
</tr>
<tr>
<td><strong>Environment</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Noise</td>
<td>Slight Adverse</td>
<td>Slight Adverse</td>
<td>Neutral</td>
</tr>
<tr>
<td>Air Quality</td>
<td>Neutral</td>
<td>Slight Adverse</td>
<td>Neutral</td>
</tr>
<tr>
<td>Greenhouse Gases</td>
<td>Neutral</td>
<td>Neutral</td>
<td>Neutral</td>
</tr>
<tr>
<td>Landscape</td>
<td>Moderate Adverse</td>
<td>Slight Adverse</td>
<td>Neutral</td>
</tr>
<tr>
<td>Townscape</td>
<td>Moderate Adverse</td>
<td>Slight Adverse</td>
<td>Neutral</td>
</tr>
<tr>
<td>Heritage of Historic resources</td>
<td>Neutral</td>
<td>Neutral</td>
<td>Neutral</td>
</tr>
<tr>
<td>Biodiversity</td>
<td>Slight Beneficial</td>
<td>Slight Beneficial</td>
<td>Neutral</td>
</tr>
<tr>
<td>Water Environment</td>
<td>Neutral</td>
<td>Neutral</td>
<td>Neutral</td>
</tr>
<tr>
<td><strong>Social</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Commuting and Other Users</td>
<td>£619,602</td>
<td>£338,057</td>
<td>£36,878</td>
</tr>
<tr>
<td>Reliability impact on commuting and other users</td>
<td>£81,789</td>
<td>£57,840</td>
<td>Neutral</td>
</tr>
<tr>
<td>Physical Activity</td>
<td>Slight Beneficial</td>
<td>Slight Beneficial</td>
<td>Neutral</td>
</tr>
<tr>
<td>Journey Quality</td>
<td>Strong Beneficial</td>
<td>Moderate Beneficial</td>
<td>Neutral</td>
</tr>
<tr>
<td>Accidents</td>
<td>-£25,430</td>
<td>-£26,419</td>
<td>-£8,502</td>
</tr>
<tr>
<td>Personal Security</td>
<td>Strong Beneficial</td>
<td>Moderate Beneficial</td>
<td>Slight Beneficial</td>
</tr>
<tr>
<td>Access to services</td>
<td>Strong Beneficial</td>
<td>Strong Beneficial</td>
<td>Neutral</td>
</tr>
<tr>
<td>Personal Affordability</td>
<td>-£66,049</td>
<td>-£43,463</td>
<td>£15,784</td>
</tr>
<tr>
<td>Severance</td>
<td>Strong Beneficial</td>
<td>Strong Beneficial</td>
<td>Neutral</td>
</tr>
<tr>
<td>Option Values</td>
<td>Strong Beneficial</td>
<td>Strong Beneficial</td>
<td>Strong Beneficial</td>
</tr>
<tr>
<td><strong>Public Accounts</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Costs to Broad Transport Budget (Local)</td>
<td>£50,567</td>
<td>-£37,447</td>
<td>-£126,531</td>
</tr>
<tr>
<td>Costs to Broad Transport Budget (National)</td>
<td>-£202,079</td>
<td>-£138,432</td>
<td>-£2,532</td>
</tr>
<tr>
<td>Indirect Tax Revenues</td>
<td>-£13,071</td>
<td>-£159</td>
<td>-£3,982</td>
</tr>
</tbody>
</table>

*Source: Steer Davies Gleave, 2014*
### TABLE 17.12 PREFERRED OPTION APPRAISAL SUMMARY TABLE

<table>
<thead>
<tr>
<th>Impacts</th>
<th>Summary of key impacts</th>
<th>Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Quantitative</td>
</tr>
<tr>
<td>Business users &amp; transport providers</td>
<td>Benefits to public transport users from improved journey times and greater choice of public transport services offset by disbenefits to business highway users. Reduction in net private sector Public Transport revenues as a result of abstraction from existing bus services to NGT.</td>
<td>Value of journey time changes (£m)</td>
</tr>
<tr>
<td>Reliability impact on Business users</td>
<td>The provision of segregated sections and allocation of high levels of priority over other highway traffic provides material improvements in reliability of Public Transport services.</td>
<td>Reliability impacts assessed based on the change in the variation of travel time on the corridors and monetised through bespoke stated preference research.</td>
</tr>
<tr>
<td>Regeneration</td>
<td>Will connect a number of key regeneration opportunity sites on the South corridor to the city centre with a frequent, reliable and high quality public transport service, enabling regeneration at these locations.</td>
<td>N/A</td>
</tr>
<tr>
<td>Wider Impacts</td>
<td>The value of wider impacts attributable to agglomeration, labour supply, imperfect competition and moves to more productive jobs have been estimated using the outputs of the Urban Dynamic Model.</td>
<td>Modelling forecasts a potential 29% increase in economic benefits when wider impacts are taken into account.</td>
</tr>
<tr>
<td>Noise</td>
<td>Increases in noise are expected as a result of the movement of the trolleybuses along the scheme, especially for segregated sections as well as increased traffic and trolleybuses accessing the depot and park and ride facilities. There will be some large negative effects for some dwellings and receptors.</td>
<td>Slight Adverse</td>
</tr>
<tr>
<td>Air Quality</td>
<td>Improvement in air quality as a result of mode shift from car use to a public transport mode with zero emissions along the line of route coupled with reductions in diesel bus services. Overall the changes in air quality will be negligible in the opening year.</td>
<td>Neutral</td>
</tr>
<tr>
<td>Greenhouse gases</td>
<td>Over the lifetime of the NGT Project, emissions will be small in comparison to existing sources in the area.</td>
<td>Neutral</td>
</tr>
<tr>
<td>Landscape</td>
<td>OHLE and the loss of green space will negatively impact the local surroundings even with proposed enhancement and mitigation measures. Impacts are varied throughout the different character areas assessed along the route.</td>
<td>N/A</td>
</tr>
<tr>
<td>Townscape</td>
<td>OHLE and the loss of green space will negatively impact the local surroundings even with proposed enhancement and mitigation measures. Impacts are varied throughout the different character areas assessed along the route.</td>
<td>N/A</td>
</tr>
<tr>
<td>Heritage of Historic resources</td>
<td>Localised moderate adverse effects on historic resources mitigated by sensitive design.</td>
<td>N/A</td>
</tr>
<tr>
<td>Biodiversity</td>
<td>Long term habitat improvements afforded by mitigation improvements that will be of benefit to local ecology.</td>
<td>N/A</td>
</tr>
<tr>
<td>Water Environment</td>
<td>Limited potential for significant impacts to surface and groundwater quality with correct mitigation measures.</td>
<td>N/A</td>
</tr>
<tr>
<td>Category</td>
<td>Description</td>
<td>Value of journey time changes (£)</td>
</tr>
<tr>
<td>----------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>-----------------------------------</td>
</tr>
<tr>
<td>Commuting and Other users</td>
<td>Material benefits to public transport users from improved journey times and greater choice of public transport services, coupled with a small net benefit to highway users formed by a combination of travel time disbenefits to general traffic and an improvement in parking generalised costs resulting from introduction of park &amp; ride options.</td>
<td>N/A</td>
</tr>
<tr>
<td>Reliability impact on Commuting and Other users</td>
<td>The provision of segregated sections and allocation of high levels of priority over other highway traffic provides material improvements in reliability of PT services.</td>
<td>N/A</td>
</tr>
<tr>
<td>Physical activity</td>
<td>Improvements to cycling and pedestrian facilities on the NGT Route will encourage physical activity. This will be slightly offset by some cyclists and pedestrians switching to NGT.</td>
<td>N/A</td>
</tr>
<tr>
<td>Journey quality</td>
<td>NGT will deliver a modern, high quality Public Transport system. New vehicles will deliver improvements to traveller care, views and stress levels, and improved road surfacing will deliver improvements to journey ride quality.</td>
<td>Strong beneficial</td>
</tr>
<tr>
<td>Accidents</td>
<td>Overall increase in vehicle km (caused by increase in car km)</td>
<td>Increase in the number of accidents.</td>
</tr>
<tr>
<td>Personal Security</td>
<td>NGT will utilise best practice design including effective lighting, CCTV, help points, landscaping, natural surveillance</td>
<td>N/A</td>
</tr>
<tr>
<td>Access to services</td>
<td>NGT will provide faster public transport links to key facilities and improve cross-city links between north and south Leeds.</td>
<td>N/A</td>
</tr>
<tr>
<td>Personal Affordability</td>
<td>NGT fares will be set at a level broadly equivalent to conventional buses.</td>
<td>£33 million benefit to road users and £39 million disbenefit to public transport users.</td>
</tr>
<tr>
<td>Severance</td>
<td>NGT will deliver additional pedestrian crossings and cycle facilities, which will reduce current severance.</td>
<td>N/A</td>
</tr>
<tr>
<td>Option values</td>
<td>NGT represents a new high quality transport opportunity, particularly as an alternative to private car (option of Park &amp; Ride).</td>
<td>N/A</td>
</tr>
<tr>
<td>Public Accounts</td>
<td>The costs to Leeds City Council and Metro include capital for implementation and revenue costs of service operations, infrastructure maintenance and renewals. These are offset by the NGT revenue which would be received by Metro.</td>
<td>Total costs of £392 million reduced by revenue income of £443 million over sixty years.</td>
</tr>
<tr>
<td>Cost to Broad Transport Budget (National)</td>
<td>The costs to the Department for Transport include a contribution towards the implementation costs and a modest reduction in rail revenue (in the medium term this could increase subsidy payments to the local franchised train operator).</td>
<td>Total costs of £202 million.</td>
</tr>
<tr>
<td>Indirect Tax Revenues</td>
<td>Reduced tax receipts from increased spending on untaxed public transport largely offset by increased receipts from duty resulting from additional fuel consumption from additional congestion/increased highway trip lengths.</td>
<td>Reduction in indirect tax from increase in public transport -£23 million offset by increase in indirect tax from highway £10 million.</td>
</tr>
</tbody>
</table>

**Source:** Steer Davies Gleave, 2014
## TABLE 17.13 NEXT BEST ALTERNATIVE APPRAISAL SUMMARY TABLE

<table>
<thead>
<tr>
<th>Name of scheme:</th>
<th>Leeds New Generation Transport (Next Best Alternative)</th>
</tr>
</thead>
</table>

### Impacts

<table>
<thead>
<tr>
<th>Impacts</th>
<th>Summary of key impacts</th>
<th>Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Business users &amp; transport providers</strong></td>
<td>Benefits to public transport users from improved journey times and greater choice of public transport services offset by disbenefits to business highway users. Reduction in net private sector Public Transport revenues as a result of abstraction from existing bus services to NBA.</td>
<td></td>
</tr>
<tr>
<td><strong>Reliability on Business users</strong></td>
<td>The provision of segregated sections and allocation of high levels of priority over other highway traffic provides material improvements in reliability of Public Transport services.</td>
<td></td>
</tr>
<tr>
<td><strong>Regeneration</strong></td>
<td>Will connect a number of key regeneration opportunity sites on the South corridor to the city centre with a frequent, reliable and high quality public transport service, enabling regeneration at these locations.</td>
<td></td>
</tr>
<tr>
<td><strong>Wider Impacts</strong></td>
<td>Wider Impacts have not been assessed for the Next Best Alternative but are expected to be less than the Preferred Option.</td>
<td></td>
</tr>
</tbody>
</table>

### Economic Impacts

<table>
<thead>
<tr>
<th>Impacts</th>
<th>Summary of key impacts</th>
<th>Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Economy</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Environmental Impacts

<table>
<thead>
<tr>
<th>Impacts</th>
<th>Summary of key impacts</th>
<th>Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Noise</strong></td>
<td>Diesel-electric hybrid buses will be inherently noisier than the Preferred Option and modal shift will be lower. This will result in some large negative affects for some dwellings and receptors.</td>
<td></td>
</tr>
<tr>
<td><strong>Air Quality</strong></td>
<td>Improvement in air quality as a result in mode shift from car use to a public transport mode will be to a lesser degree than with the Preferred Option. This will result in levels of emissions that are not significantly different to those in the Do-Minimum.</td>
<td></td>
</tr>
<tr>
<td><strong>Greenhouse gases</strong></td>
<td>The diesel-electric hybrid vehicles would not promote the same scale of modal shift than in the Preferred Option. The vehicles would also cause a slight increase in GHG emissions along the route compared to the Preferred Option vehicles.</td>
<td></td>
</tr>
<tr>
<td><strong>Landscape</strong></td>
<td>The replacement of OHLE with charging points reduces the impact to the landscape compared to the Preferred Option.</td>
<td></td>
</tr>
<tr>
<td><strong>Townscape</strong></td>
<td>The replacement of OHLE with charging points reduces the impact to the townscape compared to the Preferred Option.</td>
<td></td>
</tr>
<tr>
<td><strong>Heritage of Historic resources</strong></td>
<td>Negative impacts are mitigated as far as possible with reduces their influence on the historic environment.</td>
<td></td>
</tr>
<tr>
<td><strong>Biodiversity</strong></td>
<td>The enhancement and mitigation measures as part of the scheme will improve the quality of some areas for foraging and breeding of bats and birds.</td>
<td></td>
</tr>
<tr>
<td><strong>Water Environment</strong></td>
<td>With the correct mitigation measures, the impacts of the Next Best Alternative will not be significant.</td>
<td></td>
</tr>
</tbody>
</table>

### Qualitative (7-point scale)

<table>
<thead>
<tr>
<th>Impacts</th>
<th>Summary of key impacts</th>
<th>Assessment</th>
</tr>
</thead>
</table>

### Monetary (£ PV)

<table>
<thead>
<tr>
<th>Impacts</th>
<th>Summary of key impacts</th>
<th>Assessment</th>
</tr>
</thead>
</table>

### Distributional (7-point scale)

<table>
<thead>
<tr>
<th>Impacts</th>
<th>Summary of key impacts</th>
<th>Assessment</th>
</tr>
</thead>
</table>

### Contact:

<table>
<thead>
<tr>
<th>Name</th>
<th>Dave Haskins</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organisation</td>
<td>Metro</td>
</tr>
<tr>
<td>Role</td>
<td>Promoter/Official</td>
</tr>
</tbody>
</table>

---

**Value of journey time changes (£m)**

<table>
<thead>
<tr>
<th>Qualitative (7-point scale)</th>
<th>Monetary (£ PV)</th>
<th>Distributional (7-point scale)</th>
</tr>
</thead>
<tbody>
<tr>
<td>N/A</td>
<td>-£1.9 million</td>
<td>Some adverse impact on highway users from reallocation of priority to Next Best Alternative and business users from loss of revenue</td>
</tr>
</tbody>
</table>

**Net journey time changes (£m)**

<table>
<thead>
<tr>
<th>0 to 2min</th>
<th>2 to 5min</th>
<th>&gt; 5min</th>
</tr>
</thead>
<tbody>
<tr>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

Assuming the same impact as the Preferred Option, these benefits account for £41m PV.
Leeds NGT – Business Case Review

### Social

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
<th>Net Journey time changes (£)</th>
<th>Value of journey time changes(£)</th>
<th>Cost (Local)</th>
<th>Cost (National)</th>
<th>Source: Steer Davies Gleave, 2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commuting and Other users</td>
<td>Material benefits to public transport users from improved journey times and greater choice of public transport services, coupled with small benefit to other highway users formed by an improvement in parking generalised costs resulting from introduction of park &amp; ride options.</td>
<td>N/A</td>
<td>£338 million</td>
<td>N/A</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>Reliability impact on Comming and Other users</td>
<td>The provision of segregated sections and allocation of high levels of priority over other highway traffic provides material improvements in reliability of PT services.</td>
<td>Reliability impacts assessed based on the change in the variation of travel time on the corridors and monetised through bespoke stated preference research.</td>
<td>N/A</td>
<td>£57.8 million</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physical activity</td>
<td>Improvements to cycling and pedestrian facilities on the route will encourage physical activity. This will be slightly offset by some cyclists and pedestrians switching to the Next Best Alternative.</td>
<td>N/A</td>
<td>Slight beneficial</td>
<td>N/A</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>Journey quality</td>
<td>The scheme will deliver a modern, high quality Public Transport system. New vehicles will deliver improvements to traveller care, views and stress levels, and improved road surfacing will deliver improvements to journey ride quality.</td>
<td>Quality benefits included within time savings and not easily disaggregated</td>
<td>Moderate beneficial</td>
<td>Included within business and commuter impacts above</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accidents</td>
<td>Overall increase in vehicle km (caused by increase in car km)</td>
<td>Increase in the number of accidents.</td>
<td>N/A</td>
<td>£26 million</td>
<td>More likely to affect residents near the North Route</td>
<td></td>
</tr>
<tr>
<td>Personal Security</td>
<td>The scheme will utilise best practice design including effective lighting, CCTV, help points, landscaping, natural surveillance</td>
<td>N/A</td>
<td>Moderate beneficial</td>
<td>N/A</td>
<td>N/A</td>
<td>No adverse impacts</td>
</tr>
<tr>
<td>Access to services</td>
<td>The scheme will provide faster public transport links to key facilities and improve cross-city links between north and south Leeds.</td>
<td>N/A</td>
<td>Strong beneficial</td>
<td>N/A</td>
<td>N/A</td>
<td>No adverse impacts</td>
</tr>
<tr>
<td>Personal Affordability</td>
<td>NBA proposes no change to existing fare structures. The level of user charges has little influence on the overall scale of benefits.</td>
<td>£15 million benefit to road users and £58 million disbenefit to public transport users.</td>
<td>N/A</td>
<td>£43 million</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Severance</td>
<td>The scheme will deliver additional pedestrian crossings and cycle facilities, which will reduce current severance.</td>
<td>N/A</td>
<td>Strong beneficial</td>
<td>N/A</td>
<td>N/A</td>
<td>No adverse impacts</td>
</tr>
<tr>
<td>Option values</td>
<td>The scheme represents a high quality transport opportunity, particularly as an alternative to private car (option of Park &amp; Ride).</td>
<td>N/A</td>
<td>Strong beneficial</td>
<td>N/A</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>Cost to Broad Transport Budget (Local)</td>
<td>The costs to Leeds City Council and Metro include capital for implementation and revenue costs of service operations, infrastructure maintenance and renewals. These are offset by the NBA revenue which would be received by Metro.</td>
<td>Total costs of £352 million reduced by revenue income of £312 million over sixty years.</td>
<td>N/A</td>
<td>£37 million</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cost to Broad Transport Budget (National)</td>
<td>The costs to the Department for Transport include a contribution towards the implementation costs and a modest reduction in rail revenue (in the medium term this could increase subsidy payments to the local franchised train operator).</td>
<td>Total costs of £138 million.</td>
<td>N/A</td>
<td>£138 million</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indirect Tax Revenues</td>
<td>Reduced tax receipts from increased spending on untaxed public transport largely offset by increased receipts from duty resulting from additional fuel consumption from additional congestion/increased highway trip lengths.</td>
<td>Reduction in indirect tax from increase in public transport £14 million offset by increase in indirect tax from highway £14 million.</td>
<td>N/A</td>
<td>£0.2 million</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### TABLE 17.14 LOW COST ALTERNATIVE APPRAISAL SUMMARY TABLE

**APPRAISAL SUMMARY TABLE (AST)**

<table>
<thead>
<tr>
<th>Name of scheme:</th>
<th>Leeds New Generation Transport (Low Cost Alternative)</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Impacts</th>
<th>Summary of key impacts</th>
<th>Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Business users &amp; transport providers</strong></td>
<td>Some benefits to public transport users due to slightly improved journey times on Service 1 and Service 6 and an additional Park &amp; Ride service. This is slightly offset by disbenefits to road users due to increased congestion.</td>
<td>Qualitative (7-point scale)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Monetary (£ PV)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Distributional (7-point scale)</td>
</tr>
<tr>
<td></td>
<td>Value of journey time changes (£m)</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>Net journey time changes (£m)</td>
<td>0 to 2 min</td>
</tr>
<tr>
<td><strong>Reliability impact on Business users</strong></td>
<td>The Low Cost Alternative would not deliver road infrastructure improvements beyond standard maintenance therefore the change in reliability is forecast to be neutral.</td>
<td>Qualitative (7-point scale)</td>
</tr>
<tr>
<td><strong>Regeneration</strong></td>
<td>Will connect a number of key regeneration opportunity sites on the South corridor to the city centre with a frequent, reliable and high quality public transport service, enabling regeneration at these locations.</td>
<td>Qualitative (7-point scale)</td>
</tr>
<tr>
<td><strong>Wider Impacts</strong></td>
<td>Although the Low Cost Alternative will reduce travel times for some passengers, the impacts are not sufficient to generate benefits to the wider economy in the same way as the Preferred Option and Next Best Alternative.</td>
<td>Qualitative (7-point scale)</td>
</tr>
<tr>
<td><strong>Noise</strong></td>
<td>Hybrid diesel-electric buses will run along existing highway alignments which will not impact dwellings above those currently affected.</td>
<td>Qualitative (7-point scale)</td>
</tr>
<tr>
<td><strong>Air Quality</strong></td>
<td>Lowest levels of modal shift are expected from the Low Cost Alternative. This results in reduced changes in the distribution and levels of traffic flows on the network. Hybrid diesel-electric vehicles would have a greater impact to the local air quality than in the Preferred Option.</td>
<td>Qualitative (7-point scale)</td>
</tr>
<tr>
<td><strong>Greenhouse gases</strong></td>
<td>Hybrid diesel-electric vehicles will produce higher levels of carbon emissions than the other options but still minor in the scope of total traffic emissions.</td>
<td>Qualitative (7-point scale)</td>
</tr>
<tr>
<td><strong>Landscape</strong></td>
<td>No significant changes to the highway will be required therefore no significant impacts are expected on the landscape.</td>
<td>Qualitative (7-point scale)</td>
</tr>
<tr>
<td><strong>Townscape</strong></td>
<td>No significant changes to the highway will be required therefore no significant impacts are expected on the townscape.</td>
<td>Qualitative (7-point scale)</td>
</tr>
<tr>
<td><strong>Heritage of Historic resources</strong></td>
<td>No charging points of OHLE equipment would result in no significant impacts to local heritage.</td>
<td>Qualitative (7-point scale)</td>
</tr>
<tr>
<td><strong>Biodiversity</strong></td>
<td>Local habitats would not be created or improved and there would be no adverse effects with the correct mitigation measures.</td>
<td>Qualitative (7-point scale)</td>
</tr>
<tr>
<td><strong>Water Environment</strong></td>
<td>The concentrations of pollutants in the runoff from the highway will not significantly impact surface or groundwater quality.</td>
<td>Qualitative (7-point scale)</td>
</tr>
</tbody>
</table>
### Social

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commuting and Other users</td>
<td>Some benefits to public transport users due to slightly improved journey times. Disbenefits to road users due to increased congestion.</td>
</tr>
<tr>
<td>Reliability impact on Commuting and Other users</td>
<td>The Low Cost Alternative would not deliver road infrastructure improvements beyond standard maintenance therefore the change in reliability is forecast to be neutral.</td>
</tr>
<tr>
<td>Journey quality</td>
<td>Slight benefit to passengers due to new fleet of vehicles, however no plans to upgrade road infrastructure beyond standard maintenance and renewals. Quality benefits included within time savings and not easily disaggregated.</td>
</tr>
<tr>
<td>Accidents</td>
<td>No significant changes to vehicle km (caused by lowest levels of modal shift) Increase in the number of accidents.</td>
</tr>
<tr>
<td>Personal Security</td>
<td>The scheme assumes modest improvements to facilities which would enhance passenger security needs. Slight beneficial.</td>
</tr>
<tr>
<td>Access to services</td>
<td>There will be improvements for those not currently served but journey times will be longer than other options. The new Park &amp; Ride service will only allow boarding at the site. Neutral.</td>
</tr>
<tr>
<td>Personal Affordability</td>
<td>LCA proposes no change to existing fare structures. The level of user changes has little influence on the overall scale of benefits. £19 million benefit to road users and £3 million disbenefit to public transport users. Neutral.</td>
</tr>
<tr>
<td>Severance</td>
<td>The scheme is expected to have very little impact on pedestrian and cyclist movement. Neutral.</td>
</tr>
<tr>
<td>Option values</td>
<td>The new Park &amp; Ride sites will provide a new transport option for a large number of households. Neutral.</td>
</tr>
</tbody>
</table>

### Public Accounts

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost to Broad Transport Budget (Local)</td>
<td>The costs to Leeds City Council and Metro include revenue costs of service operations. These are offset by the revenue from the additional Park &amp; Ride service which would be received by Metro. Total costs of £127 million reduced by revenue income of &lt;£1 million per sixty years. Neutral.</td>
</tr>
<tr>
<td>Cost to Broad Transport Budget (National)</td>
<td>The costs to the Department for Transport include a slight reduction in rail revenue (in the medium term this could increase subsidy payments to the local franchised train operator). Total costs of £3 million. N/A.</td>
</tr>
<tr>
<td>Indirect Tax Revenues</td>
<td>Reduced tax receipts from increased spending on untaxed public transport largely offset by increased receipts from duty resulting from additional fuel consumption from additional congestion/increased highway trip lengths. Increase in indirect tax from public transport £2 million and highway £2 million. N/A.</td>
</tr>
</tbody>
</table>

### Source:
Steer Davies Gleave, 2014

<table>
<thead>
<tr>
<th>Value of journey time changes(£)</th>
<th>Net journey time changes (£)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0 to 2min</td>
</tr>
<tr>
<td></td>
<td>N/A</td>
</tr>
</tbody>
</table>

Some adverse impact on highway users due to increased congestion: £37 million
18. Overview

Purpose

18.1. This part of the Business Case Review sets out the Financial Case for the Leeds New Generation Transport Project (the NGT Project).

Options included in the Financial Case

18.2. The NGT Project, which is referred to in this Financial Case as the Preferred Option, involves the implementation of a new partially segregated electric trolleybus scheme between Holt Park in the north of Leeds and Stourton in the south.

18.3. In line with DfT guidance and good practice, two alternatives to the Preferred Option have been assessed in this Business Case Review. These are:

- The Next Best Alternative: which consists of a high quality articulated plug-in hybrid diesel-electric bus on the same, partially segregated route as the Preferred Option
- The Low Cost Alternative: which is based on a hybrid diesel-electric bus operating in the same transport corridors as the Preferred Option, but without segregation

18.4. This Financial Case includes information on these options for comparison, with the exception of setting out the sources of funding. A funding package has only been developed for the Preferred Option, which is the subject of the application for TWAO powers.

Approach and Structure of this Document

18.5. This Financial Case sets out the funding implications of implementing and operating each of the Preferred Option, Next Best Alternative and Low Cost Alternative.

- The Capital Funding required for each option for each year of implementation is described in Section 19
- The Funding Package, applicable to the Preferred Option only, is set out in Section 20 and demonstrates that the Preferred Option is affordable
- Section 21 describes the Operating Position of the three options, including considering the financial sustainability of each through a comparison of the forecast revenue with the estimated operating, maintenance and ongoing renewals costs
19. Capital Funding

Introduction

19.1. This section sets out the approach to determining the capital funding required for initial delivery of the NGT Preferred Option and the alternative options considered within this Business Case Review. Section 10 within this document presents the estimated capital costs for each option and summarises the comprehensive and robust approach to estimating the costs of the project. This section sets out the assumptions underlying the derivation of outturn costs for each option, representing the total funding required for implementation.

Inflation

19.2. Outturn costs are the actual cost of the NGT Project in cash terms at the time payments are made. A key assumption when determining outturn costs is the forecast rate of annual inflation anticipated to apply to construction/development prices. Inflation is applied to the Q2 2013 point estimate of costs, based on an assumed implementation programme, to determine outturn costs.

19.3. Construction cost escalation of 2.7% p.a. has been assumed. This assumption is based on advice from the NGT Project Team’s advisory team. This assumption represents no real change in construction costs, i.e. no change over time other than background inflation which is assumed to be 2.7% p.a.

19.4. The Promoters consider that there is risk associated with assuming this level of cost escalation, for example because of exchange rate fluctuations or changes in materials or labour costs. If construction cost escalation (or base inflation) is higher in total than 2.7% p.a., the outturn cost of the NGT Project would increase. An allowance for higher than assumed cost escalation is included within the quantified risk estimate for the project.

Procurement of Vehicles

19.5. The Commercial Case of this Business Case Review recommends that the vehicles for NGT are procured through a leasing arrangement rather than outright capital purchase and sets out the reasons for taking this option. The costs associated with securing the vehicles to operate the NGT service are therefore included within Section 21 of this Business Case Review rather than within the capital funding requirement.

Preferred Option

19.6. Table 19.1 shows the breakdown of the outturn costs for the Preferred Option. Table 19.2 sets out the total funding requirement by year based on
the delivery programme for the NGT Project, the year of assumed spending governing the number of years of inflation applied.

**TABLE 19.1** PREFERRED OPTION IMPLEMENTATION COST (£M)

<table>
<thead>
<tr>
<th>Cost Item</th>
<th>Q2 2013 (£m)</th>
<th>Outturn Cost (£m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction Costs</td>
<td>£133.1</td>
<td>£152.6</td>
</tr>
<tr>
<td>Development Costs</td>
<td>£27.5</td>
<td>£28.7</td>
</tr>
<tr>
<td>Land Acquisition and Compensation</td>
<td>£20.0</td>
<td>£22.4</td>
</tr>
<tr>
<td>Traffic Regulation Orders, Testing/Commissioning, Monitoring &amp; Evaluation</td>
<td>£2.6</td>
<td>£3.0</td>
</tr>
<tr>
<td>Utilities</td>
<td>£15.9</td>
<td>£17.9</td>
</tr>
<tr>
<td>Risk</td>
<td>£22.5</td>
<td>£25.9</td>
</tr>
<tr>
<td>Inflation</td>
<td>£28.9</td>
<td>Included</td>
</tr>
<tr>
<td><strong>Capital Funding Requirement</strong></td>
<td><strong>£250.5</strong></td>
<td><strong>£250.5</strong></td>
</tr>
</tbody>
</table>

*Source: Project Team, 2014*

**TABLE 19.2** PREFERRED OPTION TIME SERIES FUNDING REQUIREMENT (£M Outturn)

<table>
<thead>
<tr>
<th>Year</th>
<th>Period From</th>
<th>Period To</th>
<th>Capital Expenditure in period</th>
<th>Cumulative Capital Expenditure</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1 April 2012</td>
<td>31 March 2013</td>
<td>£2.2</td>
<td>£2.2</td>
</tr>
<tr>
<td>2</td>
<td>1 April 2013</td>
<td>31 March 2014</td>
<td>£8.0</td>
<td>£10.2</td>
</tr>
<tr>
<td>3</td>
<td>1 April 2014</td>
<td>31 March 2015</td>
<td>£10.0</td>
<td>£20.2</td>
</tr>
<tr>
<td>4</td>
<td>1 April 2015</td>
<td>31 March 2016</td>
<td>£2.9</td>
<td>£23.1</td>
</tr>
<tr>
<td>5</td>
<td>1 April 2016</td>
<td>31 March 2017</td>
<td>£2.2</td>
<td>£25.3</td>
</tr>
<tr>
<td>6</td>
<td>1 April 2017</td>
<td>31 March 2018</td>
<td>£97.0</td>
<td>£122.3</td>
</tr>
<tr>
<td>7</td>
<td>1 April 2018</td>
<td>31 March 2019</td>
<td>£74.8</td>
<td>£197.1</td>
</tr>
<tr>
<td>8</td>
<td>1 April 2019</td>
<td>31 March 2020</td>
<td>£53.1</td>
<td>£250.2</td>
</tr>
<tr>
<td>9</td>
<td>1 April 2020</td>
<td>31 March 2021</td>
<td>£0.3</td>
<td>£250.5</td>
</tr>
</tbody>
</table>

*Source: Project Team, 2014*

**Next Best Alternative**

19.7. Table 19.3 shows the breakdown of the outturn costs for the Next Best Alternative. Table 19.4 sets out the total funding requirement by year based on the delivery programme for the Next Best Alternative, the year of assumed spending governing the number of years of inflation applied. Overall the funding requirement for the Next Best Alternative is £24.8 million (10%) less than the equivalent for the Preferred Option.
TABLE 19.3  NEXT BEST ALTERNATIVE OUTTURN COST (£000)

<table>
<thead>
<tr>
<th>Cost Item</th>
<th>Q2 2013 (£m)</th>
<th>Outturn Cost (£m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction Costs</td>
<td>£113.1</td>
<td>£129.8</td>
</tr>
<tr>
<td>Development Costs</td>
<td>£27.5</td>
<td>£28.7</td>
</tr>
<tr>
<td>Land Acquisition and Compensation</td>
<td>£20.0</td>
<td>£22.4</td>
</tr>
<tr>
<td>Traffic Regulation Orders, Testing/Commissioning, Monitoring &amp; Evaluation</td>
<td>£2.3</td>
<td>£2.6</td>
</tr>
<tr>
<td>Utilities</td>
<td>£15.9</td>
<td>£17.9</td>
</tr>
<tr>
<td>Risk</td>
<td>£21.2</td>
<td>£24.4</td>
</tr>
<tr>
<td>Inflation</td>
<td>£25.8</td>
<td>Included</td>
</tr>
<tr>
<td><strong>Capital Funding Requirement</strong></td>
<td><strong>£225.8</strong></td>
<td><strong>£225.8</strong></td>
</tr>
</tbody>
</table>

Source: Project Team, 2014

TABLE 19.4  NEXT BEST ALTERNATIVE TIME SERIES FUNDING REQUIREMENT (£M OUTTURN)

<table>
<thead>
<tr>
<th>Year</th>
<th>Period From</th>
<th>Period To</th>
<th>Capital Expenditure in period</th>
<th>Cumulative Capital Expenditure</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1 April 2012</td>
<td>31 March 2013</td>
<td>£2.2</td>
<td>£2.2</td>
</tr>
<tr>
<td>2</td>
<td>1 April 2013</td>
<td>31 March 2014</td>
<td>£8.0</td>
<td>£10.2</td>
</tr>
<tr>
<td>3</td>
<td>1 April 2014</td>
<td>31 March 2015</td>
<td>£10.0</td>
<td>£20.2</td>
</tr>
<tr>
<td>4</td>
<td>1 April 2015</td>
<td>31 March 2016</td>
<td>£2.9</td>
<td>£23.1</td>
</tr>
<tr>
<td>5</td>
<td>1 April 2016</td>
<td>31 March 2017</td>
<td>£2.2</td>
<td>£25.3</td>
</tr>
<tr>
<td>6</td>
<td>1 April 2017</td>
<td>31 March 2018</td>
<td>£88.7</td>
<td>£114.0</td>
</tr>
<tr>
<td>7</td>
<td>1 April 2018</td>
<td>31 March 2019</td>
<td>£65.1</td>
<td>£179.1</td>
</tr>
<tr>
<td>8</td>
<td>1 April 2019</td>
<td>31 March 2020</td>
<td>£46.5</td>
<td>£225.6</td>
</tr>
<tr>
<td>9</td>
<td>1 April 2020</td>
<td>31 March 2021</td>
<td>£0.3</td>
<td>£225.8</td>
</tr>
</tbody>
</table>

Source: Project Team, 2014

Low Cost Alternative

19.8. Table 19.5 shows the breakdown of the outturn costs for the Low Cost Alternative. Table 19.6 sets out the total funding requirement by year based on the delivery programme for the Low Cost Alternative, the year of assumed spending governing the number of years of inflation applied. Overall the funding requirement for the Next Best Alternative is £59.9 million, around less than a quarter of the equivalent for the Preferred Option.
### TABLE 19.5 LOW COST ALTERNATIVE OUTTURN COST (£M)

<table>
<thead>
<tr>
<th>Cost Item</th>
<th>Q2 2013 (£m)</th>
<th>Outturn Cost (£m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction Costs</td>
<td>£32.3</td>
<td>£37.1</td>
</tr>
<tr>
<td>Development Costs</td>
<td>£6.3</td>
<td>£6.6</td>
</tr>
<tr>
<td>Land Acquisition and Compensation</td>
<td>£4.4</td>
<td>£4.9</td>
</tr>
<tr>
<td>Traffic Regulation Orders, Testing/Commissioning, Monitoring &amp; Evaluation</td>
<td>£0.6</td>
<td>£0.7</td>
</tr>
<tr>
<td>Utilities</td>
<td>£3.5</td>
<td>£4.0</td>
</tr>
<tr>
<td>Risk</td>
<td>£5.8</td>
<td>£6.6</td>
</tr>
<tr>
<td>Inflation</td>
<td>£7.0</td>
<td>Included</td>
</tr>
<tr>
<td><strong>Capital Funding Requirement</strong></td>
<td><strong>£59.9</strong></td>
<td><strong>£59.9</strong></td>
</tr>
</tbody>
</table>

Source: Project Team, 2014

### TABLE 19.6 LOW COST ALTERNATIVE TIME SERIES FUNDING REQUIREMENT (£M OUTTURN)

<table>
<thead>
<tr>
<th>Year</th>
<th>Period From</th>
<th>Period To</th>
<th>Capital Expenditure in period</th>
<th>Cumulative Capital Expenditure</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1 April 2012</td>
<td>31 March 2013</td>
<td>£0.5</td>
<td>£0.5</td>
</tr>
<tr>
<td>2</td>
<td>1 April 2013</td>
<td>31 March 2014</td>
<td>£1.8</td>
<td>£2.3</td>
</tr>
<tr>
<td>3</td>
<td>1 April 2014</td>
<td>31 March 2015</td>
<td>£2.3</td>
<td>£4.6</td>
</tr>
<tr>
<td>4</td>
<td>1 April 2015</td>
<td>31 March 2016</td>
<td>£0.7</td>
<td>£5.3</td>
</tr>
<tr>
<td>5</td>
<td>1 April 2016</td>
<td>31 March 2017</td>
<td>£0.5</td>
<td>£5.8</td>
</tr>
<tr>
<td>6</td>
<td>1 April 2017</td>
<td>31 March 2018</td>
<td>£22.8</td>
<td>£28.6</td>
</tr>
<tr>
<td>7</td>
<td>1 April 2018</td>
<td>31 March 2019</td>
<td>£18.2</td>
<td>£46.8</td>
</tr>
<tr>
<td>8</td>
<td>1 April 2019</td>
<td>31 March 2020</td>
<td>£13.0</td>
<td>£59.8</td>
</tr>
<tr>
<td>9</td>
<td>1 April 2020</td>
<td>31 March 2021</td>
<td>£0.1</td>
<td>£59.9</td>
</tr>
</tbody>
</table>

Source: Project Team, 2014
20. Sources of Funding

Introduction

20.1. This section details how the NGT Preferred Option will be funded. This funding package is solely for the Preferred Option; there is currently no approved funding package for either the Next Best Alternative or Low Cost Alternative, however, a plausible funding solution for each is summarised below.

20.2. The strategy for funding NGT has been developed with regard to DfT guidance. The 2012 Programme Entry Re-approval represents the conditional commitment of DfT to be the majority funder of the NGT Project. A proportion of the cost must be funded locally and to that end a range of local funding options has been and continues to be considered.

20.3. Securing TWAO powers will allow greater confidence that the NGT Project will be delivered and the Promoters will seek to secure additional third party funding, for example through developer contributions, as opportunities become available.

Preferred Option Funding

20.4. DfT’s Programme Entry Re-approval in July 2012 set out its commitment to contribute £173.5 million (outturn) of the total projected cost of £250.6 million of the NGT Project. DfT’s conditions on the funding approval include the following:

‘The scheme must be implemented in accordance with the scheme proposals as set out in your business case dated March 2012, including that it will be delivered within the timescale set out in your bid, subject to any changes which may occur as a result of further design or as a result of any remaining statutory procedures. Ministers reserve the right to reconsider their decision on funding if there are any changes to the overall cost, scope or design of the scheme which they consider to be material, particularly where any changes would alter the value for money of the scheme. You must notify the Department immediately of any such material changes, and provide on request any appropriate evidence to determine the impact of the changes on the scheme’s value for money’

20.5. As required by this condition, the DfT was notified of the Promoters intention to change the alignment in south Leeds and the rationale for the change. Subsequently a further letter was received in August 2013 from the DfT. This letter confirmed that the DfT was content with the change in routeing and that the original conditions in the previous approval letter still stood; it also included the following clarification:
‘I can also confirm that the funding to be provided by this Department at Full Approval, should that be confirmed, is only valid for the scheme as bid by Metro and subsequently approved, that is a trolley vehicle system on the corridors submitted to and approved by this Department. If any alternative scheme, whether it be based on different vehicle technology or corridors, is proposed this will require a full consideration by the Department of the business case, may require different powers, and would be the subject of different funding considerations.’

20.6. It is unambiguous that the DfT funding requested by the Promoters is specifically to fund the construction costs of NGT as a trolley vehicle system.

20.7. The development costs, a proportion of the construction costs and any additional costs incurred over and above the project costs stated in this Financial Case will be funded through the Local Authority Contribution. Table 20.1 presents the overall funding package by source.

**TABLE 20.1 SUMMARY OF FUNDING SOURCES (OUTTURN)**

<table>
<thead>
<tr>
<th>Item</th>
<th>£000</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>DfT</td>
<td>£173,500</td>
<td>69%</td>
</tr>
<tr>
<td>Metro Capital Reserves/LTP3</td>
<td>£4,900</td>
<td>2%</td>
</tr>
<tr>
<td>LCC Capital Programme/LTP3</td>
<td>£25,500</td>
<td>10%</td>
</tr>
<tr>
<td>Prudential Borrowing</td>
<td>£35,000</td>
<td>14%</td>
</tr>
<tr>
<td>Land already in Metro/LCC ownership</td>
<td>£11,600</td>
<td>5%</td>
</tr>
<tr>
<td><strong>Total Funding</strong></td>
<td><strong>£250,600</strong></td>
<td></td>
</tr>
</tbody>
</table>

Source: Project Board 2014

20.8. In acknowledging Programme Entry Re-approval, Metro and LCC Section 151 Officers agreed to the terms of the DfT Re-approval letter, which accepted that Metro and LCC would provide all funding beyond the £173.5 million DfT contribution. At that stage the Promoters’ contribution comprised £15 million of Prudential Borrowing and £20 million which was identified as ‘Committed Local Contribution from ‘Other Sources’”. While funding from other sources may become available to the Promoters (for example the West Yorkshire Transport Fund or an EarnBack mechanism), and these are being actively explored, there is no currently committed ‘other source’ of funds. Therefore the Project Board has approved a funding solution including increasing the assumed level of prudential borrowing from £15 million to £35 million.

**Next Best Alternative Funding**

20.9. The Next Best Alternative would require a broadly similar scale of funding as the Preferred Option. If this option were to be considered further it would be essential that the DfT reallocates the £173.5 million currently assigned to NGT to the Next Best Alternative plug-in diesel/electric hybrid vehicle option. This is currently specifically allocated on the basis of delivering a trolley...
vehicle solution only. Without this there is currently no local funding solution for the £226 million infrastructure cost of the Next Best Alternative.

Low Cost Alternative Funding

20.10. The Low Cost Alternative is assumed to be fundable from entirely local sources. However, at this stage no funding has been identified or secured for this option. While it could be implemented in full or in part using the West Yorkshire Transport Fund, to do so would require reallocation of funds currently earmarked for projects elsewhere.

Conclusions

20.11. The Promoters consider that the NGT Preferred Option is affordable, with a secured funding package.

20.12. DfT has confirmed that its funding approval only applies to a trolley vehicle solution; therefore it could not be applied to the Next Best Alternative or Low Cost Alternative. No funding package has been formally identified or secured for either the Next Best Alternative or the Low Cost Alternative. It cannot therefore currently be concluded that either alternative option would necessarily be affordable.
21. Operating Position

Introduction

21.1. This section sets out the forecast financial sustainability of the NGT Preferred Option and the alternative options considered within this Business Case Review.

21.2. Financial sustainability is examined in terms of the operating position; a comparison of the estimated lifecycle costs of the options with the forecast revenue. This assessment is undertaken in nominal (or outturn) terms, i.e. inclusive of background inflation. At this stage of project development this assessment is undertaken at a high level based on currently available information; no financial modelling has yet been completed.

21.3. After careful consideration, the Promoters have elected to take revenue risk for the NGT Project Preferred Option. As set out in the Commercial Case, this means that the revenues from NGT operation will accrue to the Promoters who in turn will pay fees to the contracted operator who will provide the NGT services. If revenue exceeds the contracted cost of operation, the Promoters retain the surplus. Conversely, if revenue falls short of the contracted cost of operation, the Promoters will need to make up the shortfall from their own resources.

21.4. This assessment of NGT financial sustainability is therefore undertaken from the Promoters’ perspective. Service operations and maintenance will be procured from reputable contractors for a regular agreed schedule of payments; it can therefore be concluded that the project will be financially sustainable for these entities and no further consideration from their perspective is required.

21.5. The Next Best Alternative option service would be procured either by means of a Quality Contract Scheme (QCS) or a Voluntary Partnership Agreement (VPA) between the Promoters and existing bus operators on the NGT routes. It has been assumed for the purposes of this Financial Case that a QCS is in place and that the Promoters would take revenue risk for this option. If alternatively a VPA were to be used, it would need to include a mechanism for operators to pay a proportion of any revenue surplus to the Promoters to repay their required prudential borrowing.

21.6. The Low Cost Alternative has been specified as an improvement to existing bus services on the north corridor, with service operators taking revenue risk as they do now. The Promoters are assumed to take revenue risk on the Park & Ride service on the south corridor, which will be a Metro contracted service.
Estimated Lifecycle Costs

Operating Costs

21.7. The assumed service pattern and estimated costs of operating NGT services are set out in Section 11 of the Economic Case. Nominal values have been derived from the values presented in 2010/11 prices assuming that staff costs increase at 3.7% p.a. (with real wage growth of 1.0% p.a. on top of background inflation of 2.7% p.a. until 2049/50) and all other costs increase in line with background inflation. It is assumed that commissioning and trial running costs are incurred in advance of public opening, equivalent to three months of standard operations.

Vehicle Costs

21.8. An indicative vehicle lease cost for the Preferred Option has been derived based on the purchase of twenty trolley vehicles at £650,000 each (Q2 2013 prices), maintenance, renewals and replacement on a twelve year cycle. Lease payments are assumed to be fixed in nominal terms for each twelve year cycle, increasing with inflation when the contract is re-let.

21.9. A similar arrangement has been assumed for the Next Best Alternative, although based on twenty-four plug-in articulated diesel-electric hybrid vehicles at £470,000 each (Q2 2013).

21.10. Vehicles for the Low Cost Alternative are assumed to be provided by the service operator and funded through the service operating costs, regardless of whether or not the operator is taking revenue risk.

Maintenance Costs

21.11. Estimated infrastructure maintenance costs are set out in Section 11 of this document. Nominal values have been derived from the values presented in 2010/11 prices assuming that staff costs increase at 3.7% p.a. (with real wage growth of 1.0% p.a. on top of background inflation of 2.7% p.a. until 2049/50) and all other costs increase in line with background inflation.

Renewals Costs

21.12. Estimated renewals infrastructure maintenance costs based on an assumed investment cycle over the sixty year appraisal period are set out in Section 11 of this document. Nominal values have been derived from the values presented in 2010/11 prices assuming that costs increase at 3.7% p.a. (with real growth of 1.0% p.a. on top of background inflation of 2.7% p.a.) until 2049/50 and with background growth thereafter. These assumptions are consistent with good practice and appraisals of comparable schemes.

Forecast Revenue

21.13. The process of deriving revenue forecasts for the economic appraisal is set
out in Section 12 of this document. The economic appraisal, in line with DfT guidance, represents a central case outcome. Interpretation of the possible operating position therefore needs to take into account the level of financial risk associated with this revenue estimate. A forecast of service revenue suitable for financial modelling would typically be adjusted to take account of such risk.

21.14. The demand modelling process assumes that NGT fares (in line with all other public transport fares) increase by 1.0% p.a. in real terms. The demand modelling also allows for background demand growth and for responses to relative changes in the costs of travelling by different modes, for example in response to increasing highway congestion. Nominal values have been derived from these revenues by applying background inflation of 2.7% p.a.

21.15. NGT revenues have been reduced within the economic appraisal by an assumed 5% to allow for revenue loss, for example from overriding (travelling further than allowed on the fare paid).

21.16. A revenue build-up period is assumed with ‘mature’ revenues reduced by 30% in the first full year of operations, 20% in the second and 10% in the third. Standard public operations are assumed to commence in early 2020.

Preferred Option Financial Impacts

21.17. The financial impacts of the Preferred Option and the two alternatives considered in this Business Case Review have been assessed from two perspectives. Firstly, in terms of the operating position of the ‘standalone’ NGT transport mode and secondly, in terms of the forecast impact on the operating position of existing bus operators. For the Low Cost Alternative only the latter position is considered, as this option is specified as an improvement to existing services.

NGT Operating Position

21.18. The operating position for NGT has been considered in terms of the forecast financial impact on the Promoters (who have elected to take revenue risk) excluding the costs of prudential borrowing.

21.19. Table 21.1 sets out the comparison of estimated cost and forecast revenue for a typical ‘mature’ year (i.e. beyond the revenue build-up period). A risk reduction of 20% has been made to the revenue forecast from the economic appraisal. This represents a prudent approach appropriate for the development of the funding strategy consistent with common practice.
TABLE 21.1 PREFERRED OPTION NGT ANNUAL FINANCIAL IMPACT (OUTTURN)

<table>
<thead>
<tr>
<th>Typical Mature Year of Operation (2024/25)</th>
<th>£m</th>
</tr>
</thead>
<tbody>
<tr>
<td>Service Operating Costs</td>
<td>-£8.4</td>
</tr>
<tr>
<td>Promoters’ Costs</td>
<td>-£0.2</td>
</tr>
<tr>
<td>Vehicle Lease Payment (including maintenance and renewals)</td>
<td>-£6.2</td>
</tr>
<tr>
<td>Infrastructure Maintenance</td>
<td>-£2.8</td>
</tr>
<tr>
<td>Total Annual Costs</td>
<td>-£17.6</td>
</tr>
<tr>
<td>NGT Risk-adjusted Revenue</td>
<td>£20.6</td>
</tr>
<tr>
<td><strong>Forecast Annual Operating Surplus</strong></td>
<td>£3.0</td>
</tr>
</tbody>
</table>

Source: Project Team, 2014

21.20. In early years because of commissioning and trial operations and the assumed rates of demand build-up, some revenue support will be required from the Promoters. By 2022/23 a modest surplus will be returned with sufficient operating surplus to ‘pay back’ the initial subsidy being received by 2027/28. Table 21.2 presents the forecast annual operating surplus position up to the eighth full year of operations.

TABLE 21.2 PREFERRED OPTION NGT FINANCIAL IMPACT (OUTTURN)

<table>
<thead>
<tr>
<th>Year</th>
<th>Annual £m</th>
<th>Cumulative £m</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trial operation (3 months), Full operation (2 months)</td>
<td>-£7.2</td>
<td>-£7.2</td>
</tr>
<tr>
<td>Full Year 1 2020/21</td>
<td>-£3.9</td>
<td>-£11.1</td>
</tr>
<tr>
<td>Full Year 2 2021/22</td>
<td>-£1.9</td>
<td>-£13.0</td>
</tr>
<tr>
<td>Full Year 3 2022/23</td>
<td>£0.3</td>
<td>-£12.7</td>
</tr>
<tr>
<td>Full Year 4 2023/24</td>
<td>£2.2</td>
<td>-£10.5</td>
</tr>
<tr>
<td>Full Year 5 2024/25</td>
<td>£3.0</td>
<td>-£7.6</td>
</tr>
<tr>
<td>Full Year 6 2025/26</td>
<td>£3.3</td>
<td>-£4.3</td>
</tr>
<tr>
<td>Full Year 7 2026/27</td>
<td>£4.0</td>
<td>-£0.3</td>
</tr>
<tr>
<td>Full Year 8 2027/28</td>
<td>£4.8</td>
<td>£4.5</td>
</tr>
</tbody>
</table>

Source: Project Team, 2014

21.21. Table 21.2 confirms that the risk-adjusted revenue forecast set out in this Financial Case is sufficient to cover the lifecycle costs of the system. It can therefore be concluded that the proposal is robustly financially sustainable.

21.22. Based on the forecast operating surplus the Promoters are confident that the cumulative forecast revenue surplus will be greater than the cumulative loan repayments associated with £35 million capital borrowing.

Bus Operator Impact

21.23. Table 21.3 sets out the forecast impacts on existing private sector bus operators on the NGT corridors, including the revenue impacts and cost savings which would result from the assumed rationalisation of
the bus network (11.20) and the impact of the revenue forecast to be abstracted onto Preferred Option services.

21.24. Revenue is forecast to be abstracted by NGT across a range of bus services and different operators. For some services this abstraction is balanced by generated revenue, for example where the introduction of NGT creates or improves a travel option which includes interchange. A consequent change in service patterns has only been assumed for services on the two routes most similar to the Preferred Option alignment, where the highest levels of revenue abstraction are forecast. Across other services and operators a more modest impact is anticipated.

TABLE 21.3 PREFERRED OPTION BUS ANNUAL FINANCIAL IMPACT (OUTTURN)

<table>
<thead>
<tr>
<th>Service Number</th>
<th>Annual Revenue Abstracted (£m)</th>
<th>Assumed Operating Cost Saving (£m)</th>
<th>Net Annual Impact (£m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rationalised services (1 &amp; 6)</td>
<td>-£6.9</td>
<td>£2.0</td>
<td>-£4.9</td>
</tr>
<tr>
<td>Other affected services</td>
<td>-£1.4</td>
<td>£0.0</td>
<td>-£1.4</td>
</tr>
<tr>
<td>Total</td>
<td>-£8.3</td>
<td>£2.0</td>
<td>-£6.3</td>
</tr>
</tbody>
</table>

Source: Project Team, 2014

Next Best Alternative Financial Impacts

NBA Service Operating Position

21.25. The operating position for the Next Best Alternative service has been considered in terms of the forecast financial impact on the Promoters (who for consistency are assumed to take revenue risk).

21.26. Table 21.4 sets out the comparison of estimated cost and forecast revenue for a typical ‘mature’ year (i.e. beyond the revenue build up period). A risk reduction of 20% has been made to the revenue forecast from the economic appraisal. This represents a prudent approach appropriate for the development of the funding strategy consistent with common practice.
### TABLE 21.4  NEXT BEST ALTERNATIVE ANNUAL FINANCIAL IMPACT (OUTTURN)

<table>
<thead>
<tr>
<th>Typical Mature Year of Operation (2024/25)</th>
<th>£m</th>
</tr>
</thead>
<tbody>
<tr>
<td>Service Operating Costs</td>
<td>-£8.9</td>
</tr>
<tr>
<td>Promoters’ Costs</td>
<td>-£0.2</td>
</tr>
<tr>
<td>Vehicle Lease Payment (including maintenance and renewals)</td>
<td>-£5.0</td>
</tr>
<tr>
<td>Infrastructure Maintenance</td>
<td>-£2.3</td>
</tr>
<tr>
<td>Total Annual Costs</td>
<td>-£16.4</td>
</tr>
<tr>
<td>NBA Service Risk-adjusted Revenue</td>
<td>£14.2</td>
</tr>
<tr>
<td><strong>Forecast Annual Operating Surplus</strong></td>
<td><strong>-£2.2</strong></td>
</tr>
</tbody>
</table>

*Source: Project Team, 2014*

21.27. In early years because of commissioning and trial operations and the assumed rates of demand build-up, additional revenue support will be required from the Promoters. With the Next Best Alternative, at no stage over the sixty year appraisal does the forecast annual or cumulative revenue exceed annual or cumulative operating costs (including service operations, vehicle lease, maintenance and renewals). Revenue exceeds the costs of service operations and vehicle lease by the fifth full year of operations; however the project would still require alternative funding sources to pay for infrastructure maintenance and renewals. Table 21.5 presents the forecast annual operating surplus position up to the eighth full year of operations.

### TABLE 21.5  NEXT BEST ALTERNATIVE SERVICE FINANCIAL IMPACT (OUTTURN)

<table>
<thead>
<tr>
<th>Year</th>
<th>Annual £m</th>
<th>Cumulative £m</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trial operation (3 months), Full operation (2 months)</td>
<td>-£6.6</td>
<td>-£6.6</td>
</tr>
<tr>
<td>Full Year 1 2020/21</td>
<td>-£6.4</td>
<td>-£13.0</td>
</tr>
<tr>
<td>Full Year 2 2021/22</td>
<td>-£5.1</td>
<td>-£18.1</td>
</tr>
<tr>
<td>Full Year 3 2022/23</td>
<td>-£3.8</td>
<td>-£21.9</td>
</tr>
<tr>
<td>Full Year 4 2023/24</td>
<td>-£2.6</td>
<td>-£24.5</td>
</tr>
<tr>
<td>Full Year 5 2024/25</td>
<td>-£2.2</td>
<td>-£26.7</td>
</tr>
<tr>
<td>Full Year 6 2025/26</td>
<td>-£2.3</td>
<td>-£29.0</td>
</tr>
<tr>
<td>Full Year 7 2026/27</td>
<td>-£1.7</td>
<td>-£30.7</td>
</tr>
<tr>
<td>Full Year 8 2027/28</td>
<td>-£1.4</td>
<td>-£32.1</td>
</tr>
</tbody>
</table>

*Source: Project Team, 2014*

21.28. The data in Table 21.5 confirms that that the risk-adjusted revenue forecast set out in this Financial Case is insufficient to cover the lifecycle costs of the system. It is therefore concluded that the Next Best Alternative proposal is not financially sustainable.

21.29. Based on the forecast operating deficit the Promoters would have no source of income to cover repayment of the capital borrowing which would be
required to progress this scheme.

**Bus Operator Impacts**

21.30. Table 21.6 sets out the forecast impacts by service on existing private sector bus operators on the NGT corridors, including the revenue impacts and cost savings which would result from the assumed rationalisation (11.41) of the bus network and the impact of the revenue forecast to be abstracted onto NBA services.

21.31. Revenue is forecast to be abstracted across a range of bus services and different operators. For some services this abstraction is outweighed by generation, for example where the introduction of the Next Best Alternative creates or improves a travel option which includes interchange. A consequent change in service patterns has only been assumed for services on the two routes most similar to the NBA alignment, where the highest levels of revenue abstraction are forecast. Across other services and operators a more modest impact is anticipated.

**TABLE 21.6  NEXT BEST ALTERNATIVE BUS ANNUAL FINANCIAL IMPACT (OUTTURN)**

<table>
<thead>
<tr>
<th>Service Number</th>
<th>Annual Revenue Abstracted (£m)</th>
<th>Assumed Operating Cost Saving (£m)</th>
<th>Net Annual Impact (£m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rationalised services (1 &amp; 6)</td>
<td>-£6.3</td>
<td>£2.0</td>
<td>-£4.3</td>
</tr>
<tr>
<td>Other affected services</td>
<td>+£0.2</td>
<td>£0.0</td>
<td>+£0.2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>-£6.1</strong></td>
<td><strong>£2.0</strong></td>
<td><strong>-£4.1</strong></td>
</tr>
</tbody>
</table>

*Source: Project Team, 2014*

**Low Cost Alternative**

**LCA Park & Ride Service Operating Position**

21.32. The operating position for the Low Cost Alternative service has been considered in terms of the forecast financial impact on private sector us operators, who would take revenue risk for this option. Table 21.7 sets out the comparison of estimated cost and forecast revenue for a typical ‘mature’ year (i.e. beyond the revenue build up period).
### TABLE 21.7  LOW COST ALTERNATIVE ANNUAL FINANCIAL POSITION (OUTTURRN)

<table>
<thead>
<tr>
<th>Typical Mature Year of Operation (2024/25)</th>
<th>£000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Service Operating Costs</td>
<td>-£2.8</td>
</tr>
<tr>
<td>Promoters’ Costs</td>
<td>£0.0</td>
</tr>
<tr>
<td>Infrastructure Maintenance</td>
<td>-£1.0</td>
</tr>
<tr>
<td>Total Annual Costs</td>
<td>-£3.8</td>
</tr>
<tr>
<td>LCA Park &amp; Ride Service Risk-adjusted Revenue</td>
<td>£0.7</td>
</tr>
<tr>
<td>Forecast Annual Operating Surplus</td>
<td>-£3.7</td>
</tr>
</tbody>
</table>

*Source: Project Team, 2014*

21.33. With the Low Cost Alternative, at no stage over the sixty year appraisal does the forecast annual or cumulative revenue exceed annual or cumulative operating costs (including service operations, vehicle lease, maintenance and renewals). Neither does revenue exceed the costs of service operations at any point. Table 21.8 presents the forecast annual operating surplus position up to the eighth full year of operations.

### TABLE 21.8  LOW COST ALTERNATIVE BUS FINANCIAL IMPACT (OUTTURRN)

<table>
<thead>
<tr>
<th>Year</th>
<th>Annual £m</th>
<th>Cumulative £m</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full (NBA service) operation (2 months)</td>
<td>-£1.3</td>
<td>-£1.3</td>
</tr>
<tr>
<td>Full Year 1 2020/21</td>
<td>-£2.9</td>
<td>-£4.2</td>
</tr>
<tr>
<td>Full Year 2 2021/22</td>
<td>-£2.9</td>
<td>-£7.1</td>
</tr>
<tr>
<td>Full Year 3 2022/23</td>
<td>-£3.0</td>
<td>-£10.1</td>
</tr>
<tr>
<td>Full Year 4 2023/24</td>
<td>-£3.1</td>
<td>-£13.2</td>
</tr>
<tr>
<td>Full Year 5 2024/25</td>
<td>-£3.1</td>
<td>-£16.3</td>
</tr>
<tr>
<td>Full Year 6 2025/26</td>
<td>-£3.2</td>
<td>-£19.5</td>
</tr>
<tr>
<td>Full Year 7 2026/27</td>
<td>-£3.3</td>
<td>-£22.8</td>
</tr>
<tr>
<td>Full Year 8 2027/28</td>
<td>-£3.3</td>
<td>-£26.1</td>
</tr>
</tbody>
</table>

*Source: Project Team, 2014*

21.34. The data in Table 21.8 confirms that the risk-adjusted revenue forecast set out in this Financial Case is insufficient to cover the lifecycle costs of the system. It is therefore concluded that the Low Cost Alternative proposal is not financially sustainable.

#### Bus Operator Impact

21.35. Table 21.9 sets out the forecast impacts by service on existing private sector bus operators on the NGT corridors (predominantly the North Route), including the revenue impacts and cost savings which would result from the proposals. The impact of the LCA would be modest operating cost savings (from journey time reductions) and a consequent revenue increase. The overall impact of this option on existing bus operators is modest but positive.
### TABLE 21.9  LOW COST ALTERNATIVE BUS ANNUAL FINANCIAL IMPACT (OUTTURN)

<table>
<thead>
<tr>
<th>Description</th>
<th>£m</th>
</tr>
</thead>
<tbody>
<tr>
<td>Typical Mature (LCA service) Year of Operation (2024/25)</td>
<td></td>
</tr>
<tr>
<td>Total Annual Cost Saving</td>
<td>£0.11</td>
</tr>
<tr>
<td>Bus Operator Revenue Impact</td>
<td>£0.03</td>
</tr>
<tr>
<td><strong>Forecast Annual Financial Impact</strong></td>
<td>£0.14</td>
</tr>
</tbody>
</table>

*Source: Project Team, 2014*

### Conclusions

21.36. The Promoters consider that the NGT Preferred Option is financially sustainable, with cumulative risk-adjusted forecast revenue exceeding the lifecycle costs from the eighth full year of operations. Based on the forecast operating surplus the Promoters are confident that the cumulative forecast revenue surplus will be greater than the cumulative loan repayments.

21.37. The Preferred Option’s forecast abstraction from existing bus operators is considered to be proportionate and justified given the overall beneficial impact of the scheme. The assumed bus network rationalisation can be seen to be a reasonable response, reducing the service frequency on the two services where revenue reduces by a significant amount with the reduction in operating costs representing a reasonable proportional offset to the revenue loss.

21.38. The Next Best Alternative is assessed as having a high probability of not being financially sustainable over the appraisal period. Although the risk-adjusted forecast revenue exceeds the costs of service operations and vehicle lease this option would require alternative local funding to cover infrastructure maintenance and renewals and provide no source of income to meet capital borrowing repayments.

21.39. The NBA's financial impact on existing bus operators is forecast to be similar to the Preferred Option although slightly reduced in scale. The assumed bus network rationalisation is therefore assumed to be a reasonable response. The level of impact on bus operators is considered to be less justified for this option given that there is materially less net economic benefit than the Preferred Option.

21.40. The Low Cost Alternative is assessed as having a high probability of not being financially sustainable over the appraisal period. The risk adjusted forecast revenue does not exceed the costs of service operations at any point; therefore this option would also require alternative local funding to cover infrastructure maintenance and renewals.

21.41. The LCA’s financial impact on existing bus operators is forecast to be modest but positive, with operating cost savings and additional revenue resulting from the run time savings delivered by the proposals.
22. Overview

Purpose

22.1. The purpose of the Commercial Case is to demonstrate the development of a sound procurement strategy for NGT that will ensure that the Scheme Objectives are realised over the life span of the project. Necessarily, the approach to procurement will only be finalised once powers are secured and market testing has been undertaken. This section outlines the current preferred procurement strategy and the on-going processes leading to its future confirmation.

Procurement Principles

22.2. Following the reinstatement of Programme Entry status in July 2012, the NGT Project Promoters remobilised the wider Project Team to drive forward the detailed project development and approvals process.

22.3. Within the Department for Transport (DfT) Letter to Metro re Programme Entry Funding Approval – 19th July 2012 (C–6–15) certain funding conditions are stipulated that need to be met to allow funding to be drawn down and a number of these relate to procurement. Following the project remobilisation a number of procurement workshops were held with Project Board members. (The role and membership of the Project Board is set out in the Management Case.) The procurement objectives outlined in the 2009 Major Scheme Business Case were updated to reflect the Scheme Objectives, the Programme Entry conditions and the most critical risks affecting the NGT Project. The principles of the NGT procurement strategy are:

- Procure the NGT scheme within the defined affordability constraints. The NGT scheme is subject to affordability constraints, reflecting both the DfT funding available and the local contribution. The scheme needs to be affordable in terms of both capital and operating expenditure.

- Ensure that the approach to contracting and delivery 'locks in' the benefits of the scheme and deliver value for money. This Business Case Review sets out the benefits that will be delivered by the scheme. It is essential that the scheme is procured in such a way that secures the delivery of those benefits over the life of the project. A more efficient Leeds public transport network will encourage economic growth by improving labour market connectivity, access to employment and services, and assisting in the regeneration of more deprived areas of the city.

- Minimise retained project risks. NGT is a large scale project with a number of critical risks in delivery; in particular in relation to integration, interfaces...
and associated costs. The successful delivery of principles 1 and 2 requires an appropriate and VfM risk transfer strategy, and a robust approach to the management of retained risks

- Procurement of a scheme that is consistent with the wider transport policy environment, and manages the preservation of the flexibility needed for future changes to, and/or enhancements of, the NGT scheme. NGT is one part of a wider Leeds area transport network. As such it is important for the scheme’s success that it is consistent with the wider transport policy context and preserves the flexibility required for future enhancements or changes.

22.4. Reflecting the revised procurement principles for the NGT Project, the procurement strategy set out in this Commercial Case has been updated. The procurement principles and procurement strategy set out here were approved by the Project Board in December 2013.

Output Specification

22.5. At present, the preference is for a single contract between the Promoters and a delivery vehicle covering all of the works outlined below, although this is subject to market testing and subsequent Project Board approval. As stipulated in the July 2012 DfT Programme Entry letter, it is proposed that the contracting authority will be Metro or a successor body.

22.6. The works, products and services to be under contract(s) for the delivery of NGT are as follows:

- The design and construction of 14.8 km trolleybus route as outlined in the TWAO application, including:
  - Highway improvement works, the creation of some new segregated highway
  - Procurement of 20 trolleybus vehicles
  - Substations and overhead line equipment
  - Park & Ride facilities at Stourton, and Bodington
  - Provision of depot facilities at Stourton
  - Associated landscaping and urban realm works specified by the Transport and Works Act Order
Operational Phase:

- An operational trolleybus service, including vehicle operation. The operation of the service element of the contract is expected to relate to the operation of the rapid transport system and include: revenue collection and revenue protection, infrastructure, building and grounds maintenance and repair including lifecycle replacement of capital items, contract management, pest control, cleaning, security, estates management, landscaping, energy and utilities management, waste management and operation of a helpdesk to coordinate service failure reporting, and interface reporting such as UTC.

- Facilities management services to vehicles, plant, equipment, highways and facilities, to include:
  - Planned, cyclical and reactive maintenance
  - The component replacement at end of life (renewals) of NGT infrastructure, buildings, plant and equipment
  - Security services
  - Cleaning and waste management services (including stops and vehicles)
  - Energy management

22.7. An Output Specification will be used to identify the Promoters’ requirements for NGT infrastructure, vehicles and operations. All contracts will specify that the works must be completed in accordance with the approved Transport and Works Act Order documentation. The successful tenderer(s) will develop detailed proposals to meet these requirements (and all other contractual and legal obligations). The approach will provide scope for tenderers to innovate and will also ensure that risk that the solution fails to meet the Promoters’ requirements is held by the Contractor.

22.8. When drafting the Output Specification, the Project team will refer to a number of precedent documents including relevant technical specifications and how each of these will be measured and monitored.
23. Procurement Strategy

Legislative Framework

23.1. The legislative framework selected for delivering the NGT Project has an impact on all aspects of the procurement of the system and in particular the operational solution within which the services will be delivered.

23.2. Following detailed consideration of potential legislative frameworks, the Promoters concluded that TWAO powers offer the best approach to the implementation of the NGT Project in accordance with the Scheme Objectives.

23.3. While there is no statutory requirement for a trolley vehicle system such as NGT to be authorised by Transport and Works Act Order (TWAO), authorisation by TWAO is highly desirable and can even be viewed as a prerequisite in practice in order to secure through a convenient single mechanism:

- All necessary legal authorisations
- Appropriate operational powers
- Specific changes to the general law which, in various respects, no longer makes adequate provision for trolley vehicles

23.4. A trolley vehicle system such as NGT will require a number of different authorisations, including:

- Planning permission
- Listed building consent
- Interests in land, to be secured by compulsory purchase
- Rights to attach brackets for overhead line equipment, to be secured through special
- Statutory powers
- Consent for street works (by way of statutory authority or street works licence)
- Consent for highway alterations and obstructions, under the Highways Act or otherwise
- Traffic regulation powers, by way of actual or deemed traffic regulation orders
Approval of temporary highway closures, under the Highways Act 1980, Town and Country Planning Act 1990 or otherwise

23.5. All such authorisations can be obtained through the TWAO process. No alternative single process exists for this purpose, it having been agreed with the DfT in 2009 that the one possible exception (the possibility of an order under the West Yorkshire (Parking and Transport) Act 1982) could not be viewed as a viable option. The available options are therefore either a TWAO or a package of multiple applications for different statutory consents and compulsory purchase orders which it would be very difficult to align successfully.

23.6. Operational powers which can be obtained by TWAO and which are likely to be found useful include:

- A general statutory authority to operate NGT, which in turn will ensure that it constitutes a statutory undertaking
- Prohibitions on obstruction
- A penalty fares regime
- Byelaw-making powers

23.7. The specific changes to the law which it will be desirable to secure to facilitate a trolley vehicle system and which can be sought in the TWAO remain subject to review but are likely to include the following:

- Deeming off-street segregated sections of NGT to be roads for the purposes of the Transport Act 1985
- Modification of road traffic and vehicle safety etc. legislation to apply appropriately to trolley vehicles and, if necessary, to 'duobuses' (i.e. trolley vehicles with a secondary on-board propulsion system)
- Provision for substituted services not to require registration
- Adaptation of PSV legislation to trolley vehicles
- Specific policing powers

Market Testing

23.8. Communication with industry and market engagement is an important element of the procurement strategy.

23.9. Effective communication is about ensuring that bidders understand the process at each stage, what is required of them and what evaluation process will be undertaken by the Promoters. Effective communication can influence
bidder behaviour and help ensure that the bids which are received will address all of the Promoters’ requirements to achieve the most economically advantageous tender.

23.10. Soft market testing will be undertaken early in the pre-procurement stage to seek views from the market in respect of:

- Contract structure
- Risk allocation
- Timescales
- Affordability
- Incentivisation

23.11. The Promoters will review the responses to this market testing and use these to check that the proposals outlined in this Business Case Review remain appropriate and if necessary, amend the procurement strategy as required.

**Contract Data**

23.12. During the pre-procurement stage, contract data will be developed to provide bidders with base information on which to develop their priced tenders. This will include warranted site investigations and analysis, warranted ecological and topographical surveys, warranted deflectograph surveys, systems analysis and small elements of illustrative advanced design for high priority or complex sections of the route. These will enable bidders to determine a greater degree of certainty in their pricing.

**Procurement Approach**

23.13. The Public Contracts Regulations (that must be followed by public bodies engaging in procurements of this value) offer two methods of procurement that could be used: Competitive Dialogue (CD) and Restricted Procedure.

23.14. With the Restricted Procedure approach:

- Promoters are allowed to pre-qualify prospective bidders to submit a tender. While the Restricted Procedure does allow limited clarifications to be raised both before and after tender submission, it is a one stage process and there is no mechanism for dialogue with bidders or ‘down-selecting’ to a smaller pool of (a) preferred bidder(s) through multiple stages
- The process has the advantage of being relatively fast which has clear cost advantages
The one-step nature of this process means that both the Promoters and bidders must have a very clear understanding of the project and its requirements from the outset if optimal bids are to be submitted with little opportunity for market collaboration or innovation.

This one-step process would offer little or no scope for the eventual contractor(s) to manage the interface risks between different elements of the project covered if a multi contract strategy route was taken. The Promoters would be required to clearly understand and define for bidders all project and contractual interface issues prior to starting the process.

23.15. Competitive Dialogue offers a more collaborative approach to procurement, incorporating opportunity for dialogue with a selected group of bidders:

While the use of Competitive Dialogue processes is restricted under the Public Contract Regulations to ‘particularly complex contracts’, and would therefore require justification to central government and subsequent approval, the scale and scope of NGT comfortably meets this requirement. (There is an established definition for complex contracts and this includes projects that have multiple elements and/or a requirement for an on-going relationship between the contracting parties.)

As NGT is a complex, multi-faceted project with a significant capital value where integration of the various components is a key factor to its successful delivery, extensive market engagement and consultation processes would be highly advantageous to achieve the Project’s objectives. The interactive and flexible nature of a Competitive Dialogue process allows two-way discussion and collaboration of the best and most appropriate approach to minimising and managing resulting issues, particularly if a Contract Strategy with multiple contracts is adopted.

The Competitive Dialogue process allows for continued competitive tension throughout the process, increasing the opportunities to achieve maximum value for money.

A Competitive Dialogue approach allows prospective bidders to put forward innovative proposals, or suggest new or alternative solutions for key aspects of the project during dialogue reflecting in a more efficient overall tender. This is particularly significant to NGT as this will be the first trolley bus scheme of its kind in the UK.

There are many strong precedents of the Competitive Dialogue process having been used for the procurement of similar projects.
23.16. Overall, at this stage it is judged that the Competitive Dialogue process offers the Promoters the best prospect of both maintaining competitive tension throughout the procurement process (and therefore securing best value for money) and leveraging the expertise of the wider market and specialist providers in the fields relevant to the NGT project. Consequently, Competitive Dialogue has been endorsed by the Project Board as the procurement route of choice for the NGT Project, subject to market testing and approvals.

23.17. Once the TWAO powers are granted (which is assumed to be Spring/Summer 2015), competition for the procurement of the NGT Project will commence by publishing a notice in the Official Journal of the European Union (OJEU), followed by the competitive dialogue process whereby:

- Bidders will be asked to submit a Pre-Qualification Questionnaire (PQQ) with bidders being Invited to Participate in Dialogue (ITPD) through the Invitation to Submit Outline Solutions (ISOS)
- Following the evaluation of the ISOS submissions, bidders will be shortlisted and Invited to Submit Detailed Solutions (ISDS)
- Following the outcome of the evaluation of the ISDS stage, bidders will be shortlisted and a minimum of two Invited to Submit Refined Solutions (ISRS) if further solution development is required
- The Pre-Preferred Bidder Full Business Case if required will be submitted to the DfT during the ISRS phase
- Upon approval of the Pre-Preferred bidder Full Business Case, the Promoters will close the dialogue phase and Final Tenders will be invited
- The Final Tender process will be confirmation as to what has gone before and as such, it should be a short confirmation process only on the part of the Promoters
- Following the evaluation of the Final Tenders a Preferred bidder will be selected
- Final business case will be submitted to DfT and Treasury for approval
- As no negotiations are permitted at Preferred Bidder stage, the critical path is the submission and determination of planning conditions and the expiry of the Judicial Review period. There is also an opportunity for the Preferred Bidder to finalise arrangements (e.g. sub-contracts, financing documents). During this time, the final details of the contract will be confirmed and fine-tuned
This would be followed by Contract Close and a Judicial Review period, following which construction could commence.

**Lean Sourcing Principles**

23.18. One of DfT’s requirements is that Lean Sourcing Principles are applied to the delivery of this procurement to:

- **Establish a clear understanding of the required business outcomes and ensure that the customer’s needs are agreed and clearly stated through structured engagement with business stakeholders.** These are then being used to develop an outcome based specification to test with the marketplace.

- **Carry out extensive pre-procurement market engagement with prospective suppliers and use structured and advertised industry days to test out and refine thinking on the business requirement and target outcomes before the formal procurement process begins.** These will commence six months prior to OJEU to ensure that feedback influences the development of the Output Specification and contract documentation.

- **Establish a strong planning and management discipline which will be used to drive the process and keep the procurement programme on time to manage bidder and Promoter costs.**

- **Ensure proper readiness to go to market by publishing a full bidder's pack (specification, selection and award criteria, terms and conditions and timescales) at the point of going to market alongside the OJEU Contract Notice.** This allows suppliers to make informed decisions as to whether they wish to tender for the requirement. These are currently being developed and will be tested with the market and key stakeholders. The competitive dialogue process requires detailed documents to be issued from the Invitation to Participate in Dialogue.

- **Streamline engagement with suppliers by using a structured approach to make best use of limited time and expensive resource.** This will be instigated with a programme for competitive dialogue meetings already developed in the procurement programme.

- **Use OJEU compliant eSourcing tools to help manage the full process. YorTender the electronic tendering process adopted by Leeds City Council and developed by Due North will be used to support the procurement process and the capacity of this system has been checked and tested to ensure a project of this size can be supported.**
Drive continuous improvement and reductions in procurement turnaround times by monitoring and measuring performance and applying effective project planning and management approaches that highlight progress in a visible way and enable challenge of deviation from the proposal to assure the efficiency of the process. This will include effective cross workstream management to ensure that the final solution integrates construction and operation.

**Procurement Process**

23.19. As detailed above, it is intended that the Promoters will procure the NGT Project through the Competitive Dialogue process.

23.20. The Procurement Process will be tailored following market consultation and the conclusion of the Contract Strategy. The process set out below assumes a single contract procurement. Should the infrastructure be contracted separately from the vehicles and operations, the Competitive Dialogue principles will still apply and the procurements will likely run in tandem, to ensure effective integration.

23.21. To ensure an efficient, effective, fair and compliant process:

- Project evaluation criteria will be developed by evaluation teams and approved by the NGT Project Board prior to procurement commencing. The evaluation criteria will be included in the Descriptive Documents, giving all bidders high visibility on the key criteria the Promoters will use in the selection process. The Promoters will follow an OJEU compliant tender process that offers the highest levels of transparency and audit. Internal and external legal advisers are engaged in the process to ensure the integrity of the procurement process is upheld.

- The Promoters will establish a clear protocol for the competitive dialogue process that:
  - Encourages individual bidders to come forward with ideas and proposals in an environment where they can be confident confidentiality will be maintained
  - Ensures that any information that is not commercially confidential will be shared with all bidders, thereby ensuring no party has an unfair advantage

23.22. To manage and minimise overall bid costs (for bidders and the Promoters) the following will be undertaken:

- Providing information to bidders at an early stage in an appropriate format
Setting a tight but realistic timetable

Undertaking the procurement process in an efficient and effective manner, including:

- Ensuring sufficient capacity and capability in the procurement team
- Developing detailed plans for the dialogue phase so that the Promoters and bidder teams can make arrangements for resources and ensure the dialogue sessions are productive
- Preparing Promoters dialogue papers (or similar supporting materials) on all areas of the dialogue in advance of the dialogue sessions so bidders have enough time for analysis and to develop their responses (may include lists of unacceptable variants or unacceptable modifications to the contract)
- Ensuring approval processes are undertaken at an appropriate stage and within appropriate timescales
- Considering ways to reduce the costs associated with the due diligence

23.23. To facilitate the above, the Promoters will where possible in the course of the procurement process, reduce the number of bidders, prudently and consistently with maintaining competitive tension.

23.24. It is noted that each of the bidders will commit significant investment to bid for the NGT contract(s).

Project Delivery Arrangements

23.25. The Promoters are satisfied that it has been demonstrated that the proposed approach to procuring NGT accords with both the Scheme Objectives and the procurement principles, and:

- That it has sufficient and professionally qualified staff in place to deliver and manage the procurement including the key elements of contract, finance, project and programme management as set out in the Management Case section of this document. The pre-procurement and procurement stages of the project will be delivered by a team with significant complex procurement experience including Competitive Dialogue and with a track record in delivering complex procurements on programme and budget
- That an operable contract with built-in flexibility can be constructed to meet the requirements of the Promoters as well as regulatory requirements
The infrastructure design will be developed with bidders through the competitive design process to ensure flexibility is built into the design, appropriate risk allocation is agreed and value for money is secured.

That the procurement programme is achievable, given client-side capability and the attractiveness of the proposals to the market.

**Sourcing Options**

23.26. The Promoters are keen to demonstrate via the procurement process that the NGT Project will effectively contribute to the growth of the local economies within Leeds and the wider Leeds City Region. A key driver for the NGT Project therefore is to maximise the benefits to the local economy and to contribute to the economic growth agenda.

23.27. Achieving a balanced economy and developing sustainable supply chains are viewed as tangible outputs from the NGT Project and bidders will be required to demonstrate that their supply chains are viable and offer a high degree of continuity. In this way the NGT Project can contribute both to economic growth as well as the achievement of environmental targets.

23.28. The contract documentation (including Output Specification) will be designed to deliver against the Scheme Objectives and procurement principles thereby maximising social, economic and environmental value in the delivery of the NGT Project.

23.29. The Leeds City Council Employment and Skills Toolkit will be used as part of this procurement exercise as a means to secure benefits including apprenticeships and employment opportunities for those Not in Education Employment or Training (NEET).

23.30. The sustainability agenda will also be at the heart of the NGT Project both in terms of providing an environmentally friendly transport solution, and in terms of minimising any negative impacts on the local environment through the delivery of the project.

23.31. It is anticipated that bidders will develop proposals to meet the Output Specification through the successful introduction of technologies which are already in existence. There will however be scope for tenderers to propose innovative approaches to meet or exceed the required outputs, and these will be evaluated on their merits.

23.32. As such, the procurement competition will be designed to encourage innovation, but the contractor will retain the risk in the event that any new technologies or approaches are not immediately successful. There is no necessity for the Promoters to invest in further research and development.
prior to the award of the main NGT contract, and as such Small Business Research Initiative funding will not be sought.

**Pricing Framework and Charging Mechanisms**

23.33. The payment and performance mechanism will set out how the payments during the operating period will be subject to an incentive mechanism whereby deductions and/or incentive payments are made where the Contractor does not meet or exceeds Key Performance Standards as set out in the Promoters’ Output Specification.

23.34. This payment and performance mechanism will be appropriately calibrated to ensure that the Contractor is incentivised to ensure that the service delivers the Promoters’ requirements.

23.35. The Promoters will retain the responsibility for determining both the pricing strategy and the frequencies of services. The Contractor will be responsible for the collection of revenue and revenue enforcement. Consideration will be given to revenue collection, revenue protection and ancillary revenues being part of the payment and performance regime. In particular, consideration will also be given through market testing as to what extent the risk of lower or higher than forecast revenues is shared between the parties.

**Promoters Approach to Contract and Key Contractual Clauses**

23.36. The Promoters will develop a Project Agreement in accordance with the principle of risk being allocated to the party best able to manage the risk and will draw from the principles set out in PF2. PF2 is the latest edition of a standardised contract and associated guidance for dealing with significant public infrastructure projects such as this. The drafting and guidance sets out contract terms that have been agreed between central government, the private sector and the contracting authorities in the wider public sector.

23.37. The operating element of the contracting approach will be let in line with applicable legislation in particular regulation 4(3) and 4(4) of Regulation 1370/2007. This legislation sets out the maximum permitted length of certain public transport operating contracts in the EU. This leads to a likely operating contract length of 10 – 15 years followed by compulsory re-tendering.

**Key Contract Provisions**

23.38. The approach of the Promoters to key contractual issues is summarised below, but is subject to the conclusions of the market testing process and also the conclusion of the Transport and Works Act Order process:

- Service commencement and length of contract: Following a Construction period of around 2 years, the infrastructure maintenance contract period
will last for up to 30 years and the operational contract period will last for 10 - 15 years (as described above) from the final Planned Services Availability Date

- Latest expiry date 2050

- Site surveys: bidders will be issued with warranted contract data including site investigations and lab results for the route which will form the basis of the bid solutions. Risk will be allocated to the preferred bidder in respect of site matters

- Hand-back: drafting will be included in the project agreement requiring hand-back of assets on expiry of the contract to a set standard

- Change in law: the project agreement will include drafting dealing with change in law in line with PF2. Generally change in law risk is shared with the private sector taking the risk on foreseeable events that can be accurately priced and the public sector taking the risk in cases where uncertainty prevents this

- Termination events: the project agreement will include drafting dealing with termination in line with PF2 including a requirement to transfer assets to the Promoters

**Risk Allocation and Transfer**

23.39. The apportionment of risk between the Contractor and the Promoters is essential to delivering against the Scheme Objectives and procurement principles. A Risk Allocation Matrix has been developed and will be periodically updated prior to final confirmation of the procurement and commercial strategy.

**Human Resource issues including Transfer of Undertakings (Protection of Employment) Regulations 2006 (TUPE)**

23.40. From an initial review of the scope of the project, it is not anticipated that TUPE will apply. This will be monitored with bidders through the procurement process and if TUPE does apply will be managed where applicable with the Transfer of Undertakings (Protection of Employment) Regulations 2006.

**Implementation (Contract) Timescales**

23.41. Implementation (contract) timescales are 25 – 30 years in the maintenance period (including 10 – 15 years periods for the operational services contract as described at section 2.37) plus the length of the construction period. This contract length is required because the Promoters are seeking to ensure the
development and maintenance of infrastructure that will meet its requirements over the lifespan of the asset (i.e. up to 2050 or thereabouts) and be handed back in a condition where the assets still have a residual life.

**Contract Management Approach**

23.42. The contract will include performance measurement under a payment and performance mechanism and service level targets (KPIs) set out in the Output Specification. This will require regular review meetings with the Contractor to assess performance which will enable remedial action to be taken where necessary. Escalation procedures will also form part of the contract and will be an integral part of the Contract Management Strategy.

23.43. A dedicated Contract Manager will be appointed. The purpose of the Contract Manager role will be threefold:

- To ensure the appropriate application of the contract terms throughout the construction and mobilisation and service delivery phases
- To act as the Promoters representative under the contract and be responsible for authorising the monthly payments and other payments and deductions to the contractor
- To support the Promoters in achieving value for money from the operation of the contract and in managing change throughout the life of the contract

23.44. The Contract Manager will form part of the Project Team post contract close.

**Best Value**

23.45. The procurement strategy set out in this Commercial Case has been developed in accordance with the four procurement principles to a degree and level of detail appropriate to the current stage of development of the NGT Project.

23.46. At this juncture the Promoters' preference is to have a single contract with a delivery vehicle which will be secured via the Competitive Dialogue procedure. This approach will be subject to further review and development, including in due course market testing with potential bidders.

23.47. A suitably skilled and resourced in-house team supported by advisors has been established to take forward the development of the procurement strategy and ultimately the procurement itself. Engagement with the Department for Transport and the Treasury will take place as and when required to ensure that the necessary approvals are secured in a timely and successful manner.
24. Project Planning

Introduction

24.1. The Promoters have developed a robust approach to the delivery of the NGT Project which is based on a working partnership between LCC and Metro. This joint partnership has been formalised through a Joint Venture Agreement (JVA: Core Document G-4-61) which has been signed and approved by both of the Promoters. Both LCC and Metro have committed significant resources to the NGT Project.

24.2. PRINCE2 processes, principles and themes have been adopted to help structure the approach to the delivery of the NGT Project. Strategies for risk, communication and configuration have been developed as well as robust plans for the various factors which will affect the successful delivery of NGT such as funding requirements, resources, stakeholder interactions, procurement and project controls.

24.3. A comprehensive programme for the delivery of NGT has been developed to ensure that progress on scheme delivery can be proactively monitored. This ensures the necessary remedial actions can be taken in a timely manner. Individual work stream programmes are also used to monitor and track smaller individual work packages.

Project Deliverability Assessment

24.4. The Promoters have taken a number of steps to ensure that the NGT Project is deliverable and achievable. These have included both internal and external reviews of the NGT Project and the proposed delivery mechanisms.

24.5. The NGT Project is subject to the Office of Government Commerce (OGC) Gateway Review process (delivered by Local Partnerships in the English Local Authority sector) which provides assurance that:

- The best available skills and experience are deployed on the project/programme
- All stakeholders fully support the project/programme’s status and the issues involved
- There is assurance that the project/programme can progress successfully to the next stage of development or implementation
- More realistic time and cost targets are achieved for the project/programme
- Advice and guidance to project/programme teams are provided by fellow practitioners
24.6. The OGC review process has provided external confirmation that the NGT Project is considered deliverable and that robust processes are in place to ensure delivery.

24.7. Trolleybus systems are well recognised all over the world. More than 40,000 vehicles are operating in about 370 cities in 47 countries, with over 3,500 new vehicles procured in the last 4 years. The following European cities have recently (re)introduced trolleybus systems:

- Lecce, Italy (2012)
- Bari, Italy (2010)
- Castellón de la Plana, Spain (2008)
- Padua, Italy (2007)

24.8. The Promoters have been informed by experience and good practice from those who have successfully delivered these systems. This knowledge has been supplemented by lessons learnt and expertise in emerging technologies from other rapid transport schemes in the UK including:

- Cambridgeshire Guided Busway: 40 km route with high segregation providing direct access to Cambridge City centre. Future developments will include optical guidance and high capacity vehicles
- Bristol Rapid Transport: Three rapid transport routes forming part of a wider transport programme
- Luton Dunstable Busway: High segregation 13.4 km route between Houghton Regis and London Luton airport

Evidence of Similar Projects

24.9. The Promoters have significant experience in delivering public transport schemes in West Yorkshire. Many of the schemes listed below have included elements that are directly comparable with the NGT Project:

- Bradford Guided Bus scheme: The A641 scheme was developed through a partnership between Bradford Council, Metro and the bus operator at a total cost of £7.3m, with major scheme funding of £6.3m. Inter-peak growth in patronage has been between 11 and 13%
- East Leeds Quality Bus Initiative: Developed through a partnership with Metro, Leeds City Council, First Group and Arriva at a cost of £16m. Surveys have indicated a 7% modal shift away from car to public transport
The A65 Quality Bus Initiative: £21m project to improve the A65 between Kirkstall Lane and Leeds City centre. The scheme includes 4km of new dedicated bus lane, 11 new passenger shelters and real time information as well as improved cycling provision.

Leeds Station Southern Entrance (LSSE): £17.3m project jointly promoted by Metro and Network Rail, comprising a concourse deck over the River Aire within a visually iconic enclosed building.

A61 Scott Hall Road Guided Bus scheme: Jointly funded scheme providing 2km of guideway. Surveys have indicated that patronage has increased by 70% in absolute terms after 5 years with an estimated 500 car trips per week saved.

Leeds Inner Ring Road Phase 7: A major £50m construction project finished in 2008 which completed the city's Inner Ring Road, and provides improved access to and from the M621 motorway.

The East Leeds Link Road: A £32.5m highway link direct from the M1 motorway into Leeds, improving access for residents and businesses in the east of the city.

24.10. The Promoters are also utilising procurement expertise from the LCC Public Private Partnerships Unit (PPPU). Since 2001 the PPPU has assisted the council in securing over £1 billion investment in Leeds and has been involved in the procurement of a number of complex projects including:

- £105m Leeds Street Lighting (2006) with Tay Valley Lighting and funded by Royal Bank of Scotland involving the replacement and maintenance of all lighting in Leeds.

- £264m Leeds Building Schools for the Future (2007) with Environments 4 Learning (Interserve) and funded by Sumitomo Mitsui Banking Corporation involving the rebuilding of 14 schools in Leeds over three phases.

- £103m West Yorkshire Police (2012) with a consortium led by Interserve and Equitix to deliver Two Divisional Headquarters and Custody Facilities, and a specialist operational training facility. Funded by Aviva Public Private Finance Limited.

- £145m Little London Beeston Hill and Holbeck Housing Regeneration (2013). The refurbishment of over 1200 properties and the construction of over 300 dwellings within the Little London, Beeston Hill and Holbeck.
areas of the city. The project also includes environmental improvements to those areas and is being delivered by sustainable communities for Leeds

- **£145m Residual Waste (2012)** with Veolia Environmental Services to deliver a residual municipal waste treatment and energy recovery facility. With a contract value of £460m this facility will save Leeds City Council over £200m over the term of the contract, compared with the cost of landfilling its residual municipal waste

**Project Management Options**

24.11. The Promoters have adopted PRINCE2 as the preferred project management methodology. This is the de facto project management standard for major government funded projects. The key features of PRINCE2 are:

- Focus on business justification
- Defined organisation structure for the project management team
- Product-based planning approach
- Emphasis on dividing the project into manageable and controllable stages
- Flexibility that can be applied at a level appropriate to the project

24.12. The PRINCE2 model combines a number of common sense ideas about managing projects. It provides the NGT Project with a range of processes to ensure the right management activities are done, defines roles to ensure the right people take responsibility for doing the steps, and suggests a range of management documents to hold and report on useful management information. PRINCE2 is made up of four integrated elements:

- **Principles**: Seven core concepts that the rest of PRINCE2 adheres to
- **Processes**: Seven processes that provide a set of activities showing how to manage various parts of the NGT project, which roles should be responsible for each activity and what documents will be used to create, review or update at this time
- **Themes**: Seven themes which describe how PRINCE2 recommends carrying out various aspects of project management
- **The Project Environment**: Sets out how the framework can be tailored to suit the NGT project
Project Programme

24.13. Following re-activation of Programme Entry Approval by the DfT in July 2012 work has been undertaken to determine the most appropriate means of managing the NGT Project programme. In line with the PRINCE2 principle of Managing by Stages, the NGT Project has been split into 5 key stages as shown below in Table 24.1.

<table>
<thead>
<tr>
<th>Stage Number</th>
<th>Stage Description</th>
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<tbody>
<tr>
<td>Stage 1</td>
<td>Project remobilisation to TWAO submission</td>
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<tr>
<td>Stage 2</td>
<td>Post TWAO submission to Public Inquiry</td>
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<td>Stage 3</td>
<td>Advanced Design to Conditional Approval</td>
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<td>Stage 4</td>
<td>Procurement to Full Approval</td>
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<td>Stage 5</td>
<td>Full Approval to Construction</td>
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</table>

Source: Project Team, 2014

24.14. The ‘Manage by Stages’ approach allows a collection of specialist products to be created within each stage. As one stage comes to a conclusion, an end stage report and plan for the proceeding stage are produced. This ensures a planning horizon is always maintained. Managing the NGT Project in this way assists with the planning process as well as quality planning and assurance activities.

24.15. PRINCE2 defines three levels of plans:

- **Project Plan (Level 1):** The top level plan showing the work to be done from project initiation to project completion

- **Stage Plan (Level 2):** Stage plans provide a lower level of detail than the project plan and include enough information to allow tracking and control of the work done on a day to day basis

- **Team Plans (Level 3):** The lowest level of plan containing the necessary level of detail for individual teams to forecast, track and control their work

24.16. The NGT Project utilises Level 1 and Level 2 plans to support the PRINCE2 plans theme. In addition to the (Level 1) Project Plan, a more detailed (Level 2) Stage Plan for each project stage has been created (or will be at the appropriate time for each project stage). In terms of clearly defining the products to be delivered during each stage, each advisor and member of the Project Team has provided a comprehensive summary of the key products which they are responsible for delivering. This summary is detailed in the Strategic Task Overview (STO) document which has been prepared by each advisor.
24.17. A high-level overview of the Project Plan is provided below in Figure 24.1. This provides a breakdown of activities and the duration of these activities from Programme Entry Re-approval in July 2012 to the start of operation in early 2020.

**Milestones**

24.18. The Level 1 Project Plan contains a high level overview of the main delivery tasks and also highlights a number of critical key milestones that will be tracked throughout the lifecycle of the NGT Project. These are summarised in Table 24.2 below.

**TABLE 24.2  KEY MILESTONES FOR THE NGT PROJECT**

<table>
<thead>
<tr>
<th>Milestone*</th>
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<tr>
<td>DfT Programme Entry</td>
<td>July 2012 (complete)</td>
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<td>TWAO application</td>
<td>September 2013 (complete)</td>
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<td>Public Inquiry</td>
<td>May 2014</td>
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<td>Secretary of State decision on TWAO</td>
<td>Spring 2015</td>
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<td>DfT Conditional Approval</td>
<td>Summer 2016</td>
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<td>Selection of preferred tenders</td>
<td>Autumn 2016</td>
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<td>Full approval</td>
<td>Winter 2016</td>
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<td>Contract award</td>
<td>Early 2017</td>
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<td>Start of main construction</td>
<td>Early 2017**</td>
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<td>Start of operations</td>
<td>Early 2020</td>
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* Milestones correct as of January 2014
** Some Pre-construction works are scheduled to commence in 2015

**Assurance and Approvals Plan**

24.19. There are a number of key milestones in the Project Plan where internal and/or external approvals will be required in order for the NGT Project to progress.

24.20. Key internal approvals for the NGT Project are detailed below. These key decision points are subject to ITA/LCC Executive Board approval:

- Submission of Statement of Case
- Submission of Proofs of Evidence
- Submission of Conditional Approval Business Case
- Submission of Full Approval Business Case submission
- Commencement of tender process
- Agreement of tender shortlist
- Contracts Award
### FIGURE 24.1  NGT LEVEL 1 PROGRAMME

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24.21. Key external approvals for the NGT Project are listed below. These key decision points are approved by the Secretary of State following the Public Inquiry. Full and Conditional Approvals are granted by the Department for Transport:

- Confirmation of Transport Works Act Order (TWAO)
- Conditional Approval
- Full Approval

Project Constraints and Dependencies

24.22. Major constraints and dependencies for the NGT Project have been identified in order to ensure that critical issues are addressed at appropriate points within the project lifecycle. These dependencies and constraints range from public and political acceptability of the NGT Project, potential expansion of the system, statutory approvals and processes to design and environmental factors. The current key constraints and dependencies are:

- **Public Inquiry**: Following the expiry of the period for submitting objections or representations regarding the TWAO application, the Secretary of State has decided to hold a Public Inquiry. The timing of this falls under certain statutory rules, but the exact timing and availability of an inspector will impose a constraint on project timescales.

- **Granting of TWAO Powers**: These can impose various constraints on the NGT Project, including TWAO planning conditions and legal agreements with affected parties.

- **DfT funding spend profile**: The promoters are seeking to gain TWAO powers within the timescales set out in the current programme in order to reduce or avoid costs of inflation and delays to opening.

- **General Election**: Dissolution of Parliament and the General Election in May 2015 introduce a risk to the project should this coincide with decisions on TWAO powers or funding. Should key decisions and approvals be delayed there are risks to project costs and timescales.

- **Conditional and Full Approval**: These approvals will impose certain constraints on the NGT Project which will be determined by the DfT.

- **University Sports pitches**: The timing of construction works for the replacement sports pitches at the Bodington Park & Ride site is a project constraint, as elements of this work will need to be undertaken in advance.
of the main construction works

24.23. The key constraints and dependencies listed above have already been identified as project risks, and measures to mitigate these have been developed wherever possible. Further details are set out in the Risk Registers which are updated as part of the risk management process outlined in Section 26.

Tasks on the Critical Path

24.24. The NGT Project programme has identified those activities which are considered to form part of the critical path, these include:

- Public Inquiry
- Securing TWAO powers
- Procurement
- Construction, Commissioning and Testing

Impacts of Delay

24.25. A delay in the start date of the Public Inquiry or a delay in the DfT’s decision on its outcome will have a detrimental impact on the timescales with which the promoters can gain TWAO powers to continue developing the NGT Project.

Contingency Plan

24.26. Project and strategic risks are proactively managed through a structured risk management process (see Section 26). Through this process, mitigation plans for each risk are identified wherever possible to reduce the probability and/or impact of the risk event occurring.

24.27. Should a delay in the NGT Project occur beyond the agreed tolerances (currently 0% for cost and +/- 3 months for time), an exception report and plan would be produced and presented at the Project Board for approval or escalation to the appropriate executive bodies.
25. Project Governance

Introduction

25.1. The JVA between LCC and Metro sets out their commitment to work together from the date of Programme Entry to the date of Full Approval in order to promote, fund and procure the construction, operation and maintenance of the NGT Project.

25.2. Both LCC and Metro have committed significant resources to the scheme and are supported by an extensive team of professional consultants. Together, these organisations make up the NGT Project Team.

25.3. The JVA sets out the responsibilities and general obligations of each of the Promoters and these are summarised in Table 25.1 below.

<table>
<thead>
<tr>
<th>Activity</th>
<th>LCC</th>
<th>Metro</th>
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<tbody>
<tr>
<td>Promotion of the Project</td>
<td>Joint responsibility</td>
<td>Joint responsibility</td>
</tr>
<tr>
<td>Funding</td>
<td>Joint responsibility in relation to any funding shortfall, otherwise to the extent identified in the Project Fund</td>
<td>Joint responsibility in relation to any funding shortfall, otherwise to the extent identified in the Project Fund</td>
</tr>
<tr>
<td>Applicant for the Order</td>
<td>Joint applicant</td>
<td>Joint applicant</td>
</tr>
<tr>
<td>DfT funding recipient</td>
<td>Support responsibility</td>
<td>Applicant and lead responsibility</td>
</tr>
<tr>
<td>Contracting Authority in relation to the Contractors</td>
<td>Support responsibility</td>
<td>Contracting Authority and lead responsibility</td>
</tr>
</tbody>
</table>

25.4. Subject to obtaining the necessary internal approvals, further agreements will be entered into, confirming arrangements for:

- The design, construction, operation and maintenance of the NGT Project from the date of full approval
- The managing and ownership of all Contracted Sites, Executive Sites and Additional Council Land

25.5. The NGT Project will be managed by the Promoters through the Project Board (see paragraph 25.12). Any reference to Metro includes references to any other body to which the statutory powers and functions or Order powers of Metro are transferred. It is intended that these powers and functions will be
transferred to the Combined Authority on 1st April 2014.

**Project Management Principles**

25.6. The adoption of the PRINCE2 project management method provides the opportunity to:

- Enhance Project Controls
- Provide clear channels for obtaining direction and approvals
- Encourage timely and relevant reporting

25.7. The PRINCE2 method may be tailored by the project management team to adapt the method to the context of the NGT Project. This may include:

- Adapting the PRINCE2 Themes (through strategies and controls)
- Incorporating specific terms and language more commonly associated with the NGT Project
- Revising the product descriptions for the management products
- Revising the role descriptions for the PRINCE2 project roles to fit the current team structure and the wider organisation
- Adjusting some of the processes to align with changes made elsewhere

25.8. Details of the specific tailoring activities will be outlined in the individual strategies where appropriate.

25.9. The project management strategy is defined in the Project Initiation Document (PID) (Core Document G-4-58)\(^{101}\). The PID sets out a comprehensive methodology for how the project will be executed, monitored and controlled to meet the objectives of the Promoters.

**Key Roles and Responsibilities**

25.10. The management of the NGT Project is structured on two levels: The NGT Project Board and the Project Team Management Group (PTMG). The NGT Project Board is ultimately responsible for the delivery of the project and the role of the PTMG is to manage the delivery of the project.

25.11. The key roles and responsibilities within the NGT Project are summarised in Figure 25.1 below.

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\(^{101}\) Project Initiation Document, Metro and Leeds City Council, July 2013
NGT Project Board

25.12. The NGT Project Board provides strategic guidance and approvals and decision making authority for the NGT Project. It also ensures that the project is developed and managed appropriately.

25.13. The Project Board provides links to Elected Members and Portfolio Holders within both the ITA and LCC, and comprises of senior officers from Metro and LCC. Table 25.2 provides an overview of the leadership structure of the NGT Project Board.

**TABLE 25.2 NGT PROJECT BOARD: CHAIR AND DEPUTY CHAIR**

<table>
<thead>
<tr>
<th>Name</th>
<th>Role</th>
<th>Responsibility</th>
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<tbody>
<tr>
<td>Martin Farrington*</td>
<td>Executive Director of Transport</td>
<td>Chair of the NGT Project Board</td>
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<td>Senior Responsible Owner/Project Sponsor</td>
<td>Business Case Owner</td>
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<tr>
<td>Gary Bartlett</td>
<td>Chief Officer Highways and Transportation (LCC)</td>
<td>Deputy Chair the NGT Project Board</td>
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<td></td>
<td></td>
<td>Joint Business Case Owner</td>
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</table>

*Interim Chair of Project Board until the Combined Authority roles are finalised

January 2014

* Combined Authority roles to be confirmed.
** Interim Chair of Board position until April/May 2014.
25.14. A full summary of the roles and responsibilities of the other NGT Project Board members and a copy of the Terms of Reference are available in the PID.

**LEP and Combined Authority**

25.15. The five West Yorkshire authorities, working jointly with Metro with the support of the LEP and City of York Council, have prepared a governance review with proposals for delivering greater economic growth and regeneration along with the measures included in the City Deal that was signed with the Government in 2012.

25.16. The governance review concluded that the establishment of a Combined Authority would provide a visible, stable and streamlined body that would reduce the negative impact on growth that comes from a lack of local integration and fragmentation. It also concluded that bringing together key decision making into a single body with appropriate strategic transport and economic functions that can be exercised across West Yorkshire will improve the efficiency and effectiveness of these functions and increase economic outputs.

25.17. It is proposed that the Combined Authority will come into existence on 1st April 2014 and could be known as the West Yorkshire Combined Authority. The West Yorkshire Integrated Transport Authority (ITA) and Metro would be dissolved, and their functions, property, rights and liabilities including those that relate to contracts of employment transferred to the combined authority. This is provided for in the JVA document (Core Document G-4-61)\(^{102}\). More information on the combined authority for West Yorkshire is available from the UK Government site.

25.18. With the new Combined Authority structure, the Metro Director General role will no longer exist. This position will be replaced by a new Executive Director of Transport who will be a strong representative for Transport in the new Combined Authority region. The full details of the roles and responsibilities for this new position are not yet known but it is assumed that the Executive Director of Transport will be the Senior Responsible Officer, ensuring that the NGT Project will meet its objectives and deliver the projected benefits.

**Project Team Management Group**

25.19. The NGT PTMG is responsible to the Project Board and will ensure delivery of the NGT Project within the agreed guidelines. Acting in the capacity of a Steering Group, it consists of officers from Metro and LCC, in addition to senior representatives from the appointed advisors’ teams. The remit of the

\(^{102}\) Joint Venture Agreement, Metro and Leeds City Council, 18th September 2013
PTMG is to ensure sustained progress on the development of the NGT Project, with adherence to identified and agreed target budgets.

25.20. The PTMG meets once a month to discuss progress across all workstreams of the NGT Project. Progress update reports are provided by each advisor team and members of the Project Team to identify issues arising since the last meeting as well as forthcoming actions. The PTMG also provides technical advice to the NGT Project Board as required.

**Project Director**

25.21. Dave Haskins from Metro is the nominated NGT Project Director. Roles and responsibilities for the Project Director include:

- Ensuring the timely delivery of the NGT Project
- Ensuring that the respective Executive Boards are briefed and appropriately equipped to make decisions at the required times
- Managing the resources and interfaces between the various departments within Metro and LCC

**Project Manager**

25.22. Andrew Wheeler from LCC is the nominated Project Manager. Roles and responsibilities for the Project Manager include:

- Planning and monitoring NGT Project activities
- Management of design compliance, cost control and time control
- Maintenance and use of the Project Risk Register to manage risks and report material changes
- Management of change control procedures
- Organising the consultant team and monitoring their performance
- Management of the planning, design, procurement, construction, commissioning and handover processes
- Reporting on agreed reporting lines throughout the NGT Project

**Working Groups**

25.23. As and when necessary, Working Groups have been established for each detailed technical workstream. Predominantly these are ‘task and finish’ groups whilst others meet on a weekly, fortnightly or monthly basis as required.
Implementation of Work Streams

25.24. Work packages consisting of one or more Product Descriptions referred to as Job Initiation Proforma (JIP) are used to authorise the undertaking of a specific piece of work, detailing tasks, deliverables, time, cost (in relation to the current agreed budget) and reporting requirements for those who will be carrying out the work.

Procurement

25.25. LCC PPPU will manage and deliver the procurement of NGT. Contract management arrangements will form part of the overall procurement strategy. More detail will be available as the procurement strategy develops.

Arrangements for Reporting and Decision Making

25.26. The Project Board holds the ultimate responsibility for the successful delivery of the project. The PTMG report to the Board and the Working Groups feed into the PTMG or Project Board as appropriate.

25.27. The current Project Team is shown in Figure 25.2.
FIGURE 25.2 NGT PROJECT TEAM

NGT Project Team Jan 2014

NGT Project Director: Dave Holden
NGT Project Manager: Andrew Wheeler

Procurement Manager: Angela Lawson
LCC Planning Manager: Vanessa Allen
Marketing Manager: David Nappley
Programme Manager: Louise Porter
Projects Lawyer: Jacob Sibthorpe
Design Workstream Manager: Mark Philpot

Consultants/Advisors

PPMU
Metts (PWAs workstreams)
SDG AECOM
BAX

Turner and Townsend FEG
DIA
Metts (Design & Engineering) workstreams

LEEDS CITY COUNCIL employees

WYPTE (Metro) employees
Independent Assurance

25.28. Independent process approval will be obtained through the Office of Government Commerce’s (OGC) Gateway Review process which is the standard used by local transport authorities. The OGC Gateway Review process ensures that:

- The best available skills and experience are deployed on the project
- All stakeholders fully appreciate and understand the project’s status and the issues involved
- There is assurance that the project can progress successfully to the next stage of development or implementation
- An unbiased assessment is carried out by independent teams
- More realistic time and cost targets are achieved for projects
- Knowledge and skills among local government staff are improved through participation in review teams
- Advice and guidance to project teams are provided by fellow practitioners
- The review is carried out in partnership with the project team (each project team member is likely to be interviewed by the review team)

25.29. The OGC process will appraise the NGT Project at critical stages of development, to provide assurance that it can progress successfully to the next stage. It will add value to the NGT Project by ensuring that appropriate skills are utilised and realistic timescales and cost targets are set and achieved.

25.30. Although there are six Gateway Review stages during the life of the NGT Project, this submission considers the requirements of the four reviews prior to contract award as follows:

- Gateway 0 - Strategic assessment
- Gateway 1 - Business justification
- Gateway 2 - Procurement strategy
- Gateway 3 - Investment decision
25.31. Gateway Review 0 was undertaken in July 2007. This initial review resulted in twelve recommendations covering areas such as option development, strategic fit, project governance and resources. These recommendations have since been implemented in order to assist the development of the NGT Project.

25.32. Gateway Review 1 was undertaken in January 2013 following Programme Entry Re-approval. The Gateway Review Team awarded an overall Delivery Confidence Assessment of Amber/Green which signifies that:

25.33. ‘Successful delivery appears probable. However constant attention will be needed to ensure risks do not materialise into major issues threatening delivery’

25.34. The review team outlined a number of recommendations covering areas such as roles and responsibilities, market engagement, finalising the JVA, identifying and selling the scheme benefits and development of the procurement strategy.

25.35. In terms of future Gateway Reviews it is currently envisaged that Gateway Review 2 will be undertaken in advance of Conditional Approval, following the receipt of TWAO powers, Gateway Review 3 will take place following receipt of tenders but in advance of obtaining Full Approval for the NGT Project from the DfT.

Peer Review

25.36. Programme management and risk management on the NGT Project have been subject to peer review by Turner and Townsend staff that are not directly connected to the NGT project but are working on comparable projects (e.g. Nottingham Express Transit and Trams for Edinburgh). The observations made through this process have concluded that the level of detail applied to project management and programme management is robust and over and above that commonly provided for schemes of a similar nature.

Project Resources

25.37. The NGT Project Team is a multi-organisational team located in St George House (LCC). Team members include Metro and LCC staff along with senior consultants and advisors from a range of related disciplines. The NGT Project Team is led by the Project Director and assisted by the Project Manager. The NGT Project Team and PPPU co-located to St George House in November 2013 to ensure efficient delivery as the project moves towards the procurement phase.

25.38. The Project Team is supported by specialist advisors in the following disciplines:
Cost and Risk Management: Faithful and Gould

Design, Engineering and Operations and Technical Advisor role: Mott MacDonald

Procurement: LCC PPPU

Transport Economic Appraisal: Steer Davies Gleave

Transport Modelling: Aecom

Commercial Finance: KPMG

Contract, Commercial and Land Law: DLA Piper

Parliamentary Agents: Bircham Dyson Bell

25.39. The Project Team also utilises additional resources from both Metro and LCC, including staff from Public Relations, Marketing, Legal, IT, Highways and Planning. Additional specialist resources, for tasks such as environmental surveys and land referencing are procured as required. Resources are reviewed at each stage of the project, to identify both the level and nature of any resources required.
26. Risk Management

Introduction

26.1. A detailed Risk and Opportunities Management Plan was developed in the early stages of the development of NGT in 2008. Following Programme Entry Re-Approval in 2012, a new Risk Management Strategy has been developed which supersedes this Risk and Opportunity Management Plan. While the original Opportunity Management Plan was developed broadly in line with PRINCE2 methodology, the project management processes are now more clearly defined in a PRINCE2 compliant format.

26.2. The NGT Project Team is committed to establishing and maintaining a systematic approach to the identification and management of risks. The objectives are to:

- Ensure that risk management is clearly and consistently integrated and evidenced in the culture of the team
- Manage risk in accordance with best practice to PRINCE2/MSP methodology
- Inform policy and operational decisions by identifying risks and their likely impact
- Anticipate and respond to changing social, environmental and legislative requirements

26.3. These objectives will be achieved by:

- Clearly defining the roles, responsibilities and reporting lines within the Project Team for risk management
- Including risk management issues when writing reports and considering decisions
- Continuing to demonstrate the application of risk management principles in the activities of the Project Team
- Maintaining a register of risks linked to the NGT Project Team’s strategic, project and operational objectives
- Maintaining documented procedures of the control of risk and provision of suitable information, training and supervision
- Monitoring arrangements continually and seeking continuous improvement
26.4. Regular risk management reviews will take place throughout the lifecycle of the project. These will take the form of one-to-one meetings with workstream leaders supplemented by more formal risk review meetings. The objectives outlined above in paragraph 26.3 will be continuously monitored and updated through the project lifecycle through regular risk workshops and risk meetings. The NGT Project Controls Manager is responsible for overseeing the risk management process.

**Risk Assessment and Review Process**

26.5. Risk Management for the NGT Project operates on the premise that risks occur across all project phases, therefore risk management must operate continually and consistently at all times. Risk Management is applied on three levels:

- **Strategic Risk Management**: applied during the initial project phase and is concerned with risks which will influence the achievement of project objectives. Risks at this level are high-level and strategic

- **Project Risk Management**: undertaken throughout the project and focuses on project level risks to the point of operation, allowing the Project Team to create and manage risk contingencies

- **Operational Risk Management**: this will focus on the risks associated with the completed project once operational, and is considered as part of the project design process

26.6. Figure 26.1 illustrates the process for identifying, evaluating and managing risks on the NGT Project. Risks are assessed by establishing the likelihood (probability) and impacts (consequence – time and cost). The expected risk value is estimated using a Monte Carlo modelling tool (see paragraphs 26.16 - 26.19).

26.7. Risk owners are assigned to each risk and mitigation/treatment plans are developed for each one, with target completion dates. These are reviewed monthly to ensure that the risks are actively managed. Risk Status Reports are prepared and sent to the monthly NGT Project Board meetings.

26.8. Periodic evaluation of risk values also takes place to control and further reduce the expected value of the total project risk. This ensures a more confident risk estimate for the NGT Project.
FIGURE 26.1 RISK IDENTIFICATION, EVALUATION AND MANAGEMENT

- Are the controls effective?
- Has the risk changed?

- What should be done to reduce the risk?
- Who owns/controls the risk?
- What else do you need to do about it?

- Sources of risk?
- What are the risks?
- Underlying causes and trends?

- How likely is it to happen?
- What is the impact of it happening?

Risk Register

26.9. A Risk Register is a database of all NGT Project risks. It contains details of the risk assessment, mitigation/fallback plans and accountable people. It is a live document and a central control point for risk management activities. The risk registers are continuously updated to provide an accurate account of the current risk profile.

26.10. Two Risk Registers have been developed for the NGT Project:

- **Strategic Risk Register**: Contains high level risks which have significant impacts on the programme

- **Project Risk Register**: Contains project risks which were assessed as part of the Quantified Risk Assessment and valued using Monte Carlo modelling

26.11. Examples of the Strategic and Project Risk Registers are available in the PID (Core Document G-4-58)\(^{103}\).

26.12. Mitigation actions are developed for each risk to ensure that they proceed to an 'as low as reasonably practical' position. These actions are summarised on the Risk Registers and are reviewed monthly during one to one sessions with work stream leaders or during risk workshops.

\(^{103}\) Project Initiation Document, Metro and Leeds City Council, July 2013
Headline Risks

26.13. The NGT Project is subject to statutory timescales set by the DfT and other local and national policy frameworks. These include: public inquiry date, granting of TWAO powers, and Conditional and Full Approvals.

26.14. Any increase in timescales or delays in key decisions is likely to have consequences for procurement activities, contract award and the overall programme. Close liaison and regular reviews of emerging changes to legislation are carried out with the DfT to mitigate these risks as far as is possible.

26.15. The General Election scheduled for May 2015 introduces a strategic risk as current projections (January 2014) indicate that a decision on Conditional Approval would be sought at around this time.

Quantified Risk Assessment (QRA)

26.16. Quantified Risk Assessment (QRA) is a means of quantifying potential risks to the NGT Project and is used to assess their likelihood of occurrence and the subsequent consequences in terms of cost impact.

26.17. QRA enables the NGT Project Team to identify risks with the highest cost impact and take the appropriate mitigation actions. In addition, each assessment provides a probability figure for the project risk exposure distribution. This ensures that the correct risk contingency figure is included in cost forecasts. Periodic QRA sessions allow the contingency figure to be adjusted throughout the project lifecycle ensuring a more accurate cost profile.

26.18. A robust QRA process has been implemented throughout the development of the NGT Project. Prior to the pause in development, three separate QRA workshops were held in 2009 (January, April and from June 2014) to review the Risk Management Framework and Risk Registers. The results from these workshops were used to help inform the design process for NGT, incorporating mitigation measures within the design where appropriate. Two further QRA workshops were held prior to TWAO submission in September 2013. Further QRA sessions will take place prior to Conditional and Full Approvals.

26.19. The QRA process utilised modelling using the Monte Carlo simulation. Monte Carlo simulation enables a quantitative assessment of risk to be made. It is an approach used by professionals worldwide in such widely disparate fields as finance, project management, oil & gas, as well as transportation projects.
On-Going Plans for Risk Management

26.20. The on-going plans for Risk Management vary according to the type of risk as follows:

- **Most Significant Risks**: Reporting must highlight the risks for which management actions have the most to gain. Changes to such risks are tracked from one review to the next, in order to identify significant changes that can be attributed to effective management actions or lack of action.

- **New Risks**: New risks are identified formally and informally and are captured and reported. This is done by submitting the relevant information to the Risk Manager using the Risk Identification form, rather than waiting for a formal risk review.

- **Closed Out Risks**: Will be recorded with details about why the risks are no longer valid.

26.21. The effectiveness of management responses to risk are evaluated at the Risk Workshops. Information on this, and that also captured at risk meetings, are collated and disseminated to the Project Team and Project Board in Risk Workshop Reports.
27. Communications and Stakeholder Management

Introduction

27.1. A Communication Management Strategy has been developed which outlines how the NGT project will ensure that all internal and external stakeholders are informed of relevant project information.

27.2. The initial Communication Strategy and Consultation Action Plan were developed in 2008/9 and formed part of the original Major Scheme Business Case for the scheme. These were updated following the pause in project development into a consolidated document covering communication and consultation.

Communication Strategy

27.3. The purpose of the Communications Strategy is to ensure that accurate and timely messages about the NGT Project are disseminated to a range of identified stakeholder groups. The overall objective of the Consultation Action Plan was to ensure that the NGT consultation process enabled all affected and interested parties to have a two way dialogue about the NGT Project throughout its development.

27.4. The revised document sets out the updated approach in terms of communicating, informing, engaging and managing public and stakeholder involvement at appropriate times, and in accordance with their requirements throughout the life of the NGT project.

Stakeholder Management Plan

27.5. The Promoters of the NGT Project recognise the importance and necessity of public and stakeholder engagement and participation in problem solving or decisions that directly impact upon living, working, playing, using services or doing business within the city.

27.6. A significant amount of public and stakeholder consultation has already taken place to inform the development of the NGT Project to date, and further engagement and consultation will be vital as the project progresses through the design and construction stages.

27.7. The Promoters acknowledge that engaging with stakeholders is more than just consulting. Engaging stakeholders should where appropriate include informing, consulting with, involving, collaborating with and empowering them to understand the issues to enable them to make informed choices.
27.8. In addition to these public consultation activities an on-going programme of stakeholder engagement has also taken place throughout the life of the NGT Project to date including a range of activities including:

- Meetings and briefings with Local Ward Members and attendance at Area Committee and Plans Panel Meetings
- Reporting to and briefing wider LCC Members, LCC Full Council and Executive Board and the WYITA
- Briefings and meetings with Leeds MPs
- Meetings with a range of local landowners, local business owners, residents and residents groups
- Engagement with directly affected parties through the commencement of a Land Referencing exercise
- Engagement with Statutory Consultees
- Meetings with access groups, cycling groups, environmental groups and other local and national interest groups
- Briefings with the Chamber of Commerce, developers and the wider business community
- Briefings to schools and University groups

27.9. A comprehensive account of the various consultation and stakeholder engagement activities that have been undertaken is provided in the Statement of Consultation (Core Document A-01-3) that was submitted as part of the Transport and Works Act Order application in September 2013.

27.10. The roles and responsibilities of the Project Team regarding the Communication Management Strategy are:

- The NGT Project Board is responsible for approving and reviewing periodically the Communication Management Strategy and any updates to it
- The Project Director is responsible for reviewing the Communication Management Strategy
- The Project Manager has overall responsibility for ensuring that the Communication Management Strategy is appropriately updated, implemented and reported on as required
The Project Support Team is responsible for producing the Communication Management Strategy and for the day-to-day update of the document. The Project Support team are also responsible for routinely monitoring progress on the development and implementation of communications and consultation activities.
28. Monitoring and Evaluation

Introduction

28.1. This section sets out the plans for monitoring and evaluating the success of the NGT Project, including consideration of the delivery process and the extent to which the effects of the operational scheme match those forecast.

28.2. Between three and six months before Full Approval, a Monitoring and Evaluation Plan will be prepared in line with the following DfT guidance documents, or equivalents at that time:

- Local Authority Major Schemes Monitoring and Evaluation Framework
- Draft Local Authority Major Schemes Evaluation Best Practice Guidance

28.3. NGT has been selected for ‘Fuller Evaluation’ by DfT on the grounds that: its delivery costs more than £50 million; it has particular risks and sensitivities that may affect scheme delivery or benefits realisation; and because of current key national evidence gaps in terms of the effectiveness of public transport initiatives.

28.4. The Monitoring and Evaluation Plan will:

- Detail evaluation objectives and research questions
- Set out data requirements and sources
- Justify the indicators to be monitored and the approach to collecting and collating data for each indicator
- Define the audience and outputs of the monitoring and evaluation
- Detail the programme for monitoring and evaluation
- Set out the governance structure for monitoring and evaluation

28.5. The Monitoring and Evaluation Plan will be accompanied by a Scheme Context Plan, setting out the exogenous factors and assumptions influencing the forecast impacts, and a Benefits Realisation Plan, setting out the forecast impact against each of the identified indicators.

Scheme Effects

Outputs

28.6. The output specification (described in the Commercial Case: paragraph 22.6) will set out the Promoters’ requirements for NGT infrastructure, vehicles and operations. Prior to operations
commencing, the outputs represent the infrastructure being delivered, for example the length of segregated busway constructed or overhead power supply installed. The delivery of these construction outputs will be monitored and proactively managed during implementation to ensure that they meet programme, quality and cost constraints.

28.7. Following implementation of the NGT Project, the key outputs represent the NGT service offered, particularly in terms of frequency, journey time, punctuality and quality. Service delivery data, which will be routinely collected to ensure that the service level and quality of service are maintained within the tolerances agreed with the Operator, will form the key source of data in this respect. A record of this data will be kept over time and therefore no specific additional data collection is envisaged.

Outcomes

28.8. The outcomes of the NGT Project are the aspects which naturally follow from the outputs, but which are not entirely within the control of the Promoters or Operator. For example, outcomes of operating the NGT service include the number of passengers carried and the revenue received.

28.9. For the purposes of evaluation, further information about passengers is required, for example how the passengers previously travelled. In this example, this is because the overall benefits to passengers being abstracted from private cars are different to the benefits of those being abstracted from other bus services. Complementary and routinely collected data sources will be used to consider other outcomes of the scheme, for example on the highway network (including environmental emissions and accidents) and other social impacts such as connectivity.

Impacts

28.10. The impacts of the NGT Project are those effects influenced not only by the outcomes, but also by other economic factors where the Promoters have little direct control. Examples include the expected positive impacts of the scheme on land/housing values, economic activity and quality of life.

Evaluation Approach

28.11. A high level logic map, a process mandated in DfT guidance, has been drafted (and can be seen in Figure 28.1) linking the Scheme Objectives through the inputs, outputs, and outcomes to the impacts. This will be used as a basis for drafting the plan, which will address the need for process, economic and impact evaluation approaches.
28-3

Leeds NGT – Business Case Review

FIGURE 28.1  LOGIC MAP

OBJECTIVES
1) Maximize growth of the Leeds economy by enhancing its competitive position and facilitating future employment and population growth

2) Support and facilitate the sustainable growth of Leeds, recognizing the importance of its City Centre to the future economy of the Leeds City Region

3) Support and facilitate targeted regeneration initiatives and economic growth in the more deprived areas of Leeds

4) Improve the efficiency of the City’s public transport and road networks

5) Reduce transport’s emissions of CO2 and other greenhouse gases

6) Promote quality of life through a safe and healthy built and natural environment

7) Contribute to enhanced quality of life by improving access for all to jobs and services

INPUTS
Development and Implementation Resources
Value for Money Affordability
Public Acceptability/Political Support
Operating Agreement

OUTPUTS
Public Transport Infrastructure Provision
Public Transport Service Changes
Alterations to Highway Network
Impacts During Construction
More Attractive Urban Realm

IMMEDIATE OUTCOMES
Increased Person Capacity into City Centre (2)
Better Connectivity between Deprived Areas and Economic Activity (3)
Better PT Journeys (4):
• Quicker
• More punctual
• Less crowding

LOWER PUBLIC TRANSPORT CARBON EMISSIONS (5)
Safer and More Secure Public Transport (6)
Better Connectivity between All Areas (7)
Increased Public Transport Operating Costs

UNANTICIPATED OUTCOMES

MATURE OUTCOMES
Option Values
User Benefits (4)
Non User Benefits (4):
• Lower Carbon (5)
• Better Health (6)
• Fewer Accidents (6)

IMPACTS
Land/Housing Values
More Jobs/Increased Productivity (1)
Additional Growth in the City Centre (2)
Higher Employment/Economic Activity in Deprived Areas (3)
Successful Delivery of Wider Policy Initiatives (5)
Enhanced Quality of Life (6/7)
Self Supporting Network with Capability to Expand

Unanticipated Impacts

Commercially Viable Network
Unanticipated Outcomes

Enhanced Public Transport Operating Costs
Unanticipated Outcomes

Operational Network

Costs
Unanticipated Impacts
28.12. The process evaluation will focus on monitoring and evaluating those activities that are associated with how the NGT Project inputs were utilised to create the outputs. It is therefore concerned with the following categories from the Monitoring and Evaluation Framework that focus on collecting data during scheme implementation:

- Scheme Build
- Delivery Process
- Costs
- Delivered Scheme

28.13. For these categories information will be collected that allows analysis of how the NGT Project was constructed along with how effectively this process and the people and resources involved were managed.

28.14. The economic evaluation will collect outturn data for use in re-assessing the appraisal model ex-post to allow a comparison to and analysis of the robustness and suitability of ex-ante appraisal inputs and modelling assumptions. Data for this part of the evaluation will be collected in the following categories from the Monitoring and Evaluation Framework:

- Costs
- Delivered Scheme

28.15. Outturn Appraisal Assumptions

28.16. Although still to be fully considered, it is expected that the impact evaluation for the NGT Project would be a combined outcome and theory-based approach. This will collect data on what has happened, for example via passenger counts, and triangulate it with additional information to understand why this has happened, for example through passenger surveys. Further detail will be developed and provided in the Monitoring and Evaluation Plan.

28.17. The following categories from the Monitoring and Evaluation Framework specify the collection of information concerned with the changes that occur once the NGT Project is in the operational phase, providing the basis for analysing whether the project has produced or been a catalyst for the intended results. Evidence will therefore be collected in the following categories for impact evaluation purposes:

- Travel Demand
- Travel Behaviour
- Travel Times & Reliability
Impacts on the Economy
Impacts on Carbon
Impacts on Noise
Impacts on Local Air Quality
Impacts on Accidents

Data Requirements

28.18. A significant body of data is currently available to the Promoters from the data collection exercises undertaken specifically for the NGT Project, for the development of the Leeds Transport Model (LTM), through their ongoing Local Transport Plan, other monitoring exercises and publicly available data. Examples of the last two data sources have been used in development of the Strategic Case for NGT, respectively including traffic flows and mapping of population density. However, it is recognised that data from the first two sources will be relatively old by the time that operation of the scheme commences.

28.19. In developing the baseline against which the performance of the NGT Project will be evaluated this data will be supplemented by means of a data replenishment exercise, undertaken in advance of the start of construction to ensure that this does not influence the results. The survey programme will be specified with the aim of ensuring that all relevant evaluation indicators are covered with the goal of deriving a statistically significant comparison of before and after data.

28.20. Table 28.1 below provides a first indication of the main categories of data that will be considered for collection for the impact evaluation. These will need to be reviewed considering costs and proportionality, as well as the co-operation afforded by bus operators in the corridors.
## TABLE 28.1 PROPOSED TYPES OF DATA COLLECTION

<table>
<thead>
<tr>
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<th>For inclusion in report 1 year after completion</th>
<th>For inclusion in Final Report (5 years after scheme completion)</th>
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<tbody>
<tr>
<td>NGT corridors bus passenger survey Corridor traffic counts</td>
<td>Prior to construction data (updated where relevant) plus: Patronage data – passenger numbers and revenue NGT service performance data</td>
<td>Prior to construction and 1 year after data (updated where relevant, e.g. to 2021 Census) plus: NGT corridors NGT and bus passenger surveys</td>
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<tr>
<td>Latest (2011) Census data including: population; employment; economic activity; and journey to work</td>
<td>LTP and other monitoring data including: cordon flows; travel costs; parking supply; journey times, reliability and punctuality data</td>
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<tr>
<td>Review numbers and types of planning applications</td>
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Leeds NGT – Business Case Review
New Generation Transport

Business Case Review

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29. Summary Case

The Preferred Option and Alternatives

29.1. The Preferred Option for the NGT Project involves the implementation of a new partially segregated electric trolleybus scheme between Holt Park in the north of Leeds and Stourton in the south. The specifications of NGT have been designed to maximise delivery against the objectives for the scheme. It will be fast, punctual and will increase the overall person capacity on the corridors served. There will be zero emissions at the point of use. The vehicles and stops will offer a high quality experience, maximising its attractiveness to existing public transport users and car users alike. Park & Ride sites at Bodington and Stourton will provide an attractive alternative to car travel into the city centre.

29.2. The Next Best Alternative to the Preferred Option has been specified to be as similar to the Preferred Option as possible, but utilising the best available alternative articulated vehicle that does not require overhead wires. At this time there is no credible alternative articulated vehicle that can run the whole of the route on battery power, so a high quality plug-in articulated hybrid diesel-electric bus capable of running around half of the route in electric mode has been specified for this alternative.

29.3. For comparison, a Low Cost Alternative has been specified based on a hybrid diesel-electric bus operating in the same corridors as the Preferred Option, but without segregation. The Low Cost Alternative includes delivery of Park and Ride and interventions at key junctions.

29.4. The specifications of the Preferred Option, Next Best Alternative and Low Cost Alternative are summarised in Table 5.1.

This Business Case Review

29.5. This Business Case Review has been undertaken to bring together a complete and contemporary appraisal of the Strategic, Economic, Financial, Commercial and Management Cases of the NGT Project (Preferred Option, Next Best Alternative and Low Cost Alternative) reflecting any changes since the last full MSBC submission in 2009.

Strategic Case

29.6. Leeds is the most important centre of population and employment in West Yorkshire and the wider City Region. Its population and employment is projected to grow, increasing the demand for travel. Leeds city centre is forecast to be a focus of this growth. Road congestion is already a problem and without intervention, it will worsen, bus journey times will be extended.
and will become even less punctual. On-train and on-bus crowding will increase. Together these effects will be a barrier to the city meeting its full economic potential.

29.7. Leeds has a number of areas that experience economic and social deprivation and have relatively poor connectivity with the employment opportunities and other services that are located in and around the city centre. The city has areas that have been identified for regeneration where public transport connectivity is currently a barrier to them meeting their full potential. Enhancing public transport connectivity to areas experiencing deprivation and those that are earmarked for regeneration will support their economic growth and development.

29.8. Hydrocarbon-based fuels contribute to poor air quality in Leeds and emit greenhouse gases when used. The future environmental sustainability of Leeds and the need to meet air quality standards will depend on successfully changing the mix of energy generation sources away from hydrocarbon-based fuels and towards more sustainable options. Moving towards a city-wide system of more sustainably powered public transport will contribute to this. Electrically powered public transport will allow Leeds to take full advantage as future electricity generation switches to renewable sources of fuel.

29.9. The Promoters of the NGT system have undertaken a systematic review of all the transport corridors in Leeds and identified the potential public transport interventions on each that will contribute to the step change in provision that is needed. This work identified that the A660 Otley Road and A61/M621 corridors are suitable and appropriate for a rapid transit intervention.

29.10. The Preferred Option outperforms the Next Best Alternative in terms of the fit with local and national policy objectives.

29.11. The Preferred Option, in comparison to the Next Best Alternative, will:

- Deliver more mode shift from private car to public transport because the system is inherently more attractive to users
- Attract more business investment, development and economic growth, because it is both a figurative and visible symbol of permanent investment in the infrastructure of Leeds
- Deliver a better solution for both the local environment because it has no emissions at the point-of-use and also for the long-term strategic future of Leeds as the economy rebalances away from hydrocarbon-based fuels
29.12. The Low Cost Alternative, as may be expected due to the limited scale of intervention, makes only a modest contribution towards meeting local and national policy objectives.

29.13. In 2009 the Promoters set out a strong Strategic Case for NGT. This has been thoroughly reviewed and the case remains strong.

**Economic Case**

29.14. The Economic Case describes the cost estimates and the forecast benefits of implementing the **Preferred Option, Next Best Alternative** and **Low Cost Alternative**. This informs the Value for Money assessment of each option.

29.15. The benefits and costs of the **Preferred Option** and alternatives have been assessed following published Department for Transport (DfT) Transport Analysis Guidance (WebTAG). This includes both positive and negative impacts of each option, some of which can be monetised and then expressed in a cost-benefit analysis and others which are not monetised and are considered alongside the monetised benefits in an Appraisal Summary Table.

29.16. The monetised impacts of the **Preferred Option** deliver a strong economic performance with a Benefit Cost Ratio of 2.96:1 and an NPV of £297m. When non-monetised impacts are taken into account the case remains strong. The Preferred Option represents high value for money as defined in DfT guidance.

29.17. The monetised impacts of the **Next Best Alternative** show that this alternative is significantly lower value for money than the Preferred Option with a Benefit Cost Ratio of 1.03:1 and on balance has a similar scale of non-monetised impacts.

29.18. The **Low Cost Alternative** is less value for money than both the Preferred and Next Best Alternative options and has a Benefit Cost Ratio of 0.00:1 and on balance has less positive and negative non-monetised impacts.

29.19. In 2009 the Promoters set out a strong Economic Case for NGT. This has been thoroughly reviewed and updated. The **Preferred Option** delivers high value for money. Through improvements in the specification and design of NGT the disbenefits in earlier Business Cases have been substantially ameliorated. Further design work should be expected to reduce any remaining disbenefits even further, whilst safeguarding the very significant public transport benefits offered.

**Financial Case**

29.20. The Department for Transport has indicated that it will contribute £173.5m to the total Preferred Option outturn capital cost of £250.5m. The balance will be met by the Promoters using money from their reserves, local transport
funding, prudential borrowing and transfer of land. Post TWAO award the Promoters will continue to explore additional sources of funding, such as private sector funding, with the goal of reducing their borrowing requirement.

29.21. The Next Best Alternative has outturn capital cost of £226.0m. A Department for Transport contribution is not available for this and if the NBA were to delivered the Promoters would either have to submit a new application to the Government for funding (and there is currently no application route available for this) or alternatively meet the entire cost from their own resources, but the total cost of the NBA exceeds what funding can currently be made available locally. At present, there is no plausible funding package to deliver the NBA.

29.22. It is considered that the Low Cost Alternative could be delivered from local resources.

29.23. The revised Business Case demonstrates that a funding package is in place that allows the Preferred Option to be delivered by 2020.

**Commercial Case**

29.24. The Commercial Case for the Preferred Option has been developed with the goal of securing the delivery of the scheme to time and budget, and to secure the realisation of the benefits that the Preferred Option will bring over the lifetime of the project. The TWAO will give the Promoters the powers to let a concession to operate the system. The preferred approach is to enter into a contract with a single supplier (which itself may be a joint venture) which will design, build and then operate and maintain the system. This approach will be subject to market testing post TWAO award.

29.25. As the Next Best Alternative could not be implemented via the TWAO process, the Promoters could only secure the benefits from the option through making a Quality Contract Scheme or entering into a Voluntary Partnership Agreement. Either of these procedures create a significant delivery risk.

29.26. Bus services for the Low Cost Alternative would be provided commercially on the Otley Road corridor and would be contracted for the Stourton park and ride service. Delivery risks are low.

29.27. The revised Business Case demonstrates that there is a proven commercial route for the Preferred Option that will secure the scheme’s benefits and allow timely and on-cost delivery.

**Management Case**

29.28. The proposals for management and governance of the **Preferred Option** are well developed and there is a clear and appropriately detailed implementation programme.
29.29. Overall the proposed trolleybus network is a robust project at an advanced level of development. A Transport and Works Act Order (TWAO) application was submitted in September 2013 and a Public Inquiry is expected to follow in Spring 2014. The NGT Project will move from a planning phase to procurement and further design, with the system expected to open for public use in early 2020.

29.30. The management proposals for the alternatives would be broadly the same as the Preferred Option.

29.31. In 2009 the Promoters set out a strong Management Case for NGT. The project team, risk management process and benefits realisation strategy have been commensurately strengthened with the progression of the Preferred Option towards procurement and implementation, improving further the overall Management Case.

Conclusions

29.32. The strong Business Cases set out in 2009, and then in 2012, led to the Promoters securing funding commitments for the NGT Project. Through further refinement of the specification, improvements in the design, and iteration of the commercial and management processes appropriate to the stage in the project’s development, the overall Business Case for NGT in 2014 is stronger. The NGT Project is well placed to move towards procurement and then implementation, once TWAO powers are secured.
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<td>National Public Transport Data Repository: <a href="http://data.gov.uk/dataset/nptdr">http://data.gov.uk/dataset/nptdr</a></td>
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<td>Letter to Metro re: Programme Entry Funding Approval</td>
<td>Department for Transport</td>
<td>19th July 2012</td>
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<td>Joint Venture Agreement</td>
<td>Metro and Leeds City Council</td>
<td>18th Sept 2013</td>
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<td>Project Initiation Document</td>
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