Lincolnshire COUNTY COUNCIL
- IN PARTNERSHIP -
JACOBS

Lincolnshire County Council
Lincoln Eastern Bypass

Major Scheme Business Case
Programme Entry

November 2009

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……Jacobs Project Director

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1 INTRODUCTION AND SCHEME LOCATION

1.1.1 Through the submission of this business case Lincolnshire County Council (LCC) is applying for major scheme funding (Programme Entry status) for the scheme known as the **Lincoln Eastern Bypass** (LEB). The scheme is located entirely in the East Midlands within the Eastern Sub-area of the region lying to the east of Lincoln city centre. The regional context is illustrated in **Figure 1.1**.

Figure 1.1 – Regional Context

1.1.2 The City of Lincoln is the County Town of Lincolnshire and so its continued economic success is important not just in a local context, but also for the County and the wider East Midlands within which it is identified as one of the region's five Principal Urban Areas.

1.1.3 Over three million people visit the city every year, particularly drawn by the historic cathedral and castle, as well as the new state-of-the-art City and County Museum known as 'The Collection'. The recent expansion of the University and Lincoln's status as a New Growth Point has seen Lincoln's national profile rise significantly in recent years.

1.1.4 Looking forward, the East Midlands Regional Spatial Strategy (RSS), adopted in March 2009, identifies the need to "significantly strengthen the role of Lincoln as one of the regions five Principal Urban Areas". In support of this, the Plan identifies the requirement for the provision of some 25,170 dwellings in the Lincoln Policy Area (LPA) between 2006 and 2026, with a significant proportion of these being delivered in the early years through the Growth Point initiative.

1.1.5 Whilst the above demonstrates that Lincoln can be considered to be a city 'on the up' a lack of recent investment in major transport infrastructure has been identified as a key constraint to its continued success.

1.1.6 As a result of no alternative routes being available, Lincoln's city centre currently suffers from high levels of congestion from local traffic movements which impacts on the quality of life for local residents, acts as a constraint on the economy and reduces the attractiveness of the city for visitors and investors.

1.1.7 It's strategic location within the County highway network, as illustrated in **Figure 1.2**, results in this situation being exacerbated. The city centre creates a bottle neck for Heavy Goods Vehicles travelling north / south to and from the Humber ports and for east / west traffic travelling from the East Midlands and South Yorkshire to the East Coast.

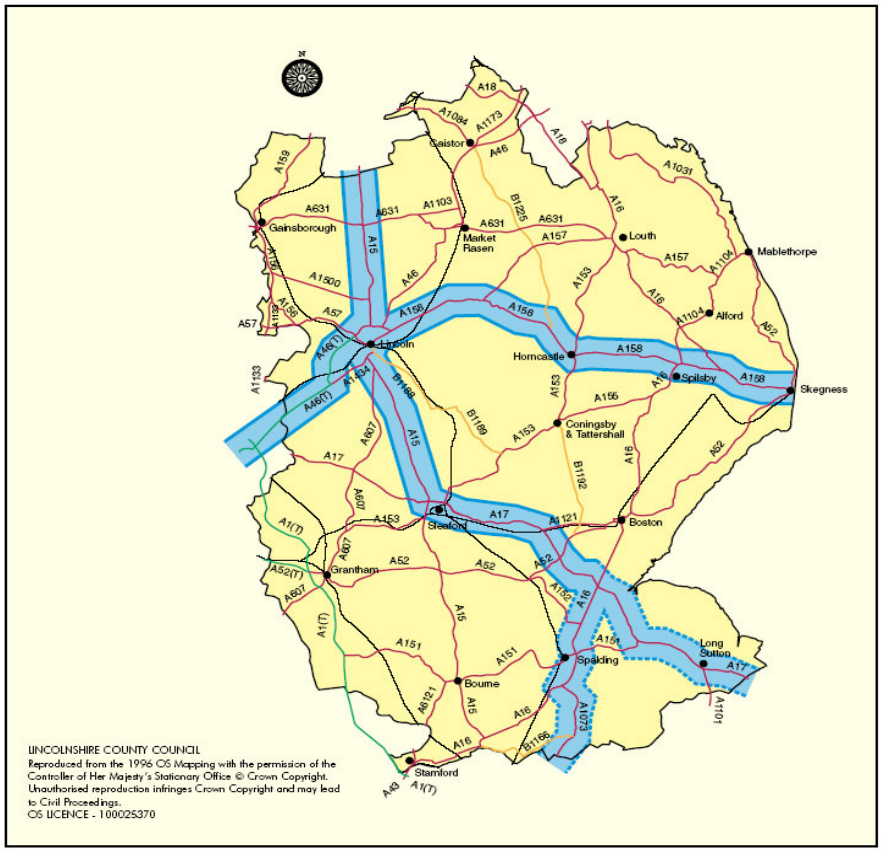

Figure 1.2 – Lincolnshire's Strategic Highway Network

1.1.8 As will be demonstrated within the remainder of this business case, the LEB has been identified as a necessary infrastructure improvement to alleviate the above problems and support the delivery of national, regional and local policy agendas identified for Lincoln up to 2026.

1.1.9 As identified above the Scheme Promoters for the LEB are LCC. However, the County is working in partnership with a number of stakeholders who are committed to the successful delivery of the scheme. In October 2003 a Memorandum of Understanding was signed between the leaders of Lincolnshire County Council, North Kesteven District Council, City of Lincoln Council, West Lindsey District Council and Lincolnshire Enterprise to work together to promote the delivery of the LEB. A copy of this document is included within **Appendix A**.

1.1.10 The LEB, as illustrated in **Figure 1.3**, provides a highway link between the A15 to the south east of the city and the A158 Northern Relief Road to the north east of the city.

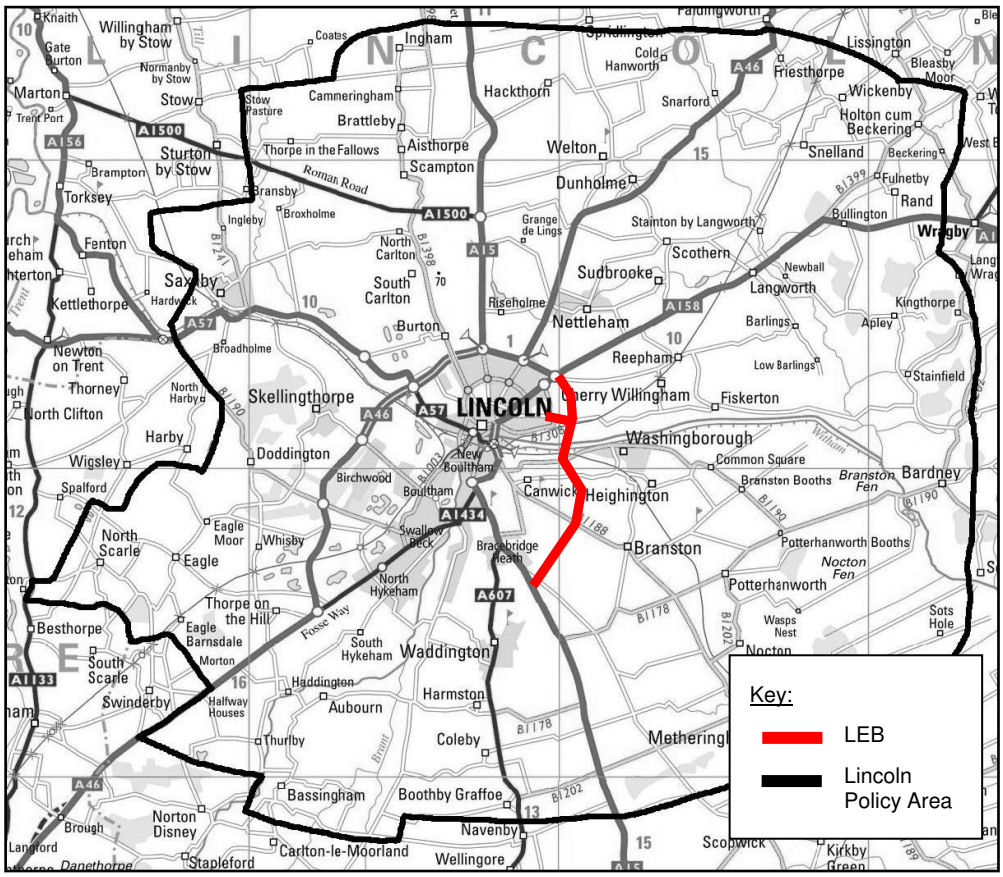

Figure 1.3 – Scheme Location

1.2 BUSINESS CASE STRUCTURE

1.2.1 Following confirmation of the second round of Regional Funding Allocations (RFA), and discussions with the Department for Transport (DfT), this Major Scheme Business Case (MSBC) has been produced by LCC and Jacobs (LCC's design and engineering consultants) for submission to the DfT in order to secure Programme Entry approval for the scheme.

1.2.2 Subject to receiving Programme Entry status the LEB will continue to be progressed in order to secure Conditional and Full approval from the DfT with an anticipated start date for construction of September 2013.

1.2.3 In line with recommended best practice this business case has been informed by early dialogue / engagement with the DfT. These discussions have been used to inform the following key elements of the business case:

- Assessment of Alternatives
- Selection of the Preferred and Next Best / Lower Cost Options
- Traffic Modelling Methodology and Traffic Forecasting Scenarios
- Assessment of the Wider Economic Benefits
- Structure of the Business Case

1.2.4 This business case has therefore been produced to accord with MSBC Guidance contained within the DfT document entitled 'Guidance for Local Authorities seeking Government funding for major transport schemes'. As such the remainder of the document is structured as follows:

- **Chapter 2:** Scheme Description and Scheme History
- **Chapter 3:** The Strategic Case – Assessment of Alternative Options
- **Chapter 4:** The Strategic Case – Problems and Objectives
- **Chapter 5:** The Strategic Case – Policy Fit
- **Chapter 6:** The Value for Money Case – Traffic Modelling Methodology
- **Chapter 7:** The Value for Money Case – Cost Benefit Analysis
- **Chapter 8:** The Value for Money Case – NATA Appraisal
- **Chapter 9:** The Value for Money Case – Supporting Analysis
- **Chapter 10:** The Value for Money Case – Conclusions
- **Chapter 11:** The Delivery Case
- **Chapter 12:** The Commercial Case
- **Chapter 13:** The Financial Case

1.2.5 A Glossary of terms frequently referenced throughout this submission is included within **Appendix B**.

1.3 CONTACTS

1.3.1 General enquiries regarding the content of this document should be directed to:

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2 SCHEME DESCRIPTION AND SCHEME HISTORY

2.1 INTRODUCTION

2.1.1 This chapter of the document initially provides an overview of the scheme history before providing a detailed description of the Preferred Option for the LEB promoted within this business case. This description includes the proposed highway and junction standards, how the scheme fits with the surrounding infrastructure and local environment. This chapter also provides details of the Next Best / Lower Cost Alternative Option.

2.1.2 As part of The Strategic Case for the LEB, **Chapter 3** provides an audit trail detailing how the assessment of a broad range of alternatives was undertaken and informed the selection of the Preferred Option and Next Best / Lower Cost Alternative.

2.1.3 The remainder of this chapter is structured as follows:

- Scheme History
- Scheme Description (Preferred Option)
- North East Quadrant Infrastructure
- Scheme Components
  - New Highway
  - Carriageway Standards
  - Junction Standards
  - Non Motorised User Facilities
  - Demand Management
  - Environmental Mitigation Works
- Scheme Description (Next Best / Lower Cost Alternative)

2.2 SCHEME HISTORY

2.2.1 The key issue surrounding the development of the LEB is the constraints imposed by the existing highway network which in turn leads to a number of negative impacts within the LPA for all users (non-motorised and motorised) as detailed within **Chapter 4** of this document. These negative effects also impact upon those who are not necessarily 'moving around' such as local residents who are affected by poor air quality resulting from congestion within the city.

2.2.2 The LEB is seen as major component in relieving these impacts and providing the opportunity to deliver public transport improvements within the city in addition to releasing significant opportunity for economic growth in the area. The relationship of the LEB with other modal improvements is discussed in **Chapter 3**. Outlined below is a summary of the history behind the selection of the Preferred Option for the scheme.

2.2.3 As with the majority of major highway schemes, the development of the LEB has a long history. In recent years, between 1990 and 2004 a significant amount of feasibility work was undertaken by LCC concluding in planning permission being granted in April 2005 for the now 'extant route'.

2.2.4 At this time the LEB was programmed for delivery within the Local Transport Plan (LTP) for 2 period (2006 - 2011), however, following the RFA review of

transport infrastructure investment priorities in the East Midlands it was agreed that the LEB should be included within the list of schemes to be delivered within LTP period 3 (2011 - 2016).

2.2.5 In April 2007 Jacobs was commissioned by LCC to re-examine the route of LEB between the A15 Wragby Road and the A15 Sleaford Road in light of the potential for longer term strategic urban expansion of Lincoln in line with Lincoln's new Growth Point status (as identified within the RSS for the East Midlands) and to ensure that the process for determining the chosen route for the LEB meets current DfT guidelines for the development of a major highway scheme.

2.2.6 The route of the LEB has historically been identified as the initial eastern boundary of future development in the Lincoln urban area. The 'extant route' somewhat restricted this boundary, and as such it has been necessary to investigate alternative routes for the LEB.

2.2.7 In accordance with the Design Manual for Roads and Bridges (DMRB), a Stage 1 Scheme Assessment Report was produced in December 2007, and investigated the route of the LEB in terms of a number of broad corridors. Five corridors were identified as part of this work, and a comparative assessment was undertaken in order to identify the preferred corridors. Each of the corridors considered are illustrated in **Figure 2.1** at the end of the document.

2.2.8 The Stage 1 Assessment highlighted that; overall, two of the corridors ('Blue' and 'Brown A') were preferred. These corridors provided the most robust economic case, were considered to be the most feasible / deliverable and had the lowest scheme costs. All corridors performed consistently in terms of the Stage 1 Environmental Assessment of impacts and benefits. The Stage 1 Scheme Assessment Report is available on request.

2.2.9 Following the Stage 1 Assessment, a Stage 2 DMRB Assessment was then undertaken to investigate potential route options (X, Y and Z) within the preferred corridors identified. Each of the route options under investigation was consistent with the extant route between the A158 Wragby Road and B1190 Washingborough Road (northern section), but varied in alignment from Washingborough Road southwards. Routes X, Y and Z are illustrated in **Figure 2.2** at the end of the document.

2.2.10 The Stage 2 Assessment report concluded that the three route options under investigation were robust schemes and should be progressed to the public consultation stage of the scheme development process. Each route option offered High Value for Money prior to DfT adjustment and provided other significant benefits when appraised against the Government's 5 key National Transport Objectives.

2.2.11 The Public Consultation results showed that Route Z had the greatest support, with Route X receiving marginally less support. The issues of greatest importance to the public were identified as:

- Reduced traffic congestion in Lincoln city centre
- Improved / more reliable journey times
- Reduced traffic accidents and improved road safety

2.2.12 When considered against regional housing targets, Lincoln's new Growth Point status and LCC's aspirations for future growth as one of the Eastern Sub-areas Principal Urban Areas, the requirement for additional housing

allocations needed to be considered as part of the scheme development process. In this instance Route Z, which is the furthest option to the east, was viewed as the preferred route option. This was endorsed by the County Council's partners and the Environment Agency prior to a Preferred Route Announcement being made in November 2008.

2.3 SCHEME DESCRIPTION (PREFERRED OPTION)

2.3.1 The scheme design has been produced in accordance with the DMRB guidance and is shown in detail in **Figure 2.3** at the end of this document.

2.3.2 The proposed LEB would provide a 7.85km dual carriageway, linking the existing northern relief road at the junction of the A15 and A158 Wragby Road in the north to the A15 Sleaford Road in the south. Improvements would also be made to the existing Greetwell Road between the proposed Greetwell Road roundabout and its junction with Outer Circle Road.

2.3.3 A separate 3.0m wide combined cycle and pedestrian right of way would be provided along the full length of the scheme which would link up with existing public rights of way. There would be additional provisions for equestrians in the form of a widened verge. A number of further non-motorised user facilities are proposed and detailed below.

2.3.4 The road has been designed to allow for a 70mph speed limit.

2.3.5 A new four arm roundabout is to be constructed to replace the existing roundabout at the A158 Wragby Road / A15 junction. From here the scheme would be at existing ground level adjacent to the roundabout before falling into a cutting below the existing level of Hawthorn Road. Hawthorn Road would be raised on embankments to cross the bypass on an overbridge. No junction would be formed at this location.

2.3.6 The LEB would then pass southward; mainly in cutting and adjacent to the edge of Greetwell Quarry before being carried on embankment over the eastern corner of the limestone quarry cavity and on towards its junction with Greetwell Road. Within this section the minor road, Greetwell Fields, is to be stopped up with alternative provision made for access.

2.3.7 At Greetwell Road, a four arm roundabout is proposed. A pedestrian / cycle bridge would be provided over the bypass, to the north of the roundabout.

2.3.8 Between the bypass and Outer Circle Road junction, Greetwell Road would be realigned to remove the dip and bend that the existing road follows.

2.3.9 From the junction with Greetwell Road the proposed bypass would continue south passing over an embankment and a new structure over the Lincoln to Market Rasen Railway. The LEB then turns south-westerly and falls gently into the Witham Valley on an embankment towards the River Witham and the adjacent watercourses.

2.3.10 A five span viaduct is proposed to carry the LEB over the River Witham and the adjacent watercourses. A pedestrian / cycle bridge is proposed to link the pedestrian and cycle facility adjacent to the LEB to the SUSTRANS cycle route which runs along side the river.

2.3.11 The LEB would then pass under the Lincoln to Spalding Railway, and immediately to the south, would connect to the B1190 Washingborough Road via a new four arm roundabout. From here the bypass would travel in a south-easterly direction while climbing in a deep cutting and passing under Heighington Road. Heighington Road would be carried over the bypass along

its existing alignment on a new bridge. No junction would be provided with the LEB at this location. The LEB turns to travel south west to form a new four arm roundabout at its junction with the B1188 Lincoln Road.

2.3.12 A pedestrian / cycle underpass is proposed to cross the bypass just north of the roundabout junction with the B1188 Lincoln Road.

2.3.13 The route would then continue south-westwards towards the A15 Sleaford Road. A new four arm roundabout would be formed at the junction with the A15 Sleaford Road, south of Bracebridge Heath. Bloxholm Lane to the east of the bypass would be diverted to join Sleaford Road at the roundabout. A bridleway bridge would cross over the bypass to link both sections of Bloxholm Lane. A left in-left out junction was considered at this location, however, it was discounted on safety grounds.

2.3.14 The proposed scheme will be new highway from A158 Wragby Road to the A15 Sleaford Road approximately 7.85km long. The road will be a dual 2 All Purpose carriageway 7.3 meters wide with 1 metre paved hard strips on either side and 2.5 metre grass verges. There will be two lay-bys provided over the length of the scheme.

2.3.15 The improved Greetwell Road will be a dual 2 All Purpose carriageway 7.3 meters wide with 1 metre paved hard strips on either side before narrowing to a single carriageway highway 7.3 metres wide as it approaches the urban fringe of Lincoln. A ghost island junction will be formed along Greetwell Road at a new access to Allenby Industrial Estate.

2.4 SCHEME COMPONENTS

2.4.1 The scheme consists of a number of elements designed to ensure that it makes a positive contribution to the problems and issues currently experienced in the area. The individual elements of the scheme are identified below and described in detail within the following sections.

- Carriageway Standards
- Junction Standards
- Non-Motorised User Facilities
- Demand Management
- Environmental Mitigation Works

2.5 CARRIAGEWAY STANDARDS

2.5.1 The methodology used to determine appropriate carriageway standards for the LEB has been undertaken in accordance with DMRB 5.1.3 TA 46/97 Traffic Flow Ranges for Use in the Assessment of New Rural Roads. This guidance note gives a recommendation of the opening year Annual Average Daily Traffic (AADT) flow ranges which each carriageway standard is likely to economically justify. These flow ranges are reproduced in **Table 2.1**.

Carriageway Standard	Opening Year AADT	
	Minimum	Maximum
S2	<13,000	
WS2	6,000	21,000
D2AP	11,000	39,000
D3AP	23,000	54,000
D2M	<41,000	
D3M	25,000	67,000
D4M	52,000	90,000

Table 2.1 – Recommended Opening Year Economic Flow Ranges (Source: Table 2.1 of TA 46/97)

2.5.2 The above flow ranges have been calculated by undertaking extensive estimates of the economic benefits of providing different carriageway standards on new rural roads. As detailed, flows can fall within the ranges of two or more standards.

2.5.3 It must be noted that the recommended carriageway standards are for use as starting points in the design and economic assessments, and the ranges do not provide any indication of the ultimate flow which a road can carry. They should be used to decide which carriageway standards are most likely to be economically and operationally acceptable in normal circumstances for any given traffic flow.

2.5.4 The forecast opening year (2016) AADT flows, for the LEB have been compared to the flows in **Table 2.1** in order to assign the most appropriate carriageway standard(s) to each section.

2.5.5 **Table 2.2** details the forecast opening year (2016) AADT flows for each section of the LEB, from north to south, and the recommended carriageway standard(s) for each section of the route.

Carriageway Section	LEB (TEMPRO Scenario)	
	AADT (2016)	Appropriate Standard
A158 Wragby Road to Greetwell Road	12,400	S2 / WS2 / D2AP
Greetwell Road to B1190 Washingborough Road	17,400	WS2 / D2AP
B1190 Washingborough Road to B1188 Lincoln Road	13,400	WS2 / D2AP
B1188 Lincoln Road to A15 Sleaford Road	11,400	S2 / WS2 / D2AP

Table 2.2 – Estimated opening year AADT / carriageway standards (TEMPRO)

2.5.6 As the LEB is to be an all purpose route, motorway-type routes have been discounted from this comparison.

2.5.7 **Table 2.2** demonstrates that for all sections of the LEB between A158 Wragby Road and A15 Sleaford Road, D2AP links would be appropriate.

2.5.8 In summary, providing D2AP route for all sections of the LEB would provide a common carriageway standard, whilst at the same time complying with the guidelines issued in TA 46/97.

2.6 JUNCTION STANDARDS

2.6.1 The purpose of assessing the junction standards is to ensure that the most appropriate junction types are provided with regard to the volume of flows that are predicted to travel both on the LEB and its side roads.

2.6.2 The methodology used to determine junction standards for the LEB has been undertaken in accordance with various documents contained within DMRB 6 including:

- 6.1.1 TD 9/93 *Amendment No. 1 Highway Link Design*
- 6.2.1 TD 40/94 *Layout of Compact Grade Separated Junctions*
- 6.2.7 TA 23/81 *Junctions and Accesses: Determination of size of roundabouts and major / minor junctions*

2.6.3 These documents contain a range of advice for arriving at the most appropriate standard of junctions.

2.6.4 TD 9/93 identifies a number of road types, together with the most appropriate strategy for dealing with both major and minor road junctions.

2.6.5 For the purposes of this assessment the LEB has been classified as Category 6 – D2AP (as justified above). In terms of minor junctions DMRB states that Category 6 roads generally have "*No minor junctions at-grade. No gaps in the central reserve*", and for major road junctions the guidance specifies "*At-grade roundabouts at the lower end of the flow range. Otherwise full grade separation*".

2.6.6 This guidance further specifies that "*Minor roads shall be stopped-up, provided with left in / left out connections, or grade separated without connection*".

2.6.7 The major road junctions along the LEB have been identified, through a comparison of predicted traffic flows and future development pressures, as follows:

- A158 Wragby Road Junction
- Greetwell Road Junction
- B1190 Washingborough Road Junction
- B1188 Lincoln Road Junction
- A15 Sleaford Road Junction

2.6.8 Opening year traffic flows for the LEB on these sections of route show them to fall between the upper and lower bounds for D2AP, and therefore, these junctions should be designed as at-grade roundabouts in line with the DMRB guidance.

2.6.9 A further three minor roads presently cross the alignment of the LEB. These are:

- Hawthorn Road
- Heighington Road

- Bloxholm Lane

2.6.10 The DMRB guidance indicates three possible options, namely stopping-up, provision of left-in / left-out connections or grade separation without connection.

2.6.11 Hawthorn Road and Heighington Road both provide access to Lincoln from local villages. Stopping-up the roads or providing left-in left-out access to the LEB would necessitate diverting local traffic. It is therefore considered that providing 'grade separation without connection' to the bypass at these locations is the preferred and most suitable option.

2.6.12 The Bloxholm Lane junction is located approximately 200m from the LEB terminal roundabout with A15 Sleaford Road. Bloxholm Lane runs from the A15 southeast towards the B1188 and Sleaford, and an alternative route between Bloxholm Lane and the A15 is provided by the B1178, joining the A15 close to RAF Waddington.

2.6.13 It is again considered to be impractical to completely close the road, especially on the eastern side which provides access to local properties. Therefore Bloxholm Lane, to the east of the bypass, will be realigned such that it ties into the A15 Sleaford Road roundabout.

2.6.14 On the western side of the proposed LEB, Bloxholm Lane provides limited access, and for this reason it is considered appropriate to stop-up the road at the junction with the LEB, whilst retaining the route as a local service road from the A15. This will negate the need for at-grade minor road junctions along the LEB.

2.6.15 **Table 2.3** provides a summary of the proposed junction standards along the length of the LEB. For more detail reference should be made to **Figure 2.3** at the end of this document.

Junction	Proposal
A158 Wragby Road	At-grade roundabout
Hawthorn Road	Overbridge (no access to / from LEB)
Greetwell Road	At-grade roundabout
B1190 Washingborough Road	At-grade roundabout
Heighington Road	Overbridge (no access to / from LEB)
B1168 Lincoln Road	At-grade roundabout
A15 Sleaford Road	At-grade roundabout

Table 2.3 – LEB Proposed Junction Standards

2.6.16 It is acknowledged that in order to secure statutory procedures and move through the DfT Major Scheme funding process, further development of the scheme design will be required. However, the current level of scheme design is considered to be appropriately detailed to inform the Programme Entry submission and planning application

2.6.17 All proposed link and junction improvements have been tested using the Lincoln VISUM Model and are shown to provide additional capacity to cope with predicted 2031 Design Year traffic flows. A more detailed description of the Lincoln VISUM Model is provided within **Chapter 6**, with a full

commentary provided within the Local Model Validation Report included within **Appendix F**.

2.7 NON-MOTORISED USER FACILITIES

2.7.1 Non-motorised users will benefit from proposed facilities to encourage walking and cycling. These include a segregated 3.0m wide cycleway / pedestrian route alongside the entire length of the LEB which links to existing public rights of way and the SUSTRANS national cycle network and four cycle and pedestrian accessible bridges / underpass as detailed below:

- A pedestrian / cycle bridge is proposed to link the pedestrian and cycle facility adjacent to the LEB to the SUSTRANS cycle route which runs along side the River Witham
- A pedestrian / cycle bridge is proposed over the bypass, to the north of the four arm roundabout at Greetwell Road
- A pedestrian / cycle underpass is proposed to cross the bypass just north of the roundabout junction with the B1188 Lincoln Road
- A pedestrian / cycle bridge is proposed over the bypass to provide a link to the severed Bloxholm Lane

2.7.2 There will be additional provisions for equestrians in the form of widened verges along the route of the LEB. Non-motorised user benefits are captured within the Value for Money assessment of the scheme in **Chapter 8**.

2.8 DEMAND MANAGEMENT

2.8.1 Through demand management measures the County Council is committed to 'locking in' the benefits of the LEB associated with the removal of through traffic from Lincoln city centre and using the additional road space to promote more sustainable modes such as Quality Bus Corridors, Park & Ride and improved non-motorised user facilities.

2.8.2 This is discussed in more detail within **Chapter 3** of this document which outlines the role of the LEB within the context of the wider Lincoln Transport Strategy.

2.9 ENVIRONMENTAL MITIGATION WORKS

2.9.1 A number of streets within Lincoln city centre currently experience a high level of traffic generated pollution. An Air Quality Management Area (AQMA) was established over a number of these streets by the City of Lincoln Council (CLC). Construction of the proposed LEB is included as a measure to improve air quality within CLC's Air Quality Action Plan (2006). Previous studies on the proposed LEB predict that air quality improvements as a result of the proposed LEB are sufficient for the current AQMA to achieve air quality objectives. The re-routing of HGV's from the city centre will have the most significant impact with respect to local air quality.

2.9.2 The LEB would also reduce noise pollution within Lincoln city centre. In particular, properties in close proximity to the A15 through Lincoln would experience beneficial noise impacts as a result of the LEB. To mitigate any additional noise generated along the route of the LEB, a low noise road surface such as Stone Mastic Asphalt (SMA) will form part of the scheme design. Similarly, noise barriers of earth bunds may also be used to reduce noise for properties along the route of the LEB.

2.9.3 The scheme will take into account any potential heritage issues by creating design solutions to avoid or minimise any impact. To date pre-application discussions with English Heritage have secured agreement of an appropriate appraisal and mitigation strategy and a letter confirming this is included within **Appendix L**.

2.9.4 The visual impacts on landscape and townscape have also been considered. Trees will be planted on the route where it can be seen from adjacent housing, as well as reinstating the hedgerow pattern through the area. Where cuts are made into the landform for the route, trees and shrubs will be planted on the adjacent slopes.

2.9.5 Contractors will operate in accordance with Environment Agency Pollution Prevention Guidelines (PPGs) in order to ensure any environmental impacts are correctly mitigated. Discussions have confirmed that the Environmental Agency agree in principle with the drainage proposals for the scheme and the Flood Risk Assessment submitted in support of the planning application.

2.10 SCHEME DESCRIPTION (NEXT BEST / LOWER COST ALTERNATIVE)

2.10.1 In accordance with Major Scheme guidance, a Next Best / Lower Cost Alternative has also been considered and appraised as part of the development of the business case. The full appraisal of the Next Best / Lower Cost Alternative is included within the Value for Money Case within **Chapters 7** and **8** of this business case. A brief scheme description is provided within the remaining sections of this chapter.

2.10.2 Other modal improvements in the LPA are not viewed as feasible alternatives to the LEB but dependent on its short-term introduction (see **Chapter 3**). The Next Best / Lower Cost Alternative, as detailed within this section, has therefore been developed and appraised as a truncated version of the LEB. This can be seen to deliver many benefits within the LPA however, as discussed later within this submission; the existing problems and issues experienced within the city would not be fully mitigated without the introduction of the 'full' LEB (Preferred Option).

2.10.3 In addition, future growth aspirations, as detailed within Local, Regional and National Policy documents, cannot be fully realised without the introduction of the 'full' LEB (Preferred Option).

2.10.4 The Next Best / Lower Cost Alternative will connect the existing northern relief road at the A158 Wragby Road roundabout to the B1188 Lincoln Road as illustrated in **Figure 2.4** below and in more detail in **Figure 2.5** at the end of this document.

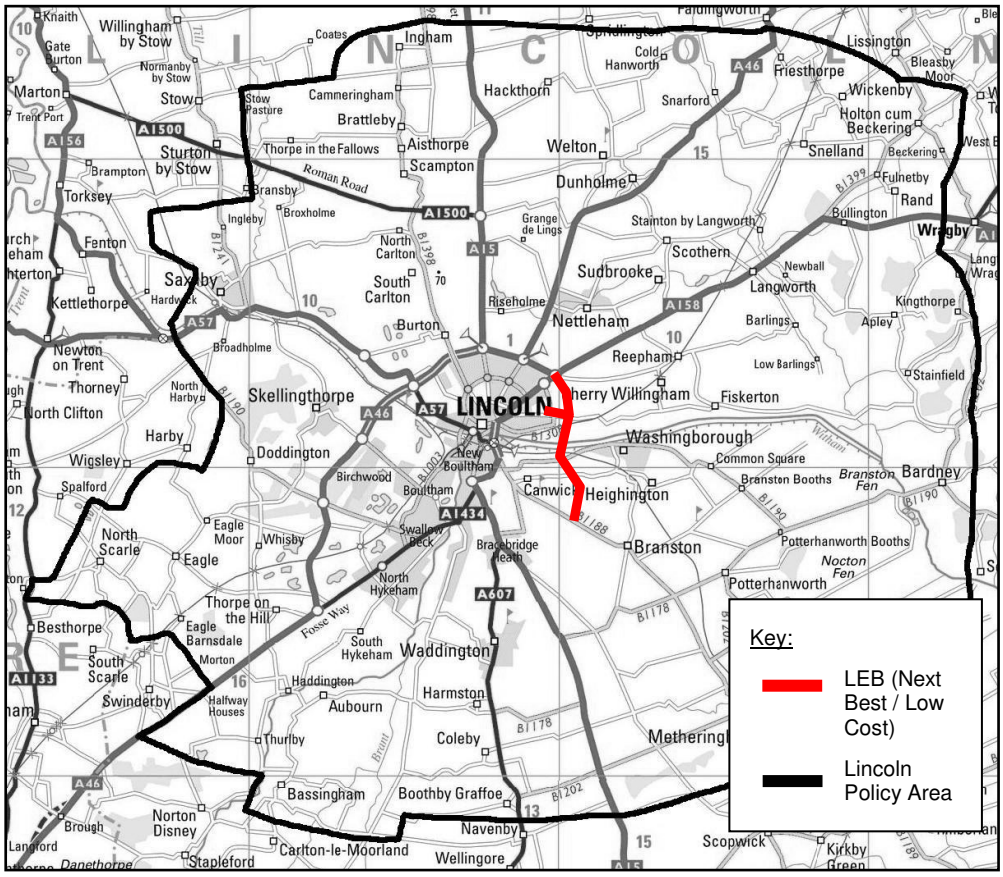

Figure 2.4 – LEB (Next Best / Lower Cost Alternative)

2.10.5 All elements of the Next Best / Lower Cost Alternative between the A158 Wragby Road and Lincoln Road will be the same as described for the Preferred Option. As such all scheme components have been designed in accordance with DMRB standards.

2.10.6 The Next Best / Lower Cost Alternative is 5.18km in length with a base cost of £95.442m (excluding risk and Optimism Bias) in comparison to the Preferred Option which is 7.85km in length with a base cost of £108.463m (excluding risk and Optimism Bias).

2.10.7 It should however be noted that although the Next Best / Lower Cost Alternative is considered by LCC and stakeholders to be the only acceptable alternative to relieving some of the existing problems and issues currently experienced within the city, a key link (B1188 Lincoln Road to the A15 Sleaford Road) which provides significant benefits is omitted from this alternative proposal. As a result the scheme will only meet the objectives required if it is built to the specification indicated for the Preferred Option.

3 ASSESSMENT OF ALTERNATIVE OPTIONS

3.1 INTRODUCTION

3.1.1 A key requirement of the DfT's guidance on the development and evaluation of major schemes is the need to consider a wide range of alternative solutions in the context of their ability to solve identified problems and issues and achieve defined objectives.

3.1.2 In recognition of the importance of the above, LCC and its partners (the District Councils of North Kesteven (NKDC), West Lindsey (WLDC) and the City of Lincoln (CLC)) commissioned the **Lincoln Transport Strategy (LTS)** in 2004. The strategy was introduced in 2006. It was designed to be a 'live strategy' and was revisited and updated in 2007 to reflect significant changes in National and Regional policy such as the adoption of the RSS for the East Midlands (inclusive of revised housing allocations) and Lincoln's status as a Growth Point area. The updated strategy was subsequently adopted by LCC and partners and re-published in 2008.

3.1.3 The LTS is a multi-modal transport study which sets out a framework for the prioritisation of transportation improvements in and around the LPA for the LTP periods up to 2026. It was undertaken using a 'problem and policy' driven approach and appraised using a WebTAG framework and included the consideration of a broad range of modal solutions.

3.1.4 The LEB is prominent in this transport strategy as being a key element in the delivery of the Regional aspirations for the economic development of the LPA and the Eastern Sub Area as defined in the RSS. The links between the LTS and the development of the LEB provides a strong evidence base for the consideration of 'a wide range of alternatives' designed to address identified issues and meet defined objectives. The LTS has therefore been used as a key piece of evidence in support of this submission, the consideration of alternative options and the 'need' for the scheme.

3.1.5 This chapter of the document provides an overview of the development of the LTS. It concludes by demonstrating that despite considering a wide range of possible alternatives that the LEB is the most appropriate solution and is in fact a necessary catalyst for many other schemes to be realised.

3.1.6 The remaining sections of this chapter are structured as follows:

- **The Lincoln Transport Strategy Overview** – introduces the LTS and outlines the key stages involved in the development of the LTS
- **LTS Phase 1 (2004)** – summarises the development of the strategy objectives and details the process adopted to identify and understand the existing / future problems and issues
- **LTS Phase 2 (2004)** – focuses on the identification and development of a wide range of improvement schemes covering all modal choices and details the process by which they were appraised
- **LTS Phase 3 (2005)** – includes the development and appraisal of the 'Vision' leading to the adoption of the LTS
- **LTS Update (2007)** – provides an overview of the LTS update process and justification
- **Further Option Testing** – details the process adopted to test and compare alternative options

3.2 THE LINCOLN TRANSPORT STRATEGY OVERVIEW

3.2.1 As stated above, the LTS was undertaken using a 'problem and policy' driven WebTAG appraisal framework and included the consideration of a broad range of modal solutions.

3.2.2 The study area for the LTS was based upon the LPA as defined within the Lincolnshire Structure Plan (2004). The extent of the LPA was determined through analysis of journey to work patterns and although Lincoln's influence extends beyond this boundary, the focus of the study was on addressing the transport issues within this area.

3.2.3 The key stages in the development of the LTS are illustrated in **Figure 3.1** and summarised within the subsequent sections of this chapter.

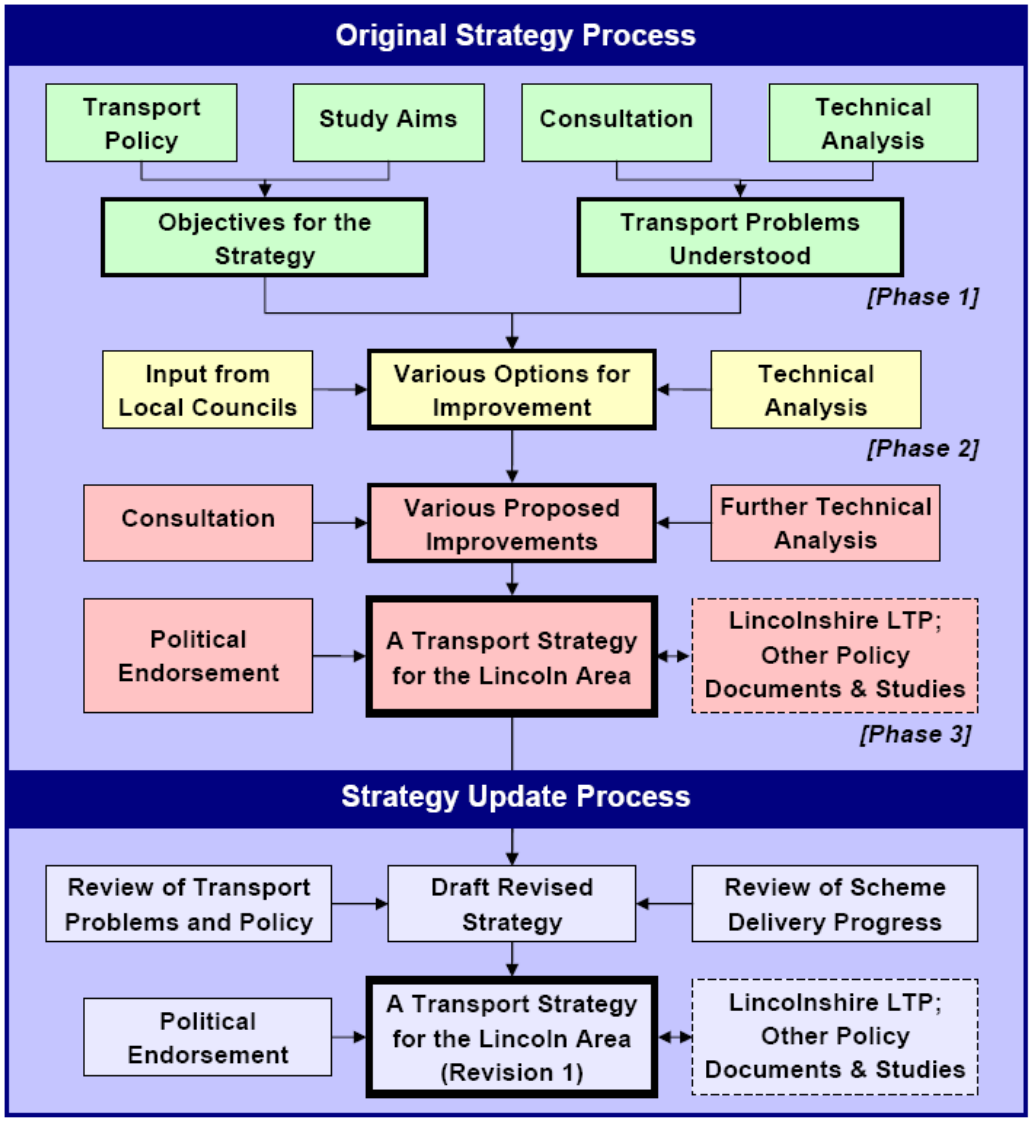

Figure 3.1 – LTS Development (Key Stages)

3.3 LTS PHASE 1

3.3.1 Phase 1 of the LTS was completed in August 2004. It comprised the key stages illustrated within **Figure 3.1** which are summarised within the following sections. A more detailed record of Phase 1 of the LTS can be found within

the report entitled, **Lincoln Transport Strategy, Problems and Issues Report (August 2004)** included within **Appendix C** of this submission.

Strategy Objectives

3.3.2 The LTS objectives were developed and endorsed by the LTS study partners in 2004 following a review of pertinent land-use and transportation policy documents relevant to the LPA.

3.3.3 In total there were five stages employed to determine these objectives. The process is summarised in **Figure 3.2**. In August 2007, a further review was undertaken of pertinent policy documents updated or adopted since the original review. Further details of this process are provided within section 3.6 of this chapter. This review concluded that although each of the LTS objectives remained valid, an additional objective should be included to reflect the longer term strategic urban expansion of Lincoln (as identified within the RSS) and Lincoln's new Growth Point status.

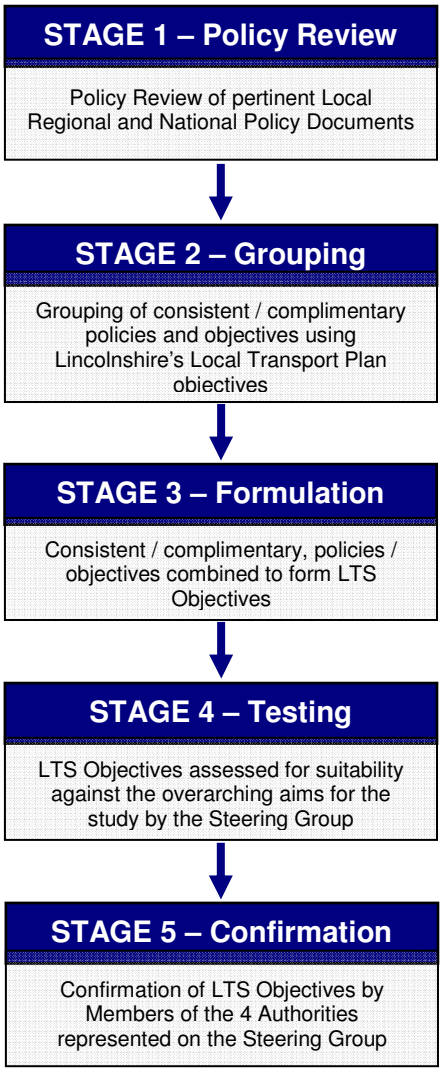

Figure 3.2 – LTS Objectives Methodology

3.3.4 Nine strategy objectives were identified as part of the initial review in 2004 and a further strategy objective was defined in 2007 as part of the review. The LTS strategy objectives (**SO**) are listed below:

SO1) To assist the sustainable economic growth of Lincolnshire through infrastructure improvements to the following:

- The Strategic Road Network
- Non-Strategic Road Network

SO2) To remove strategic road-based freight from Lincoln and other adversely affected communities through:

- Encouraging the use of alternative modes
- Improving links to the Primary / Trans-European Road Network

SO3) To ensure that the transport infrastructure meets the needs of existing and proposed developments especially:

- In the regeneration priorities in the Lincoln Policy Area
- Including minimising congestion through the promotion of walking, cycling and public transport
- Managing parking

SO4) To reduce the number and severity of road traffic accidents by reducing the potential for conflict between different modes and improving the facilities for convenient and safe alternatives

SO5) To maximise accessibility and reduce peripherality by improving the range of travel options especially for those without access to the private car

SO6) To increase Public Transport usage by improving:

- Reliability, frequency and journey time of bus services

SO7) To improve overall air and noise quality within the study area, especially in the Air Quality Management Area in Lincoln by the removal of unnecessary traffic by:

- Removing through traffic
- Reducing local journeys in Community Travel Zones
- Other traffic management measures

SO8) Protect and enhance the built environment by reducing the adverse impacts from traffic, through improvements to the transport infrastructure

SO9) Improve the attractiveness and liveability of central Lincoln for residents, workers and visitors by creating a safe, attractive and accessible environment for pedestrians

SO10) To support the effective implementation and delivery of both the emerging Sub-Regional Strategy and the new Growth Point agenda of the Lincoln Policy Area

Problems and Issues

3.3.5 Existing and future problems / issues facing the transport network within the LPA were identified through a combination of technical analysis (including the interrogation of the historic Lincoln Saturn Model, traffic data and census information), on site observations and extensive discussions with relevant specialists from LCC, CLC, NKDC and WLDC.

3.3.6 To supplement the above, a public consultation exercise was also undertaken as part of Phase 1 of the LTS. The results of this exercise enabled the study team to gain a detailed understanding of the general publics' and stakeholders' views on the problems and issues facing the existing and future provision of transport within the LPA.

3.3.7 The public consultation exercise involved the distribution of a questionnaire to 10,000 randomly selected households in the study area. The questionnaire gathered opinions on the problems faced when travelling in the LPA and what improvements should be made. The questionnaire was also available on the LCC website.

3.3.8 Stakeholders were also consulted at a problems and issues workshop held in Lincoln in May 2004. Stakeholders were invited to attend and debate the transport problems and issues facing the study area both now and in the future. Stakeholders included representatives from regional and local government, the emergency services, the Highways Agency, statutory environmental consultees, transport providers, non-motorised user groups and environmental groups.

3.3.9 The results of both the consultation exercises confirmed and strengthened the findings of the technical work undertaken. The majority of the problems and issues identified focus on central Lincoln, particularly with regard to high level of traffic and predominantly through traffic.

3.3.10 Existing and future problems and issues were identified and summarised under the following headings:

- Buses
- Cycling
- Environmental Constraints
- Equestrians
- Highways and Traffic Issues
- Land Use and Regeneration
- Parking
- Pedestrians
- Rail Network
- Safety

3.3.11 Through reviewing the issues facing all modes of transport, the environment and land use / development aspirations, it was possible to develop a robust understanding of the key problems facing the LPA. A summary of the findings is provided below.

- Lack of suitable route choice for transport to the south & east of the study area

- Waterways form a natural constraint with few crossing points
- Railways create a constraint, particularly the two level crossings in the city centre
- Buildings and developments create a built constraint to infrastructure improvements throughout the city
- The historic 'uphill' area of the city centre has many historic buildings and narrow streets
- High volumes of HGVs and through traffic in the city centre because of lack of alternative routes
- Congestion in the city centre and on radial routes leads to unreliable journey times and delays
- Over-dependence on the private car across Lincoln
- High accident occurrence in several areas over recent years due to unsuitable traffic levels
- Susceptibility of cyclists and pedestrians to accidents in the city centre
- Parking mainly centred in lower part of the city centre
- Railway capacity underused, especially by commuters
- Limited local railway stations in Lincoln
- Poor quality trains
- No direct trains to London
- Congestion leads to reduced levels of bus service
- Low frequency of bus services on Sunday and in the evenings
- Poor quality bus station
- Low proportion of low-floor buses
- Lack of cross-city services
- Low and declining bus patronage
- Lack of provision of cycling paths
- Security concerns associated with cycle routes
- Inadequate and unsafe cycle parking
- Hills make cycling in some areas difficult
- Busy roads with narrow footways make pedestrian routes unattractive
- Pedestrian severance between residential areas and the city centre
- High noise levels on some strategic routes
- Poor air quality in the city centre

3.3.12 In summary, investigations revealed that the aspirations for economic growth and improvements to the quality of life within the LPA are currently constrained by a number of factors and that under a Do-Minimum Scenario this will continue to be the case in the future. It was therefore concluded that in order for these aspirations to be met, there was a requirement to improve

the environment and more importantly the provision of transport infrastructure and modal choice.

3.3.13 The majority of the problems and issues identified were focused on central Lincoln, particularly those associated with the high levels of traffic and the impact of through traffic.

3.3.14 By the conclusion of Phase 1, the LTS Objectives had been politically endorsed and a full understanding of the problems and issues had been developed through technical investigations and public and stakeholder consultation.

3.4 LTS PHASE 2

Option Identification, Evaluation and Classification

3.4.1 Phase 2 of the LTS started with the identification of a series of initial options. These initial options were generated by the study team through a combination of the following:

- Technical analysis and observations
- Consideration of historic proposals
- Extensive discussions with relevant specialists from LCC, CLC, NKDC and WLDC
- Consultation and liaison with key stakeholders (Stakeholder Problems and Issues Seminar undertaken as part of Phase 1)
- An analysis of the responses to the Phase 1 public consultation exercise

3.4.2 Additionally, in accordance with best practice advice, the key criteria utilised to generate the initial options was to ensure that they contributed to solving the identified problems and issues and support the delivery of the strategy objectives as defined as part of Phase 1 of the LTS. This resulted in the identification of 18 initial options as detailed alphabetically within **Table 3.1**. At this stage these options were conceptual in nature and not fully worked up.

Options	
City (urban area) Parking Strategy	Lincoln Eastern Bypass
Commuter Rail Network	Lincoln Southern Bypass
Dual A15 to A158	Local Highway Improvements (cumulative)
Dual A46 existing Western Bypass	Pedestrianisation
Fully integrated Park & Ride	Public Transport Interchange
Improved bus services (frequency)	Quality Bus Corridors within LPA
Improved bus services (priorities)	Redevelop Bus Station
Improved Cycle Network	Relocate Bus Station
Level Crossing Improvements	Traffic Management Measures (within the Uphill area of the City)

Table 3.1 – LTS Initial Options

3.4.3 It was agreed by the Steering Group that a workshop was the most appropriate means of confirming which of the initial options should be taken forward for further development and appraisal.

3.4.4 The Steering Group was comprised of officer representatives from LCC, CLC, NKDC and WLDC and represented the vehicle through which the LTS was progressed. Monthly Steering Group meetings were held to provide direction to ensure the successful execution of the study. Members of the Steering Group were seen as representatives of the direct stakeholders and thus key players in the delivery of the LTS.

3.4.5 The Steering Group Options Workshop was held in June 2004. The aim of this workshop was to utilise the knowledge and experience of members of the Steering Group to undertake an initial strategic evaluation of all possible options for inclusion in the LTS. It was also used as a means of identifying any additional options which should be included within the process. It was agreed that this process would allow the study team to concentrate more detailed efforts on the options which have the greatest potential to meet the aims and objectives of the study and were deliverable.

3.4.6 The initial options identified in **Table 3.1** were appraised in the workshop against the Option Evaluation Sheet shown in **Table 3.2**.

Option No:	**Option Description:**					
Is the option feasible in engineering and planning terms?					**YES**	**NO**
Would option be effective as a stand-alone option?					**YES**	**NO**
If No, what other option(s) would be required to make this option effective?						
Contribution to Meeting Objectives						
		-2	**-1**	**0**	**+1**	**+2**
SO1	To assist the sustainable economic growth of Lincolnshire through Infrastructure Improvements					
SO2	To remove strategic road-based freight from Lincoln and other adversely affected communities					
SO3	To ensure that the transport infrastructure meets the needs of existing and proposed developments					
SO4	To reduce the number and severity of road traffic accidents by reducing the potential for conflict between different modes and improving the facilities for convenient and safe alternatives					
SO5	To maximise accessibility and reduce peripherality by improving the range of travel options especially for those without access to the private car					
SO6	To increase Public Transport usage					
SO7	To improve overall air and noise quality within the study area, especially in the Air Quality Management Area in Lincoln by the removal of unnecessary traffic					
SO8	Protect and enhance the built environment by reducing the adverse impacts from traffic, through improvements to the transport infrastructure					
SO9	Improve the attractiveness and liveability of central Lincoln for residents, workers and visitors by creating a safe, attractive and accessible environment for pedestrians					
Contribution to Solving Problems						
Score			**-2**	**-1**	**+1**	**+2**
Supporting Analysis						
Cost	**H**	**M**	**L**	**Equity**		
Public Acceptability	**H**	**M**	**L**	**Winners (W) and Losers (L)**		
Timescale	**S**	**M**	**L**			
Financially Sustainable	**YES**	**NO**				
Parties to be Involved?						
Compatible/Complementary Options				***Consider in more detail?*** YES/NO **Priority?**		

Table 3.2 – Steering Group Workshop Option Evaluation Sheet

3.4.7 As can be seen from reference to **Table 3.2**, options were evaluated against their contribution to meeting the strategy objectives, solving identified problems and issues as well as being assessed against criteria such as feasibility, cost, public acceptability, timescale and financial sustainability. Options were also classified under the one of the following:

- Stand Alone Options: options deemed feasible, deliverable and effective as a stand alone piece of transport infrastructure
- Dependent Options: options which require additional pieces of transport infrastructure to make them effective
- Discounted Option: options not deemed feasible, deliverable or effective under any circumstances in engineering and planning terms

3.4.8 This part of the process resulted in the majority of the options being classified as either stand alone or dependent.

3.4.9 Five additional options were added following further discussions at the workshop:

- An East / West Link, which is a highway scheme facilitating east / west movements across central Lincoln
- A Western Gateway Link, which is a highway scheme aimed at opening up development to the west of Lincoln
- School Travel Plans
- Business Travel Plans
- Rail / Highway Grade Separation

3.4.10 The first two options were included on the basis that they would provide a valuable contribution within the overall strategy to solving the identified problems and issues and contributing to the strategy objectives identified in Phase 1 of the study.

3.4.11 The School Travel Plans and Business Travel plans were added in order to champion the progression of Green Travel Plans and sustainable travel.

3.4.12 It was also determined that although anticipated costs and previous studies have indicated that it is not deliverable, an option to introduce rail / highway grade separation at the two level crossings within the city centre should also be investigated.

3.4.13 When combined with the initial options; a total of 23 potential options had now been put forward. The confirmed options list is detailed alphabetically within **Table 3.3**.

Option Name	
Business Travel Plans	Lincoln Eastern Bypass
City Centre Parking Strategy	Lincoln Southern Bypass
Commuter Rail Network	Local Highway Improvements
Dual Northern Relief Road	Public Transport Interchange
Dual Western Relief Road	Quality Bus Corridors
East-West Link	Rail/Highway Grade Separation
Fully Integrated Park & Ride	Redevelop Bus Station
High St Level Crossing Closure	Relocate Bus Station
Improved Cycle Network	School Travel Plans
Improved Pedestrian Facilities	Uphill Traffic Management
Increased Bus Service Frequency	Western Gateway Link
Increased Priorities for Bus Services	

Table 3.3 – Confirmed Options List

Option Development

3.4.14 It was agreed that although the workshop had been a valuable exercise, each of the options should be worked up in more detail prior to further appraisal using a more detailed methodology.

3.4.15 Each of the identified options was therefore taken forward for further development in order to gain a greater understanding of their likely benefits and their likely compatibility with other solutions. Though the options remained strategic in nature this process provided a more robust evidence base for the appraisal and identification of options to be taken forward.

Option Appraisal

3.4.16 The option appraisal process built on the 1 page Option Evaluation Sheet detailed within **Table 3.2** but also appraised each option against Central Government's 5 key National Transport Objectives using a 'strategic level' Appraisal Summary Table. Each option was appraised using a five point scoring system (from +2 to -2).

- Environment
- Safety
- Economy
- Accessibility
- Integration

3.4.17 Finally, as the options had not been fully worked up and were still regarded as strategic in nature, a risk / confidence assessment was used to gauge the level of any identified areas of concern.

3.4.18 Three options were discounted from the process at this stage as detailed below:

- Increased bus service frequency
- Commuter rail network
- Rail/Highway grade separation

3.4.19 For each of these options, a robust justification was provided to explain why they were deemed to be not feasible, deliverable or effective under any engineering and planning circumstances. This is summarised below.

3.4.20 Improved Bus Service Frequency was discounted primarily on the grounds that it was not financially sustainable and that revenue support would be required.

3.4.21 The Commuter Rail Network and Rail / Highway grade separation options were also discounted on the grounds of financial sustainability.

Option Appraisal Results

3.4.22 Following the option appraisal process each of the options under consideration were compared in order to establish which ones demonstrated the highest contribution to solving the identified problems and issues, achieving the strategy objectives and their contribution to the Central Governments 5 Key Transport Objectives. **Figure 3.3** provides a graphical representation of the appraisal results.

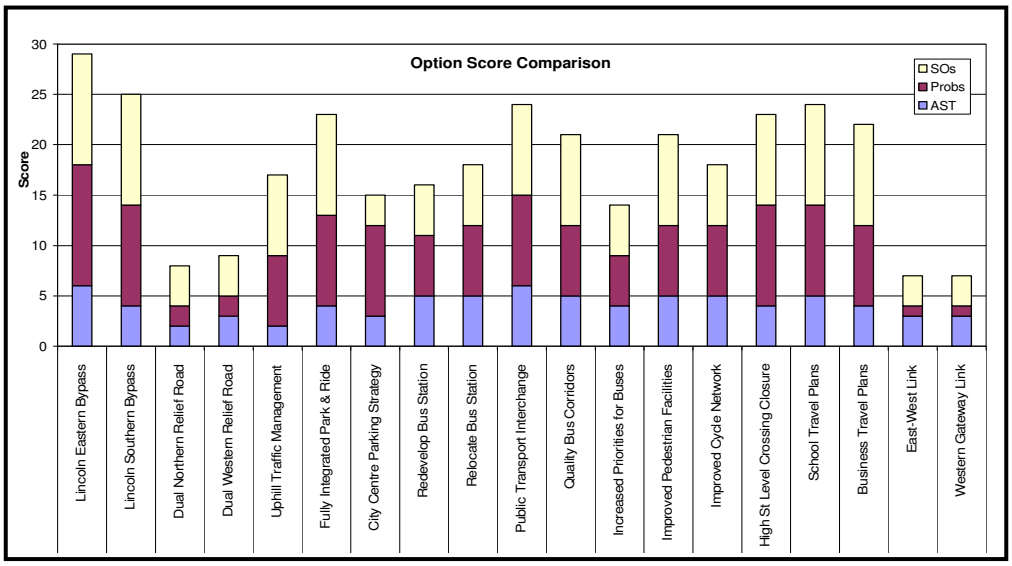

Figure 3.3 – Option Appraisal Results

3.4.23 The option appraisal process resulted in a prioritised list of potential options to be included within the LTS as detailed within **Table 3.4**. Full details of the Option Appraisal Process can be found within the report entitled: ***'Lincoln Transport Study, Options Report'*** included within **Appendix D**.

Highways	Public Transport	Parking	Sustainable Modes
Lincoln Eastern Bypass	Quality Bus Corridors	Park & Ride	Improved Pedestrian Facilities
Lincoln Southern Bypass	High St Level Crossing Closure	City Centre Parking Strategy	Improved Cycling Facilities
East West Link	Public Transport Interchange	N/A	School Travel Plans
Uphill Traffic Management	N/A	N/A	Business Travel Plans

Table 3.4 – LTS Stage 2 Priority Options

3.4.24 Of these options, the LEB was viewed by stakeholders as the priority for delivery as part of the LTS. The LEB recorded the highest score when appraised against its ability to solve the identified problems and issues, particularly those surrounding high traffic levels within the centre of Lincoln, the strategy objectives and contribution to the Governments National Transport Objectives.

3.5 LTS PHASE 3

3.5.1 Following the development and appraisal process the proposed options were grouped into an emerging strategy referred to as the 'The Vision'. In order to present this emerging strategy to stakeholders and the public, it was necessary to outline provisional timescales for the delivery of each of the proposals.

3.5.2 The intended period of implementation of each element within 'The Vision' was therefore established, with the different periods corresponding to five year LTP periods as follows:

- Short-term, or within 5 years (LTP2 period, 2006 to 2011)
- Medium term, or within 5 to 10 years (2011 to 2016)
- Longer Term, beyond 10 years (2016 and beyond)

3.5.3 For clarity and ease of communication, the various elements within 'The Vision' were split into five categories or themes as follows:

- Walking & Cycling
- City Centre & High Street
- Public Transport
- Parking
- Roads

3.5.4 The resulting strategy was then referred to in public consultation documents as the Emerging LTS as illustrated in **Figure 3.4**. A consultation leaflet and questionnaire was issued to the same 10,000 households as selected for the Stage 1 consultation exercise.

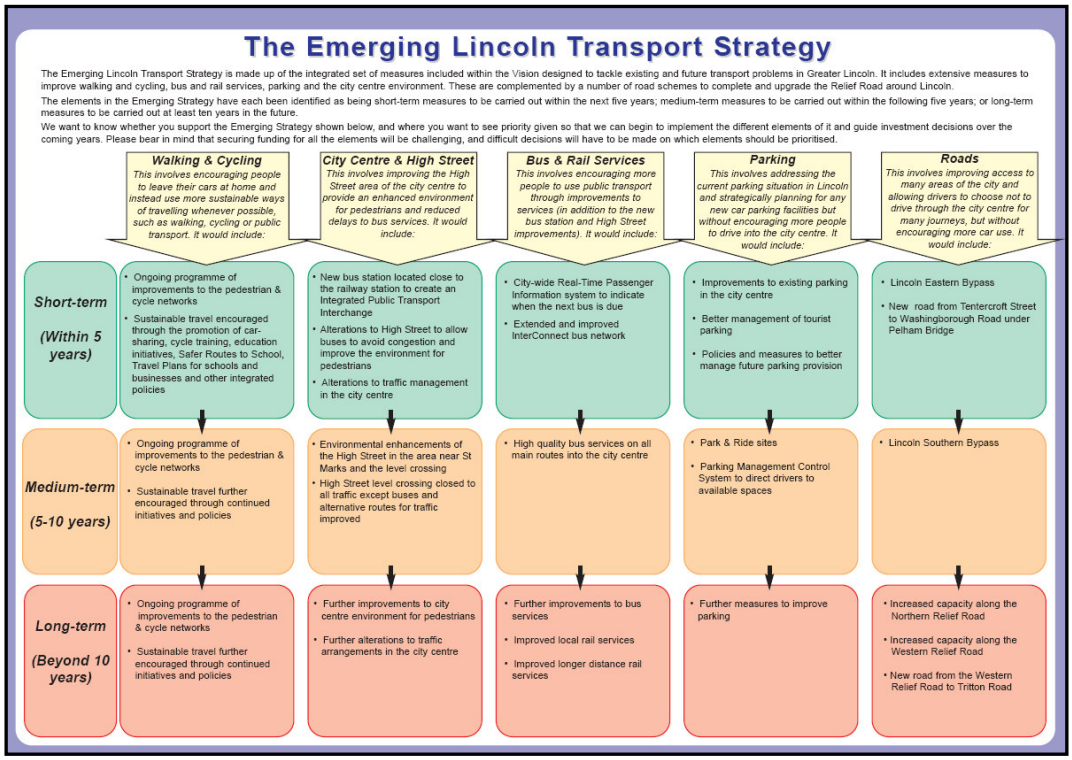

Figure 3.4 – The Emerging Lincoln Transport Strategy

3.5.5 The consultation leaflet and questionnaire clearly set out the Emerging Strategy and asked which of the proposals people regarded as priorities.

3.5.6 A series of Public Exhibitions were also held over 6 days throughout the LPA. These exhibitions were open to everyone and provided a valuable opportunity for additional engagement with the general public. Over the 6 days over 1,000 members of the public attended the exhibitions.

3.5.7 The Stage 2 consultation exercise revealed that people generally supported the transport improvements proposed by the 'Emerging Strategy'. The transport improvements they considered to be the priorities for the future of the LPA are detailed (in order of preference) within **Table 3.5**.

Priority	Option Name
1	A Lincoln Eastern Bypass
2	Improved pedestrian and cycle network
3	Improved City Centre parking
4	High Quality bus services
5	The provision of Park & Ride
6	A new bus station
7	A Lincoln Southern Bypass

Table 3.5 – LTS Stage 2 Consultation Priority Options

3.5.8 Following the Stage 2 public and stakeholder consultation 'The Vision' was revisited at a Partner Workshop and the final strategy determined. This workshop determined that as a result of uncertainties regarding future funding

and delivery that a logical way forward was to combine those options identified in the emerging strategy as medium and longer term options.

3.5.9 This workshop was also used as a means of producing a delivery / implementation plan for the LTS. Timescales, scheme costs and potential funding routes were identified.

3.5.10 The final set of priorities promoted as part of the LTS are detailed within **Table 3.6**.

Short Term Improvements
Lincoln Eastern Bypass
High Street Level Crossing Closure
Traffic Management Measures
Parking Strategy
Public Transport Interchange
Quality Bus Corridors
Pedestrian and Cycle Network Improvements
Longer Term Improvements
East / West Link
Lincoln Southern Bypass
Relief Road Improvements
Western Gateway Link
Extension of Pedestrian Areas and Priorities
Further Traffic Management Measures
Continuation of Parking Strategy
Park & Ride
Continuation of Pedestrian and Cycle Network Improvements
Further Quality Bus Corridors
Real Time Passenger Information
Extended Interconnect Service
Rail Service Improvements

Table 3.6 – LTS Proposed Transport Improvements

3.5.11 The LTS concluded that even with the introduction of alternative modes such as public transport and non-motorised user facilities that there was still a requirement for the introduction of the LEB in the short-term if the aspirations of the LTS, specifically meeting the objectives and solving the problems and issues, were to be achieved. It was therefore acknowledged that the LEB was of key significance to the overall benefits of the strategy and would act as a catalyst for the introduction of other modal improvements within the Lincoln area in the medium to longer term

3.5.12 The LTS promoted the delivery of the LEB within the short-term on the basis that it will:

- Remove unnecessary through traffic from central Lincoln
- Support the delivery of the City of Lincoln's Master Plan contained within the emerging Local Development Framework (inclusive of improvements for non-motorised users and to the public realm within central Lincoln)
- 'Free up' road space on key arterial routes in the LPA which would support the potential delivery of Quality Bus Corridors and Park & Ride

3.5.13 The LTS also identified a requirement for other highway based solutions such as the Lincoln Southern Bypass, the East West Link, traffic management measures and local junction improvements. However, when appraised against the Government's 5 key National Transport Objectives and the LTS problems and issues and objectives, these alternatives did not score as highly. Public and stakeholder consultation also revealed less support for these schemes to be delivered in the short-term.

3.5.14 The conclusions of the LTS are supported by the acknowledgement within the RSS (Eastern Sub Area priorities paragraph 2.4.18 and policy 6) that a predominately road based approach to infrastructure is required in the Eastern Sub Area if its peripheral nature and relative inaccessibility is to be addressed.

3.5.15 As previously identified, the adopted LTS was designed to be a 'live' document which is flexible in nature and able to accommodate changes in national, regional and local policy as well as third party influences such as developer contributions.

3.5.16 As such, in 2007 the LTS was revisited and updated to reflect significant changes in policies included within the RSS (in particular housing targets), any changes in the existing and the future situation and any progress achieved since original strategy was undertaken. This process is described in more detail in the following section.

3.6 STRATEGY UPDATE PROCESS (2007)

3.6.1 The process of revising the original Strategy began in July 2007 with a review of altered and emerging policy, to determine whether the original objectives remained valid in light of the changes to national, regional and local policy since January 2006.

3.6.2 As previously reported, one additional objective was subsequently added. This objective resulted from the emerging policy to facilitate the proposed sustainable urban extensions supported by the RSS: '*To support the effective implementation and delivery of both the emerging Sub-Regional Strategy and the new Growth Point agenda of the Lincoln Policy Area*'.

3.6.3 The transport problems and issues identified as part of the original study were also reviewed to determine any key changes to the existing or future situation. A number of additional issues were identified as part of this process as detailed below:

- Delays to buses caused by congestion
- Issues with concessionary bus fares
- Increasing development pressures
- Increased level crossing closures
- Poor city centre air quality

3.6.4 A review was also undertaken of the progress achieved since the original LTS was published. This took account of factors such as the RFA process, the development of outline schemes to a more detailed level and the consequent determination in some cases of more accurate scheme costs. Changes in likely funding sources were also considered, such as major developments which could potentially deliver private funding for infrastructure schemes.

3.6.5 This review resulted in the development of a revised delivery programme for the various schemes contained within the original LTS. Following various discussions with stakeholders from the County Council and their partner authorities, the revised LTS was finalised and presented to Councillors from each authority for endorsement.

3.6.6 One of the key decisions within the update process was to align the timescales of the revised LTS with those outlined for the newly adopted RSS. The short-term was therefore changed to refer to the period up to 2016, whilst the longer term was updated to cover the period 2016 to 2026 and beyond. This ensures that in accordance with the RSS, the revised LTS covers the period up to 2026 as opposed to 2021.

3.6.7 The improvements to transport proposed by the revised LTS, both in the short-term (up to 2016) and in the longer-term (2016 to 2026 and beyond) are summarised in **Table 3.7**.

Transport Improvement – Scheme or Measure	Short Term (2008 - 2016)	Longer Term (2016 – 2026+)
Small-scale walking/cycling/public transport schemes	X	X
Quality Bus Corridors	X	X
Real Time Passenger Information	X	
Public Transport Interchange	X	
Park & Ride	X	X
Parking Strategy	X	X
Rail Service Improvements	X	X
Lincoln Eastern Bypass	X	
Traffic Management Measures	X	X
City Centre Pedestrian Improvements	X	X
East – West Link (Ropewalk to South Park Avenue)	X	X
Western Gatewayl Link (A46 to Tritton Road)	X	
Lincoln Southern Bypass		X
Relief Road Improvements		X

Table 3.7 – LTS update (2007) Proposed Transport Improvements

3.6.8 The timeframes associated with these improvements were confirmed by LCC and its partners at a workshop in November 2007. Where possible, schemes were allocated for delivery in the short-term or the longer term. However, as shown in **Table 3.7**, both timescales have been selected for many schemes, either to reflect their proposed delivery using a phased approach, or due to an ongoing aspect to their implementation.

3.6.9 Within the revised LTS the LEB was once again recognised as being of key significance to facilitating the overall aims of the strategy and was identified as being of fundamental importance to the successful delivery of a number of schemes within the strategy.

3.6.10 Full details of the LTS update process can be found in the report entitled ***'A Transport Strategy for the Lincoln Area (Revision 1)'*** included within **Appendix E**.

3.7 FURTHER OPTION TESTING

3.7.1 To support the delivery of the LTS, further work was undertaken to test a range of LTS options using the Lincoln VISUM Model. This work was undertaken to demonstrate that, as concluded within the LTS, the LEB was indeed the catalyst for the introduction of other schemes and an essential component for the delivery of the overall benefits of the strategy.

3.7.2 The Lincoln VISUM Model is a strategic transport model covering the LPA which has been validated against the DMRB criteria and provides a robust representation of real life conditions. The Lincoln VISUM Model replaced the historic Lincoln SATURN Model as the key policy / decision making tool within the LPA.

3.7.3 A more detailed description of the Lincoln VISUM model is provided with **Chapter 6** of this business case.

3.7.4 This options testing process was also undertaken in order to ensure that the LEB remains the most appropriate solution in terms of Value for Money and should continue to be promoted as a major scheme priority. The following options were considered as part of this process:

- Quality Bus Corridors (QBC)
- Park & Ride
- Lincoln Eastern Bypass (LEB)
- Lincoln Southern Bypass (LSB)

3.7.5 These options were identified for assessment based upon the likely impact that they would have in terms of solving the key problems and issues associated with high traffic volumes within the centre of Lincoln and achieving the overall strategy objectives. It was considered that other solutions within the LTS would not have the same level of impact due to their scale / nature and could not be considered as valid alternatives for inclusion within this assessment.

3.7.6 Other improvements such as the Public Transport Interchange, the Western Gateway Link and the East West Link were not included as part of this further options testing as they were either; developer led initiatives, not considered to be deliverable in the short term i.e. by 2016 or not considered to be viable alternatives to the LEB in terms of removing strategic through traffic from the city centre.

3.7.7 A summary of the QBCs, Park & Ride and LSB options are provided within the following sections.

Quality Bus Corridors

3.7.8 The LTS identified four QBCs along routes within Lincoln. The QBCs were identified on the basis that they covered the key radial routes within the LPA, had a significant catchment area and were currently used by operators as key public transport routes. The four QBCs are illustrated within **Figure 3.5** and described in detail within the subsequent paragraphs.

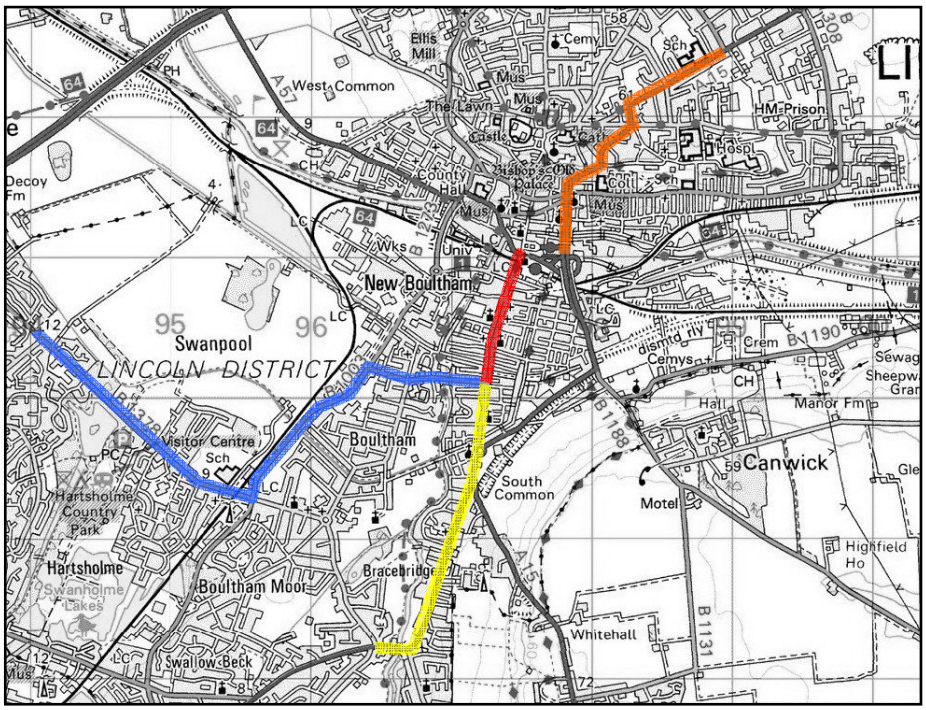

Figure 3.5 – Quality Bus Corridors

3.7.9 QBC1 is proposed to run along High Street between the junction with St Mark Street and Tentercroft Street and the junction with Dixon Street. This is the most important of the proposed corridors as it represents the main route into Lincoln for buses from the south of the city.

3.7.10 QBC2 is proposed to run from High Street at the junction with Dixon Street, along High Street, St Catherine's and Newark Road until the junction with Brant Road.

3.7.11 QBC3 is proposed to run from the exit of the bus station along Broadgate, Lindum Road and Wragby Road until the junction with Ruskin Avenue.

3.7.12 QBC4 is proposed to run from High Street at the junction with Dixon Street, along Dixon Street, Boultham Park Road and Skellingthorpe Road until the junction with Birchwood Avenue.

3.7.13 The bus priorities for each corridor would include a combination of bus lanes, signal priorities, bus branding, real time information and parking restrictions.

Park & Ride

3.7.14 Park & Ride sites are promoted within the LTS as a key initiative for improving access to the city centre. They would form part of the wider Parking Strategy for Lincoln.

3.7.15 Two potential Park & Ride sites, to the east and west of the city, were recommended within LTS (based on current transport infrastructure and potential catchment). These are illustrated within **Figure 3.6** and would each

be served by frequent high quality bus services to and from the city centre along routes with bus priorities to avoid congestion. It should be noted that these locations are not definitive and it was accepted that may need to be adjusted to reflect progress with other infrastructure improvements.

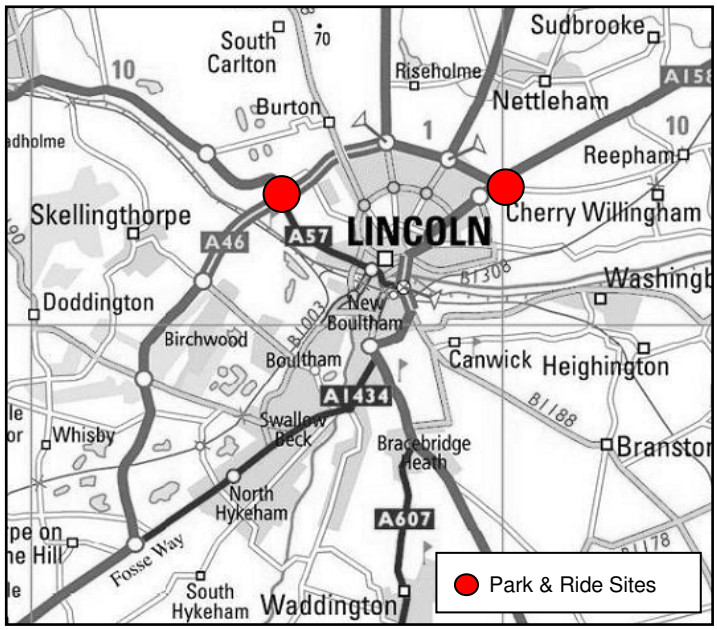

Figure 3.6 – Park & Ride Sites

Lincoln Southern Bypass

3.7.16 The LSB is a new road proposed in the long-term from the A15 in the east to the A1434/A46 roundabout in the west as illustrated in **Figure 3.7**. The LSB would complete a full orbital relief road around Lincoln.

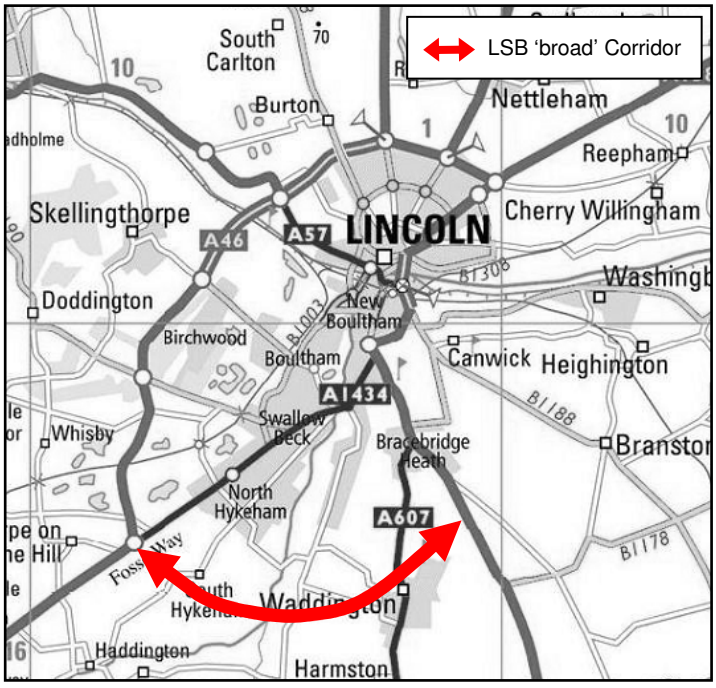

Figure 3.7 – Lincoln Southern Bypass

3.8 OPTION TESTING SCENARIOS

3.8.1 The options testing process included a total of 10 different scenarios aimed at providing a comprehensive picture of the interaction and outcomes of a range of LTS priorities in terms of their ability to solve the identified problems and issues and achieve the defined strategy objectives. **Table 3.8** details the 10 scenarios tested.

Test Description
Park & Ride Schemes
Quality Bus Corridors
Quality Bus Corridors with Park & Ride Schemes
Lincoln Eastern Bypass (Preferred Option)
Lincoln Eastern Bypass (*2005 alignment granted planning permission)
Truncated Lincoln Eastern Bypass (Preferred alignment) terminating at Lincoln Road (Lower Cost Alternative)
Extended Lincoln Eastern Bypass (Preferred alignment) terminating at A607
Quality Bus Corridors with Park & Ride Schemes and Lincoln Eastern Bypass
Lincoln Southern Bypass
Truncated Lincoln Southern Bypass terminating at A607

Table 3.8 – LTS Modelling Scenarios

3.9 RESULTS

3.9.1 Where possible each of the scenarios identified within **Table 3.8** was subject to an economic assessment which included the calculation of Benefit to Cost Ratio's (BCR). The effects of each of the scenarios were also assessed in terms of their impact upon journey times and traffic flows around the network. A summary of the key findings of this process are provided below:

- When considered in isolation, Quality Bus Corridors and Park & Ride facilities have only a very small impact on journey time savings and congestion relief, making them a poor alternative to the LEB for the purposes of removing strategic traffic through Lincoln city centre and stimulating economic development.
- QBC and Park & Ride work best in combination with the LEB, giving the highest journey time savings and reducing a significant amount of traffic on the existing Lincoln road network. With the LEB in place, benefits are locked in, enabling investment in public transport and Park & Ride to take place with a high confidence of success.
- The LEB Preferred Option and the shorter Next Best / Lower Cost Alternative have similar BCRs. However, the missing southern section associated with the shorter truncated route does not re-distribute traffic from the south of Lincoln as effectively as the LEB Preferred Option.
- The extended LEB (terminating at the A607) has the most economic benefits but a lower BCR due to the increased cost of constructing the extra section. There is little difference in strategic traffic re-distribution between this and the LEB Preferred Option.

- Both short (Next Best / Lower Cost Alternative) and long (Preferred) LEB options have increased risk factors from terminating on roads close to village centres. These include local environmental and air quality deterioration, increased accident risk and deliverability risk of the scheme not being completed and thus terminating permanently at these points. To this end, the A15 primary route is the most logical point to terminate the LEB.
- The two LSB options have much lower benefits. These schemes fail to remove the same volumes of traffic from the city centre and radial routes as the LEB Preferred Option. This indicates the LSB option is not a strategic alternative to the LEB Preferred Option with its effectiveness only being realised as the final link in the Lincoln orbital route.

3.10 CONCLUSIONS

3.10.1 The evidence provided within this chapter has shown that, despite consideration of a wide range of modal alternatives, the LEB Preferred Option remains the most viable solution to the identified problems and issues as part of the LTS, particularly the removal of traffic from the city centre. In addition the LEB Preferred Option is seen as a significant component for the delivery of the overall LTS strategy objectives and the longer term growth aspirations of Lincoln as an RSS defined Principal Urban Area and an identified Growth Point.

3.10.2 It has also been determined that the introduction of the LEB Preferred Option will act as a catalyst and is of fundamental importance for the delivery of other modal solutions identified within the LTS. It provides the opportunity to 'free up' road space within the centre of Lincoln and on key radials thus facilitating the delivery of city centre demand management improvements such as traffic management proposals, non-motorised user enhancements, Quality Bus Corridors and Park & Ride. It would also have significant benefits in terms of improving the quality of life within the city centre by reducing severance caused by high traffic volumes and noise / air pollution within the Air Quality Management Area and the historic core of the city.

3.10.3 As a result of the above, it was confirmed that the LEB Preferred Option should be taken forward and promoted by LCC as the preferred solution within the business case. Also, as reported within **Chapter 2**, it is considered that the truncated version of the LEB terminating at Lincoln Road should be promoted as the Next Best / Lower Cost Alternative within the Value for Money section of the business case. Other modal or highway options included within the LTS are not considered by LCC as providing an acceptable Next Best / Lower Cost Alternative when appraised against the scheme problems and issues.

4 THE STRATEGIC CASE – PROBLEMS AND OBJECTIVES

4.1 INTRODUCTION

4.1.1 WebTAG states that in developing a transport strategy or plan it is essential to be clear as to what the strategy or plan is designed to achieve. The answer to this question can be expressed at varying levels of generality or detail ranging from broad statements of vision through strategic objectives, to more specific objectives and detailed problems to be overcome.

4.1.2 Stated objectives serve several functions. They help to identify the problems to be overcome, both now and in the future. They provide guidance on the types of solution which might be appropriate and the locations in which they are needed. They also act as constraints, in clarifying what should be avoided in pursuing any particular solution. They also provide the basis for the appraisal of alternative solutions and for monitoring progress in implementation.

4.1.3 As detailed in **Chapter 3** the LTS was developed in line with WebTAG guidance using a problem and policy approach. This included detailed analysis of the existing and future problems within the LPA and the development of specific objectives aimed at alleviating the identified problems and issues.

4.1.4 The LEB is identified as a significant element of the delivery of the LTS and in order to promote a consistent approach to the decision making within the LPA, the problems, issues and scheme objectives for the LEB are therefore the same as those identified and defined within the LTS.

4.1.5 This chapter of the document therefore provides a summary of the scheme objectives as defined within the LTS, the current and future problems that the LEB will alleviate, and the key outcomes its implementation will deliver. As such, the remainder of this chapter is structured as follows:

- Scheme Objectives
- Socio Economic Characteristics
- Existing Transport Infrastructure
- Problems and Issues
- Scheme Outcomes
- Outcome Summary

4.2 SCHEME OBJECTIVES

4.2.1 As detailed previously, the LTS objectives were developed and endorsed by the LTS study partners in 2004 following a review of pertinent land-use and transportation policy documents relevant to the LPA.

4.2.2 In August 2007, a further review was undertaken of pertinent policy documents updated or adopted since the original review. This concluded that although each of the LTS objectives remained valid an additional objective should be included to reflect the longer term strategic urban expansion of Lincoln (as identified within the emerging RSS) and its new Growth Point status.

4.2.3 Adopting the LTS objectives as the Scheme Objectives for the LEB promotes a consistent approach to decision making within the LPA and has ensured

that the LEB scheme development process has been 'policy driven'. The Scheme Objectives (**SO**) for the LEB are therefore defined as:

SO1) To assist the sustainable economic growth of Lincolnshire through infrastructure improvements to the following:

- The Strategic Road Network
- Non-Strategic Road Network

SO2) To remove strategic road-based freight from Lincoln and other adversely affected communities through:

- Encouraging the use of alternative modes
- Improving links to the Primary / Trans-European Road Network

SO3) To ensure that the transport infrastructure meets the needs of existing and proposed developments especially:

- In the regeneration priorities in the Lincoln Policy Area
- Including minimising congestion through the promotion of walking, cycling and public transport
- Managing parking

SO4) To reduce the number and severity of road traffic accidents by reducing the potential for conflict between different modes and improving the facilities for convenient and safe alternatives.

SO5) To maximise accessibility and reduce peripherality by improving the range of travel options especially for those without access to the private car.

SO6) To increase Public Transport usage by improving:

- Reliability, frequency and journey time of bus services

SO7) To improve overall air and noise quality within the study area, especially in the Air Quality Management Area in Lincoln by the removal of unnecessary traffic by:

- Removing through traffic
- Reducing local journeys in Community Travel Zones
- Other traffic management measures

SO8) Protect and enhance the built environment by reducing the adverse impacts from traffic, through improvements to the transport infrastructure.

SO9) Improve the attractiveness and liveability of central Lincoln for residents, workers and visitors by creating a safe, attractive and accessible environment for pedestrians.

SO10) To support the effective implementation and delivery of both the emerging Sub-Regional Strategy and the new Growth Point agenda of the Lincoln Policy Area.

4.3 SOCIO ECONOMIC CHARACTERISTICS

4.3.1 DfT guidance recommends a review of the socio-economic characteristics to support the development the business case for a scheme. This section of the document provides information on the eleven electoral wards within Lincoln

which will potentially be influenced by the scheme. This includes data on population, car ownership and travel to work by mode.

4.3.2 The eleven wards within Lincoln are shown in **Figure 4.1** at the end of the document and are included within **Table 4.1** below with population figures from the 2001 census.

Population	
Abbey	7,330
Birchwood	7,800
Boultham	7,970
Bracebridge	8,366
Carholme	7,162
Castle	6,684
Glebe	8,376
Hartsholme	8,890
Minster	7,132
Moorland	7,854
Park	8,031
Total Lincoln	**85,595**
East Midlands	**4,172,174**

Table 4.1 – Ward Population Data

4.3.3 The wards all have similar population. Castle contains the smallest population at approximately 6,700 and Hartsholme contains the highest population at approximately 8,900 demonstrating that there are just over 2,000 people between the largest and the smallest ward.

Travel Patterns and Travel Behaviour

Travel to Work

4.3.4 Travel to work data for Lincoln as a whole has been analysed against the East Midlands Region and England. The results can be found in **Table 4.2** below:

Travel to Work	Lincoln %	East Midlands %	England %
Underground/Metro/Tram	0.07	0.07	3.16
Train	0.52	0.98	4.23
Bus/Coach	7.35	6.98	7.51
Motorbike	1.47	1.04	1.11
Car/Van	51.45	60.38	54.92
Passenger	8.15	6.95	6.11

Travel to Work	Lincoln %	East Midlands %	England %
Minicab	0.79	0.41	0.52
Bicycle	7.10	3.27	2.83
Foot	16.25	10.49	9.99
Other	0.41	0.39	0.46

Table 4.2 – Travel to Work Data

4.3.5 The results show that, compared to the rest of the East Midlands region, Lincoln has a lower percentage of people travelling to work by car or van, but a much higher number of people travelling on foot or by bicycle. In comparison to both the East Midlands and England, Lincoln has more than double the proportion of people cycling to work.

4.3.6 Also demonstrated is that travel to work by train in Lincoln and the East Midlands is significantly lower in comparison to the rest of England. This is due to the lack of options to travel by this mode. The rest of the modes, including bus, motorbike, minicab and car passenger are similar for Lincoln compared to the East Midlands and England.

Car Ownership

4.3.7 Information for car ownership has been compiled from the 2001 census and is shown in **Table 4.3** below:

Car Ownership	Households	No vehicle	% one or more vehicles
Abbey	3,057	1,304	57.34
Birchwood	3,242	1,031	68.20
Boultham	3,445	1,151	66.59
Bracebridge	3,224	605	81.23
Carholme	3,222	1,091	66.14
Castle	3,191	1,295	59.42
Glebe	3,366	968	71.24
Hartsholme	3,792	760	79.96
Minster	3,114	1,133	63.62
Moorland	3,230	1,059	67.21
Park	3,758	1,649	56.12
Lincoln	**36,643**	**12,046**	**67.13**
East Midlands	**1,732,482**	**420,165**	**75.75**
England	**20,451,427**	**5,488,386**	**73.16**

Table 4.3 – Car Ownership Data

4.3.8 **Table 4.3** shows that in comparison to the East Midlands and England, nine of the eleven wards have lower than average car ownership. Only two wards, Bracebridge and Hartsholme have greater car ownership than the national

average. These areas are located to the south and south west of Lincoln respectively.

Economic Activity

In each ward, the percentage of economically active people who are unemployed has been collated from the 2001 census. The term 'economically active' is used to describe those people who are in the labour force. It includes all those which are working as well as those actively seeking work.

The term economically inactive is used to describe those aged 16 - 74 who are not in the labour force, such as students, retired persons, permanently sick/disabled, looking after family etc, and should not be used included in calculating unemployment rates.

Table 4.4 below shows the number of working age people in each ward, as well as the number of economically active, economically inactive and the percentage unemployed.

Ward	All People- Working Age	Economically Active	Economically Inactive	Unemployed
Abbey	5,579	3,374	2,205	315 (9.3%)
Birchwood	5,405	3,450	1,955	270 (7.8%)
Boultham	6,048	3,925	2,123	191 (6.5%)
Bracebridge	5,930	4,332	1,598	141 (3.6%)
Carholme	5,647	3,599	2,048	209 (5.8%)
Castle	4,786	2,970	1,816	246 (8.3%)
Glebe	5,762	3,695	2,067	262 (7.1%)
Hartsholme	6,358	4,583	1,775	183 (3.9%)
Minster	4,842	2,867	1,975	191 (9.7%)
Moorland	5,318	3,238	2,080	234 (7.2%)
Park	6,087	4,169	1,918	335 (8.0%)

Table 4.4 – Percentage Unemployed in each ward

4.3.9 The table above shows that some wards exhibit unemployment rates which are higher than 8% (e.g. Abbey, Minster, Park, Castle). However, some exhibit low unemployment rates (less than 5%) such as Bracebridge and Hartsholme. This pattern is inversely proportional to the car ownership rates shown in **Table 4.3**. Bracebridge and Hartsholme wards exhibit the highest car ownership rates within Lincoln and the lowest unemployment rates. Abbey and Minster wards exhibit the highest unemployment rates, and have two of the lowest car ownership rates.

Index of Multiple Deprivation

4.3.10 The Index of Multiple Deprivation (IMD) is a measure of deprivation. It takes in to account the seven different aspects to deprivation:

- Income
- Employment
- Health deprivation

- Disability deprivation
- Education Skills and Training
- Barriers to Housing and Services
- Crime the Living Environment

4.3.11 The IMD scores for the whole of Lincoln are shown in **Figure 4.1** at the end of this document. It shows that the wards with the highest employment rates and lowest car ownership rates are the most deprived. There are also pockets of deprivation within the wards of Birchwood and Moorland.

4.4 PROBLEMS AND ISSUES

4.4.1 As previously identified, the problems and issues facing transport within the LPA were investigated as part of the development of the LTS. They were established by investigating local problems and integrating these with regional and national issues and policy to establish a comprehensive list of the problems and issues facing the LPA.

4.4.2 This involved reviewing the issues facing all modes of transport, the environment, and land use and development aspirations to provide a robust understanding of the situation. In addition to the technical analysis (including interrogation of the historic Lincoln SATURN Model, traffic data and census information) and observations carried out, a public and stakeholder consultation exercise was undertaken. The results of this exercise confirmed and strengthened the findings of the technical analysis.

4.4.3 Since the LEB has been identified as being of key significance to the delivery of the LTS, the pertinent problems and issues that this process identified have been employed to inform the LEB scheme development process, namely:

Problem 1: Lack of suitable route choice to the south and east of Lincoln

Problem 2: Waterways form a natural constraint with few crossing points

Problem 3: High volumes of Heavy Goods Vehicles and long distance traffic in city centre

Problem 4: Pedestrian severance between residential areas and the city centre

Problem 5: Congestion in city centre leads to unreliable journey times

Problem 6: Congestion impact on the reliability and attractiveness of bus services

Problem 7: High accident rates in recent years due to unsuitable traffic levels

Problem 8: High volumes of traffic through the city centre results in poor air quality in the city centre and an Air Quality Management Area

Problem 9: High volumes of traffic through the city centre impacts on Townscape in particular the cathedral and Lincoln's historic core

Problem 10: High noise and vibration levels on strategic routes and key links within the city centre

4.4.4 As recommended within DfT guidance, quantified evidence has been further utilised to inform the business case and to illustrate the size and scale of the defined problems. A variety of sources of information have been used to inform this process. These include, but are not limited to accident statistics,

traffic flows, route observations, site visits, census data and also the interrogation of the Lincoln VISUM Model.

4.4.5 The following sections provide a range of supporting evidence relating to the defined problems and issues, future problems and issues, and the scheme outcomes, under the following headings:

- Existing Problems
  - Traffic and Congestion
  - Road Traffic Accidents
  - Environmental considerations
- Fututre Problems
- Scheme Outcomes

TRAFFIC AND CONGESTION

4.4.6 The key problems relating to traffic and congestion within the LPA are as follows:

Problem 1:	Lack of suitable route choice to the south and east of Lincoln
Problem 2:	Waterways form a natural constraint with few crossing points
Problem 3:	High volumes of Heavy Goods Vehicles and long distance traffic in the City centre
Problem 4:	Pedestrian severance between residential areas and the city centre

4.4.7 Lincoln's existing road network is generally comprised of a number of routes radiating from the city centre, as can be seen in **Figure 2.3** at the end of this document. To the north and west of the city, a number of the radial routes are connected to the existing relief road formed by the A158 and A46.

4.4.8 Within the Eastern Sub Area of the East Midlands the A15 is the primary north-south route through Lincolnshire, connecting Humberside and North Lincolnshire with Lincoln, Sleaford and Peterborough. The A15 is also a route of strategic importance for the adjacent counties of Norfolk and Cambridgeshire, as well as for Lincolnshire. It uses the only river crossing to the east of the city for some 18 miles to pass over the River Witham and at the present time, strategic traffic on the A15 has to travel through Lincoln city centre.

4.4.9 The through route from the north requires traffic to use the A158, Wragby Road, Broadgate, Pelham Bridge and A15 Canwick Road. This directs traffic through an Air Quality Management Area which includes the central area around Broadgate and Pelham Bridge.

4.4.10 The Lincoln western relief road, the A46, was constructed in 1985, but this does not connect to the A15 to the south of the city and is inaccessible for drivers wanting to bypass Lincoln. As identified above, through traffic has little option but to use the A15 and pass through Lincoln. Here, the mix of strategic and local traffic results in frequent delays, congestion, severance and subsequent environmental and safety impacts.

4.4.11 Interrogation of the Lincoln VISUM Model suggests that 8% of the traffic within the city centre consists of HGVs.

4.4.12 Further problems relating to congestion within the LPA are as follows:

Problem 5: Congestion in the city centre leads to unreliable journey times

Problem 6: Congestion impacts on the reliability and attractiveness of bus services

4.4.13 **Table 4.5** shows base year traffic flows extracted from the Lincoln VISUM Base Model on key links through Lincoln city centre. Reference **Figure 4.2** at the end of the document for each location.

Section	AM Peak 08:00-09:00	Inter Peak 10:00-16:00	PM Peak 17:00-18:00
A15 Bunker's Hill between Hawthorn Road and A158 Wragby Road	1420	1280	1599
A15 Lindum Road north of Clasketgate junction	1774	1708	1812
A57 St Mary's Street	979	819	924
B1262 High Street north of Tentercroft Street	555	469	540
A15 Canwick Road north of South Park Avenue	2379	2070	2040
A15 South Park Avenue	1400	1339	1432
B1188 Canwick Road south of South Park Avenue	2580	1733	2591
A15 Cross O'Cliff Hill	935	760	1116
B1131 Canwick Avenue	799	681	992

Table 4.5 – Base year (2006) traffic flows on key links through Lincoln

4.4.14 The data indicates that traffic flows are highest in the PM period along the sections of the A15 north of the city centre and are more evenly distributed between the AM and PM peaks along routes south of the city centre. On average the AM and PM peak flows are 1.20 times higher than the inter peak flows.

4.4.15 These links comprise a mix of Urban All Purpose type 3 and type 4 roads. A comparison of the traffic flows detailed within **Table 4.1** and theoretical capacities for these road types contained within *DMRB TA 79/99 Determination of Urban Road Capacity* indicates that within the AM and PM peak periods the A15 through Lincoln is either nearing or is at its theoretical capacity under normal conditions thus resulting in the heavy congestion experienced on a daily basis. The high percentage of HGV's using the A15 further compounds the congestion problem.

4.4.16 The extent of the congestion makes journey times unreliable. Journeys through the city centre at peak times can be up to 30% longer than average. This has impacts upon the reliability of bus services, freight movements as well as journeys by the private car.

ROAD TRAFFIC ACCIDENTS

Problem 7: High accident rates in recent years due to unsuitable traffic levels

4.4.17 Accident data ranging from 1st January 2004 to 31st December 2008 has been interrogated using a Geographical Information System (GIS). Accident details have been analysed by severity, number of casualties and weather conditions.

4.4.18 **Table 4.6** shows the number of accidents which have occurred throughout the study area, by severity in each year.

Year	Slight	Serious	Fatal	Total
2004	425	33	3	461
2005	428	29	3	460
2006	389	41	4	434
2007	343	40	4	387
2008	347	40	4	391
Total	**1,917**	**183**	**15**	**2,115**

Table 4.6 – Accident numbers, by severity from 2004 to 2008

4.4.19 This data shows that there has been a general decline in accident numbers between 2004 and 2008. This has been calculated as a 15% decrease in total numbers of accidents.

4.4.20 This trend parallels the fall in slight accidents in the same period. However, the numbers of serious and fatal accidents has remained relatively constant over the same period.

4.4.21 The data has been analysed to identify accident 'hotspots' in the local area. Hotspots have been defined as; a site where more than 10 accidents have occurred over the five year period. Hotspots within the limits of the urban area of Lincoln, which are likely to be affected by the LEB, are listed in **Table 4.7**.

Junction	Slight	Serious	Fatal	Total
B1378 Skellingthorpe Road / B1003 Tritton Road	15	2	0	17
B1003 Tritton Road / Dixon Street	14	2	0	16
A1434 Newark Road / Hykeham Road / Rookery Lane	14	0	0	14
A15 Broadgate / Silver Street / Clasketgate / Monks Road	13	1	0	14
A15 Wragby Road / Outer Circle Road	12	0	0	12
B1131 / B1188 Lincoln Road	10	1	0	11
B1398 Burton Road / B1273 Yarborough Crescent	11	0	0	11
Total	89	6	0	96

Table 4.7 – Junctions in Lincoln with more than 10 accidents in the last five year period

4.4.22 **Table 4.7** shows that there are four locations within the urban area of Lincoln which have experienced more than 10 accidents in the five year period 2004 to 2008. These junctions are all located within 30 – 40 mph speed limits. It is also noted that, at these locations there is likely to be a relatively high footfall of pedestrians.

4.4.23 In addition, analysis of accidents in 2007/08 on individual links has been undertaken in order to identify any problem areas. **Table 4.8** lists those links where accident rates in the last year are higher than the expected rate for that type of road.

Link	PIA in 2008	PIA per mvkm	Average PIA per mvkm for road type	Factor exceeding average rate
A57 St Mary's Street	3	3.6668	0.2610	14.05
B1262 High Street	18	2.2978	0.2589	8.87
A15 Broadgate	6	0.9101	0.2593	3.51
B1378 Skellingthorpe Road	5	0.3461	0.2589	1.34
A1434 Newark Road	13	0.4464	0.2610	1.71

Table 4.8 – Personal Injury Accident (PIA) rates per million vehicle km (mvkm) on selected links in Lincoln

4.4.24 Accident rates have been compared with average accident rates per million vehicle km (mvkm), which have been taken from DMRB 13.1.4. **Table 4.8** shows that accident rates on all the identified links within the city centre exceed the average rate expected for that road type. Routes which suffer disproportionately (St Mary's Street, High Street and the A15 Broadgate) carry heavy volumes of traffic and are typically used for through movements between the north and south of the city. The combination of heavy traffic with some drivers being unfamiliar with the routes and a high footfall of pedestrians in the city centre leads to a higher accident rate.

ENVIRONMENTAL CONSIDERATIONS

Problem 8: High volumes of traffic through the city centre results in poor air quality within the city centre and the AQMA

4.4.25 As previously reported, air quality in some parts of Lincoln is poor. Monitoring of air quality is undertaken by the City of Lincoln Council.

4.4.26 A number of streets within the city centre currently experience high levels of traffic generated pollution. The UK Air Quality Objective for NO_2 is set at a maximum annual mean of 40 ug/m^3. Two of the monitored sites have exceeded this value over recent years. These are Drill Hall in Broadgate and Ridgeway House, which in 2007 had NO_2 values of 69 ug/m^3 and 40 ug/m^3 respectively.

4.4.27 As a result, an AQMA was declared covering a number of these streets in respect of NO_2 and PM_{10}. The AQMA for NO_2 includes the central areas of A15 Broadgate and Pelham Bridge, while the AQMA for PM_{10} covers the entire are of the City of Lincoln. The AQMAs are illustrated in **Figures 4.3** and **4.4** at the end of the document.

Problem 9: High volumes of traffic through the city centre impacts on Townscape in particular the cathedral and Lincoln's historic core

4.4.28 In addition to air quality impacts, the high volumes of traffic in the city centre, in particular the high sided HGVs have a detrimental impact on Townscape in the city centre. This impacts on the views of the cathedral and detracts from the cultural value of Lincoln's historic core.

4.4.29 Over three million people visit the city every year, particularly drawn by the historic Cathedral, Castle and the new state-of-the-art City and County Museum, known as 'The Collection'. The East Midlands Regional Tourism Strategy includes the aim of 'lifting Lincoln into the top rank of heritage city destinations in Britain'.

4.4.30 It is considered that this regional aspiration is currently constrained by the high volumes of traffic in the city centre.

Problem 10: High noise and vibration levels on strategic routes and key links within the city centre

4.4.31 Traffic levels on the key links through Lincoln city centre (see **Table 4.5**), also result in high noise and vibration levels on strategic routes and key links within the city centre. As above this impacts on the cultural value of Lincoln's historic core. It also results in noise nuisance for business and residential properties fronting these routes.

4.5 FUTURE PROBLEMS

4.5.1 The Lincoln VISUM Model has been used to simulate the future situation on the network without the LEB in place.

4.5.2 The traffic model shows that in the 'Do-Minimum' scenario the predicted increase in flows by 2031 (LEB Design Year), results in a notable reduction in average speeds and increased journey times across the LPA.

4.5.3 From both a wider network perspective and within the city centre, this predicted increase in future traffic flows would not only have a detrimental affect on private vehicles, it would also impact upon non-motorised users, public transport, and also commercial vehicle movements.

4.5.4 Increased journey times and reduced journey time reliability would impact upon the efficiency and attractiveness of bus services within the area. Increased traffic flows on key radials and through the city centre would increase congestion on an already constrained network and have a detrimental impact upon local air quality and noise levels, particularly within the AQMA and historic core of the city centre.

4.5.5 Local residents would experience an increase in severance and pedestrian and cyclist safety would deteriorate due to increased conflict with motorised vehicles.

4.5.6 In summary the existing problems and issues identified above would be exacerbated with key future issues being as follows:

- **Congestion –** increased congested within central Lincoln and on key radials would lead to a deterioration of the environment for drivers, public transport users, cyclists, pedestrians and local residents within the LPA
- **Delay –** increasing delay for private vehicles and public transport
- **Road Safety –** increased traffic levels are likely to result in a reduction in road safety due to vehicle and non-motorised user conflicts, particularly within central Lincoln
- **Accessibility –** the following accessibility impacts would increase:
  - **Severance –** adversely affected due to increasing traffic on the network increasing severance on key radial routes and across the city, particularly between residential and commercial areas. Accessibility to Lincoln's historic core would also be more difficult for visitors to the area
  - **Access to the Transport System –** adversely affected due to the decline in public transport and the increasing reliance on the private car throughout the LPA
  - **Social Inclusion & Deprivation –** general problems would disproportionately affect the socially disadvantaged. The projected decline in public transport patronage (and hence provision) would impact most heavily on those without access to a private car. This would lead to an increasingly polarised local society that is contrary to government policy of increasing social mobility

4.5.7 These future conditions on the wider network would be detrimental to regional housing, economic and transport aspirations included within the RSS and the delivery of the Growth Point agenda for the LPA.

4.5.8 In addition to the above the deterioration of conditions in the city centre would have a detrimental impact on local businesses and the public realm. This would reduce the ability of Lincoln to attract investment from the business community and detract from its setting as a visitor attraction. This potential impact on the local tourist and retail economy would have serious implications for the local and regional economy.

4.5.9 These future conditions would also impact on Lincoln's status as one of the five 'Principal Urban Areas' in the East Midlands.

4.6 PROBLEMS AND ISSUES SUMMARY

4.6.1 The construction of the LEB Preferred Option would support the alleviation of these existing and future problems by the removal of unnecessary through traffic from Lincoln. The subsequent 'locking-in' of these benefits for Lincoln city centre will allow the national, regional and sub regional aspirations for the LPA to be achieved and support the introduction of modal alternatives and demand management measures.

4.7 SCHEME OUTCOMES

4.7.1 Outcomes can be defined as intended changes to transport which would result from a scheme being introduced over a period into the future. As with the problems and objectives, a range of desired outcomes were developed as part of the LTS and agreed by the study partners.

4.7.2 As the LEB is the catalyst for the successful delivery of the LTS, it is considered that it would contribute to the delivery of each of the LTS outcomes as detailed below.

Outcome 1: A reduction of 'through trips' within the urban area, particularly:

- Trips passing through Lincoln city centre
- HGV trips

Outcome 2: A reduction in the modal share for the private car for:

- Trips into Lincoln city centre
- Trips on the 'school run'

Outcome 3: A reduction in the impact of car trips resulting from development

Outcome 4: An improvement in air quality within the urban area (particularly the AQMA within central Lincoln)

Outcome 5: An increase in public transport trips into and through the city centre

Outcome 6: A reduction in accidents and casualties, particularly:

- Involving vulnerable road users
- In locations significantly used by children
- At sites with known accident issues

Outcome 7: The provision of appropriate parking options for all users of the city centre

Outcome 8: Sufficient freedom of movement for all modes to and within the Lincoln Policy Area

Outcome 9: An increase in levels of walking & cycling within the Lincoln Policy Area, particularly:

- Parents and children travelling to and from school
- Short trips of less than two miles
- Trips into the city centre

Outcome 10: An improvement in the liveability quality of Life within the Lincoln Policy Area

Outcome 11: An improvement in air quality and a reduction in noise levels caused by traffic (particularly for sensitive receptors such as schools, hospitals and Lincoln's historic core)

Outcome 12: An increase in the vitality of Lincoln as a sub-regional centre by encouraging trips for tourism, leisure, business and shopping

Outcome 13: A city that operates effectively for trade and service vehicles

Outcome 14: The provision of appropriate access to development sites with minimised impact of increased traffic on the local area

Outcome 15: The protection of the historic environment from traffic impacts

Outcome 16: The Sub-Regional Strategy and Growth Point Agenda delivered by 2026

5 THE STRATEGIC CASE – POLICY FIT

5.1 INTRODUCTION

5.1.1 As stated within the DfT's guidance, the strategic element of the business case is required to demonstrate how the scheme is consistent with, and will contribute to local, regional and possibly national objectives in transport and other relevant policy areas.

5.1.2 It is expected by the DfT that a promoted scheme should demonstrate how it would enhance the objectives of the LTP or the wider objectives of the promoting authority, such as regeneration and social inclusion. The strategic case should be explicit about how the scheme would help deliver the LTP targets and to what extent targets could be enhanced were the scheme to be implemented.

5.1.3 The strategic case also needs to show how the objectives of the scheme align with the strategies of regional Government, notably the Regional Transport Strategy (RTS) and the RSS.

5.1.4 Where appropriate, The Strategic Case should also demonstrate how the scheme objectives align other transport delivery agencies plans and objectives and non-transport objectives such as housing, economic development and regeneration.

5.1.5 The objectives of the LEB have been assessed against the objectives of a range of pertinent local, regional and national strategies. The remainder of this chapter therefore represents the 'strategic fit' of the LEB Preferred Option with these strategies and is structured as follows:

- Local Policy
- Regional Support
- Regional Policy
- National Policy

5.1.6 A commentary of the 'strategic fit' of the Next Best / Lower Cost Alternative is provided at the end of this chapter.

5.1.7 For the purposes of the strategic appraisal a three point scale has been used to represent 'a positive contribution', 'a neutral contribution' and 'a negative contribution' as illustrated below:


Positive Contribution
Neutral Contribution
Negative Contribution

5.2 LOCAL POLICY

5.2.1 The following sections provide an overview of how the objectives of the LEB align with the following pertinent local policy documents and strategies:

- Local Transport Plan 2 (LTP2)
- Longer Term Vision for Lincolnshire
- Local Plans

5.3 LOCAL TRANSPORT PLAN 2 (LTP2)

5.3.1 The LTP process allows local authorities to establish transport priorities over a five year timeframe. It sets out how government funds allocated to authorities for transport are to be spent and sets targets against which the performance of the authority in question can subsequently be measured. At a local level the LTP is therefore the most important transport policy document.

5.3.2 Within the LTP document authorities are expected to define the schemes which they intend to promote and deliver through their block allocation of funds over the 5 year LTP period. Local authorities are also invited to include in their LTP's broad details of priority major schemes (those with capital costs >£5m and are not deliverable through the block allocation) that they intend to submit for funding approval during the LTP period. LTP's should include information on the likely benefits, the cost and delivery timetable of any major schemes while a more comprehensive Value for Money appraisal should be included within a business case submission to the DfT.

5.3.3 From a regional perspective, the LTP both informs and is informed by the pertinent RTS. The strategic 'fit' of the scheme within the regional context is discussed further in sections 5.10 to 5.13 of this chapter.

5.3.4 The LEB was promoted as LCC's priority major scheme within LTP period 1 (2000-'01 to 2005-'06). LCC has maintained their commitment to the delivery of the LEB within LTP period 2 (2005-'06 to 2010-'11).

5.3.5 The LEB was therefore acknowledged as a key component of the strategies set out in both LTPs and its subsequent promotion within period 2 demonstrates the strategic importance of delivering the LEB to LCC and the East Midlands.

5.3.6 In order to demonstrate the strategic 'fit' of the LEB with the current LTP, a qualitative appraisal of its synergy with the transport objectives for this period is included within **Table 5.1**. These objectives have been developed by LCC to achieve the longer term vision for transport and have been derived through consultation with stakeholders, other organisations and the public.

LCC LTP2 OBJECTIVE	QUALITATIVE COMMENTARY	IMPACT
To assist the sustainable economic growth of Lincolnshire and the East Midlands region through improvements to the transport network	The LEB contributes to the sustainable economic growth of the local and regional economy through improving journey times and journey time reliability on the strategic network for all users. It would also make a substantial contribution to meeting the potential longer term targets for the strategic urban expansion of Lincoln and delivering the Regional housing targets specified within the RSS and supported by the Growth Point Agenda. The implementation of the LEB will also provide the opportunity to deliver more sustainable transport measures in the future. It will remove traffic from key radial routes and the city centre providing the opportunity to introduce the bus priority measures, improved non-motorised user facilities and other demand management measures identified within the LTS.	**POSITIVE**
To increase public transport usage by improving: • **The quality of vehicles and infrastructure** • **The reliability, frequency and journey times of service** • **Bus / rail integration**	The removal of traffic from key radial routes and the city centre would provide quicker and more reliable journey times for existing public transport services, improving their efficiency. In the longer term the LEB, as defined in the LTS, would act as a catalyst to support the implementation of QBCs and an attractive Park & Ride system. It is the intention that additional road space resulting from the removal of traffic would be reallocated to public transport services.	**POSITIVE**
To improve access to key services by widening travel choices, especially for those without access to a car	Removing traffic from the city centre and radial routes would enable quicker and more reliable journey times for public transport, making it a more attractive option for those without access to a car. In the longer term the LEB, as defined in the LTS, would act as a catalyst to support the implementation of QBC and an attractive Park & Ride system. It is the intention that additional road space resulting from the removal of traffic would be reallocated to public transport services therefore further improving access for those without a car and improving severance issues currently experienced within the city centre. In addition, the provision of dedicated non-motorised user facilities along the length of the LEB with links to existing facilities will help to improve travel choice.	**POSITIVE**

LCC LTP2 OBJECTIVE	QUALITATIVE COMMENTARY	IMPACT
To make travel for all modes safer and, in particular, reduce the number and severity of road casualties	The LEB would result in accident savings as reported within the Value for Money appraisal. Significant levels of traffic would reassign to a higher standard of road. In addition the removal of traffic from key radial routes and the city centre would reduce existing non-motorised user / vehicle conflicts.	**POSITIVE**
To remove unnecessary HGVs from affected communities by: • **Appropriate traffic management measures** • **Highway improvements** • **Encouraging the use of alternative modes of transport**	The LEB will provide an alternative route for HGVs that currently travel through the centre of Lincoln and on key radial routes with property frontage. This will significantly improve the efficiency of these movements for the haulage industry and also remove the negative impacts experienced by local residents and communities such as severance, noise, air quality, the visual impact of high sided vehicles and safety concerns.	**POSITIVE**
To maintain the transport system to standards which allow safe and efficient movements of people and goods	The LEB would improve highway transport infrastructure for strategic journeys and thus facilitate the efficient movement of people and goods. As the LEB would be constructed to contemporary standards, current issues associated with historic, narrow streets would be alleviated. The reassignment of high levels of traffic to a safer part of the network will result in accident savings and reduce vehicle conflicts on key radials and in the city centre.	**POSITIVE**
To protect and enhance the built and natural environment of the County by reducing the impacts of traffic	The LEB would improve noise and air quality issues currently affecting the city centre, key radials with significant property frontage and the AQMA on the A15. However, the overall effect of land take and construction of a new route would have an adverse impact on the environment and natural resources. This would, where possible, be limited by the extensive mitigation proposals identified within the Environmental Statement produced in support of the planning application for the scheme and developed through dialogue with statutory environmental stakeholders.	**NEGATIVE**

LCC LTP2 OBJECTIVE	QUALITATIVE COMMENTARY	IMPACT
To improve the quality of public spaces for residents, workers and visitors by creating a more attractive and accessible environment	The removal of traffic from the key radials and key parts of the city centre such as the A15 at Broadgate will reduce severance and improve accessibility for residents, visitors and workers. In addition the removal of traffic will also significantly improve noise and air quality levels throughout the city centre. Traffic reductions in Lincoln's historic core will also improve the environment for over 3 million tourists who annually visit Lincoln's castle and cathedral.	**POSITIVE**
To enhance air quality, particularly within declared Air Quality Management Areas	As identified the introduction of the LEB will remove significant levels of HGVs and other traffic from the city centre and enhance air quality, particularly in the AQMA, designated along the A15.	**POSITIVE**

Table 5.1 – Strategic 'fit' with Lincolnshire's LTP2 Objectives

5.3.7 As identified within LTP2, the LEB falls on the key north-south strategic route within the County. It is directly referenced as the County's priority major scheme for development during the plan period and is identified as reducing congestion by removing through traffic from key corridors in the city.

5.3.8 The LTS, as referenced within the LTP2, recognises the LEB as the catalyst for facilitating the key benefits associated with the overall strategy through enabling the transfer of strategic through traffic from key routes within the city centre. The subsequent relocation of road space is identified as providing the opportunity to reclaim the city centre for the benefit of the public realm and supporting improved public transport infrastructure and facilities for non-motorised users, thus increasing accessibility and options for travel.

5.3.9 In summary, this section has demonstrated that the LEB exhibits an excellent strategic 'fit' with LCC's LTP2 key objectives and aspirations. The scheme is acknowledged as a key component of the strategies set out in the document and the subsequent promotion of the scheme within period 2 demonstrates the strategic importance of its delivery to LCC and the East Midlands Region.

5.4 A LONGER TERM VISION FOR LINCOLNSHIRE

5.4.1 In addition to the objectives discussed above, the LTP2 also includes longer term aspirations for transport within the county. '**A Longer term Vision for Lincolnshire**' establishes priorities for the local transport network up to 2030.

5.4.2 The Longer Term Vision for Lincolnshire shows the authority working towards the following objectives for the transport system by 2030:

- A well managed and safe road network to maximise the reliability of journeys and reduce the impact of traffic on communities
- Good inter and intra-regional access to support a growing economy
- Streets in built-up areas are seen primarily as places where people can carry on their activities in a pleasant environment
- Sensitive rural areas are managed in ways that retain, and where possible enhance, the value of the natural environment

- Good access by a choice of modes to services, jobs and for leisure within Lincolnshire

5.4.3 **Table 5.2** provides a qualitative appraisal of the contribution of the LEB to delivering Lincolnshire's longer term aspirations. As such it demonstrates that the LEB has a strong strategic fit with the future aspirations for transport within Lincolnshire.

LONGER TERM VISION FOR LINCOLNSHIRE IN 2030	QUALITATIVE COMMENTARY	IMPACT
There is a well managed and safe road network to maximise the reliability of journeys and reduce the impact of traffic on communities	The LEB would result in accident savings as reported within the Value for Money appraisal. Significant levels of traffic would reassign to a higher standard of road, In addition the removal of traffic from key radial routes and the city centre would reduce existing non-motorised user / vehicle conflicts. As reported in the Value for Money appraisal the LEB would also result in significant journey time savings and improve reliability.	**POSITIVE**
There is good inter and intra-regional access to support a growing economy	The LEB facilitates better access for intra- and inter-regional movement. It would improve north / south movements in one of the East Midlands Principal Urban Areas, and for traffic originating in the East / West Midlands, East Anglia and South Yorkshire it would facilitate improved access to the Humber Ports and East Coast tourist destinations such as Skegness. Journey time improvements and reliability improvements would support a growing economy.	**POSITIVE**
Our streets in built-up areas are seen primarily as places where people can carry on their activities in a pleasant environment	Many communities along key radial routes within Lincoln would benefit from the LEB and associated removal of traffic. This would reduce the conflict in the built up areas associated with through traffic and provide a more pleasant environment in which to live and work. Traffic reductions in Lincoln's historic core will also improve the environment for over 3 million tourists who annually visit Lincoln's castle and cathedral.	**POSITIVE**
Our sensitive rural areas are managed in ways that retain, and where possible enhance, the value of the natural environment	The LEB would improve noise and air quality issues currently affecting the city centre, key radials with significant property frontage and the AQMA on the A15. However, the overall effect of land take and construction of a new route would have an adverse impact on the environment and natural resources. This would, where possible, be limited by the extensive mitigation proposals identified within the Environmental Statement produced in support of the planning application for the scheme and developed through dialogue with statutory environmental stakeholders.	**NEGATIVE**

LONGER TERM VISION FOR LINCOLNSHIRE IN 2030	QUALITATIVE COMMENTARY	IMPACT
There is a good access by a choice of modes to services, jobs and for leisure within Lincolnshire	Removing traffic from the city centre and radial routes would enable quicker and more reliable journey times for public transport, making it a more attractive option for those without access to a car. In the longer term the LEB, as defined in the LTS, would act as a catalyst to support the implementation of QBCs and an attractive Park & Ride system. It is the intention that additional road space resulting from the removal of traffic would be reallocated to public transport services therefore further improving access for those without a car. In addition, the provision of dedicated non-motorised user facilities along the length of the LEB with links to existing facilities will help to improve travel choice.	**POSITIVE**

Table 5.2 – Strategic 'fit' with the Longer Term Vision for Lincolnshire in 2030

5.4.4 The LEB exhibits a strong strategic 'fit' with the longer term aspirations of Lincolnshire as identified within the LTP2. This provides the evidence that along with facilitating short term transport objectives within the LTP2 period, the LEB supports the longer term strategy to deliver sustainable growth.

5.5 LOCAL PLANS

5.5.1 The strategic fit of the LEB with the following Local Plans has been undertaken.

- North Kesteven District Local Plan
- West Lindsey Local Plan
- City of Lincoln Local Plan

5.5.2 It is acknowledged as part of this assessment that as a result of the changes to the national planning system introduced through the Planning and Compulsory Purchase Act 2004, the status of the above documents as the adopted Development Plan for both authorities will be superseded by the pending introduction of Local Development Frameworks.

5.5.3 LCC and Partner Authorities have recently agreed to produce a Joint Core Strategy for the LPA as part of the Local Development Framework process. However, in the absence of this document the above Local Plans continue to provide the adopted policy for the LPA. In addition, as reported within chapter 1 of the business case, LCC and its Partner Authorities signed a Memorandum of Understanding in October 2003 to work together to promote the delivery of the LEB. This reflects the strategic importance of the scheme in supporting the delivery of the local policy aspirations.

5.6 NORTH KESTEVEN DISTRICT LOCAL PLAN

5.6.1 The North Kesteven Local Plan considers the LEB to be of crucial importance to the resolution of transport problems in the LPA. As a result Policy T7 from the Local Plan Revised Deposit Draft 2003 states that planning permission will not be granted for developments that would hinder the construction and operation of the LEB, as the route is safeguarded. This document is the most

recent available for North Kesteven as the adopted Local Plan 2007 is currently subject to a legal challenge.

5.6.2 Due to the direct 'policy' support for the LEB within the Local Plan, a strong strategic 'fit' with this part of the Development Plan has also been demonstrated.

5.7 WEST LINDSEY LOCAL PLAN

5.7.1 The West Lindsey Local Plan identifies the LEB as a key development option in order to accommodate growth in the main urban centre for Lincolnshire. Thus, Policy Econ 13 states that planning permission will not be granted for development proposals which will prejudice the implementation of the road scheme. It also states that the construction of the scheme is a fundamental measure required to achieve the increased regional importance of the Lincolnshire economy as set out in the RSS. This is re-enforced in Policy Strat 1, which also sets the LEB as fundamental to Lincolnshire long term development

5.7.2 As a result of the direct 'policy' support for the LEB within the West Lindsey Local Plan, a strong strategic 'fit' with this part of the Development Plan has also been demonstrated.

5.8 CITY OF LINCOLN LOCAL PLAN

5.8.1 The City of Lincoln Local Plan was adopted in August 1998. The Local Plan contains the land use policies to underpin proposals contained within the LTP which directly involve the development or use of land, or which may otherwise have land use implications. The policies and proposals are rooted in the principles of sustainable transport, accessibility, modal choice and safety as are policies of the Local Plan which are dependent on the sequential approach to the release of land for development (especially those for new housing allocations, shopping and leisure development).

5.8.2 The City of Lincoln Local Plan supports the LEB as it falls in to the category of a 'missing link' scheme which involves the construction of new roads which will reduce traffic congestion and pollution and take traffic away from more sensitive areas (e.g. city centre, historic core). The Local Plan states that it would enable:

- Through traffic (particularly HGV traffic) to be removed from the city centre and residential and mixed use areas adjacent to radial routes
- The reduction of environmental damage caused by excessive traffic, especially in historic streets and other sensitive areas
- Improved access to commercial and other industrial areas to the east of the city thus stimulating regeneration and economic development
- The removal of 'through traffic' from the upper High Street area thereby strengthening retail and other links between the historic core, the Top-of-High Street and the central shopping core

5.8.3 As a result of the direct 'policy' support for the LEB within the City of Lincoln Local Plan, a strong strategic 'fit' with this part of the Development Plan has also been demonstrated.

5.9 REGIONAL SUPPORT

5.9.1 A key element of the regional planning is the RFA process. In order to promote a strong regional emphasis and agenda, the Government requests advice from the regions, concerning their major scheme transport priorities.

5.9.2 Identification of priorities at a regional level is intended to enable the creation of a coherent, credible and strategic vision for improving the economic performance of regions and will help to promote 'Regional Intelligence'.

5.9.3 Regional support for the LEB was recently confirmed as part of round 2 of the RFA process. The LEB was identified by the East Midlands Regional Development Agency (EMDA) and Regional Assembly as part of the Preferred Investment Package for the East Midlands with funding allocated for 2013 onwards. The LEB can therefore be viewed as having strong regional support for the delivery of the scheme and associated benefits.

5.10 REGIONAL POLICY

5.10.1 The following sections provide an overview of how the objectives of the LEB align with the following pertinent regional policy documents and strategies:

- East Midlands Regional Plan
- Regional Transport Strategy
- Eastern Sub Area Objectives

5.11 EAST MIDLANDS REGIONAL PLAN (RSS8) – MARCH 2009

5.11.1 The East Midlands Regional Plan (RSS8) was adopted in March 2009 and provides a broad development strategy for the East Midland up to 2026. It also represents the spatial element of the East Midlands Integrated Regional Strategy.

5.11.2 The Regional Plan identifies the scale and distribution of the provision for new housing and priorities for the environment, transport, infrastructure, economic development, agriculture, minerals and waste treatment and disposal.

5.11.3 The following sections provide commentary of how the delivery of the LEB would support the policy aspirations contained within the RSS.

RSS Policy 1 – Core Objectives

5.11.4 RSS Policy 1 identifies the Regional Core Objectives for the East Midlands. The aim of these objectives is to deliver sustainable development within the East Midlands. These Core Objectives are shown below:

- To ensure that the existing **housing** stock and new affordable and market housing address need and extend choice in all communities in the region
- To reduce **social exclusion**
- To protect and enhance the **environmental quality** of urban and rural settlements
- To improve the **health** of the Region's residents
- To improve **economic prosperity**, employment opportunities and regional competitiveness
- To improve **accessibility** to jobs, homes and services
- To protect and enhance the **environment**

- To achieve a 'step change' increase in the level of the Region's **biodiversity**
- To reduce the causes of **climate change**
- To **minimise adverse environmental impacts of new development** and promote optimum social and economic benefits

5.11.5 The LEB can be seen to provide a positive contribution to the majority of the RSS Core Objectives. This is discussed below.

Housing

5.11.6 The LEB will help to unlock the development potential of land to the north east and south east of Lincoln for new housing. These developments are supported within the RSS and their delivery will contribute significantly towards the regional housing targets. The introduction of the LEB will remove traffic from strategic routes within Lincoln and improve access to key sites allocated for development as part of future growth aspirations as one of the regions Principal Urban Areas.

Social Exclusion

5.11.7 The benefits associated with the LEB will be wide ranging and will support policies aimed at social exclusion by providing a number of direct and indirect benefits for all parts of the community in the LPA. All users of the existing highway network will benefit from reduced congestion and improved journey times and the implementation of the route will provide improved access to jobs and opportunities for new employment.

5.11.8 As previously identified, although no additional public transport services are included in the scheme, there will indirect benefits in terms of more reliable and shorter journey times for existing public transport users into Lincoln. The LEB will also reduce severance with Lincoln city centre which is the focal point of the local community. As a result this will provide benefits for those members of the local community without access to the private car.

5.11.9 As identified within the LTS, the LEB would also support the potential delivery of QBCs and Park & Ride sites.

To protect and enhance the environmental quality of urban and rural settlements

5.11.10 The removal of traffic from the key radials and key parts of the city centre such as the A15 at Broadgate will result in improvements to the quality of the built environment and also to the quality of the environment within urban areas. In addition, the removal of traffic will also significantly improve noise and air quality levels throughout the city centre. Traffic reductions in Lincoln's historic core will also improve the environment for over 3 million tourists who annually visit Lincoln's castle and cathedral. The removal of high sided HGVs will also result in noise, air quality and visual benefits.

To improve the health of the Region's residents

5.11.11 Improvements to air quality levels on key radial routes and within Lincoln's city centre, part of which is designated as an AQMA, will support improvements to the health of the Region's residents. Segregated facilities for pedestrians and cyclists would be provided alongside the LEB, and links would be made to a large number of existing non-motorised user routes (including SUSTRANS routes). These improvements should encourage walking and cycling, and hence improve the physical fitness of the local

population. Reductions in traffic as a result of the scheme would also encourage walking and cycling on key radial routes and in the city centre resulting in further health benefits. The scheme would also support the delivery of additional future benefits through enabling the reallocation of road space in the LPA to more sustainable modes.

To improve economic prosperity, employment opportunities and regional competitiveness

5.11.12 As identified within **Chapter 7**, when appraised against DfT Value for Money criteria the LEB is shown to represent High Value for Money to the national and regional economy. It will open up development opportunities to the north east and south east of Lincoln and encourage investment. It is anticipated that its introduction will improve access to employment opportunities. In addition, the removal of through traffic from the city centre will also support the local business, retail and tourist economies. Journey time savings on the regional strategic network will also improve the productivity and efficiency of the regional economy.

To improve accessibility to jobs, homes and services

5.11.13 It is anticipated that the introduction of the LEB will improve access to jobs and new employment opportunities. Through the reduction in existing levels of congestion and providing opportunities to reallocate road space for public transport and non-motorised user facilities, the LEB will also deliver additional options for travel and support accessibility to the city centre and the LPA in general.

To protect and enhance the environment

5.11.14 The environmental impacts and benefits of the scheme are discussed in detail within **Chapter 8** of this document. This reveals that the scheme will deliver environmental benefits for Noise, Air Quality, Greenhouse Gases, Physical Fitness and Journey Ambience. However, the overall effect of land take and construction of a new route would have an adverse impact on the environment and natural resources. This would, where possible, be limited by the extensive mitigation proposals identified within the Environmental Statement produced in support of the planning application for the scheme and developed through dialogue with statutory environmental stakeholders.

To achieve a 'step change' increase in the level of the Region's biodiversity

5.11.15 The LEB has been appraised as having a slight adverse impact on the Region's biodiversity. Where possible impacts will be limited through the application of mitigation measures developed as part of the Environmental Statement.

To reduce the causes of and impacts of climate change

5.11.16 The implementation of the LEB will provide the opportunity to deliver more sustainable transport measures in the future. It will remove traffic from key radial routes and the city centre providing the opportunity to introduce the bus priority measures, improved non-motorised user facilities and other demand management measures identified within the LTS.

5.11.17 The removal of traffic from the city centre as a result of the LEB will have a positive impact on local air quality, particularly within the AQMA.

To minimise adverse environmental impacts of new development and promote optimum social and economic benefits

5.11.18 The LEB will provide the opportunity for the redevelopment of Brownfield sites and the delivery of proposed sustainable urban extensions supported within the RSS. As identified it will also improve access to jobs and deliver benefits for all members of the community within the LPA.

RSS Policy 3 – Distribution of New Development

5.11.19 RSS Policy 3, Concentrating Development in Urban Areas states that:

"New development will be concentrated primarily in and adjacent to the Region's five Principal Urban Areas, the five Principal Urban Areas are the built up areas centered on Derby, Leicester, Lincoln, Northampton and Nottingham"

5.11.20 The LEB is seen as a major component for unlocking significant potential within key development sites to the south and east of the Lincoln city centre which is identified as a Principal Urban Areas within the East Midlands. Development sites include the North East Quadrant (NEQ) and the South East Quadrant (SEQ) and as such the scheme can be viewed as providing a strong strategic fit with Policy 3 of the RSS.

RSS Policy 4 – Development in the Eastern Sub-area

5.11.21 RSS Policy 4, Development in the Eastern Sub-area states that:

"Development in the Eastern Sub-area should:

- *Significantly strengthen the role of Lincoln as one of the Region's five Principal Urban Areas in accordance with the policies and proposals in Part 2 of the regional plan*
- *Ensure that the agreed Growth Point Programmes of Delivery at Lincoln and Grantham are achieved both in overall numbers of dwellings and in the agreed phasing of development"*
- *Continue to promote sustainable tourism in historic settlements, including Lincoln and Stamford"*

5.11.22 As stated above, the LEB will unlock significant potential for development to the north east and south east Lincoln city centre thus significantly contributing to the economic growth aspirations within the Eastern Sub-Area and further strengthening Lincoln's role as one of the Region's five Principal Urban Areas in the East Midlands. The LEB will also protect and enhance the tourist economy within Lincoln and support the delivery of the Government's Growth Point agenda. As such the LEB is considered to have a robust policy fit with RSS Policy 4.

RSS Policy 6 – Overcoming Peripherality in the Eastern Sub-area

5.11.23 RSS Policy 6, Overcoming Peripherality in the Eastern Sub-area states that:

"Peripherality and lack of accessibility in the central and eastern part of the sub-area should be addressed through:

- *A programme of infrastructure improvements that concentrates on public transport and road improvements in existing key transport corridors*
- *Improved connections both between the region and its ports and between its ports and mainland Europe; and improvements to its telecommunications networks*

- *Multi-modal accessibility improvements both within and beyond the sub-area"*

5.11.24 Within the Eastern Sub-area of the East Midlands the A15 is the primary north-south route between Humberside and Peterborough, passing through the centre of Lincoln. It uses the only crossing of the River Witham to the east of the city for some 18 miles. A western relief road was constructed in 1985 but this does not connect the A15 to the south of the city. As a consequence strategic traffic has little option but to use the A15 and pass through Lincoln city centre. This results in frequent delays and traffic congestion. In addition the heavy traffic results in severance and safety issues, with pedestrians finding crossing the A15 difficult.

5.11.25 The LEB would provide an additional river crossing allowing strategic traffic on the A15 to bypass Lincoln city centre thus providing significant improvement to the key north / south and east / west strategic corridors within the Eastern Sub-area. This in turn would improve access to the wider trunk road network thus facilitating movements to the Humber ports and the Trans European network.

5.11.26 The removal of strategic traffic from the city centre and key radials will release road space resulting in less congested routes in to the centre of Lincoln with more reliable journey times which will facilitate potential opportunities for future Park & Ride and QBCs servicing the city centre.

5.11.27 The removal of traffic from the city centre and on the key radials will also have significant severance benefits through the removal of conflicts between non-motorised users and vehicular traffic. As a result of the above evidence, the LEB is considered to have a robust policy fit with RSS Policy 6.

Summary

5.11.28 Based on the information provided above, the LEB can be seen to provide a strong 'policy fit' and contribution to the wider outcomes and objectives of the RSS as detailed within Policy 1 (Core Objectives) and Policies 3, 4 and 6.

5.11.29 In addition to the 'strategic fit' with the wider policy outcomes of the RSS the LEB is also specifically identified as a Sub-Area Transport Investment Priority within Appendix 6 of the RSS.

5.12 REGIONAL TRANSPORT STRATEGY (RTS)

5.12.1 **Table 5.3** provides a qualitative commentary of how the LEB will support the transport objectives included within the RTS.

REGIONAL TRANSPORT STRATEGY OBJECTIVES	QUALITATIVE COMMENTARY	IMPACT
1) To support sustainable development in the Region's Principal Urban Areas, Growth Towns and Sub-Regional Centres described in Policy 3	As part of the Growth Point Agenda, over the next 10 years and beyond, Lincoln will expand its role as the Principal Urban Areas in the County by delivering a fundamental change in the level of housing and economic growth in the city and wider area, principally through the development of a series of key sites in and around the city. This includes providing the necessary infrastructure and local services to support a growing population as well as linking housing growth aspirations with economic development priorities. As part of Lincolnshire's vision for sustainable growth the LEB is seen as a major component for unlocking the potential of two of Lincoln's strategic development areas namely, the NEQ and the SEQ which have a combined capacity of well over 5,000 dwellings.	**POSITIVE**
2) To promote accessibility and overcome peripherality in the Region's rural areas	The LEB will improve accessibility to central Lincoln and surrounding areas: • By improving links to the strategic road network • By releasing road space for possible improvements to public transport facilities • By providing an additional river crossing • By improving journey times on key radial routes • By improving journey times for through traffic travelling between areas to the north and south of the city avoiding the city centre In addition, the removal of traffic from key radials and through the city centre will result in severance benefits by reducing conflicts between non-motorised users and vehicular traffic.	**POSITIVE**
3) To support the Region's regeneration priorities outlined in Policy 19	The LEB would support the regeneration priorities within the LPA by facilitating development to the east of Lincoln (particularly the NEQ and nearby estates) and supporting the long term strategic urban expansion of Lincoln. It is also anticipated that its introduction will improve access to additional jobs. The NEQ and nearby estates would benefit from increased provision of affordable housing whilst the removal of through traffic from key radials into Lincoln city centre will provide opportunities for more reliable, public transport thus improving the environment for pedestrians and cyclists. The removal of through traffic from the city centre will also support the local business and retail community as well as the large local tourist economy. Journey time savings on the regional strategic network will also improve productivity and efficiency.	**POSITIVE**

REGIONAL TRANSPORT STRATEGY OBJECTIVES	QUALITATIVE COMMENTARY	IMPACT
4) To promote improvements to inter-regional and international linkages that will support sustainable development within the Region	The LEB will provide significant improvements and benefits to the strategic road network within the region and unlock the considerable potential for sustainable development to the east of Lincoln (NEQ and the SEQ). North / south movements within Lincolnshire's key strategic corridor will be improved as through traffic will be able to bypass the congested city centre. East / west movements will also be improved by providing a link to the A158 to Skegness and the coast. The improvements to Lincolnshire's key strategic corridors would provide a reliable and effective transport link between the Principal Urban Areas in the East Midlands and also improve accessibility to the only two ports within the East Midlands region (Boston and Sutton Bridge).	**POSITIVE**
5) To improve safety across the Region and reduce congestion, particularly within the Region's Principal Urban Areas and on major inter-urban corridors	Through reducing the level of unnecessary through traffic in Lincoln, the LEB would reduce conflicts between motorised and non-motorised users and therefore reduce the likelihood of accidents in the city centre. Reassignment of traffic to a higher standard of route is also likely to reduce existing accident levels. Additionally, the provision of segregated cycle and pedestrian facilities on the LEB would further reduce the potential for accidents.	**POSITIVE**
6) To reduce traffic growth across the Region	Traditionally movements within the LPA are heavily dependant upon on the private car and this is acknowledged within the RSS. The introduction of the LEB will however act as a catalyst for the introduction of viable QBCs and Park & Ride Facilities through the removal of traffic congestion from the city centre and from key radial routes to and from Lincoln as detailed previously. In addition, the removal of traffic, particularly HGV's, from the city centre will result in reduced conflict between non-motorised users and vehicular traffic thus creating a more attractive environment for non motorised users and potential for a move away from the use of private vehicles for shorter journeys within the city centre.	**POSITIVE**

REGIONAL TRANSPORT STRATEGY OBJECTIVES	QUALITATIVE COMMENTARY	IMPACT
7) To improve air quality and reduce carbon emissions from transport by reducing the need to travel and encouraging modal shift away from the private car, particularly towards walking, cycling and public transport and away from road based freight transport	Air Quality in some parts of Lincoln is poor; this has resulted in an AQMA being declared in the central area. This includes the A15 Broadgate and Pelham Bridge. Traffic congestion and queuing in these areas contributes to the poor local air quality. The removal of traffic from the city centre as a result of the LEB will have a positive impact on local air quality, particularly within the AQMA. There are no specific interventions to encourage modal shift away from the private car to public transport. However the removal of traffic from the congested areas of the city centre and key radials as a result of the LEB are seen as a catalyst for potential future public transport improvements in the form of QBCs and Park & Ride. The LEB will incorporate non-motorised user facilities (pedestrian and cyclist) along its length which will link to existing facilities including the SUSTRANS network. These facilities may encourage modal shift away from the private car for short journeys within the eastern area of Lincoln. In addition the removal of traffic from the city centre and key radials into Lincoln will remove vehicular / non-motorised user conflicts thus improving the overall environment for non-motorised users.	**POSITIVE**

Table 5.3 – LEB Appraisal Against Regional Transport Objectives

5.12.2 It can be seen from **Table 5.3** that the LEB exhibits a strong strategic 'fit' within the context of the RTS Objectives.

5.13 EASTERN SUB-AREA TRANSPORT STRATEGY

5.13.1 Within the RTS the 6 Regional Transport Objectives considered above have been refined into 26 more specific sub-area objectives. It is therefore important to consider the LEB in terms of the 6 objectives identified for the Eastern Sub-Area. A qualitative assessment of the LEB against the 6 Eastern Sub-Area objectives is provided within **Table 5.4**.

EASTERN SUB-AREA TRANSPORT OBJECTIVES	QUALITATIVE COMMENTARY	IMPACT
E1) To develop the transport infrastructure, public transport and services needed to support Lincoln's role as one of the region's five Principal Urban Areas in a sustainable manner	As demonstrated within this document, the LEB is considered to be a key component of the delivery of the LTS and is identified as a necessary infrastructure improvement to support Lincoln's role as one of the region's five Principal Urban Areas.	**POSITIVE**

EASTERN SUB-AREA TRANSPORT OBJECTIVES	QUALITATIVE COMMENTARY	IMPACT
E2) To develop opportunities for modal switch away from road based transport in the nationally important food and drink sector	There are no direct benefits associated with the potential for a modal switch away from road based traffic in the food and drinks sector. The LEB would however provide significant benefits in terms of removing strategic heavy traffic from the centre of Lincoln on to higher standard more appropriate routes. As detailed previously this would improve journey time reliability through diverting traffic away from unsuitable congested routes which in turn would benefit national distribution within the food and drink sector. The LEB would not directly contribute towards shifting freight to alternative modes. However it would provide an important strategic link to the east of Lincoln improving the Primary / Trans-European Road Network, thus reducing the effect of freight traffic on affected communities. It would also support the introduction of a freight terminal to the east of Lincoln which is currently being considered by the County Council. Overall the assessment has been deemed Neutral owing to the absence of direct benefit associated with potential modal switch for the food and drink sector.	**NEUTRAL**
E3) To make better use of the opportunities offered by existing ports, in particular Boston, for all freight movements, and improving linkages to major ports in adjacent Regions such as Grimbsy, Immingham and Felixstowe	There are no specific proposals to make better use of the opportunities offered by ports both within and outside the region. However the LEB will have significant benefits to Region's strategic road network which will in turn benefit freight movements in general. Reducing congestion within Lincoln, improving links with the primary and strategic road network and improving journey time reliability for long distance strategic traffic will strengthen the ability of the regions strategic road network to deliver freight to ports. The improvements to Lincolnshire's key strategic corridors would also improve accessibility to the only two ports within the East Midlands region (Boston and Sutton Bridge).	**POSITIVE**
E4) To improve access to the Lincolnshire Coast, particularly by public transport	The LEB will have significant benefits for strategic traffic travelling from the south of the city to the east coast by providing a highway link to the A158 Wragby Road which bypasses the congested areas of the city centre. The LEB will not directly improve access to the Lincolnshire coast by public transport, however the benefits associated the removal of traffic from the centre of Lincoln and key radials will unlock the potential for associated public transport improvements including QBCs and Park & Ride. These facilities could in turn provide the opportunity for modal shift away from the private car to public transport as a more viable alternative.	**POSITIVE**

EASTERN SUB-AREA TRANSPORT OBJECTIVES	QUALITATIVE COMMENTARY	IMPACT
E5) To reduce peripherality, particularly to the east of the A15, and overcoming rural isolation for those without access to the private car	The LEB will help to help to reduce peripherality, particularly to the east of the A15 by: • Giving drivers more choice of routes to access or bypass Lincoln • Providing an additional river crossing • Reducing journey times for through traffic travelling between areas to the north and south of the city avoiding the city centre There will be positive impacts within the route corridor through provision of significant non motorised user facilities along the route. These facilities will provide direct access to the SUSTRANS network thus promoting connectivity within the LPA and potential for a shift to non motorised modes for local journeys. In addition there will be indirect benefits associated with the LEB through the removal of traffic from the city centre thus facilitating improvements to the public realm, reallocation of road space for non-motorised users and releasing potential for public transport improvements.	**POSITIVE**
E6) To reduce the number of fatal and serious road traffic accidents	The LEB will improve road safety in central Lincoln and outlying settlements within the LPA by: • By providing an alternative, more direct route between areas to the north and south of the Lincoln avoiding the city centre • By improving linkages between primary route corridors • By reducing conflicts between HGVs, other road users, pedestrians and property Through reducing the level of unnecessary through traffic in Lincoln, the LEB would reduce conflicts between motorised and non-motorised users and therefore reduce the likelihood of accidents in the city centre. Reassignment of traffic to a higher standard of route is also likely to reduce existing accident levels. Analysis undertaken demonstrates that the LEB will provide £3.392m of benefits in terms of accident savings over the 60 year appraisal period. Additionally, the provision of segregated cycle and pedestrian facilities on the LEB would further reduce the potential for accidents along the route corridor.	**POSITIVE**

Table 5.4 – LEB Appraisal Against Eastern Sub-Area Transport Objectives

5.13.2 **Table 5.4** demonstrates that the LEB will deliver significant benefits within the context of policies E1 to E6 of the Eastern Sub-Area.

5.14 NATIONAL POLICY

5.14.1 The following sections provide an overview of how the objectives of the LEB align with the following pertinent national policy documents and strategies:

- Delivering a Sustainable Transport System (DaSTS) – November 2008
- Growth Point Agenda
- Government 30 year Plan
- The Shared Priorities for Transport

5.15 DELIVERING A SUSTAINABLE TRANSPORT SYSTEM (DASTS) – NOVEMBER 2008

5.15.1 The Government report, 'Delivering a Sustainable Transport System' (November 2008) presents the Government's Five Goals for Transport. The goals have been refined since they were first published in the Government document, "Towards a Sustainable Transport System" (October 2007). The Goals for Transport focus upon the challenge of delivering strong economic growth, while at the same time reducing greenhouse gas emissions.

5.15.2 **Table 5.5** provides a qualitative assessment of the LEB against the five key goals contained within DaSTS.

DASTS GOAL	QUALITATIVE COMMENTARY	IMPACT
To support national economic competitiveness and growth, by delivering reliable and efficient transport networks	When appraised against DfT Value for Money criteria the LEB is shown to represent High Value for Money to the national economy. It will open up development opportunities to the east of Lincoln and encourage investment. The removal of through traffic from the city centre will also support the local business and retail community as well as the large tourist economy. Journey time savings on the regional strategic network will also improve productivity and efficiency.	**POSITIVE**
To reduce transport's emissions of carbon dioxide and other greenhouse gases, with the desired outcome of tackling climate change	Although the LEB cannot be considered as a traditional environmentally friendly transport improvement, it will result in reduced CO_2 and other Greenhouse Gas emissions on the transport network in the city centre and the designated AQMAs. When compared to a Do-Minimum Scenario the introduction of the LEB, significantly reduces congestion, improves journey times and removes strategic through traffic from Lincoln's city centre and away from sensitive receptors such as Lincoln's historic core and an AQMA. Although the LEB does not include any specific interventions to encourage modal shift away from the private car to public transport, the reductions of traffic levels on key radials routes and in the city centre will facilitate the introduction of QBCs and Park & Ride as identified within the LTS.	**POSITIVE**

DASTS GOAL	QUALITATIVE COMMENTARY	IMPACT
To contribute to better safety, security and health by reducing the risk of death, injury or illness arising from transport, and by promoting travel modes that are beneficial to health	Through reducing the level of unnecessary through traffic in Lincoln the LEB would reduce conflicts between motorised and non-motorised users and therefore reduce the likelihood of accidents in the city centre. Reassignment of traffic to a higher standard of route is also likely to reduce existing accident levels. Additionally, the provision of segregated cycle and pedestrian facilities on the LEB would further reduce the potential for accidents. Analysis undertaken demonstrates that the LEB will provide accident savings within Lincolnshire which equate to £3.392m in benefit over the 60 year appraisal period.	**POSITIVE**
To promote greater equality of opportunity for all citizens, with the desired outcome of achieving a fairer society	The removal of traffic from the key radials and key parts of the city centre such as the A15 at Broadgate will reduce severance and improve accessibility for residents, visitors and workers. The scheme will also provide greater access to jobs and stimulate economic activity within the LPA. As such the benefits associated within the scheme can be attributed to all parts of society. This is discussed in detail within the supporting analysis section of the Value for Money appraisal. In addition, in the longer term, the LEB, as defined in the LTS, would act as a catalyst to support the implementation of QBCs and an attractive Park & Ride System. It is the intention that additional road space resulting from the removal of traffic would be reallocated to public transport services therefore further improving access for those without a car. In addition, the provision of dedicated non-motorised user facilities along the length of the LEB with links to existing facilities will help to improve travel choice.	**POSITIVE**
To improve quality of life for transport users and non-transport users, and to promote a healthy natural environment	The removal of traffic from the key radials and key parts of the city centre such as the A15 at Broadgate will reduce severance and improve accessibility for residents visitors and workers. In addition the removal of traffic will also significantly improve noise and air quality levels throughout the city centre. Traffic reductions in Lincoln's historic core will also improve the environment for over 3 million tourists who annually visit Lincoln's castle and cathedral. Although the LEB will not directly improve options to travel its introduction will provide opportunities to encourage modal shift away from the private car to public transport. The reductions of traffic levels on key radials routes and in the city centre will facilitate the introduction of QBCs and Park & Ride as identified within the LTS. The removal of unnecessary through traffic from Lincoln city centre will also significantly reduce existing severance levels and provide opportunities to create a more accessible environment by reducing conflicts with private vehicles.	**POSITIVE**

Table 5.5 – LEB Appraisal Against DaSTS Goals

5.15.3 Reference to **Table 5.5** demonstrates that the LEB can be considered to support the delivery of all of the key goals contained within DaSTS. As such it is considered to have a robust policy 'fit' with this key national transport policy document.

5.16 GROWTH POINT AGENDA

5.16.1 Announced in December 2005, the Growth Point initiative is designed to provide support to local communities who wish to pursue large scale and sustainable growth, including new housing, through a partnership with the Government.

5.16.2 The Government invited local authorities to submit strategic growth proposals which were sustainable, acceptable environmentally and realistic in terms of infrastructure to be assessed by Government and its agencies.

5.16.3 On 24 October 2006, 29 local authorities and partnerships across the East, South East, South West, East Midlands, and West Midlands were named as first round Growth Points, commencing a long-term partnership for growth with Government.

5.16.4 Building on the success of the Growth Points, the Housing Green Paper published 23 July 2007 announced the expansion of the Growth Points Programme into a second round, and invited additional local authorities to submit expressions of interest to become part of the 2008/9 programme.

5.16.5 Twenty second round Growth Points, with the collective capability of delivering an additional 75,000 homes above emerging RSS levels, were announced on 16 July 2008.

5.16.6 As part of this government initiative Lincoln has been awarded Growth Point status. In supporting Lincoln as a New Growth Point, the Government is entering into a long-term partnership with the four local authorities (Lincolnshire County Council, City of Lincoln Council, North Kesteven Council and West Lindsey District Council), recognising their ambitions for growth, subject to the statutory regional and local planning process. The four local authorities are working together to regenerate the local economy and have further plans to secure continued growth for the City. Ambitions for Lincoln include:

- A 30 Year vision for a regenerated city centre
- The consolidation and expansion of District Mixed Use Centres
- An additional 9,500 homes at Lincoln by 2016
- Single carriageway access to the NEQ development area
- Regeneration of the city centre and Brownfield sites identified in an urban capacity study
- Promotion of city centre living
- Upgrading the inadequate infrastructure to support further employment growth in Lincoln

5.16.7 Growth Point status for Lincoln will assist partners in the delivery of their ambitions for sustainable growth. Over the next 10 years and beyond, Lincoln will expand its role as the Principal Urban Area in the County by delivering a fundamental change in the level of housing and economic growth in the city and wider area, principally through the development of a series of key sites in and around the city. This will lead to an increase in the number, quality and variety of houses that cater for all requirements; higher population numbers; a larger business base; and a higher quality and quantity of jobs for local

people. This will also be supported by the provision of the necessary strategic green infrastructure.

5.16.8 Fundamental to the success of the Growth Point aspirations within the LPA is the implementation of the LEB. As detailed within this submission the LEB has been proven to be the catalyst for achieving each of the Growth Point ambitions identified above and particularly those relating to regeneration and economic growth.

5.17 GOVERNMENT 30 YEAR PLAN

5.17.1 The Governments Transport 30 Year Plan, **'The Future of Transport – a network for 2030'** was published in July 2004 and sets out the Governments vision for transport over the next 30 years.

5.17.2 The strategy builds upon the progress made since the implementation of the **'10 Year Plan for Transport 2000'**.

5.17.3 The 30 Year Plan is built around the following three central themes:

- Sustained investment over the long term
- Improvements in transport management
- Planning ahead

5.17.4 Underlying these central themes are a number of objectives which guide the strategy over the next 30 years. A review of these underlying objectives has been undertaken to establish how the LEB contributes to these long term aspirations for transport.

5.17.5 The LEB can be seen to contribute positively to the following objectives as outlined within the 30 Year Plan:

- The road network providing a more reliable and freer-flowing service for both
- Personal travel and freight, with people able to make informed choices about how and when they travel
- The road network enhanced by new capacity where it is needed, assuming that any environmental and social costs are justified
- Local travel enhanced through: more reliable buses enjoying more road space
- Local travel enhanced through: creating a culture and improved quality of local environment so that cycling and walking are seen as an attractive alternative to car travel for short journeys, particularly for children
- Supported by effective decision making that gives local and regional stakeholders more influence over transport investment in their area, including the rail network
- Supported by effective decision making that ensures that choices on transport are made alongside other decisions that have an impact on transport, particularly housing and regeneration, at the national, regional and local level
- Supported by effective decision making that ensures the social, economic and environmental costs and benefits are fully recognised when decisions are taken using the New Approach to Appraisal and our developing Value for Money analysis

- Respecting the environment by working across government to ensure that we can deliver carbon savings in line with our domestic and international commitments and reduce the impact of other emissions which pollute the environment
- Respecting the environment by ensuring that the noise impacts of transport are reduced and mitigated

5.18 THE SHARED PRIORITIES FOR TRANSPORT

5.18.1 In recognition of the fact that delivering better public service across the country relies on central and local government working together, in July 2002 the Government and the Local Government Association agreed a set of shared priorities for local government. The aim of the Shared Priorities is to provide a balance between the Government's legitimate interest in seeking improvements in key public services, with the importance of local priorities and local organisations having to pursue national priorities in ways which reflect local needs and communities.

5.18.2 These shared priorities cover a wide range of services, including sustainable communities, education, the economy, the environment and transport and they provide a focus for the efforts of Government and Councils for delivering improved public services.

5.18.3 It is acknowledged that the Shared Priorities have recently been superseded by the introduction of the DaSTS goals, however, given the infancy of the former it has been considered appropriate to continue to demonstrate the 'strategic fit' of the LEB with the Shared Priority for Transport.

5.18.4 The shared priority for transport covers four key areas :

- **Delivering accessibility** – providing enhanced access to places of work, learning, health care, shopping and other opportunities to improve people's quality of life and reduce social exclusion
- **Safer roads** – supporting the aim of reducing casualties on the country's roads as outlined in the national road safety strategy "Tomorrow's Roads – Safer for Everyone"
- **Tackling congestion** – recognising that in the larger towns and cities across the country, congestion is having (or will have if allowed to grow unchecked) a detrimental effect on the local economy and quality of life
- **Better air quality** – improving air quality by lowering the levels of pollution generated by road traffic, thereby reducing the effects on human health and improving quality of life

5.18.5 **Table 5.6** provides a qualitative summary of how the LEB contributes to the aspirations of the Shared Priorities for Transport.

SHARED PRIORITY	QUALITATIVE COMMENTARY	IMPACT
Delivering Accessibility	As detailed within the previous assessments, the LEB will provide significant improvements to the Region's strategic and primary road network thus improving both the north / south and east / west movements within the Eastern Sub-areas strategic corridors. An additional crossing of the River Witham will be provided thus increasing route options and improve accessibility to the areas of development and housing to the east of the city for both local and strategic long distance traffic. Traffic will be removed from the city centre and key arterial routes thus reducing non-motorised used / vehicular traffic conflicts and reducing severance, particularly on the A15. The removal of through traffic would also facilitate the potential of further public realm improvements within city centre. The introduction of non-motorised user facilities along the length of the proposed LEB with also provide the opportunity a modal switch for short journeys and provide links with existing pedestrian and cycling facilities.	**POSITIVE**
Safer Roads	Analysis undertaken as part of the LEB Economic and Safety Assessments, have demonstrates that the LEB will provide accident savings within Lincolnshire which equate to £3.392m in benefits over the 60 year appraisal period.	**POSITIVE**
Tackling Congestion	The introduction of the LEB will remove a significant amount of traffic from the centre of Lincoln and from key arterial routes thus reducing congestion within the constrained parts of the network. This will result in vehicles having more choice of routes to access and bypass Lincoln.	**POSITIVE**
Better Air Quality	By removing traffic and congestion from the city centre and key radials into Lincoln an improvement in air quality would be likely, particularly along the existing A15 corridor through the centre of Lincoln in the vicinity of Broadgate and Pelham Bridge which is designated as an AQMA. Air quality in the vicinity of the LEB is likely to decrease however the air quality would remain within acceptable limits.	**POSITIVE**

Table 5.6 – LEB Appraisal Against the Shared Priorities for Transport

5.18.6 Based upon the information in **Table 5.6** it can be seen that the LEB fully accords with and provides a strong 'strategic fit' with the aspirations of the Shared Priorities for Transport.

5.19 CONCLUSIONS

Preferred Option

5.19.1 In summary, this chapter has demonstrated that the LEB Preferred Option has an extremely robust policy fit with local, regional and national policy aspirations and outcomes. The Strategic Case for the scheme is therefore considered to be strong.

5.19.2 The LEB is recognised as the catalyst for delivering the wider aspirations of LTP2, the LTS and the Growth Point agenda. Its implementation would enable the transfer of strategic through traffic from key routes within the city centre. The subsequent reallocation of road space is identified as providing the opportunity to reclaim the city centre for the benefit of the public realm. On the key radial routes to and from the city, the subsequent reduction in traffic levels would support the introduction of improved public transport infrastructure (QBCs) and potential Park & Ride sites. When combined these improvements would significantly reduce social exclusion through increasing accessibility and options to travel.

5.19.3 The LEB is also fundamental to the delivery of wider economic benefits in the LPA and the Sub Region. It has significant support from the local business community and would support the sustainable economic growth aspirations of the County and partners.

5.19.4 At a regional level the scheme is supported within the Regional Transport / Economic Strategies for the East Midlands, is identified within the RFA Preferred Investment Package for the East Midlands, and is crucial to the delivery of the regional housing targets within the area and the promotion of Lincoln as one of the East Midlands Principal Urban Areas.

Next Best / Lower Cost Alternative

5.19.5 With regard to the Next Best / Lower Cost Alternative the 'strategic fit' is not as robust. As this option does not connect the A15 in the south with the A15 to the north of the city the removal of traffic from Lincoln city centre is not as significant. Furthermore this option does not provide the same level of support for the policy aspirations contained within local, regional and national policy documents regarding economic growth and reaffirming Lincoln's role as one of the East Midlands 5 Principal Urban Areas. In particular the Next Best / Lower Cost Alternative would not provide the same level of support to the development site to the south east of Lincoln which is identified within the RSS. This will result in Lincoln struggling to deliver the challenging housing and employment targets established by the RSS and supported by the Growth Point initiative.

5.19.6 In addition, the accident, noise and air quality benefits associated within the Next Best / Lower Cost Alternative are not as pronounced. This is discussed in more detail with The Strategic Case.

5.19.7 It should also be noted that for the above reasons the Next Best / Lower Cost Alternative does not have the same degree of public, political and stakeholder support. This is discussed in more detail within **Chapter 9** of the business case.

6 THE VALUE FOR MONEY CASE – TRAFFIC MODELLING METHODOLOGY

6.1 INTRODUCTION

6.1.1 A key source of information that has informed the appraisal of the LEB contained within this submission is the Lincoln VISUM Model which covers the LPA. To date, a highway model, a demand model and variable demand capability have been developed. Interrogation of the VISUM Model has provided the majority of the quantified evidence referenced in this submission and has been used as a key decision making tool in the development of the scheme, and the selection of the preferred option within this business case.

6.1.2 The VISUM modelling software was developed by PTV in Germany. It pairs robust modelling algorithms with a graphical interface that enables accurate, clear analysis. It is also compatible with GIS, enabling the use of third party GIS tools through the ability to transfer data between the two formats, along with micro-simulation packages such as VISSIM. This flexibility has established VISUM as one of the leading transport modelling suites in use today.

6.1.3 VISUM is a 'strategic' macro traffic modelling tool, which enables large areas of the transport network to be modelled. It can be used to assess the impacts of a single development site on the network as well as the cumulative impacts of a number of developments. Of all the proprietary software on the market very few tools offer the capability of a full range of different demand models from the very simple single mode, single trip purpose to advanced multi-mode and multi-purpose approaches.

6.1.4 In accordance with best practice, the Lincoln VISUM Model has been successfully validated against DMRB criteria (journey times and vehicle numbers) and is therefore considered to be a robust representation of real life observed flows.

6.1.5 For a more detailed explanation of the history of the Lincoln VISUM Model and the detailed modelling and forecasting methodologies used to inform the model development, reference should be made to the following reports which are included within **Appendix F**.

- Local Model Validation Report
- Demand Report
- Forecasting Report
- Data Collection Report

6.1.6 The remainder of this chapter provides a summary of each of the key elements involved in the development of the Lincoln VISUM Model and is structured as follows:

- Model Network
- Data Collection
- Matrix Development
- Calibration
- Validation
- Variable Demand Modelling

6.2 MODEL NETWORK

6.2.1 Link data including road geometries and important attributes such as speed restrictions, lane configurations, road type and allowed turning movements were imported directly into VISUM from NAVTEQ digital mapping. This provided the 'raw' network for the model.

6.2.2 Following the development of the 'raw' network supplementary data was then used in order to more accurately reflect local attributes such as road speed and capacity. These adjustments were based upon data from a range of sources including:

- Additional speed restriction data from LCC
- Aerial photographs provided by LCC
- Site observations
- Local knowledge
- Speed flow curves

6.2.3 An important step in creating the base network was the junction coding whereby geometric data is assigned to key junctions within the network. Junctions were accurately coded using data such as junction types, lane numbers and widths, turning pockets, entry / exit lanes on roundabouts and control data for signalised junctions in order to reflect conditions on the ground. Traffic signal timings were supplied by LCC from the SCOOT control systems, developed through LINSIG and the outputs fed back into VISUM.

6.3 DATA COLLECTION

6.3.1 Traffic data collection took place during a four-week period between September and October 2006. The data collection sites were chosen on the basis of importance on the Lincoln road network. Traffic counts were required both for the calibration and validation of modelled flows on the main links and for the calibration of traffic generation from each zone within the model.

6.3.2 The data collected included Manual Classified Turning Counts (MCTC), Automatic Traffic Counts (ATC), Roadside Interview Surveys (RSI) and Journey-time surveys as detailed below:

- **Manual Classified Turning Counts:** A total of 96 MCTCs were carried out at 96 key junctions across the city for a 12 hour period from 07:00 to 19:00.
- **Automatic Traffic Counts:** A total of 98 ATCs were put in place across the study area which recorded bi-directional traffic flows split down into 15 minute intervals.
- **Road Side Interviews:** A total of 18 RSIs were carried out at key locations chosen to best capture the movement of vehicles into and out of the city centre from all strategic route corridors. This provided information which formed the basis of the initial origin and destination demand matrices.
- **Journey Time Surveys:** Ten key routes were identified within the Lincoln area which formed the basis for a programme of journey time surveys.

6.3.3 For more details of the data collection which took place, reference should be made to the Data Collection Report in **Appendix F**.

6.4 MATRIX DEVELOPMENT

6.4.1 Building the demand matrices was a complex element of the model development process. Key elements of this process are summarised below:

- **Zoning Structure:** Dividing the model into zones provided the structure for building origin and destination matrices. The basis for the zoning structure was the Office of National Statistics (ONS) zone geography, which led to a structure of 139 internal zones within the Lincoln model and 16 external zones covering the immediate wider area.
- **Trip Segmentation:** Trip segmentation involved breaking down trips by journey purpose. Six journey purposes were identified based on 'behaviour-homogeneous' groups as detailed below:
  - Home-based work
  - Home-based education
  - Home-based employers business
  - Home-based other
  - Non-home based employers business
  - Non-home based other
- **Trip Generation:** Observed trips identified as part of the data collection process formed the basis for demand matrices. Remaining trips were synthetically generated using a variety of sources of data and research.
- **Trip Distribution:** This trip information then needed to be correctly distributed across the network. This was undertaken using a gravity model in VISUM (or by the Census Matrix Tools software package for the case of 'Home-based work' journey purpose). This used pre-loaded planning data and national statistics from the DfT National Travel Survey 2006 to complete the process.
- **Matrix Merging and Estimation:** The final step was to merge the origin and destination matrices with the observed matrices derived from the RSI surveys. A matrix estimation procedure called T-Flow Fuzzy was applied to adjust the distribution of trips when assigned to the model network. To ensure double counting was eliminated, the number of unobserved trips was reduced by the equivalent number of observed (RSI) trips.

6.4.2 For more details of the matrix development process, reference should be made to the Local Model Validation Report included within **Appendix F**.

6.5 MODEL CALIBRATION

6.5.1 The key element of the model calibration process involved adjusting the model inputs to match observed conditions.

6.5.2 A number of key processes were involved in the model calibration process. These included the use of:

- Assignment Procedures
- Network Corrections
- Count Data
- Model Convergence

6.6 MODEL VALIDATION

6.6.1 Model validation served as the final check of the accuracy of the base model. Separate datasets which were not used or manipulated during the calibration process were checked against modelled flows, both individually and collectively as screenlines.

6.6.2 In accordance within DMRB Volume 12a, the models were also validated against the journey time survey data.

6.6.3 DMRB standards require that more than 85% of all journey time routes are modelled to within 15% or one minute (whichever is greatest) of observed times. For all three modelled periods (AM peak, Inter Peak, PM peak) the Lincoln VISUM model either achieved or significantly surpassed the validation threshold required.

6.7 VARIABLE DEMAND MODELLING

6.7.1 In accordance with DfT guidance contained within WebTAG, all transport major schemes submitted for funding approval after 1st June 2007 need to consider the modelled effects of variable demand. The process of variable demand modelling aims to consider the change in demand when there are changes to the transport infrastructure.

6.7.2 The first stage in developing the variable demand element of the Lincoln VISUM Model was to apply travel costs to the base model in advance of any forecasting which includes infrastructure improvements.

6.7.3 A choice model was then developed within CUBE/TRIPS and VISUM software platforms in order to model trip information over two modes, a 12 hour weekday average and for all155 zones in the Lincoln Model. The choice model was developed in line with the detailed advice and recommendations of the DfT as presented in WebTAG Unit 3.10.3, published June 2006.

6.7.4 Operating within the Lincoln VISUM Model road network, the model assigned the appropriate trips onto the networks, and travel costs were passed to the choice model.

6.7.5 The model was then split into previously defined journey purposes, as some journey purposes are more sensitive to cost increases. This allowed the model to accurately reflect the changes in demand of those trip types as costs rose.

6.7.6 Finally, as with fixed demand assignment, the choice model was run through a number of iterations until convergence was achieved.

6.8 SUMMARY

6.8.1 In summary, the Lincoln VISUM Model has been developed in accordance with contemporary best practice and DfT requirements and has been successfully validated in line with DMRB criteria. As such it represents a robust reflection of traffic conditions within Lincoln and thus presents most appropriate and accurate vehicle from which to assess the likely impacts of proposed improvements within the LPA, and support the business case for LEB.

7 THE VALUE FOR MONEY CASE – COST BENEFIT ANALYSIS

7.1 ECONOMIC ASSESSMENT

7.1.1 DfT guidance relating to the economic assessment of major schemes is contained within WebTAG Unit 3.5.4. This unit of WebTAG identifies the impacts of a scheme which can be presented within the monetised Cost Benefit Analysis (CBA). In accordance with this guidance, the following software has been used in the economic assessment of the scheme:

- Transport User Benefit Appraisal (TUBA version 1.7c)
- Queues and Delays at Roadwork's (QUADRO version 4.6)
- Cost Benefit Analysis (COBA version 11.7)

7.1.2 In line with best practice, data contained within the Trip End Model Presentation pROgram (TEMPRO) Version 5.4 has been used to provide future year traffic growth across the network. TEMPRO is the industry standard software which provides projections of growth over time for use in local and regional models.

7.1.3 The methodology and results from the TEMPRO traffic growth scenario are described below. Three additional future traffic growth scenarios have also been tested in order to gain a greater understanding of the CBA of the scheme under future year conditions which are subject to uncertainty. These scenario tests are discussed in more detail within section 7.2 of this chapter and in more detail within the Forecasting Report within **Appendix F**.

7.1.4 A key source of information which has informed the Value for Money appraisal contained within this chapter is the Lincoln VISUM Model which has been adopted by LCC as a key decision making tool for the LPA.

7.1.5 As previously reported the traffic model has been successfully validated against DMRB criteria (journey times and vehicle numbers) and is therefore considered to be a robust representation of real life observed flows. Interrogation of the model has provided quantified evidence referenced in this Value for Money Appraisal.

DO - MINIMUM

7.1.6 Within the Lincoln VISUM Model, the future year Do - Minimum situation has assumed that all committed proposals are in place. This includes the recent change in road design of the B1308 Clasketgate / A15 to one way along Clasketgate away from its junction with the A15. The signal timings for this junction have been modified and optimised within the model. There are currently no other committed highway improvements.

7.1.7 The Lincoln VISUM Model also assumes that local improvements would be made to the network in order to facilitate operation. Where appropriate traffic signals have been optimised within the model to allow for the changing demand for traffic at each highway intersection.

7.1.8 The remaining junctions within the model were also assessed as to the feasibility of junction improvements, this included the provision of turning pockets where space allowed, converting priority junctions to signals where additional benefit could be achieved, and the improvement of capacity at roundabouts and signals. This review identified 15 junctions where there was delay within both the opening and design year in either the AM or PM peak, these are as follows:

- B1226 Riseholme Rd/ Scopwick Pl
- A46/ A57 Saxilby Rd (Roundabout)
- B1273 Yarborough Rd / B1938 Burton Rd (Roundbaout)
- B1273 The Ave/ West Parade
- A15 Broadgate/A15 Lindum Rd/ B1308 Monks Rd/ Clasketgate
- B1378 Skellingthrope Rd/ Birchwood Ave
- B1262 High St/ B1360 Dixon St
- A15 South Park Ave/ B1188 Canwick Rd
- B1188 Canwick Rd/ B1190 Washingborough Rd
- A46 / Whisby Road
- B1360 Dixon St/ B1262 High St
- B1182 Nettleham Rd/ Cabourne Ave
- B1273 Longsdale Rd/ Ravendale Drive
- A15 Wragby Rd/ B1182 Ruskin Ave
- A15 South Park/ St Catherines/ B1262 High St (Roundabout)

7.1.9 Where possible minor improvements were made to these junctions within the model.

7.1.10 This approach has been informed through early liaison with the DfT and conforms to best practise to ensure a realistic road network in the opening and design years.

TUBA

7.1.11 TUBA has been used to derive the Transport Economic Efficiency (TEE) of the scheme, which incorporates the Business and Consumer Traveller Impacts and Private Sector Provider Revenues and Costs elements of the WebTAG requirements. The programme calculates the costs and benefits of the scheme, with benefits expressed in terms of journey time and vehicle operating cost savings over sixty years. The main inputs for TUBA are:

- Economic Parameters
- Assessment Periods
- Scheme Costs
- Matrix Data

7.1.12 This includes modelled components to give an impression of the network performance over a sixty year period, as well as standardised components to meet the guidelines set out by WebTAG.

ECONOMIC PARAMETERS

7.1.13 Economic Parameters have been taken from the standard TUBA 1.7 economics file (April 20009), as recommended by WebTAG. This file provides details of tax rates, fuel costs, Values of Time (VOT) and Vehicle Operating Costs (VOC). Growth forecasts for both the VOT and VOC have also been included for future years.

ASSESSMENT PERIODS

7.1.14 For this assessment, the current year was taken as 2006, with the scheme opening year of 2016. The horizon year was taken as 2076 in order to accommodate for the sixty year analysis period. A design year of 2031 was chosen for the purposes of forecasting how future traffic growth will affect the scheme in future years, which has in turn informed TUBA how the scheme would be affected over sixty years.

7.1.15 Time slices for the AM peak, Inter-Peak and PM peak have been modelled for use in TUBA. These models then produce skim matrices for each vehicle type (Car (all 3 user classes), LGV, HGV) for travel times, counts and distances for every origin-destination pair in the study area. This data has been imported into TUBA with the travel times factored by 0.017 to convert the units from minutes into hours.

7.1.16 The matrices for each time slice were then multiplied by an annualisation factor to convert average weekday data into average yearly data in accordance with WebTAG. The annualisation factors are based on the fact that there are 253 working days during the year and the AM and PM peak periods are 3 hours long. The following annualisation factors were used for the AM, PM and Interpeak periods:

- AM Peak flows multiplied by 253 to represent a year's worth of weekday flows for a three hour period 07:00 – 10:00
- PM Peak flows were multiplied by a factor of 759, as with the AM to account for a year's worth of three hour periods between 16:00 and 19:00
- Inter-Peak flows were multiplied by 1518 to expand a single weekday six hour period into one multiplied by 253 weekdays

SCHEME COSTS

7.1.17 Detailed scheme costs have been prepared for the LEB at a base price of Quarter 3 2009. Full details of the derivation of the scheme costs are provided within **Chapter 13 – The Financial Case**.

7.1.18 A Retail Price Index (RPI) value of 214.4 derived from the National Statistics website has been used for the purposes of the TUBA runs. It was assumed that the Do-Minimum Scenario would not incur any costs, and therefore only the prices for the Do-Something options were required for TUBA. The total scheme costs for the Preferred Option and the Next Best / Lower Cost Alternative are detailed within **Table 7.1**.

Stage	Preferred Option	Next Best / Lower Cost Alternative
Construction	£89.854m	79.448m
Land	£9.145m	6.898m
Preparation	£5.778m	£5.778m
Supervision	£3.686m	£3.318m
Total	**£108.463m**	**£95.442m**

Table 7.1 –Scheme Costs (Base Costs, Quarter 3 2009 excluding risk and optimism bias)

RISK AND OPTIMISM BIAS

7.1.19 Transport projects are inherently risky due to the long planning horizon and complex interfaces. Often the project scope or ambition level will change significantly during project development and implementation. Changes may be due to uncertainty at the early project stages on the level of ambition, the exact corridor, the technical standards, project interfaces and geotechnical conditions, for example. As a result, a certain degree of budget uncertainty exists which will typically be reduced through the project cycle.

7.1.20 Within the major scheme process this uncertainty is covered by risk assessment and the application of an Optimism Bias uplift to reflect the level of uncertainty associated with the scheme. The DfT require that base cost estimates should be adjusted to account for risk and Optimism Bias in order to obtain more accurate cost estimates and that the economic appraisal should be based upon risk adjusted benefits as well as costs.

7.1.21 In order to fully understand and define the risks associated with the delivery of the scheme, a Quantified Risk Assessment (QRA) has been undertaken. The QRA resulted in a risk value of **£7,649,000** for the Preferred Option and a risk value of **£6,884,000** for the Next / Best Lower Cost Alternative. Full details of the QRA process are included within **Chapter 12 – The Financial Case**. A copy of the QRA and associated Risk Register is included within **Appendix G**

7.1.22 The size of the Optimism Bias adjustment required reduces as project definition improves and / or as risks are identified and taken into account. In practice, reductions are linked to formal stages in the development of projects and key milestones. For example, for highway schemes, reductions can be specified at public consultation / preferred route, Order publication and works commitment stages.

7.1.23 **Table 7.2** shows the upper and lower bounds of basic Optimism Bias factors. To inform the determination of an appropriate Optimism Bias adjustment, LCC has completed the detailed Optimism Bias calculator taken from a Highways Agency's Annex 1 *Scheme Cost Estimate Summary Form* while considering the following:

- Many years invested knowledge in the scheme
- Early contractor involvement in the design and cost estimate
- Presentation to DfT of a preliminary business case for the Extant Route in December 2005

Scheme Type	Stage of Preparation	Basic Optimism Factor (%)	
		Lower Bound	Upper Bound
Standard Scheme / Non-Controversial	Scheme Conception / Preliminary Business Case (up to OGC 2)	15	45
	Outline Business Case confirmed (OGC 2)	5	25
	Draft Orders published (OGC 3A)	5	N/A
	Work Price Reviewed / Confirmed (OGC 3B)	3	N/A

Table 7.2 – Optimism Bias Factors

7.1.24 By selecting a level of complexity, the stage of the scheme and various control measures a percentage of Optimism Bias has been derived.

7.1.25 For the LEB route an Optimism Bias adjustment factor of 29.8% has been calculated. This factor has produced an optimism bias value of **£34.778 million** for the Preferred Option and an optimism bias value of **£30.670 million** for the Next / Best Lower Cost Alternative. A detailed worksheet for the Optimum Bias calculation is included within **Appendix H**.

7.1.26 **Table 7.3** details the scheme costs adjusted for risk and Optimism Bias for use within the Economic Appraisal of the scheme.

Stage	Preferred Option	Next Best / Lower Cost Alternative
Construction	£100.461m	£88.836m
Land	£19.752m	£16.286m
Preparation	£16.385m	£15.167m
Supervision	£14.293m	£12.707m
Total	**£150.89m**	**£132.996m**

Table 7.3 – Scheme Costs Adjusted for Risk and Optimism Bias

EXPENDITURE PROFILE

7.1.27 **Table 7.4** details the scheme cost expenditure profile over the design and construction years for both the Preferred Option and the Next Best / Lower Cost Alternative. The scheme costs are broken down into the years the expenditure occurs for input into TUBA.

Year	Percentage Spend for Preferred Option & Next Best / Lower Cost Alternative			
	Construction	Land	Preparation	Supervision
2009 / 10	0.00%	0.00%	9.34%	0.00%
2010 / 11	0.00%	0.00%	9.34%	0.00%
2011 / 12	0.00%	0.00%	9.34%	0.00%
2012 / 13	0.00%	0.00%	32.73%	0.00%
2013 / 14	12.00%	20.00%	17.37%	18.50%
2014 / 15	46.00%	20.00%	12.84%	33.83%
2015 / 16	38.00%	20.00%	4.53%	33.83%
2016 / 17	4.00%	40.00%	4.53%	13.84%
2017 / 18	0.00%	0.00%	0.00%	0.00%

Table 7.4 – Scheme Cost Expenditure Profile

7.1.28 In addition to the scheme costs, the amount of tax paid by road users for fuel tax and car tax has been factored into the final TUBA analysis.

MATRIX DATA

7.1.29 Matrices have been extracted from the Lincoln VISUM Model to supply time and distance information for each origin-destination pair, and factored into an acceptable format for use in TUBA. The following time periods were extracted:

- 2016 Do - Minimum AM/IP/PM
- 2016 Preferred Option AM/IP/PM
- 2016 Next Best / Lower Cost Alternative AM/IP/PM
- 2031 Do - Minimum AM/IP/PM
- 2031 Preferred Option AM/IP/PM
- 2031 Next Best / Lower Cost Alternative AM/IP/PM

7.1.30 Due to the large volume of data being input into TUBA, a short verification process was required to ensure that the correct matrices had been specified.

TUBA RESULTS

7.1.31 The calculation process in TUBA involves working out the costs and benefits for each of the above modelled time periods, and multiplying those into annual totals for the modelled years. It then expands those annual costs and benefits into an appraisal period total over sixty years, assuming that the cost of the scheme is a one off cost spread over a short period and the benefits will come about over the long term in the proceeding years after the scheme is in place.

7.1.32 The results of the assessment are presented in terms of a comparison between total user costs over sixty years in the Do-Minimum and the total user costs over sixty years in the Do-Something. The difference between them equates to the Present Value of Benefits (PVB), which is offset by the Present Value of Costs (PVC).

7.1.33 The results of the TUBA runs, which exclude accident and maintenance benefits, are summarised in **Table 7.5**.

TEMPRO	Preferred Option	Next Best / Lower Cost Alternative
Consumer User Benefits	£105.062m	£34.259m
Business User Benefits	£364.019m	£277.921m
Carbon Benefits	£-1.077m	£-1.084m
Present Value of Benefits	**£468.004m**	**£311.096m**
Present Value of Costs	**£94.011m**	**£81.729m**

(Note: Present Value Benefits above not inclusive of Accident and Maintenance benefits)
Table 7.5 – Summary of Economic Assessment (discounted to 2002 prices)

QUADRO

7.1.34 As the LEB would be constructed predominantly off-line, the impacts on traffic during construction are considered to be minimal. Therefore, the effects of construction delay have been discounted from the economic assessment.

7.1.35 QUADRO has been used to assess the likely costs associated with maintenance in the future year Do-Minimum scenario. It is considered that the disbenefits associated with future maintenance on the existing network will be alleviated by the introduction of the LEB which will in effect act as a diversionary route. The net positive benefits of the LEB will therefore mirror the disbenefits of the future year Do-Minimum scenario that would be alleviated with the LEB in place.

7.1.36 A maintenance profile has been derived for the existing A15 using *TA 46/97 Annex B Maintenance Works Profiles, Durations and Costs*, and this has been used to assess maintenance impacts up to 2076.

7.1.37 Maintenance impacts have been assessed for the following existing maintenance scenarios for which the LEB will act as a diversionary route:

- A15 / A158 Wragby Road Roundabout to Greetwellgate – Diversion
- Greetwellgate to Broadgate – Shuttle Working
- Broadgate to Canwick Road / South Park Avenue – Contraflow
- Canwick Road / South Park Avenue to Canwick Avenue – Diversion
- Canwick Avenue to Proposed LEB Roundabout – Shuttle Working
- Pelham Bridge to Canwick Road – Shuttle Working

7.1.38 In the Do-Something scenarios it is assumed that the delays during maintenance on the existing A15 through Lincoln and on the LEB will cancel each other out; the LEB will act as the diversion route whilst the old route through Lincoln is maintained, whilst the old route through Lincoln will act as the diversion route whilst the LEB is maintained.

7.1.39 The results of the QUADRO assessment are provided in **Table 7.6** below.

Value	Preferred Option & Next Best / Lower Cost Alternative
Consumer User Benefits	£1.070m
Business User Benefits	£2.063m
Carbon Benefits	£0.008m
Present Value of Benefits	**£3.141**

Table 7.6 – Estimated Maintenance Benefits (2002 prices)

COBA

7.1.40 The COBA 11.7 software program has been used to derive accident benefits for the LEB. Accident savings are calculated over the 60 year appraisal period and are expressed in terms of the number of accidents saved, the number of casualties saved and the economic benefits of the reduction in accidents.

7.1.41 Traffic data for the scheme opening year (2016) has been input into COBA to analyse the 2016-2030 period. Traffic data for the design year (2031) has been input into COBA to analyse subsequent years. This allows the program to 're-base' the traffic growth calculations based on scheme traffic forecasts.

7.1.42 Accident data from the 2004-2008 five year period has been used in the analysis for the whole COBA network.

7.1.43 The results of the COBA assessments are presented in **Table 7.7**.It should be noted that the accident savings below do not include for benefits during maintenance.

Impact over 60 years	Change in Casualty Numbers			Change in PIA	Benefits £m (2002 prices)
	Fatal	Serious	Slight		
Preferred Option	0.2	16.9	243.5	198.3	£3.392m
Next Best / Lower Cost Alternative	-16	-116.3	-947.1	-741.0	£-34.019m

Table 7.7 – Estimated Accident Savings (discounted to 2002 prices)

7.1.44 As the LEB is a high quality, modern, safe dual carriageway, its introduction offers the potential for traffic to transfer from higher-risk urban roads onto a safer road.

7.1.45 The results show that, for the Preferred Option, there is indeed predicted to be a small reduction in overall accident numbers and casualties over the 60 year appraisal period, resulting in a small accident benefit, as shown in **Table 7.7**.

7.1.46 It can be seen that the LEB Preferred Option would provide accident savings of £3.392million. Over the 60 year appraisal period the LEB Preferred Option is predicted to prevent almost 200 personal injury accidents and over 250 casualties.

7.1.47 The results for the Next Best / Low Cost Alternative show that, rather than a reduction, there would actually be a small increase in overall accident numbers and casualties over the 60 year appraisal period, resulting in a small

accident disbenefit, as shown in **Table 7.7**. This is for the following two reasons.

7.1.48 Firstly, some of the traffic approaching Lincoln from the south and south-east would still be drawn to the LEB, but rather than being able to use the southern-most section of the Preferred Option they would have to use the existing AAA, BBB and CCC roads to access the B1188 Lincoln Road / LEB roundabout. They would therefore be travelling on sections of existing road that would be less safe than the southern-most dual carriageway section of the Preferred Option.

7.1.49 Secondly, some of the traffic in the south and south-east suburbs of Lincoln would continue to travel through the city centre via the existing AAA, BBB and CCC roads, rather than being able to use the southern-most section of the Preferred Option. They would therefore be travelling on sections of existing road that would be less safe than the southern-most dual carriageway section of the Preferred Option.

7.1.50 The net result of these two effects is that more traffic would have to remain on less-safe existing roads rather than being able to transfer onto a safe, modern, high quality dual carriageway, resulting in an overall increase in accident numbers / casualties and a small accident disbenefit.

7.2 ECONOMIC ASSESSMENT RESULTS (TEMPRO SCENARIO)

7.2.1 **Table 7.8** below provides the Cost / Benefit summary and the BCR for the LEB under the TEMPRO traffic growth scenario.

Cost / Benefit Category	Preferred Option	Next Best / Lower Cost Alternative
Consumer User Benefits	£105.062m	£34.259m
Business User Benefits	£364.019	£277.921m
Accident Benefits	£3.392m	£-34.019m
Maintenance	£3.141m	£3.141m
Carbon Benefits	£-1.077	£-1.084
Present Value of Benefits (PVB)	**£474.537**	**£280.218**
Present Value of Costs (PVC)	**£94.011**	**£81.729**
Net Present Value (NPV)	**£380.526**	**£198.489**
Benefit to Cost Ratio (BCR)	**5.05**	**3.43**

Table 7.8 – Summary of Economic Assessment (TEMPRO) discounted to 2002 prices

7.3 COST BENEFIT ANALYSIS (CBA) SCENARIO TESTS

7.3.1 In accordance with DfT guidance, a range of future scenarios have been developed in order to appraise the scheme under various conditions which are subject to future uncertainty. Unit 3.9.2 of WebTAG states that *'scenarios should be chosen to draw attention to the major technical, economic, political*

and local development uncertainties upon which the success of the scheme depends.'

7.3.2 The previous sections of this chapter provide the CBA of the LEB assuming TEMPRO only traffic growth across the network. Under the TEMPRO growth conditions the LEB can be seen to represent High Value for Money.

7.3.3 In order to appraise the scheme against future uncertainties three additional scenarios have been developed. These are:

- The Core Scenario
- The Optimistic Scenario
- The Pessimistic Scenario

7.3.4 Due to uncertainties associated with other proposed transport interventions within the LPA and the fact that the introduction of LEB is seen as a key catalyst for the delivery of other transport interventions identified within the LTS, it was considered that, for the purpose of this work, it was appropriate to only consider factors affecting demand on the highway network due to development / future land use.

7.3.5 A summary of the methodology undertaken to develop each of the identified scenarios and the CBA results of this process are summarised below. For further detailed information reference should be made to the following documents:

- Future Land-Use Scenarios, Appraisal Methodology (**Appendix P**)
- Forecasting Report (**Appendix F**)

THE CORE SCENARIO

7.3.6 The Core Scenario represents the land use scenario that appears most likely given published plans. It includes development proposals which are categorised as '**near certain**' and '**more than likely**' and thus represents a robust estimate of development that will go ahead. It should be noted however that this scenario does not include additional development that are currently uncertain. These proposals are picked up within the Optimistic and Pessimistic scenarios.

7.3.7 **Near certain** represents outcomes with high probability and includes approved development proposals, projects under construction and developments for which intent has been announced by a proponent to the regulatory agencies.

7.3.8 **More than likely** represent outcomes that are likely to happen but there is some uncertainty. These include developments which are due to submit planning or consent application imminently, or the application is within the determination period.

7.3.9 TUBA runs were undertaken in accordance with the methodology outlined above in **section 7.1** for the TEMPRO traffic growth scenario. A summary TEE table showing the TUBA results for the Core Scenario are presented in **Table 7.9**.

Core Scenario	Preferred Option
Consumer User Benefits	£400.889m
Business User Benefits	£506.472m
Carbon Benefits	£-7.902m
Present Value of Benefits	**£899.459m**
Present Value of Costs	**£66.109m**
BCR	**13.61**

(Note: Present Value Benefits above not inclusive of Accident and Maintenance benefits)
Table 7.9 – Core Scenario , Summary of Economic Assessment (discounted to 2002 prices)

THE OPTIMISTIC SCENARIO

7.3.10 The Optimistic Scenario represents the highest level of land use development that is likely to occur over the planning period (up to 2031). This scenario incorporates all identified sites within the Core Scenario as well as the wider future development aspirations contained within the East Midlands RSS.

7.3.11 The Optimistic Scenario therefore includes development proposals which appear as '**reasonably foreseeable**' as well as '**near certain**' and '**more than likely**'.

7.3.12 **Reasonably foreseeable** represent outcomes which may happen but there is currently significant uncertainty. These include the following development proposals:

- Identified within a development plan
- Not directly associated within the transport scheme, but may occur if the scheme is implemented
- Development conditional upon the transport scheme proceeding
- A committed policy goal, subject to tests (e.g. deliverability) who's outcomes are subject to significant uncertainty

7.3.13 **Table 7.10** summarises the TUBA results for the Optimistic Scenario.

Optimistic Scenario	Preferred Option
Consumer User Benefits	£633.244m
Business User Benefits	£789.236m
Carbon Benefits	£1.150m
Present Value of Benefits	**£1423.630m**
Present Value of Costs	**£109.691m**
BCR	**12.98**

(Note: Present Value Benefits above not inclusive of Accident and Maintenance benefits)
Table 7.10 – Optimistic Scenario , Summary of Economic Assessment (discounted to 2002 prices)

THE PESSIMISTIC SCENARIO

7.3.14 The Pessimistic Scenario also includes development proposals which appear as '**reasonably foreseeable**' as well as '**near certain**' and '**more than likely**'. However, in the case of the Pessimistic Scenario the reasonable foreseeable development proposals are assumed to be 50% lower than the Optimistic Scenario. In this instance the Pessimistic Scenario therefore represents a future development situation which falls between the Core and the Optimistic Scenarios.

7.3.15 **Table 7.11** summarises the TUBA results for the Pessimistic Scenario.

Pessimistic Scenario	Preferred Option
Consumer User Benefits	£523.160m
Business User Benefits	£675.645m
Carbon Benefits	£-4.4m
Present Value of Benefits	**£1194.405m**
Present Value of Costs	**£98.753m**
BCR	**12.09**

(Note: Present Value Benefits above not inclusive of Accident and Maintenance benefits)
Table 7.11 – Pessimistic Scenario , Summary of Economic Assessment (discounted to 2002 prices)

7.4 SUMMARY OF ECONOMIC ASSESSMENT RESULTS

7.4.1 In summary, TUBA defined the monetised benefits of the scheme based on journey time savings and Values of Time taken from the Lincoln VISUM Model for both the Preferred Option and Next Best / Lower Cost Alternative option for the following traffic growth scenarios:

- TEMPRO
- The Core Scenario
- The Optimistic Scenario
- The Pessimistic Scenario

7.4.2 TUBA then multiplied those benefits out over a sixty year period and offset them with the overall costs of the scheme to produce a Present Value of Costs (PVC) and a Present Value of Benefits (PVB).

7.4.3 In the case of the TEMPRO growth scenario monetised accident benefits were also assessed using COBA and maintenance benefits assessed using QUADRO. The PVB for the TEMPRO growth scenario has therefore included these additional benefits associated with the scheme.

7.4.4 For each of the scenarios the Net Present Value (NPV) was derived by subtracting the PVC from total PVB. The final Benefit to Cost Ratio (BCR) was then derived by dividing the PVB by the PVC.

7.4.5 **Table 7.12** provides a summary of the Economic Assessment results for each of the LEB scenarios tested.

BCR	Preferred Option	Next Best / Lower Cost Alternative
TEMPRO	5.05	3.43
Core Scenario	13.61	
Optimistic Scenario	12.98	
Pessimistic Scenario	12.09	

Table 7.12 –Economic Assessemnt Scenarios BCR Summary

8 THE VALUE FOR MONEY CASE – NATA APPRAISAL

8.1 INTRODUCTION

8.1.1 This chapter of the business case provides an appraisal of the LEB against central Government's 5 key transport objectives as detailed in **Table 8.1**.

Environment	To protect the built and natural environment
Safety	To improve safety
Economy	To support sustainable economic activity and get good value for money
Accessibility	To improve access to facilities for those without a car and reduce severance
Integration	To ensure that all decisions are taken in the context of the Government's integrated transport policy and other relevant policies

Table 8.1 – Government's 5 Key Transport Objectives

8.1.2 In accordance with recommended best practice, the appraisal has followed the guidance contained within WebTAG.

8.1.3 As specified by WebTAG, detailed worksheets have been produced for the Sub Objectives associated with each of the above central Government objectives. These worksheets are referenced as appropriate within this chapter and are contained within the supporting appendices.

8.1.4 The majority of the environmental information used to inform this appraisal has been obtained from environmental investigations undertaken as part of the development of the scheme and the Environmental Statement which was submitted in support of the planning application in October 2009. The environmental assessment has therefore been undertaken in accordance with a Stage 3 DMRB Assessment for Highways Schemes. A copy of the Environmental Statement is available on request.

8.1.5 Much of the quantified information required to complete the Value for Money assessment for the LEB has been made available via the Lincoln VISUM Model, details of which are provided within **Chapter 6.**

8.1.6 Appraisal Summary Tables (ASTs), which summarise the main impacts of the scheme against the Government's 5 key transport objectives have been produced for both the Preferred Option, and the Next Best / Lower Cost Alternative. An AST is a one page tabular summary of the main benefits and impacts of a scheme from an environmental, economic and social perspective. When combined with the remaining elements of the appraisal process, it provides decision makers with a concise and transparent means of determining the overall Value for Money of a transport scheme / solution.

8.1.7 The subsequent sections of this chapter are structured as follows:

- Environment Objective
- Safety Objective
- Economy Objective

- Accessibility Objective
- Integration Objective
- Appraisal Summary Table

8.1.8 **Chapter 7** provides detailed information relating to the derivation of the Monetised Cost Benefit Analysis of the LEB. For completeness, these monetised benefits are also summarised within the relevant sections of this chapter under each of the corresponding sub objectives. In order to present information regarding the scheme's non-monetised benefits and disbenefits this section of the document considers the environmental, accessibility and integration impacts and benefits of the scheme. For further details reference should be made to the AST for the Preferred Option and the Next Best / Lower Cost Alternative at the end of this chapter (**Tables 8.12** and **8.13**).

8.1.9 The Supporting Analysis of the Value for Money appraisal is reported within **Chapter 9** with the overall conclusions in **Chapter 10**.

8.2 ENVIRONMENT OBJECTIVE

8.2.1 The Government's Environment Objective aims to protect the built and natural environment. This includes reducing the direct and indirect impacts of transport facilities and their use on the environment for both users and non users. **Table 8.2** details the Government's Environment Sub Objectives which when combined inform the Value for Money assessment of the impact of a scheme on the Environment. The methodologies utilised for this appraisal accord with WebTAG guidance and are described within the following sections.

Environment
Government Objective: To protect the built and natural environment.
To reduce **Noise**
To improve **Local Air Quality**
To reduce **Greenhouse Gases**
To protect and enhance the **Landscape**
To protect and enhance the **Townscape**
To protect the **Heritage of Historic Resources**
To support **Biodiversity**
To protect the **Water Environment**
To encourage **Physical Fitness**
To improve **Journey Ambience**

Table 8.2 – Environment Objective

8.3 ENVIRONMENT OBJECTIVE – NOISE

8.3.1 WebTAG Unit 3.3.2 states that, 'the assessment of noise impacts from multi modal plans and strategies should aim to inform the appraisal process by comparing the change in estimated population annoyed in the longer term for each option in relation to a Do-Minimum scenario.

8.3.2 In accordance with WebTAG guidance, noise levels at properties within 600m of the proposed scheme were assessed for the Do-Minimum and the Do-Something for the opening year (2016) and the design year (2031) of the scheme. The assessment was undertaken for those areas experiencing an increase of at least 25% or a reduction of 20% in traffic levels.

8.3.3 For the purpose of this assessment, population estimates were based on house counts taken from detailed plans of the study area. In accordance with WebTAG the national average household size of 2.4 people per dwelling was assumed (DETR Housing Statistics).

8.3.4 The LEB removes traffic from adjacent many properties situated in close proximity to the A15 through Lincoln, which will in general experience beneficial noise impacts as a result of the scheme. In particular, significant beneficial impacts are predicted for properties north of the city centre in close proximity to the A15, whilst having an adverse effect on only a small number of properties.

8.3.5 Noise levels would increase slightly for most properties in close proximity to the LEB and for properties adjacent to some local roads that form junctions with the LEB.

8.3.6 Detailed worksheets relating to the assessment of the Noise Sub Objective are included within **Appendix I1**. A summary of the quantitative assessment for the Preferred Option and the Next Best / Lower Cost Alternative is provided below and included within the ASTs at the end of this chapter.

8.3.7 Preferred Option: The assessment has indicated that there is an estimated net improvement for 61 of the population experiencing an improvement in noise levels as a result of the Scheme, resulting in a NPV of £5,846,395 over 60 years.

8.3.8 Next Best / Lower Cost Alternative Option: The assessment has indicated that there is an estimated net improvement for 53 of the population experiencing an improvement in noise levels as a result of the Scheme, resulting in a NPV of £3,803,065 over 60 years.

8.4 ENVIRONMENT OBJECTIVE – LOCAL AIR QUALITY

8.4.1 The Local Air Quality Sub Objective was assessed against the guidance contained within WebTAG Unit 3.3.3 and Volume 11 of the DMRB, Section 3 – Air Quality.

8.4.2 Concentrations of Nitrogen Dioxide (NO_2) and Particulate Matter (PM_{10}) were predicted for the baseline year (2006), the scheme opening year (2016) and the scheme design year (2031) in both the Do-Minimum and Do-Something scenarios. In accordance with WebTAG guidance, the overall change in exposure to NO_2 and PM_{10} was assessed for those properties which lie within 200m of roads affected by the scheme with a change in traffic flows of +/- 10%.

8.4.3 The assessment shows that a greater number of properties would experience an improvement in air quality than would experience deterioration and that there would be an overall improvement in air quality within the area and importantly within the AQMA designated along the A15. This improvement is principally as a result of the reduction in traffic flows within the city centre due to the redistribution of traffic onto the LEB and the surrounding network.

8.4.4 Detailed worksheets relating to the assessment of the Local Air Quality Sub Objective are included within **Appendix I2**. A summary of the quantitative

assessment for the Preferred Option and the Next Best / Lower Cost Alternative is provided below and included within the AST's at the end of this chapter.

8.4.5 Preferred Option: The assessment has indicated that there is estimated to be 84720 properties which would experience improvements to PM_{10} concentrations and 10,320 which would suffer deterioration, resulting in a net improvement to 74,400 properties. In terms of NO_2 it is estimated that there would be a net improvement of 77,750 properties. This has resulted in an assessment score of -5362 for PM_{10} and -35091 for NO_2 (negative number means benefits).

8.4.6 Next Best / Lower Cost Alternative Option: The assessment has indicated that there is estimated to be 107,980 properties which would experience improvements to PM_{10} concentrations, and 34,225 properties would suffer deterioration, resulting in a net improvement to 73,755 properties. In terms of NO_2 it is estimated that there would be a net improvement of 81,126 properties. This has resulted in an assessment score of -3926 for PM_{10} and -29073 for NO_2 (negative number means benefits).

8.5 ENVIRONMENT OBJECTIVE – GREENHOUSES GASES

8.5.1 As stated in the WebTAG guidance, contained within Unit 3.3.4, the UK is committed to helping tackle climate change. It has a legally binding target, agreed at Kyoto, to cut the emissions of greenhouse gases. Carbon Dioxide (CO_2) is considered to be the most important greenhouse gas and is therefore used as the key indicator for the purposes of assessing the impacts of transport options on climate change.

8.5.2 The assessment of the change in greenhouse gas emissions as a result of the LEB has been undertaken using TUBA version 1.7c. Full details of this process are provided within **Chapter 7**.

8.5.3 The TUBA output has provided the total change in carbon emissions (tonnes) and an economic saving (Net Present Value) over the 60 year appraisal period.

8.5.4 **Table 8.3** details the predicted carbon savings and Net Present Value for both Preferred Option and the Next Best / Lower Cost Alternative.

Benefits	Preferred Option	Next Best / Lower Cost Alternative
Change in Carbon (tones)	27,565	26,385
Net Present Value	£-1.077m	£-1.084

Table 8.3 – Carbon Benefits

8.5.5 The main impacts in terms of greenhouse gas emissions would be seen along the existing A15 corridor through Lincoln city centre. Reduced queuing and congestion along this corridor will lead to a reduction in carbon emissions over the 60 year appraisal period.

8.6 ENVIRONMENT OBJECTIVE – LANDSCAPE

8.6.1 The landscape is the product of the interaction between natural, biological and human processes over thousands of years. Landcover, landscape pattern, and individual features such as woodland and building styles,

combine to define different types of landscape character. Through our perception of the landscape character of an area and the way in which we experience its different features and qualities through vision, smell, hearing and touch, a 'sense of place' evolves, drawing up on memories and cultural associations.

8.6.2 Landscapes of different scales and qualities combine to form the fabric of the countryside and are part of our shared environmental resource. Some landscapes may be statutorily protected, where the distinctive landscape character and natural beauty are of a high quality. Defining the essential characteristics of particular landscapes through a process of Landscape Character Assessment is the first step in identifying the potential impacts of new development and whether the landscape character would be enhanced or degraded should development proceed.

8.6.3 The appraisal of the Landscape Sub Objective has been carried out in accordance with the methodology identified in WebTAG and the national guidelines provided by the Countryside Agency's 'Landscape Assessment Guidelines 1993'. This approach builds on the methodology contained within Volume 11 of DMRB.

8.6.4 Reference has also been made to the "Guidelines for Landscape and Visual Impact Assessment" published in 1995 by the Landscape Institute and the Institute of Environmental Assessment.

8.6.5 In accordance with WebTAG Unit 3.3.7 (The Landscape Sub Objective) it has been accepted that any scheme design would include appropriate mitigation to achieve best fit within the landscape.

8.6.6 Detailed worksheets relating to the assessment of the Landscape Sub Objective are included within **Appendix I3**. A summary of the qualitative assessment for the Preferred Option and the Next Best / Lower Cost Alternative is provided below and included within the ASTs at the end of this chapter.

8.6.7 Both the Preferred Option and Next Best / Lower Cost Alternative would have a **Large Adverse** impact upon landscape character (especially the associations of landform, pattern and visual amenity) within the Witham valley due to the alignment and earthworks of the proposals.

8.7 ENVIRONMENT OBJECTIVE – TOWNSCAPE

8.7.1 Townscape has been assessed in accordance with the methodology outlined within WebTAG Unit 3.3.8.

8.7.2 Townscape is the physical and social characteristics of the built and urban un-built environment. Townscape character is derived from the way a settlement has evolved, the materials and building styles used in its construction, and in the way that people use and move between buildings and the spaces between them. Through our perception of the townscape character of an area and the way we experience its different features and qualities through vision, smell, hearing and touch, a 'sense of place' evolves drawing up on memories and cultural associations.

8.7.3 Townscapes of different scales and qualities exist, from hamlets to large cities. Particularly cherished townscapes may be statutorily protected through designations such as Conservation Areas.

8.7.4 Detailed worksheets relating to the assessment of the Townscape Sub Objective are included within **Appendix I4**. A summary of the assessment for

the Preferred Option and the Next Best / Lower Cost Alternative is provided below and included within the AST's at the end of this chapter.

8.7.5 The Preferred Option would have Slight Adverse effects on the visual setting of the Cathedral from views out of Washingborough and Branston, however, it is considered that, overall it would have a **Slight Beneficial** effect in terms of the Townscape Sub Objective. This is due to the reduction in traffic within Lincoln and surrounding settlements such as Bracebridge Heath, encouraging greater human interaction within the city and especially village centres.

8.7.6 As above the Next Best / Lower Cost Alternative would have Slight Adverse effects on the visual setting of the Cathedral from views out of Washingborough and Branston. However, it is deemed overall to have a **Neutral** effect on townscape. This is because the LEB truncated at Lincoln Road would not reduce through traffic through Lincoln and Bracebridge Heath to the extent that the Preferred Option would. Thus, human interaction within the city and village centres would not encourage human interaction to the same extent. In contrast to the Preferred Option which removes 4,783 vehicles from the A15 the Next Best / Lower Cost Alternative removes 3,586.

8.8 ENVIRONMENT OBJECTIVE – HERITAGE OF HISTORIC RESOURCES

8.8.1 Heritage of Historic Resources has been assessed in line with the guidance set out within WebTAG Unit 3.3.9. This guidance builds on the approach contained within Volume 11 of DMRB and is based on guidelines prepared by English Heritage. It assesses the cultural heritage resource within the study area in terms of Form, Survival, Condition, Complexity, Context and Period against a series of Heritage indicators, namely: Scale it matters, Significance, Rarity and Impact.

8.8.2 Detailed worksheets relating to the assessment of the Heritage of Historic Resources Sub Objective are included within **Appendix I5**. A summary of the assessment for the Preferred Option and the Next Best / Lower Cost Alternative is provided below and included within the AST's at the end of this chapter.

8.8.3 Both the Preferred Option and Next Best / Lower Cost Alternative generate an assessment score of **Moderate Adverse**. The assessment has shown that, although significant impacts are reduced or mitigated through archaeological recording works, historic building recording and landscape proposals, there are some uncertain impacts which mitigation proposals cannot account for. More detailed mitigation measures are included within the Environmental Statement and pre-application discussions with English Heritage have agreed an appropriate appraisal and mitigation strategy (see **Appendix L**).

8.9 ENVIRONMENT OBJECTIVE – BIODIVERSITY

8.9.1 The Biodiversity Sub Objective was assessed in accordance with the guidance contained within WebTAG Unit 3.3.10. This guidance is based on advice from Natural England and builds on the methods for assessing biodiversity and earth heritage that are established in Volume 11 of DMRB. In accordance with WebTAG Unit 3.3.10, where mitigation proposals have been developed as part of the Scheme they have been taken into consideration as part of the appraisal.

8.9.2 Detailed worksheets relating to the assessment of the Biodiversity Sub Objective are included within **Appendix I6**. A summary of the assessment for

the Preferred Option and the Next Best / Lower Cost Alternative is provided below and included within the AST's at the end of this chapter.

8.9.3 Both the Preferred Option and Next Best / Lower Cost Alternative have been given the assessment score of **Slight Adverse**. These scores have been awarded on account of the potential impacts the geological Site of Special Scientific Interest at Greetwell Quarry, and the potential loss of habitat of some species.

8.10 ENVIRONMENT OBJECTIVE – WATER ENVIRONMENT

8.10.1 The Water Environment Sub Objective appraisal was carried out in accordance with the methodology provided in WebTAG Unit 3.3.11.

8.10.2 The assessment considered the available water resources (for example River, Floodplain, Groundwater, Sea & Estuaries and Stillwaters) in terms of various attributes. These attributes included water supply, waste transport and dilution, biodiversity, aesthetics, cultural heritage recreation and value to the economy. They are indicators of the quality of the water environment.

8.10.3 Each attribute was considered in relation to the following criteria to assess the importance of the feature:

- Quality
- Scale
- Rarity
- Substitutability

8.10.4 The magnitude of the impact upon each feature was assessed independently from the importance of the feature. Together, the importance and magnitude allowed an assessment of the significance of any impact on the Water Environment as a result of the Scheme.

8.10.5 For both the Preferred Option and Next Best / Lower Cost Alternative, the LEB has been assessed overall as having a **Slight Adverse** Impact on the Water Environment.

8.10.6 Detailed worksheets relating to the assessment of the Water Environment Sub Objective are included within **Appendix I7**. A summary of the assessment for the Preferred Option and the Next Best / Lower Cost Alternative is also included within the AST's at the end of this chapter. It should be noted that as part of pre-application discussions in support of the Environmental Statement, the Environment Agency has agreed in principal with the drainage strategy for the scheme and also the Flood Risk Assessment submitted in support of the planning application.

8.11 ENVIRONMENT OBJECTIVE – PHYSICAL FITNESS

8.11.1 WebTAG Unit 3.3.12 states that the consideration of health implications should be identified through an appraisal of changes in the opportunities for increased physical activity through cycling and walking. Providing increased opportunities to walk and cycle may also have additional benefits including improvements to the physical environment within communities, fostering well-being and community spirit, which also have implications for health.

8.11.2 The recommended minimum level of activity for adults is 30 minutes or more of moderate activity, most days of the week. The key to promoting physical fitness is to encourage walking and cycling without significantly affecting the

health benefits of existing participants (i.e. avoiding a reduction in existing levels of walking and cycling). Given that the available evidence indicates the minimum level of activity which is beneficial is 30 minutes, and assuming that the analysis can distinguish between trips which fall above and below this duration, there are four levels of benefit, which can be considered:

- For new walk and cycle trips where journey times are below this threshold, there would be some **Minor benefits**
- For new walk and cycle trips where journey times are above this threshold, there would be **Significant** health benefits
- For existing walk and cycle trips, where the journey time remains above the threshold, health benefits would be **Largely Unchanged**
- For existing walk and cycle trips, where the journey time falls below the threshold, there would be **Minor Reductions in Health Benefits**

8.11.3 Detailed worksheets relating to the assessment of the Physical Fitness Sub Objective are included within **Appendix I8**. A summary of the assessment for the Preferred Option and the Next Best / Lower Cost Alternative is provided below and also included within the ASTs at the end of this chapter.

8.11.4 The assessment has shown that for both the Preferred Option and Next Best / Lower Cost Alternative, there are several pedestrian routes which would experience an increase in journey times. However, it is considered that the increase would be very small in proportion to a typical 30 minute journey. For all other routes, suitable facilities would be provided, such as overbridges, footbridges, subways etc. Segregated facilities for pedestrians and cyclists would be provided alongside both options of the bypass, and links would be made to a large number of existing routes, including a SUSTRANS route. These improvements will encourage walking and cycling, and hence improve the physical fitness of the local population. Reductions in traffic volumes, particularly within the city centre and on key radials would also encourage walking and cycling.

8.11.5 Both the Preferred Option and the Next Best / Lower Cost Alternative have been awarded an assessment score of **Slight Beneficial**.

8.12 ENVIRONMENT OBJECTIVE – JOURNEY AMBIENCE

8.12.1 Travellers do not normally travel for their own sake. Some forms of tourism, such as sightseeing tours, provide exceptions to this general rule. Travel is derived demand that arises from people's desire to engage in productive and non-productive activities. Therefore, a high quality journey when experienced, is often (but not always) taken for granted. However, a poor journey quality, when experienced, can be easily recognised. Journey quality can be affected, positively or negatively, by travellers themselves and by the network providers and operators.

8.12.2 The methodology for the assessment of Journey Ambience (WebTAG Unit 3.3.13) focuses on measures under the control of network providers and operators that improve en route journey quality or Journey Ambience. The measures are an important part of the Government's commitment to:

- Deliver better public transport services, through 'Quality Partnerships' in relation to buses and rail
- Improve the management of the Trunk and local road networks

8.12.3 In accordance with the guidance contained within WebTAG, the following three Journey Ambience factors have been assessed:

- Traveller care
- Traveller's views
- Traveller stress

8.12.4 The appraisal of Journey Ambience has focused on two principal groups; public transport users and drivers of private vehicles. An assessment has been made of the impact on each category using a simple three-point scale; Better, Neutral or Worse.

8.12.5 Detailed worksheets relating to the assessment of the Journey Ambience Sub Objective are included within **Appendix I9**. A summary of the assessment for the Preferred Option and the Next Best / Lower Cost Alternative is provided below and also included within the ASTs at the end of this chapter.

8.12.6 The appraisal reveals that in terms of public transport users, both options would result in a **Large Beneficial** impact through the reduction of traffic levels and fear of potential accidents on the existing routes through the city centre. Improvements could also be achieved in terms of reductions in delays and reduced driver frustration.

8.12.7 Drivers of private vehicles would experience improvements in terms of enhanced information and also as a consequence of reductions in driver frustration, the fear of potential accidents and route uncertainty. This is a result of the anticipated levels of traffic reassignment to the LEB which will be designed in accordance with contemporary standards. The predicted AADT for the Preferred Option and Next Best / Lower Cost Alternative are in excess of 10,000 vehicles in both the opening year (2016) and the design year (2031). Therefore, due to the quantitative nature of WebTAG, the assessment score for drivers of private vehicles has been deemed to be **Large Beneficial** for both the Preferred Option and Next Best / Lower Cost Alternative as over 10,000 travellers would benefit from these improvements on a daily basis.

8.13 SAFETY OBJECTIVE

8.13.1 The Safety Objective is divided into the two Sub Objectives as detailed in **Table 8.4.** The methodologies utilised for the safety appraisal of the LEB accord with WebTAG guidance and are described in more detail within the following sections.

Safety
Government Objective: To reduce the loss of life, injuries and damage to property resulting from transport accidents and crime
To reduce **Accidents**
To improve **Security**

Table 8.4 – Safety Objective

8.14 SAFETY OBJECTIVE – ACCIDENTS

8.14.1 WebTAG Unit 3.4.1 contains the guidance relating to the Accidents Sub Objective, which has been the key point of reference for this appraisal.

8.14.2 Key quantitative indicators under the Accident Sub Objective are the changes in the numbers of accidents as a consequence of a proposal and the severity of those accidents. As recommended within the WebTAG guidance, the assessment of the likely changes in accidents numbers and casualties has been undertaken using the COBA 11.7 software program.

8.14.3 Within COBA, accident savings are calculated over a 60 year appraisal period and are expressed in terms of the number of accidents saved, the number of casualties saved and the total monetised economic benefits of the reduction in accidents.

8.14.4 The results of the COBA assessments are presented in **Table 8.5**. Further detailed information regarding the use of COBA to assess the likely accident benefits of the LEB can be found within **Chapter 7** of this submission.

Impact over 60 years	Change in Casualty Numbers			Change in PIA	Benefits £m (2002 prices)
	Fatal	Serious	Slight		
Preferred Option	0.2	16.9	243.5	198.3	£3.392
Next Best / Lower Cost Alternative	-16	-116.3	-947.1	-741.0	£-34.019

Table 8.5 – Accident Benefits

8.14.5 It can be seen that the Preferred Option for the LEB would provide accident savings of £3.392 million over the 60 year appraisal period and the Next Best / Lower Cost Alternative would provide accident disbenefits of £-34.019.

8.14.6 A more detailed explanation of these results is provided within the COBA analysis within **Chapter 7**.

8.15 SAFETY OBJECTIVE – SECURITY

8.15.1 The aim of the Security Sub Objective is to reflect both changes in security and the likely numbers of users affected. WebTAG Unit 3.4.2 provides security indicators for road users, public transport passengers and freight. These are:

- Formal surveillance
- Informal surveillance
- Landscaping
- Lighting and Visibility
- Emergency Call

8.15.2 Detailed worksheets relating to the assessment of the Security Sub Objective are included within **Appendix I10**. A summary of the assessment for the Preferred Option and the Next Best / Lower Cost Alternative is provided below and also included within the AST's at the end of this chapter.

8.15.3 Both the Preferred Option and the Next Best / Lower Cost Alternative will be designed in accordance with contemporary standards and will not significantly alter the existing situation. Therefore the assessment score for both options have been recorded as **Neutral**.

8.16 ECONOMY OBJECTIVE

8.16.1 The Economy Objective is concerned with improving the economic efficiency of transport in recognition that congestion and the unreliability of journeys add to the cost of business.

8.16.2 **Table 8.6** details the Economy Sub Objectives, which when combined, inform the Value for Money assessment of a scheme in terms of the economy. The methodologies utilised for the assessment of each of the Economy Sub Objectives accord with WebTAG guidance and are described within the following sections.

Economy
Government Objective: To support sustainable economic activity and get good value for money
To get good value for money in relation to impacts on **Public Accounts**
To improve transport economic efficiency for **Business Users and Transport Providers**
To improve transport economic efficiency for **Consumer Users**
To improve **Reliability**
To provide beneficial **Wider Economic Impacts**

Table 8.6 – Economy Objective

8.17 ECONOMY – PUBLIC ACCOUNTS

8.17.1 The Public Accounts Sub Objective has been appraised in accordance with WebTAG Unit 3.5.1.

8.17.2 The distribution of impacts between government and society is a key issue in the justification of government action. The DfT therefore require that the impacts of proposals on public accounts are defined.

8.17.3 Within WebTAG, the 'public accounts' impact is defined as net costs incurred by central or local government bodies (including public sector agencies). It includes investment and operating costs, grant and subsidy and changes in indirect tax and other revenues. Investment and operating costs incurred by private sector providers should be treated as disbenefits, offsetting changes in private sector providers' revenue.

8.17.4 The WebTAG Public Accounts Tables for the Preferred Option and the Next Best / Lower Cost Alternative are included within **Appendix I11**.

8.17.5 The Present Value of Costs (PVC) of the Preferred Option has been calculated as **£94.011** million. The PVC for the Next Best / Lower Cost Alternative has been calculated as **£81.729** million.

8.17.6 Reference should be made to **Chapter 7** and **Chapter 12** of this submission for further details relating to the QRA and Optimism Bias calculations.

8.18 ECONOMY – TRANSPORT ECONOMIC EFFICIENCY

8.18.1 The two Transport Economic Efficiency (TEE) Sub Objectives are identical in concept and method of calculation and are therefore covered under one heading as prescribed within WebTAG Unit 3.5.2.

8.18.2 The TEE Tables shown in detail in **Appendix I12** present the results of the cost benefit analysis disaggregated by group (users, operators and others), by mode of transport and by impact for both the Preferred Option and the Next Best / Lower Cost Alternative.

8.18.3 The Analysis of Monetised Costs and Benefits (AMCB) Table for the Preferred Option and Next Best / Lower Cost Alternative are reproduced in **Tables 8.7** and **8.8**.

8.18.4 The Preferred Option demonstrates **High Value for Money**, with a Benefit to Cost Ratio (BCR) of **5.03**, for those benefits which can be monetised. The Next Best / Lower Cost Alternative also demonstrates **High Value for Money** with a lower BCR of **3.40**.

8.18.5 The monetised benefits presented have been derived using TUBA 1.7c, COBA 11.7 and QUADRO 4, release 6, using a price base of 2002 and a 60 year evaluation period.

8.18.6 The benefits of the scheme accrue to both private and business users as well as to society in general, primarily through reductions in travel time and a reduction in accidents over the evaluation period.

	Values in £000's	
Noise		
Local Air Quality		
Greenhouse Gases		
Journey Ambience		
Accidents	£3.392m	
Consumer Users	£105.062m	
Business Users and Providers	£364.019m	
Reliability		
Option Values		
Present Value of Benefits (see notes) (PVB)	£472.473m	
Public Accounts	£94.011m	
Present Value of Costs (see notes) (PVC)	£94.011m	
OVERALL IMPACTS		
Net Present Value (NPV)	**£378.46m**	*NPV=PVB-PVC*
Benefit to Cost Ratio (BCR)	**5.03**	*BCR=PVB/PVC*

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.

Table 8.7 – AMCB Table for the Preferred Option

	Values in £000's	
Noise		
Local Air Quality		
Greenhouse Gases		
Journey Ambience		
Accidents	£-34.019m	
Consumer Users	£34.259m	
Business Users and Providers	£277.921m	
Reliability		
Option Values		
Present Value of Benefits (see notes) (PVB)	£278.161m	
Public Accounts	£381.729m	
Present Value of Costs (see notes) (PVC)	£81.729m	
OVERALL IMPACTS		
Net Present Value (NPV)	**£196.432m**	*NPV=PVB-PVC*
Benefit to Cost Ratio (BCR)	**3.40**	*BCR=PVB/PVC*

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.

Table 8.8 – AMCB Table for the Next Best / Lower Cost Alternative

8.19 ECONOMY OBJECTIVE – RELIABILITY

8.19.1 The Reliability Sub Objective assesses journey time reliability for all transport users.

8.19.2 The assessment of changes in reliability for the LEB has been undertaken in line with the change in stress levels methodology as prescribed within WebTAG Unit 3.5.7. The change in levels of stress is defined as the ratio of Annual Average Daily Traffic (AADT) to the Congestion Reference Flow (CRF) which is itself a measure of capacity.

8.19.3 The methodology adopted in order to calculate CRF's has followed that outlined within DMRB 5.1.3.

8.19.4 It is noted that the stress values provide only a broad indication of the impact of reliability, and the methodology is only suitable for the assessment of links between junctions.

8.19.5 Four locations have been compared as follows:

- A15 Wragby Road and LEB south of A158 Wragby Road Roundabout
- A15 Melville Street and LEB north of B1190 Washingborough Road
- A15 Canwick Road and LEB south of B1190 Washingborough Road
- B1188 Canwick Road and LEB south of B1188 Lincoln Road

8.19.6 The methodology compares Do-Minimum and Do-Something stress levels. An overall assessment score is then calculated by multiplying the change in stress levels and the expected Do-Something AADT traffic flows. WebTAG restricts stress levels to between 75% and 125%, which artificially restricts the assessment.

8.19.7 The opening of the LEB will allow strategic through traffic to divert away from Lincoln city centre. Removal of through traffic to the LEB will increase journey time reliability both for traffic using the bypass and local traffic using the existing A15 corridor through Lincoln.

8.19.8 Detailed worksheets relating to the assessment of the Reliability Sub Objective are included within **Appendix I13**. A summary of the assessment for the Preferred Option and the Next Best / Lower Cost Alternative is provided below and also included within the AST's at the end of this chapter.

8.19.9 The quantitative methodology employed indicates that the LEB will result in a **Slight Beneficial** Impact for both the Preferred Option and the Next Best / Lower Cost Alternative on journey time reliability. This methodology has been limited to assessing the changes seen by traffic movements along the existing A15 corridor; however, it is likely that smaller changes will be seen on other links, such as B1262 High Street, which will see positive changes as a result of the opening of the LEB.

8.19.10 The results of the reliability assessment are included in **Table 8.9.**

	Overall Assessment	Assessment Score
Preferred Option	**562,300**	**Slight Beneficial**
Next Best / Lower Cost Alternative	**487,511**	**Slight Beneficial**

Table 8.9 – Reliability Assessments

8.20 ECONOMY OBJECTIVE – WIDER ECONOMIC IMPACTS

8.20.1 In accordance with DfT guidance an assessment of the likely Wider Economic Impacts of the LEB has been undertaken inline with the methodology outlined within WebTAG Unit 2.8, - 'The Wider Economic Impacts Sub Objective'.

8.20.2 Discussions with the LCC Planning and Regeneration team and a review of pertinent local and regional planning policy documents led to the identification of the Brayford Regeneration Area (Refer to **Figure 8.1** at the end of the document), a 50ha site close to Lincoln city centre, as the focus of the appraisal.

8.20.3 Outputs from the Lincoln VISUM Model were used to undertake detailed analysis of the likely changes in accessibility between the Regeneration Area and the 8 identified hinterland zones for all modes of transport.

8.20.4 Due to the size of the identified Regeneration Area and relatively low levels of unemployment compared to job vacancies it was concluded that the likely benefits as a result of the LEB, in terms of increased employment for currently unemployed residents within the Brayford Regeneration Area would be limited. It was noted however that many of the areas surrounding the Regeneration Area, which were designated as its hinterland within the assessment, exhibit signs of high economic deprivation. The analysis was therefore expanded to include the Regeneration Area and the surrounding 8 hinterland zones.

8.20.5 Expanding the analysis into the surrounding hinterlands demonstrated that much of the LPA would experience a notable benefit in terms of improved access to jobs and vacancies. It was however noted that the initial segmentation of the area into the Regeneration Area and hinterland zones meant that it was difficult to quantify specific numbers without double counting between zones.

8.20.6 Due to the difficulties experienced in quantifying the exact benefits across the area, both the Preferred Option and the Next Best / Lower Cost Alternative of the LEB have been given an assessment score of **Neutral**. As a result of this approach and the difficulties referenced, it was agreed through dialogue with the DfT that a monetised appraisal and supporting Regeneration Report could be scoped out of the assessment. A more detailed technical note outlining the justification for this approach is included within **Appendix J**.

8.21 ACCESSIBILITY OBJECTIVE

8.21.1 Accessibility issues predominantly focus on the concerns of non-motorised users. In general terms the accessibility objective can be defined as 'ease of reaching'. It is concerned with increasing the ability with which people in different locations and with differing availability of transport, can reach different types of facility. The Accessibility Objective is divided into the three Sub Objectives identified in **Table 8.10**. The methodologies utilised for the accessibility appraisal accord with WebTAG guidance and are described within the following sections.

8.21.2 It should be noted that the Accessibility Objective does not seek to identify monetised user benefits as these are recognised and accounted for during the Cost Benefit Analysis under the Economy Objective.

Accessibility
Government Objective: To improve access to facilities for those without a car and to reduce severance.
To increase **Option Values**
To reduce **Severance**
To improve access to the **Transport System**

Table 8.10 – Accessibility Objective

8.22 ACCESSIBILITY OBJECTIVE – OPTION VALUES

8.22.1 The methodology for undertaking an assessment of the Option Values Sub Objective is contained within WebTAG Unit 3.6.1. WebTAG puts forward the viewpoint that within appraisals it is particularly important to consider the 'value' of having an alternative transport option available. For example, a car-owner may value the ability to use a public transport option if ever they cannot drive or their car is unavailable.

8.22.2 As neither the Preferred Option nor Next Best / Lower Cost Alternative includes any provision for additional public transport services there is nothing on which to place a value. Therefore the summary assessment score has been recorded as **Neutral** for both options and as such worksheets have not been produced.

8.22.3 However, it is acknowledged that the introduction of the LEB would generally lead to indirect benefits for existing public transport services operating within Lincoln city centre and on the key radials into and out of the city. Through the removal of traffic from the A15, the central area of the city and key radials, the LEB would support more reliable and shorter journey times for public transport users.

8.23 ACCESSIBILITY OBJECTIVE – SEVERANCE

8.23.1 Severance is essentially the impact a busy road may have on a community. For example, those residents living on one side of a road may feel 'cut off' or severed from their friends or facilities on the other side of the road under investigation. Guidance on the appraisal of the Severance Sub Objective is contained within WebTAG Unit 3.6.2.

8.23.2 Severance is concerned with non-motorised users, especially pedestrians. Cyclists and equestrians also experience severance, but to a lesser extent than pedestrians as they can travel more quickly than people on foot. To ensure a consistent approach the Severance Sub Objective recommends that the classification of impacts should be based upon pedestrians only.

8.23.3 The WebTAG guidance requires assessments to be made of the level of severance both with and without the proposed scheme, and the numbers of pedestrians affected. An overall assessment is then derived.

8.23.4 According to the guidance contained within WebTAG Unit 3.6.2, severance may be classified under one of four broad levels; None, Slight, Moderate and Severe.

8.23.5 The following steps were undertaken to enable the assessment of the Scheme with regard to severance:

- Estimation of the level of severance for the Do-Minimum case
- Estimation of the level of severance for the Do-Something
- Estimation of the change in severance (reduction and increases) by comparing the level of severance for the Do-Minimum and Do-Something cases
- Estimation of the number of people likely to be affected by changes in severance

8.23.6 An overall assessment was based on the following guidelines:

- The overall assessment is likely to be **Neutral** if increases in severance are broadly balanced by relief from severance

- The overall assessment is likely to be **Slight** where change in severance is slight or the total numbers of people affected across all levels of severance is low
- The overall assessment is likely to be **Large** where change in severance is large, and affects a moderate or high number of people, or the total number affected across all levels of severance is high
- The overall assessment is likely to be **Moderate** in all other cases

8.23.7 Detailed worksheets relating to the assessment of the Severance Sub Objective are included within **Appendix I14**. A summary of the assessment for the Preferred Option and the Next Best / Lower Cost Alternative is provided below and also included within the AST's at the end of this chapter.

8.23.8 Both the Preferred Option and Next Best / Lower Cost Alternative include facilities to encourage walking and cycling along the route. Facilities include a segregated 3.0m wide cycleway / pedestrian route alongside the entire length of the scheme which links to existing public rights of way, the SUSTRANS national cycle network and four cycle and pedestrian accessible bridges / underpasses as detailed below:

- A pedestrian / cycle bridge is proposed to link the pedestrian and cycle facility adjacent to the LEB to the SUSTRANS cycle route which runs along side the River Witham
- A pedestrian / cycle bridge is proposed over the bypass, to the north of the four arm roundabout at Greetwell Road
- A pedestrian / cycle underpass is proposed to cross the bypass just north of the roundabout junction with the B1188 Lincoln Road
- A pedestrian / cycle bridge is proposed over the bypass to provide a link to the severed Bloxholm Lane

8.23.9 With regard to the existing transport network within the LPA, the Preferred Option results in a decrease in AADT along key radials. As a result the Preferred Option would improve non-motorised user severance through the principal urban road network throughout Lincoln. This is also the case for the Next Best / Lower Cost Alternative although the decrease in AADT is smaller as the scheme terminates at the B1188 Lincoln Road and as such does not remove as much traffic from the city centre.

8.23.10 In accordance with the guidance an overall **Slight Beneficial** assessment score has been recorded for both the Preferred Option and the Next Best / Lower Cost Alternative.

8.24 ACCESSIBILITY OBJECTIVE – ACCESS TO THE TRANSPORT SYSTEM

8.24.1 The most important determinant of access to the transport system is the availability of a vehicle for private use. WebTAG Unit 3.6.3 states that analysis should therefore be conducted to show the proportions of households with no access to a car. For those without a car, access to the public transport system is of crucial importance.

8.24.2 The appraisal methodology for this Sub Objective therefore involves analysis of access to the public transport system within the LPA and how the implementation of a scheme can impact upon access to the public transport system.

8.24.3 As discussed previously, the LEB does not contain any specification for additional public transport provision or infrastructure. Therefore, the assessment score has been deemed **Neutral** for both options and as such worksheets have not been produced.

8.24.4 However, it is again acknowledged that the introduction of the LEB would lead to indirect benefits for existing public transport services operating within the city centre and on key radials. Through the removal and reassignment of traffic away from congested links it would support more reliable and shorter journey times for public transport. Improved efficiency of the local public transport services would improve their attractiveness as a viable mode of transport in and around the city.

8.25 INTEGRATION OBJECTIVE

8.25.1 The Integration Objective is concerned with integration within and between different types of transport and also integration with land-use planning objectives and policy at a national, regional and local level. The Integration Objective is divided into the three Sub Objectives identified in **Table 8.11**. The methodologies utilised for this appraisal accord with WebTAG guidance and are described within the following sections.

Integration
Government Objective: To ensure that all decisions are taken in the context of the Government's integrated transport policy
To improve **Transport Interchange**
To integrate transport policy with **Land-Use Policy**
To integrate transport policy with **Other Government Policies**

Table 8.11 – Integration Objective

8.26 INTEGRATION OBJECTIVE – TRANSPORT INTERCHANGE

8.26.1 The Transport Interchange Sub Objective is contained within WebTAG Unit 3.7.1. The ability to interchange between different modes of transport was identified within the Government's White Paper 'A New Deal for Transport' (DETR 1998) as a key element of achieving integrated transport. The Government's objectives for freight also include a shift towards rail, which is likely to involve additional modal transfers to / from road at each end of the journey.

8.26.2 The assessment of the Transport Interchange Sub Objective is therefore divided into two categories; 'Passengers' and 'Freight'.

8.26.3 As detailed within WebTAG guidance, in relation to highway schemes, this Sub Objective is only applicable in certain cases where an interchange between different modes forms part of the scheme, such as a Park & Ride facility.

8.26.4 For both the Preferred Option and Next Best / Lower Cost Alternative, the assessment score with respect to both the passenger and freight interchange categories is therefore **Neutral**, as the LEB does not incorporate any specification for additional public transport provision or freight facilities. As the assessment is neutral, worksheets have not been produced.

8.26.5 However, as detailed previously, the introduction of the LEB would have indirect benefits in terms of facilitating the introduction of modal alternatives such as QBCs and Park & Ride as identified within the LTS.

8.27 INTEGRATION OBJECTIVE – LAND USE POLICY

8.27.1 WebTAG Unit 3.7.2 states that the proposed scheme should be assessed against how well it integrates with land use proposals and policies at all levels.

8.27.2 As identified within **Chapter 5 – The Strategic Case** of this document, the LEB has a robust policy fit with the RSS as well as the RTS. It is also supported at a national level by the National Growth Point Agenda and demonstrates a robust policy fit with the Governments national objectives contained within DaSTS and the Government 30 year plan for transport.

8.27.3 At a local level the LEB is identified as Lincolnshire's priority major scheme within the LTP2 and is supported by policies contained within the City of Lincoln Local Plan, the North Kesteven District Local Plan and the West Lindsey Local Plan.

8.27.4 The Preferred Option and the Next Best / Lower Cost Alternative provide a robust policy fit with the majority of the pertinent local regional and national policies and objectives assessed. Both options are therefore considered to have an overall assessment score of **Beneficial** when appraised against the Land Use Policy Sub Objective. Detailed worksheets relating to the assessment of this Sub Objective are included within **Appendix I15**.

8.27.5 It should be noted that as specified within The Strategic Case the 'strategic fit' of the Next Best / Lower Cost Alternative is not as robust. As this option does not connect the A15 in the south with the A15 to the north of the city the removal of traffic from Lincoln city centre is not as significant. Furthermore this option does not provide the same level of support for the policy aspirations contained within local, regional and national policy documents regarding economic growth and reaffirming Lincoln's role as one of the East Midlands 5 Principal Urban Areas. In particular the Next Best / Lower Cost Alternative would not provide the same level of support to the development site to the south east of Lincoln which is identified within the RSS. This will result in Lincoln struggling to deliver the challenging housing and employment targets established by the RSS and supported by the Growth Point initiative.

8.28 INTEGRATION OBJECTIVE – OTHER GOVERNMENT POLICY

8.28.1 The Other Government Policy Sub Objective considers the impact of the scheme on other Government policies in order to assess the overall policy integration within Government. A review has been undertaken to assess the extent to which this is the case for the Preferred Option and Next Best / Lower Cost Alternative, the results of which are summarised below.

8.28.2 It is considered that both options would contribute positively to Government policies on:

- **Department for Transport:** Transport (particularly the 30 Year Plan, Delivering a Sustainable Transport System and the scheme provides High Value for Money in line within 2004 advice to ministers)
- **Department for Transport and Department for Environment, Food and Rural Affairs:** Environmental Protection (Noise, Air Quality,

Greenhouse Gases, Townscape, Physical Fitness and Journey Ambience)

- **Department for Communities and Local Government:** Regeneration
- **Department for Education and Employment:** Labour Market Flexibility
- **Department of Health:** Health
- **Department for Environment, Food and Rural Affairs:** Social Inclusion
- **HM Treasury:** Economic Growth
- **Department of Trade and Industry:** National and Regional Competitiveness

8.28.3 Both options would, however, have a negative impact, at various scales, to Government policies on:

- **Department for Transport and Department for Environment, Food and Rural Affairs:** Environmental Protection (Landscape, Biodiversity, Water Environment), although as reported mitigation proposals have been agreed with the Environment Agency as part of pre-application discussions for planning approval.
- **Department for Culture Media and Sport:** Heritage, although as reported mitigation proposals have been agreed with English Heritage as part of pre-application discussions for planning approval.

8.28.4 The overall assessment score for both the Preferred and Next Best / Lower Cost Alternative options under the Other Government Policy Sub Objective has therefore been assessed as **Beneficial**. Detailed worksheets relating to the assessment of the Other Government Policies Sub Objective are included within **Appendix I16**. Once more, it should be noted that although the assessment scores for both options are the same, the level of benefits for the Next Best / Lower Cost Alternative will not be as significant as it does not connect the A15 in the south with the A15 to the north of the city. As such the level of benefits against the above objectives is not as pronounced.

8.29 APPRAISAL SUMMARY TABLES

8.29.1 ASTs for the Preferred Option and for the Next Best / Lower Cost Alternative are included overleaf within **Tables 8.12** and **8.13**.

Preferred Option		Description Provision of a new relief road running to the east of Lincoln. The road will connect the existing northern relief road at A158 Wragby Road to A15 Sleaford Road, south of Bracebridge Heath. This would provide an additional crossing of the River Witham east of Lincoln and enable strategic through traffic using the A15 to	Problems High traffic levels in Lincoln City Centre have led to unreliable journey times, high accident rates, pedestrian severance, high noise levels and poor air quality.	Present Value Benefits: £472.473m Present Value Costs: £94.011m Net Present Value: £378.462mm Benefit to Cost Ratio: 5.03
OBJECTIVE	**SUB OBJECTIVE**	**QUALITATIVE IMPACTS**	**QUANTITATIVE ASSESSMENT**	**ASSESSMENT**
Environment	**Noise**	Noise levels would increase slightly for properties in close proximity to the LEB and adjacent to some local roads that form junctions with the LEB. Noise levels would generally decrease for the majority of properties near to main roads within Lincoln City Centre. The total population annoyed is reduced by the Scheme.	Without Scheme: 3716 people annoyed; 2045 properties with noise levels above 66 dB LAeq; 0 properties with noise levels above 80 LAeq. With Scheme: 3656 people annoyed; 1499 properties with levels above 66 dB LAeq; 0 properties with levels above 80 LAeq.	Net change in population annoyed: -61 NPV: £5,846,395
	Local Air Quality	A greater number of properties would experience an improvement in air quality. This is as a result of a reduction in traffic flows along the current main alignment and a re-distribution of traffic on the road network.	PM10: 84720 properties with improvement; 10320 properties with deterioration; 0 properties with no change. NO2: 86370 properties with improvement; 8617 properties with deterioration; 53 properties no change	Conc's wtd for exposure: PM_{10}: -5362; NO_2 : -35019 (-ve = net benefit)
	Greenhouse Gases	The scheme will result in an increase in greenhouse gas emissions.	Total change in tonnes of carbon: - 27565 tonnes of carbon (reduced carbon over 60 year appraisal period)	Net Present Value: £ -1.077 million
	Landscape	Landscape character (especially the associations of landform, pattern and visual amenity) within the Witham valley would be adversely impacted	N/A	Large Adverse
	Townscape	Reduction in traffic within Lincoln and surrounding settlements would encourage human interaction within the city and especially village centres.	N/A	Slight Beneficial
	Heritage of Historic Resources	Construction: temporary impacts on 5 historic buildings & 3 historic landscapes; permanent impacts on 23 archaeological sites; long-term impacts on 3 archaeological sites, 5 historic buildings & 3 historic landscape types. Operation: long-term impacts on 3 archaeological sites & 3 historic landscape types	Temporary construction impacts: 1 Moderate, 7 Slight; Permanent construction impacts: 1 Moderate, 7 Slight, 15 Unknown; Long-term construction impacts: 2 Moderate, 9 Slight, 2 Slight Beneficial; Long-term operation impacts: 6 Slight.	Moderate adverse
	Biodiversity	Slight adverse/neutral impacts: BAP priority habitats & species, a nationally designated & a locally designated site. Permanent landtake from SSSI & SNCI.	Permanent land take for the scheme is approximately 46ha	Slight Adverse
	Water Environment	Low significant impact on tributary of Branston Brook. All other impacts are insignificant	N/A	Slight adverse
	Physical Fitness	Slightly increased journey time on two routes. New rights of way and improved access to existing routes would increase opportunities for physical fitness.	N/A	Slight Beneficial
	Journey Ambience	The LEB would introduce better, less stressful journeys between the north and south of Lincoln and better views of the surrounding landscape for travellers.	N/A	Large Beneficial
Safety	**Accidents**	The central area of Lincoln suffers from high traffic levels which have led to high accident rates. Removal of through traffic to the LEB will result in lower accident rates on the existing A15 through Lincoln.	Personal Injury Accident Savings: 198.3 Casualty Savings: Fatal 0.2; Serious 16.9; Slight 243.5	PVB £ 3.392 million
	Security	The LEB will be designed in accordance with contemporary standards and it will not significantly alter the existing situation.	N/A	Neutral
Economy	**Public Accounts**	Lincolnshire County Council is to fund 10% (£9.875m) of the scheme costs, and £5 million is to funded by Growth Pojnt Funding The remaining will be funded through the LTP Major Scheme process	Central Government: £79.136 million Local Government: £14.875 million	PVC £ 94.011 million
	Econ. Efficiency: Business Users & Transport Providers	The scheme provides good levels of business user benefits	Business Users: £ 364.019 million Private Sector Provider: No Impact Other Business Impacts: No Impact	PVB £364.019 million
	Econ. Efficiency: Consumers	The scheme provides good levels of consumer user benefits	Consumer Users: £ 105.062 million	PVB £ 105.062 million
	Reliability	Stress levels have been assessed along the A15 corridor through Lincoln, including A15 Wragby Road and B1188 Canwick Road. The opening of the bypass will reduce traffic along this corridor, resulting in a reduction in stress levels on these links	A15 Wragby Road / Melvile Street / Canwick Road / B1188 Canwick Road Do - Minimum: 86.43% / 88.95% / 145.67% / 138.49% Preferred Route: 63.78% / 77.19% / 128.02% / 127.83 Overall Assessment: 562,300	Slight Beneficial
	Wider Economic Impacts	The likely benefits in terms of increased employment for currently unemployed residents within the Brayford RA would be limited	Difficulties experienced in quantifying the exact benefits	Neutral
Accessibility	**Option values**	No additional public transport services are included; indirect benefits in terms of more reliable and shorter journey times for existing public transport users into Lincoln. Complimentary to Quality Bus Corridors (QBC) proposed as part of Lincoln Transport Strategy.	N/A	Neutral
	Severance	The number of people benefiting from the reduction of severance through Lincoln outweighs the negative impacts experienced by a much lower number of people affected by route severance along the line of the LEB.	N/A	Slight Beneficial
	Access to the Transport System	No additional public transport services are included; indirect benefits in terms of more reliable and shorter journey times for existing public transport users into Lincoln. Complimentary to Quality Bus Corridors (QBC) proposed as part of Lincoln Transport Strategy.	N/A	Neutral
Integration	**Transport Interchange**	No changes in public or freight transport interchange are proposed by the scheme.	N/A	Neutral
	Land-Use Policy	The scheme would be beneficial in relation to regional and local policy, and on balance neutral in relation to national policy.	N/A	Beneficial
	Other Gov Policies	Key Government strategies are aided by the scheme.	N/A	Beneficial

Table 8.12 – Preferred Option AST

Next Best / Lower Cost Alternative		Description **Provision of a new relief road running to the east of Lincoln. The road will connect the existing northern relief road at A158 Wragby Road to B1188 Lincoln Road. This would provide an additional crossing of the River Witham east of Lincoln and enable strategic through traffic using the A15 to bypass Lincoln City Centre.**	Problems **High traffic levels in Lincoln City Centre have led to unreliable journey times, high accident rates, pedestrian severance, high noise levels and poor air quality.**	**Present Value Benefits: £278.161m** **Present Value Costs: £81.729m** **Net Present Value: £196.432m** **Benefit to Cost Ratio: 3.40**
OBJECTIVE	**SUB OBJECTIVE**	**QUALITATIVE IMPACTS**	**QUANTITATIVE ASSESSMENT**	**ASSESSMENT**
Environment	**Noise**	Noise levels would increase slightly for properties in close proximity to the LEB and adjacent to some local roads that form junctions with the LEB. Noise levels would generally decrease for the majority of properties near to main roads within Lincoln City Centre. The total population annoyed is reduced by the Scheme.	Without Scheme: 3716 people annoyed; 2045 properties with noise levels above 66 dB LAeq; 0 properties with noise levels above 80 LAeq. With Scheme: 3746 people annoyed; 1250 properties with levels above 66 dB LAeq; 0 properties with levels above 80 LAeq.	Net change in population annoyed: -53 NPV: £3,803,065
	Local Air Quality	A greater number of properties will experience improved air quality, due to a general reduction in traffic flows and re-distribution of traffic on the existing road network.	PM_{10}: 107980 properties with improvement; 34225 properties with deterioration; 0 properties no change. NO_2: 111165 properties with an improvement; 30039 properties with deterioration; 1001 properties no change	Concentrations weighted for exposure (negative value reflects a net benefit) PM_{10}: - 3926 NO_2 : - 29073
	Greenhouse Gases	The scheme will result in an increase in greenhouse gas emissions.	Total change in tonnes of carbon: - 26385 tonnes of carbon (reduced carbon over 60 year appraisal period)	Net Present Value: £ -1.084 million
	Landscape	Landscape character (especially the associations of landform, pattern and visual amenity) within the Witham valley would be adversely impacted	N/A	Large Adverse
	Townscape	Reduction in traffic within Lincoln and some surrounding settlements would encourage human interaction within the city and especially village centres.	N/A	Neutral
	Heritage of Historic Resources	Construction: short-term impacts on 5 historic buildings & 3 historic landscapes. Permanent impacts on 16 archaeological sites. Long-term impacts on 3 archaeological sites & 3 historic landscape types. Operation: Long-term impacts on 3 archaeological sites , 5 historic buildings & 3 historic landscape types	1 "Moderate", 8 "Slight" short-term construction impacts. 1 "Moderate", 7 "Slight", 8 "Unknown" permanent construction impacts. 1" Moderate", 5 "Slight", 2 "Slight Beneficial" long-term construction impacts. 11 "Slight" long-term operation impacts.	Moderate adverse
	Biodiversity	Direct slight adverse/neutral impacts on BAP priority habitats & species, a nationally designated & a locally designated site. Permanent landtake from SSSI & SNCI.	Permanent land take for the scheme is approximately 46ha	Slight Adverse
	Water Environment	Insignificant impacts on water quality in the River Witham, North Delph, Canwick Fen Drain and a tributary of Branston Brook. Insignificant impacts on groundwater and flood risk.	N/A	Slight adverse
	Physical Fitness	Some diversions to rights of way, increasing journey time slightly on two routes. The provision of new rights of way and improved access to existing NMU routes would increase opportunities for physical fitness. Regular maintenance would be required at the underpass on Lincoln Road, so it does not become misused.	No Forecast Data Available	Slight Beneficial
	Journey Ambience	The LEB would introduce better, less stressful journeys between the north and south of Lincoln and better views of the surrounding landscape for travellers.	N/A	Large Beneficial
Safety	**Accidents**	This scheme would result in an increase in accidents throughout Lincoln	Personal Injury Accident Savings: -741.0 Casualty Savings: Fatal -16.0; Serious -116.3; Slight -947.5	PVB £ -34.019 million
	Security	The LEB will be designed in accordance with contemporary standards and it will not significantly alter the existing situation.		Neutral
Economy	**Public Accounts**	Lincolnshire County Council is to fund 10% (£8.715m) of the scheme costs, and £5.000 million is to be funded by Growth Pojnt Funding. The remaining will be funded through the LTP Major Scheme process	Central Government: £68.015 million Local Government: £13.715 million	PVC £81.729 million
	Econ. Efficiency: Business Users & Transport Providers	The scheme provides good levels of consumer user benefits	Business Users: £ 277.931 million Private Sector Provider: No Impact Other Business Impacts: No Impact	PVB £277.931 million
	Econ. Efficiency: Consumers	The scheme provides good levels of consumer user benefits	Consumer Users: £ 34.259.8 million	PVB 34.259.8 million
	Reliability	Stress levels have been assessed along the A15 corridor through Lincoln, including A15 Wragby Road and B1188 Canwick Road. The opening of the bypass will reduce traffic along this corridor, resulting in a reduction in stress levels on these links - awaiting revised assessments	Wragby Road / Melville Street / Canwick Road / B1188 Do - Minimum: 86.40% / 88.95% / 145.67% / 138.49% Lower Cost Alternative: 62.69% / 80.13% / 128.30% / 124.69% Overall Assessment: 487,511	Slight Beneficial
	Wider Economic Impacts	As the scheme does not include any provision for additional public transport services there is nothing on which to place a value.	N/A	Neutral
Accessibility	**Option values**	No additional public transport services are included; indirect benefits in terms of more reliable and shorter journey times for existing public transport users into Lincoln. Complimentary to Quality Bus Corridors (QBC) proposed as part of Lincoln Transport Strategy.	N/A	Neutral
	Severance	The number of people benefiting from the reduction of severance through Lincoln outweighs the negative impacts experienced by a much lower number of people affected by route severance along the line of the LEB.	N/A	Slight Beneficial
	Access to the Transport System	No additional public transport services are included; indirect benefits in terms of more reliable and shorter journey times for existing public transport users into Lincoln. Complimentary to Quality Bus Corridors (QBC) proposed as part of Lincoln Transport Strategy.	N/A	Neutral
Integration	**Transport Interchange**	No changes in public or freight transport interchange are proposed by the scheme.	N/A	Neutral
	Land-Use Policy	The scheme would be beneficial in relation to regional and local policy, and on balance neutral in relation to national policy.	N/A	Beneficial
	Other Gov Policies	Key Government strategies are aided by the scheme.	N/A	Beneficial

Table 8.13 – Next Best / Lower Cost Alternative AST

9 THE VALUE FOR MONEY CASE – SUPPORTING ANALYSIS

9.1.1 As identified within WebTAG Unit 2.5, 'there are three additional groups of issues which do not fit easily within the AST. This is because the AST always takes the perspective of the overall public interest at a national level. However, the issues covered in this chapter are more focused on the implications of the LEB for particular groups of users, non-users, operators and public sector authorities. The key themes included within this Supporting Analysis are listed below and discussed in detail within the subsequent paragraphs.

- Distribution and Equity
- Affordability and Financial Sustainability
- Practicality and Public Acceptance

9.2 DISTRIBUTION AND EQUITY

9.2.1 This section of the supporting analysis is designed to show the distribution of the overall impacts summarised in the AST, thereby enabling a judgement to be made about fairness of the impacts across those affected by the proposed scheme. The remainder of this section therefore outlines the distribution of the benefits of the LEB under the following headings:

- Environment
  - Noise and Local Air Quality
  - Landscape
  - Townscape
  - Biodiversity
- Safety
- Economy
- Accessibility – Access to the Transport System

9.3 ENVIRONMENT

9.3.1 As stated in **Chapter 8**, in order to support the Planning Application for the LEB, an Environmental Impact Assessment has been undertaken. The resulting information has been used to inform the appraisal of environmental aspects of the Distribution and Equity analysis.

Noise and Local Air Quality

9.3.2 Assessment of noise levels at various noise sensitive receivers has followed the methodology outlined in DMRB. Noise levels have been calculated at all residential dwellings and other sensitive receptors within 600m of the scheme and for those roads (within 2km) on the existing road network that are predicted to result in a traffic increase of at least 25% or a reduction of 20% in the baseline year (2016) as a result of the introduction of the LEB.

9.3.3 Properties situated on the main arterial roads within the city of Lincoln experience noise level decreases. For properties located on roads such as Station Road, Bunkers Hill and Nettleham Road, with moderate to minor noise benefits when the Do-Minimum 2016 is compared to the Do-Something scenario, it is likely that these noise reductions would be noticeable to occupants of properties in close proximity to these roads. These noise

benefits are as a result of redistribution of traffic within the local road network as a result of the LEB. This is the case for both the Preferred Option and the Next Best Alternative. However, as the Preferred Option removes additional traffic from main arterial roads within Lincoln the benefits would be more significant.

9.3.4 Although there are reductions in traffic flow on the B1190 Lincoln Road and A15 Sleaford Road, the noise benefits that nearby properties would experience are 'Negligible' (both Options).

9.3.5 Properties located in a relatively rural location such as Glebe Farm, Heighington Road, Westfield Farm, Folly Lane and Canwick Manor, Canwick Avenue currently experience high ambient L_{Aeq} noise levels due to the frequent aircraft movements from the adjacent RAF Waddington. The impact of the proposed scheme is therefore 'Negligible to No-Change' in terms of the noise environment of these properties (both Options).

9.3.6 On the wider road network **Minor** or **Negligible** benefits are generally predicted for properties within the city, noise level changes for such properties are likely to be noticeable as traffic is removed from the city but are not considered to be significant.

9.3.7 Sample receptors were identified at 71 locations within the LPA where significant traffic changes (+/-10%) are predicted to occur following the introduction of the LEB.

9.3.8 The receptors show that at present, there are elevated NO_2 levels along the main arterial roads within the city centre reflecting the heavily trafficked nature of these roads and the declaration of the areas as an AQMA for NO_2.

9.3.9 The City of Lincoln Council has designated AQMAs for NO_2 and PM_{10} within Lincoln as a result of poor levels of air quality within the city. The AQMAs for NO_2 and PM_{10} are illustrated in **Figures 4.3** and **4.4** respectively at the end of the document.

9.3.10 The majority of the receptors are predicted to experience a beneficial impact for NO_2 and PM_{10} due to reductions in pollutant concentrations as a result of the proposed scheme. This is a result of decreased traffic in the city of Lincoln. All receptors within the AQMA for NO_2 are predicted to experience a decrease in NO_2, of varying levels. For example the receptors on the A15 on South Park and Melville Street are expected to experience a decrease of approximately 18% for the Preferred Option. Benefits associated with the Next Best / Lower Cost Alternative would not be as significant as less traffic is removed from the A15 corridor.

9.3.11 There are receptors in other areas which also experience large decreases in NO_2 such as on the A1434 Newark Road and Wragby Road (25% for the Preferred option), and 'Buena Vista' (30% for the Preferred option) and 'Lynwood' (31% for the Preferred option) in Waddington village.

9.3.12 103 Bunkers Hill, 257 Lincoln Road (B1188) and 141 Hawthorn Chase are located in close proximity to the proposed scheme. These receptors are predicted to experience a moderate adverse (103 Bunkers Hill and 257 Lincoln (B1188)) and a slight adverse impact for NO_2 (141 Hawthorn Chase), as very large and large increases in traffic are predicted in the vicinity of these properties as a result of the scheme. The impact for PM_{10} is slight adverse for 257 Lincoln Road (B1188) and 103 Bunkers Hill and negligible for 141 Hawthorn Chase as the concentrations increase by a magnitude of 6.9%, 7.6% and 3.4% respectively (Preferred option).

9.3.13 The widespread decreases in noise, NO_2 and PM_{10} throughout the city centre would benefit non-motorised users on the arterial routes in to Lincoln and also shoppers and tourists in the city centre. It is expected that this would have positive impacts on businesses in the city centre. A better environment for shoppers and tourists would make Lincoln a more attractive destination for shoppers and tourists, increasing footfall within the city centre, thus helping to boost trade. Residents living along the arterial routes would also benefit, having better air quality in their gardens and surrounding their homes. As the Preferred option removes additional traffic from main arterial roads and the city centre the benefits would be more significant than for the Next Best / Lower Cost Alternative.

9.3.14 Since both noise and air quality are directly linked to traffic flows, the impact of the LEB on noise and air quality can generally be represented graphically by predicted changes in traffic flows. **Figures 9.1** and **9.2** at the end of the document illustrate the predicted change in traffic flows for both the Preferred Option and the Next Best / Lower Cost Alternative.

Landscape

9.3.15 A total of 13 Historic Landscape Types have been identified within the study area. These are shown in **Figure 9.3** at the end of the document.

9.3.16 The study area is characterised by the 18th century enclosure landscape, with nucleated farmsteads and a system of fairly straight roads radiating out from Lincoln. The dominant land use is arable fields, with broken hedgerow boundaries and few trees. The study are is bisected by the River Witham, pasture fields on both banks, and is flanked on the west by the 19th and 20th century urban fringe of Lincoln.

9.3.17 The impacts on the historic landscape consist of lighting of the carriageway at night and road noise adding to the already present sense of urbanisation caused by existing roads and lighting of settlements. These impacts are listed in **Table 9.1** below.

No.	Type	Description of Impact	Value	Magnitude of un-mitigated impact
1	18th Century Enclosure with boundaries removed in the modern period and isolated farmsteads	Increased sense of urbanisation due to increased level of road noise and road noise present in more parts of this type. Lighting of junctions would increase this sense of urbanisation at night.	Low	Minor
2	18th Century Enclosure with boundaries added in the modern period and isolated farmsteads	As above.	Low	Minor
3	18th Century Enclosure with isolated farmsteads	Lighting of the junctions with Bloxholm Lane and Sleaford Road would increase the sense of urbanisation at night.	Low	Negligible

No.	Type	Description of Impact	Value	Magnitude of un-mitigated impact
11	Riverside	Increased urbanisation due to increased level of road noise and road noise present in more parts of this type. Lighting of junctions would increase this sense of urbanisation at night.	Low	Minor

Table 9.1 – Long Term Operation Impacts on the Historic Landscape

9.3.18 The increased sense of urbanisation at isolated farmsteads, such as lighting, will have a minor negative impact on the residents living in the affected farmsteads. The residents are expected to be both road users and non-road users, and may be businesses which rely on their rurality e.g. Bed and Breakfasts, self catering cottages etc. Thus, it can be concluded that for both the Preferred and Next Best / Lower Cost Alternative a very small population of both road and non-road users would be slightly affected by the change in historic landscape. It may also have a minor negative affect on a small number of businesses. Leisure users of the River Witham would also be affected by an increase in road noise and deterioration of air quality.

Townscape

9.3.19 A total of 28 historic buildings have been identified in Lincoln as part of the development of the Environmental Impact Assessment.

9.3.20 Of these, one site, Lincoln Cathedral has been assessed to be of Very High value. Located at the core of the historic city, the Cathedral is internationally recognised as a key example of Gothic architecture.

9.3.21 Four sites of High Value have been identified. Lincoln Castle and the Bishop's Palace are located within the upper city of Lincoln and are of considerable importance, both for their history and architecture, and in terms of the historic development of the City of Lincoln. This is reflected in the designation of the Castle and Bishop's Palace complex as Scheduled Ancient Monuments. These buildings are located within the Cathedral and City Centre Conservation Area Number 1. Designated in recognition of its historic, archaeological and architectural interest this conservation area contains the historic core of Lincoln and includes 322 Listed Buildings. The medieval parish Church of All Saints in Greetwell (Site 98) has been identified within the study area. The value of the church has been assessed as High due to its Grade II* Listed status, and its architectural and historic importance.

9.3.22 A total of 14 sites have been assessed as being of Medium value.

9.3.23 One site of negligible sensitivity has also been identified. This is Greetwell Road Bridge over Greetwell Beck (Site 417).

9.3.24 The predicted impacts of operation of the scheme are summarised in **Table 9.2** below and illustrated in **Figure 9.4** at the end of the document. All operation impacts are predicted to commence during the construction phase and continue in the long term during operation of the scheme.

Site No.	Site Name	Value	Type of Impact	Unmitigated Magnitude of Operation Impact
96	Greetwell Hall	Medium	Operation of the scheme would be visible on approach to the Hall. Relationship to key elements of setting would not be affected.	Negligible
98	Church of All Saints	High	Urbanisation of setting resulting from the visibility of the river crossing and cutting in views from the south doorway and churchyard. Introduction of major element infrastructure into predominantly rural setting.	Minor
214	Sheepwash Grange (18th Century Farmhouse)	Medium	Damage to rural landscape setting, introduction of new noise and visual impacts	Minor
255	Glebe Farmhouse	Medium	New infrastructure element in rural landscape setting. Introduction of noise impacts	Negligible
309	Branston Heath Farmhouse	Medium	New infrastructure element in rural landscape setting. Introduction of noise impacts. Understanding of the site would be unaffected.	Negligible
772	Manor Farm	Low	Damage to rural landscape setting, introduction of new noise and visual impacts	Minor
773	Canwick Heath Farm	Low	Scheme would form a new element within the site's setting. Understanding of the site would be unaffected.	Negligible
774	Halfway House	Low	Scheme would form a new element within the site's setting. Understanding of the site would be unaffected.	Negligible
775	The Foremans House and workers' cottages	Low	Scheme would form a new element within the site's setting. Understanding of the site would be unaffected.	Negligible
776	Cathedral Church of St Mary, Cloisters, Chapter House and Libraries	Very High	Scheme visible in protected views from the tower and south elevation during the day and night. Views to rural hinterland beyond would be maintained.	Minor
777	Lincoln Castle	High	Scheme visible in protected views from the tower and south elevation during the day and night. Views to rural hinterland beyond would be maintained.	Minor
778	The Bishop's Palace	High	Operation of the scheme would be visible in limited long distance views from the upper terrace to the southeast.	Negligible

Table 9.2 – Predicted Impacts during Operation on Historic Buildings

9.3.25 **Table 9.2** and **Figure 9.4** at the end of the document show that for the Preferred option there would be 12 historic buildings which would experience slight negative effects, most of which lie within a 200m buffer of the proposed LEB. Most of the impact would be visual and aural, as the scheme would be seen and heard from the historic buildings. With the exception of site numbers 776, 777 and 778, the affected buildings are rural farmhouses and churches, affecting a small population. Due to the elevated location of sites 776, 777 and 778, the scheme would be visible from these sites, causing a minor impact.

9.3.26 In the case of the Next Best / Lower Cost Alternative 8 historic buildings would experience a slight negative affect most of which lie within a 200m buffer.

9.3.27 It can be concluded that in terms of townscape, some isolated historic farmhouses and churches would have negative visual and aural benefits, affecting a small population.

9.3.28 Reduced traffic flows within Lincoln and surrounding settlements such as Bracebridge Heath will encourage greater human interaction within the city and especially village centres, benefiting residents and shoppers in the settlements.

9.3.29 Biodiversity

9.3.30 There is one site in the study area that receives statutory protection as a Site of Special Scientific Interest (SSSI):

- **Greetwell Quarry SSSI**: This site is designated for its geological features, being considered of national importance for its exposures of Lincolnshire Limestone. The quarry is no longer active, therefore in some areas dense scrub has developed on unworked ground and on spoil. The site is of National value for its geological interest.

9.3.31 Five sites in the study area are designated by the pertinent Local Planning Authorities as Sites of Nature Conservation Interest (SNCIs) or Local Wildlife Sites (LWSs). These are:

- Greetwell Wood SNCI
- Canwick Hall Wood SNCI
- Washingborough Junction SNCI
- Witham Corridor LWS
- Greetwell Junction Railway Embankment LWS

9.3.32 The SSSI and SNCIs are illustrated within **Figure 9.5** at the end of the document.

9.3.33 For both the Preferred Option and the Next Best /Lower Cost Alternative, the Greetwell Quarry and Greetwell Wood SNCI would experience slight adverse effects. Also, there would be numerous direct slight adverse/neutral impacts on habitats and species, one nationally designated site and one locally designated site.

9.4 SAFETY OBJECTIVE

9.4.1 As stated in **Chapter 8**, the COBA 11.7 software program has been used to derive predicted accident savings as a result of the LEB. For the Preferred Option, the reduction in traffic levels within the city centre and key radials due to transfer to the LEB will result in benefits for all motorised and non-motorised users .This will provide increased opportunity for the movement of non-motorised users within Lincoln and within surrounding communities through a reduction in severance / conflict caused by high volumes of through traffic.

9.5 ECONOMY OBJECTIVE

9.5.1 The TEE tables presented within **Appendix I2** provide a breakdown of the economic benefits of the Preferred Option and Next Best / Lower Cost Alternative.

9.5.2 From a Distribution and Equity perspective, the associated journey time and vehicle operating costs benefits for both the Preferred Option and the Next Best / Lower cost Alternative are spread over the LPA and are applicable to private vehicles and public transport services. The vast majority of these benefits fall on UK residents, although the scheme does improve access to Humberside International Airport and the Humber Ports.

9.5.3 With regard to wider economic impacts, both the Preferred Option and Next Best / Lower Cost Alternative are not considered to be a barrier to employment within Lincoln and will have significant indirect economic benefits in terms of facilitating development and employment opportunities across the LPA, including areas of economic deprivation.

9.6 ACCESSIBILITY OBJECTIVE – ACCESS TO THE TRANSPORT SYSTEM

9.6.1 As stated in **Chapter 8**, the neither the Preferred Option of the Next Best / Lower Cost Alternative contain any specification for additional public transport provision or infrastructure. However, both options will support the operation of existing public transport services through enabling a quicker and more reliable service across the LPA.

9.7 AFFORDABILITY AND FINANCIAL SUSTAINABILITY

9.7.1 The affordability and financial sustainability of the scheme has been considered. The initial investment costs will be met through a combination of sources including the Regional Funding Allocation, Growth Point Funding, LCC's capital resources and developer contributions. As previously identified Regional support for the scheme has been confirmed and the scheme is included within the East Midlands Preferred Investment Package which has been approved by the DfT.

9.7.2 As detailed within The Financial Case (see **Chapter 13**) LCC has secured Growth Point Funding towards the scheme costs and has also secured Section 151 Officer sign-off for the local authority contribution to the scheme. To provide the DfT with confidence that the Financial Plan is robust and that due consideration of financial risk of all funding streams has been considered, LCC has also secured Section 151 Officer sign-off to underwrite any Third Party Contributions at this stage. LCC is currently negotiating Third Party Contributions with landowners and developers and these contributions will be confirmed as part of the planning approvals process.

9.7.3 As a highway scheme the proposals do not require a significant ongoing revenue commitment. Routine highway maintenance will be required to maintain the carriageway in a suitable condition. The maintenance commitments for the scheme will be accounted for in the LCC's maintenance budgets.

9.8 PRACTICALITY AND PUBLIC ACCEPTABILITY

9.8.1 The role of practicality and public acceptance is to show to what extent projects can be delivered, recognising that there may be constraints, or objections to proposals that prevent their implementation.

9.8.2 The following analysis examines the practicality of both options under the following headings as set out within WebTAG Unit 2.5:

- Feasibility
- Enforcement
- Area of Interest
- Complexity
- Timescale
- Phasing and Portioning
- Complementarity
- Conflicts
- Public Acceptability

9.9 FEASIBILITY

9.9.1 In developing the scheme the issue of feasibility has been fully investigated. Both the Preferred Option and the Next Best / Lower Cost Alternative are technically feasible and have been designed in accordance with DMRB guidance, with particular reference to the following documents.

- TD 09/93 – Highway Link Design
- TD 27/05 – Cross Sections and Headrooms
- TD 16/07 – Geometric Design of Roundabouts
- TA 46/97 – Traffic Flow Ranges for Use in the Assessment of New Rural Roads
- TD 40/94 Layout of Compact Grade Separated Junctions
- TA 23/81 Junctions and Accesses: Determination of size of roundabouts and major / minor junctions

9.9.2 Additional guidance has included relevant British Standards and the Manual of Contract documents for Highway Works (MCDHW).

9.9.3 The design has been developed using MX Professional, a computer aided design system, and using Land Form level information provided by Ordnance Survey.

9.9.4 No departures from standards have been identified at this time, thus it can be concluded that both options are technically feasible.

9.9.5 From a legal perspective, a planning application, for the Preferred Option was submitted to City of Lincoln Council on 13th October 2009. The Application is due to be determined by February 2010. Once the Planning Application has been determined land reference plans will be prepared with a view to drafting Compulsory Purchase Order (CPO) plans and schedules.

9.9.6 Side Road Order (SRO) plans and schedules will also be drafted with a view to publishing the draft SROs in February 2010, and draft CPOs in April 2010. If needed, a Public Inquiry for the CPO and SRO is programmed for November 2010.

9.9.7 It can be concluded that once Programme Entry and Planning Application has been achieved, the legal processes of attaining the appropriate Orders will be

carried out. Having been confirmed funding for 2013 onwards as part of Round 2 of the RFA process shows that there is strong political regional support for the delivery of the scheme.

9.10 ENFORCEMENT

9.10.1 It is considered that minimal enforcement will be required. The design of the highway for both options will ensure self enforcement in terms of controlling vehicle speeds and minimising accidents.

9.11 AREA OF INTEREST

9.11.1 LCC are the promoting authority for the scheme. In October 2003 a Memorandum of Understanding was signed between the leaders of Lincolnshire County Council, North Kesteven District Council, City of Lincoln Council, West Lindsey District Council and Lincolnshire Enterprise to work together to promote the delivery of the LEB. Each of the above organisations acknowledges the importance of the LEB in supporting their policy aspirations and strengthening Lincoln's role as one of the five Principal Urban Areas within the East Midlands.

9.11.2 Throughout the scheme development process officers and Members of all partnering authorities have worked together. Reports on progress have been presented by the Project Board at the Lincoln Area Strategic Planning Joint Advisory Committees together with Member briefings as and when requested.

9.11.3 Public consultations as part of the LTS and the LEB route selection process have revealed strong support for the Preferred Option and key stakeholders have been consulted throughout the scheme development process. The Next Best / Lower Cost Alternative does not have the same level of public and stakeholder support.

9.12 COMPLEXITY

9.12.1 There are not considered to be any major complex issues associated with either the technical aspects or the project delivery. A Governance / Project Management System has been established and is included within The Delivery Case (see **Chapter 11**).

9.13 TIMESCALE

9.13.1 The construction of the LEB is programmed to start in 2013, with an opening year of 2016. More detail regarding the Project Plan is included within The Delivery Case (see **Chapter 11**).

9.14 PHASING

9.14.1 The LEB cannot be implemented in phases, and must be considered as one component.

9.15 PARTITIONING

9.15.1 To deliver the scheme objectives the LEB must connect the A15 in the south of the city to the A15 in the north of the city. The A15 is the main north-south route through Lincolnshire, connecting Humberside and North Lincolnshire with Lincoln, Sleaford and Peterborough. At the present time, strategic traffic on the A15 has to travel through Lincoln city centre over Pelham Bridge.

9.15.2 The scheme will only meet the objectives if it is built to extent and specification of the Preferred Option.

9.16 COMPLIMENTARITY

9.16.1 The construction of the Preferred Option will facilitate the provision of other components of the LTS, such as Quality Bus Corridors and Park & Ride sites. The removal of strategic through traffic from the city centre will allow the introduction of demand management measures and the allocation of existing road space to be dedicated to bus corridors, and other sustainable modes such as cyclists and pedestrians (see **Chapter 3** for more detail).

9.16.2 The Next Best / Lower Cost Alternative does not offer the same level of complimentarity with the LTS.

9.17 CONFLICTS

9.17.1 The LEB does not conflict with any other proposals.

9.18 POLITICAL NATURE OF POLICIES AND PROPOSALS

9.18.1 As identified above the Preferred Option has significant political support and stakeholders signed a memorandum of understanding in 2003. The Next Best / Lower Cost Alternative does not have the same level of political support.

9.18.2 As demonstrated within The Strategic Case (see **Chapter 5**), the scheme is in accordance with pertinent policy documents within the LPA and at a Regional level.

9.19 PUBLIC ACCEPTANCE

9.19.1 The scheme and specifically the Preferred Option can be viewed as having significant public acceptance. As referenced above, the Next Best / Lower Cost Alternative does not have the same level of public support. Public consultation undertaken to date is outlined below.

9.19.2 In January 2005, during Phase 3 of the LTS, a questionnaire was issued to 10,000 households within the LPA setting out the emerging LTS. The questionnaire included a range of proposed improvements to transport and asked which improvements people regarded as priorities. A series of Public Exhibitions were also held over six days throughout the study area. This supplemented the leaflet and questionnaire through providing additional information. In total over 1,000 members of the public attended.

9.19.3 The consultation revealed that people generally supported the transport improvements proposed by the strategy. As part of this exercise the LEB was identified by the public as the priority improvement for the LPA.

9.19.4 In February 2008, LCC consulted the public and local residents on specific proposals for the LEB. The consultation activities again involved questionnaires, leaflets, local media exposure, internet sources, and public exhibitions. The findings from this exercise have subsequently been used to inform the scheme development process and are summarised below.

- Of the three possible routes presented to the public, the Preferred Option (Route Z) received the most support
- The three most important considerations relating to the LEB emerged as:
  - Reducing traffic congestion in Lincoln city centre
  - Improved and more reliable journey times
  - Reduced accidents and road safety

- Residents felt that a reduction in traffic through rural villages was also important as this was currently a concern
- The impact on visual landscape of the LEB was of most concern to residents living closest to it. However, it was found they were generally in favour of the LEB due to the transport benefits it will deliver
- Consideration for sites of archeological significance received the lowest level of importance rating. However, consideration for wildlife and conservation areas received more support than improved public transport and cycling and pedestrian facilities, demonstrating that the residents in this area still have a high consideration for the impact the scheme will have on the surrounding environment
- It was identified that the single occupancy driver was the most common form of transport, although there was also a high number of pedestrians and cyclists
- There was support for the bypass by users of all forms of transport
- Feedback from the consultation was strong, with 90.4% finding the exhibitions either Very Useful or Useful

9.19.5 In summary, the LEB has been subject to significant pubic consultation and has been shown to have high levels of public acceptability. It was supported by the public as the priority scheme as part of the LTS in 2005 and the Preferred Option was subsequently endorsed in 2008.

9.19.6 Stakeholders have also been involved in the decision making process from an early stage. They were invited to attend and debate the transport problems and issues workshop held in Lincoln in May 2004 as part of the production of the LTS. Stakeholders included representatives from regional and local government, the emergency services, the Highways Agency, statutory environmental consultees, transport providers, non-motorised user groups and environmental groups. In addition key stakeholders involved in the delivery of the LEB are included within the Project Board (see **Chapter 11 – The Delivery Case**).

9.19.7 In addition to the above, key stakeholders have also been involved in the selection of a preferred alignment (Preferred Option) for the LEB. Stakeholder consultation has revealed that the Environment Agency, North Kesteven District Council and the City of Lincoln Council all support the delivery of the LEB and the Preferred Option promoted within this business case as it is the most appropriate for securing the long-term planning growth for the LPA. Other stakeholders who support the scheme include the Ministry of Defence, the University of Lincoln, the Lincoln Chamber of Commerce and the Road Haulage Association.

10 THE VALUE FOR MONEY CASE – CONCLUSIONS

10.1 INTRODUCTION

10.1.1 The purpose of this chapter is to provide the overall Value for Money conclusions for the both the Preferred and Next Best / Lower Cost Alternative. As such it considers the findings included within the previous chapters and provides an overall summary of both options in the context of its monetised and non monetised benefits and disbenefits.

10.1.2 The remainder of this chapter is therefore structured as follows:

- Monetised Benefits and Disbenefits
- Non-monetised Benefits and Disbenefits
  - Environment
  - Accessibility
  - Integration
- Value for Money Conclusions

10.2 MONETISED BENEFITS AND DISBENEFITS

10.2.1 Monetised benefits associated with major schemes are defined through consideration of the following:

- Accident Savings as a consequence of the scheme
- Maintenance Benefits as a consequence of the scheme
- The Present Value Benefits (PVB) for Business Users and Transport Providers
- PVB for Consumer Users
- The Present Value Costs (PVC) of the scheme

10.2.2 The overall monetised benefits associated with the scheme are compared to its PVC to determine a Benefit Cost Ratio (BCR). The BCR is of crucial importance for Ministers when determining the overall Value for Money of a scheme.

10.2.3 **Table 10.1** summarises the monetised benefits of the LEB Preferred Option and the Next Best / Lower Cost Alternative.

Cost / Benefit Category	Preferred Option	Next Best / Lower Cost Alternative
Consumer User Benefits	£105.062m	£34.259m
Business User Benefits	£364.019	£277.921m
Accident Benefits	£3.392m	£-34.019m
Maintenance	£3.141m	£3.141m
Carbon Benefits	£-1.077	£-1.084
Present Value of Benefits (PVB)	**£474.537**	**£280.218**
Present Value of Costs (PVC)	**£94.011**	**£81.729**
Net Present Value (NPV)	**£380.526**	**£198.489**
Benefit to Cost Ratio (BCR)	**5.05**	**3.43**

Table 10.1 – Summary of Monetised Benefits

10.2.4 Based purely on the monetised benefits summarised within **Table 10.1**, both the Preferred Option and the Next Best / Lower Cost Alternative can be seen to provide **High Value for Money** prior to the DfT adjustment to accommodate non-monetised benefits / impacts. The Preferred option however provides much greater benefits in terms of Consumers and Business Users across the network.

10.2.5 The Economic Assessment scenario analysis undertaken (see **Chapter 7**) demonstrates that when future land use proposal are assumed to be in place and additional trips loaded locally onto the highway network that the benefits of the scheme increase resulting in a significantly higher BCR for the Preferred Option.

10.3 NON-MONETISED BENEFITS AND DISBENEFITS

10.3.1 The non-monetised benefits cover the elements of the appraisal which cannot currently be presented in monetary terms within the BCR. Non-monetised impacts / benefits are included within the Economy, Environment, Accessibility and Integration objectives and are discussed within the following sections.

10.4 ECONOMY

10.4.1 The opening of the LEB will allow strategic through traffic to divert away from Lincoln city centre and the A15. The removal of through traffic to the LEB will increase journey time reliability both for traffic using the bypass and traffic using the existing A15 corridor through Lincoln thus benefiting all modes. The quantitative assessment undertaken using changes in stress levels as a result of both options. This indicates that both the Preferred Option and the Next Best / Lower Cost Alternative will have a **Slight Beneficial** assessment score when appraised against the Reliability Sub-Objective. However, the expected level of benefit is higher for the Preferred Option.

10.4.2 The lack of an eastern bypass around Lincoln is not currently considered to be a barrier for unemployed residents living within identified RA's from gaining

employment. Both options are therefore considered to have a **Neutral** net impact when appraised against the Wider Economic Impacts Sub-Objective.

10.5 ENVIRONMENT

10.5.1 **Table 10.2** provides a summary of the non-monetised benefits / disbenefits of the Preferred Option and Next Best / Lower Cost Alternative.

Benefit / Disbenefit Category	Preferred Option	Next Best / Lower Cost Alternative
Noise	Net change in population annoyed: -61	Net change in population annoyed: - 53
Local Air Quality	Net Benefit: PM_{10} 5362, NO_2 35019	Net Benefit: PM_{10} 3926 , NO_2 29073
Landscape	Large Adverse	Large Adverse
Townscape	Slight Beneficial	Neutral
Heritage of Historic Resources	Moderate Adverse	Moderate Adverse
Biodiversity	Slight Adverse	Slight Adverse
Water Environment	Slight Adverse	Slight Adverse
Physical Fitness	Slight Beneficial	Slight Beneficial
Journey Ambience	Large Beneficial	Large Beneficial

Table 10.2 – Summary of Non-Monetised Benefits / Disbenefits

10.5.2 It should be noted that where disbenefits have been identified the scheme includes appropriate mitigation proposals. It can be seen from reference to the above table that the Preferred Option records more beneficial environmental scores within the AST for Noise, Air Quality, Greenhouse Gases and Townscape. All other environmental assessment scores are consistent.

10.6 ACCESSIBILITY

10.6.1 The removal of traffic from the A15 through the centre of Lincoln and the reassignment of traffic to the LEB results in a significant number of people experiencing a relief from severance for both the Preferred Option and the Next Best / Lower Cost Alternative. Both options record an overall assessment score of **Large Positive**. The Option Values and Access to the Transport System Sub-Objectives are not directly influenced by either option and as such have been awarded assessment scores of **Neutral**.

10.7 INTEGRATION

10.7.1 As demonstrated within **Chapter 5**, both options have a strong strategic 'fit' with local, regional and national land use and transport policy. They also have a positive contribution in the context of wider Government policy including DaSTS and the Growth Point Agenda. However, the policy aspirations included within local, regional and national policy will be better served if the LEB is built to extent and specification of the Preferred Option.

10.7.2 The Transport interchange sub-objective is not directly influenced by the LEB and as such has been awarded an assessment score of **Neutral**.

10.8 VALUE FOR MONEY CONCLUSIONS

10.8.1 In light of the above it is considered that both options provide robust monetised and non-monetised benefits and as such can be viewed as providing High Value for Money when appraised against the full range of DfT guidance.

10.8.2 It is noted however that although the Next Best / Lower Cost Alternative can be seen to represent High Value for Money the benefits seen as a result of the Preferred Option are far greater. In addition when compared against the scheme objectives and the existing problems and issues within the LPA, the Preferred option demonstrates much stronger fit.

11 THE DELIVERY CASE

11.1 INTRODUCTION

11.1.1 The Chapter of the business case provides The Delivery Case for the LEB and is structured under the following headings:

- Governance
- Project Plan and Milestones
- Stakeholder Management
- Monitoring and Evaluation
- Gateway Review (Assurance)
- Major Scheme Delivery Experience

11.1.2 It should be noted that procedures for Risk Management are included within The Financial Case within **Chapter 13** of the business case.

11.2 GOVERNANCE

11.2.1 From a Governance perspective the Project has been organised at the following levels:

1. Executive Management
2. The Senior Responsible Owner
3. Project Board
4. Project Manager
5. Project Teams

11.2.2 A visual representation of this delivery framework is provided by **Figure 11.1**.

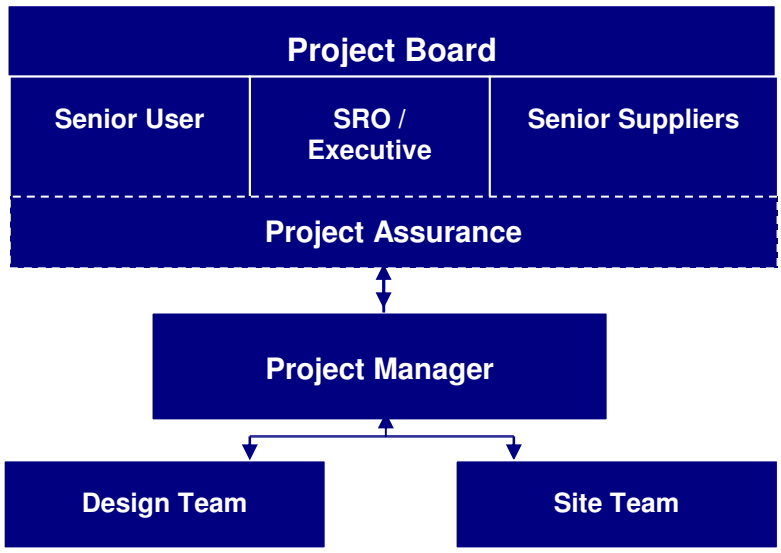

Figure 11.1 – Delivery Framework

11.2.3 In accordance with DfT guidance, once Programme Entry has been granted the above project structure will be developed in more detail at an Inception Meeting. This meeting will be used to confirm the Governance structure and the roles and responsibilities of the entire delivery team.

11.2.4 Following the Inception Meeting a detailed project organogram will be completed with named individuals provided for the Design and Site teams. The current Governance Structure is detailed below.

Executive Management

11.2.5 The Executive management of the project is provided by Councillor William Webb who is LCC's executive Councillor for Highways and Richard Wills who is the LCC Director for Development. Contact Details are provided in **Table 11.1** below:

Role	Name	Contact Details
Executive Councillor for Highways	Cllr William Webb	Tel: 01522 552093 Email: cllrw.webb@lincolnshire.gov.uk
Director of Development	Richard Wills	Tel: 01522 552222 Email: richard.wills@lincolnshire.gov.uk

Table 11.1 – Executive Management

Senior Responsible Owner

11.2.6 The Senior Responsible Owner for the LEB is **David Walton**. David is an experienced Chartered Engineer with responsibility for the delivery of highways and transportation services to LCC. Within this role David is the Client Services Manager for the Technical Services Partnership which is the consultancy arm of the County Council.

11.2.7 As Senior Responsible Owner for the scheme his key responsibilities include:

- Ultimately responsible for the project
- Appointment of the Project Manager
- Chair the Project Board meetings
- Approve the milestone reports and initiate follow on action as necessary
- Monitor the scheme in line with the business and financial progress with in the agreed tolerances
- Ensure that a project or programme of change meets its objectives and delivers the projected benefits
- Ensure that the project is subject to review at appropriate stages
- Own the project or programme brief and business case
- Development of the project or programme organisation structure and logical plans
- Monitoring and control of progress
- Formal project closure
- Post implementation review
- Problem resolution and referral

Project Board

11.2.8 As identified above, David Walton as Senior Responsible Owner for the scheme chairs the Project Board. The Project Board includes representatives

from all the key stakeholders who are committed to the delivery of the LEB. In October 2003 a Memorandum of Understanding was signed between the leaders of Lincolnshire County Council, North Kesteven District Council, City of Lincoln Council, West Lindsey District Council and Lincolnshire Enterprise to work together to promote the delivery of the LEB.

11.2.9 Throughout the process of scheme development officers and Members of all partnering authorities have worked together and as Senior Users are represented on the Project Board. Reports on progress have been presented by the Project Board at the Lincoln Area Strategic Planning Joint Advisory Committees together with Member briefings as and when requested. The Project Board also includes representation from LCC's Design Consultants (Jacobs) and LCC's ECI Contractor (May Gurney). Contact details for the Project Board are provided within **Table 11.2** below.

Role	Name	Contact Details
Senior Responsible Owner		
Client Services Manager Lincolnshire County Council	David Walton	Tel: 01522 552935 Email: david.walton@lincolnshire.gov.uk
Senior Users		
Assistant Director (Highways and Traffic) Lincolnshire County Council	Paul Coathup	Tel: 01522 553086 Email: paul.coathup@lincolnshire.gov.uk
Assistant Director Lincolnshire Enterprise	Ivan Annibal	Tel: 01522 550510 Email: ivan.annibal@lincolnshire.gov.uk
Head of Planning City of Lincoln Council	Pete Boswell	Tel: 01522 873472 Email: pete.boswell@lincoln.gov.uk
Principle Forward Planning Officer North Kesteven District Council	Mike Braithwaite	Tel: 01529 414155 ex 2443 Email: mike.braithwaite@n-kesteven.gov.uk
Chief Executive West Lindsey District Council	Duncan Sharkey	Tel: 01427 676501 Email: duncan.sharkey@west-lindsey.gov.uk
Senior Suppliers		
Divisional Director, Jacobs	Peter Kirk	Tel: 0113 389 1255 Email: peter.kirk@jacobs.com
Eastern Area Manager, May Gurney	Jasper Barnham	Tel: 07747 842072 Email: jbarnham@maygurney.com

Table 11.2 – Project Board

11.2.10 The key responsibilities of the Project Board include:

- Liaison between the project management & staff, Councillors and Study Partners & Senior Management
- Overall responsibility for the risk management. (Although day to day management of individual risks will be delegated to the most appropriate person)
- The assurance that the project remains on course to deliver the required quality to meet the business plan

- Identify and manage issues for the 'Gateway' review and support the 'Gateway' Review Team
- The approval and funding for significant changes to the project
- Responsible for publicity and dissemination of information about the project
- Review, comment and improve on the Project delivery processes and procedures
- Management and mitigation of strategic risk
- Review resource provision
- Ensure there are robust procedures to capture learning and promote continuous improvement
- Resolve conflict escalated by the Project teams
- Establish formal reporting arrangements
- Implement audit strategy

11.2.11 As the Project Board members do not work full time on the project they place a great deal of reliance on the Project Manager (the role of the Project Manager is outlined later within this section). Although they receive regular reports from the Project Manager, there are key issues for consideration:

- Are things really going as well as we are being told?
- Are any problems being hidden from us?
- Is the solution going to be what we want?
- Are we suddenly going to find that the project is over budget or late?

11.2.12 All of these points mean that there is a need in the project organisation for independent monitoring of all aspects of the project's performance and products. This is the **Project Assurance** function.

11.2.13 According to the needs and desires of the Project Board, assurance responsibilities are delegated, as long as the recipients are independent of the Project Manager and the rest of the Project Management Team. Any appointed assurance jobs assure the project on behalf of one or more members of the Project Board.

11.2.14 Assurance covers all interests of a project, including business, user and supplier. Project Assurance is independent of the Project Manager; therefore the Project Board does not delegate any of its assurance responsibilities to the Project Manager.

11.2.15 The implementation of the assurance responsibilities cover the following:

- Maintenance of thorough liaison throughout the project between the supplier and the customer
- User needs and expectations are being met or managed
- Risks are being controlled
- Adherence to the Business Case
- Constant re-assessment of the value-for-money solution
- Fit with the overall programme or company strategy

- The right people are being involved
- An acceptable solution is being developed
- The project remains viable
- The scope of the project is not `creeping upwards' unnoticed
- Focus on the business need is maintained
- Internal and external communications are working
- Applicable standards are being used
- Any legislative constraints are being observed
- The needs of specialist interests (for example, security) are being observed
- Adherence to quality assurance standards

Senior Users

11.2.16 As identified above, the Senior Users for the scheme include representations from the following organisations, all of whom are included within the Project Board:

- Lincolnshire County Council
- Lincolnshire Enterprise
- City of Lincoln Council
- North Kesteven District Council
- West Lindsey District Council

11.2.17 As Senior Users they are responsible for the specification of the needs of all those who will use the final product(s), for User liaison with the project team, and for monitoring that the solution will meet those needs within the constraints of the business case in terms of quality, functionality and ease of use. The Senior User role commits user resources and monitors products against requirements.

11.2.18 If complexity or importance warrants it, the Senior User may delegate the responsibility and authority for some of the assurance responsibilities to a user assurance role.

Senior Supplier

11.2.19 As shown in **Table 11.2** the Senior Suppliers for the LEB are representatives for LCC's Design Consultants (Jacobs) and LCC's ECI Contractor (May Gurney). As Senior Suppliers they are accountable for the quality of products delivered by the Supplier(s) and have the authority to commit or acquire Supplier resources required. If warranted, some of this assurance responsibility of the Senior Suppliers may be delegated to separate supplier assurance personnel.

Project Manager

11.2.20 The role of the Project Manager is to provide the project with a firm foundation and to maximise its success within challenging timescales. **David Skeet** of LCC is an experienced Chartered Engineer who has been appointed to deliver the scheme. As the LCC Project Manager he is or will be responsible for:

- Managing the production of the required deliverables
- Planning and monitoring the project
- Direct and motivate the project team
- Be the primary contact for the project
- Adopting any delegation and use of project assurance roles within agreed reporting structures
- Preparing and maintaining the Project Plan (or Project Execution Plan), Stage and Exception Plans as required
- Manage project risks, including the development of contingency plans
- Liaison with programme management (if the project is part of a programme) and related projects to ensure that work is neither overlooked nor duplicated
- Overall progress and use of resources, initiating corrective action where necessary
- Change control and any required configuration management
- Reporting through agreed reporting lines on project progress through Highlight Reports and stage assessments
- Liaison with appointed project assurance roles to assure the overall direction and integrity of the project
- Adopting technical and quality strategy
- Identifying and obtain any support and advice required for the management, planning and control of the project
- Managing project administration
- Conducting end project evaluation to assess how well the project was managed [nb. 'post project' is different from 'end of project'] and preparing an end-project report
- Preparing a Lessons Learned report
- Preparing any follow-on action recommendations as required

11.2.21 As Project Manager, David also has project management and control responsibilities. These are outlined below.

Progress Reporting

11.2.22 The Project Manager prepares input to the “Highlight Reports” once a month, describing the project’s progress as well as the key risks and issues for consideration by the Project Board. If it is apparent that milestone dates will be missed, the Project Manager notifies the Project Board, with details of:

- Reasons for the delay
- Impact
- Mitigation plan

11.2.23 The Project Manager, in consultation with the SRO, is responsible for agreeing minor adjustments. However, significant variations against the project plan require escalation to the Project Board.

Change Control

11.2.24 Where threats to key milestones or threats to the quality of deliverables emerge these are reported to the SRO immediately along with options on how the specific issues can be resolved. If appropriate, a change request is raised that which describes any additional work that may be required as well as the costs associated with performing the work and any impact on project timescales. Where change control impacts on the project budget, authorisation by the Project Board is required.

Risk Management

11.2.25 A risk is defined as any potential event that poses a significant threat to the project. The approach to managing risk includes the following key elements and steps.

11.2.26 Any member of the project can report a risk to the Project Manager. Risks identified are reviewed at least once a month with the Project Manager and Project Teams to ensure that these are being managed; and if necessary whether they should be escalated. Risks are categorised by 'type', as follows:

- Cost (e.g. estimating errors, overruns)
- Schedule (e.g. estimating/scheduling errors, resource availability problems, overruns)
- Technical (e.g. requirements complexity and/or changes)
- Operational (e.g. implementation problems due to conflicts, poor communications, unavailability of key personnel)
- External (e.g. events outside the programme such as marketplace developments, poor or non-response from suppliers, regulatory changes and strategy changes)

11.2.27 Risks are estimated by the Project Manager, based on an assessment of its probability of occurrence and its likely impact. This is, in the most part, a subjective exercise.

11.2.28 It is the Project Managers responsibility to identify the appropriate actions that need to be taken to mitigate each risk. Based on this, the Project Manager assigns the necessary resources and defines target dates. Where appropriate, a separate management action plan is created that specifies how a specific risk will be mitigated.

11.2.29 Overall responsibility for monitoring progress made on risk mitigating actions lies with the Project Board. On a day to day basis, the Project Manager monitors progress made on mitigating actions through regular progress review meetings with the team.

11.2.30 Following the completion of mitigating actions the probability of occurrence and/or potential impact will be reviewed in order to determine whether either/both have been reduced. This task is completed via meetings with the originator(s) of the risk. If mitigating actions are considered to have been unsuccessful, additional activities are defined and the contingency plan (in case the risk is realised) reviewed and updated as appropriate.

Construction Phase

11.2.31 During construction certain project management responsibilities will be delegated to various on site managers. However, the LCC Project Manager will maintain overall control and responsibility for delivery.

Project Teams and Team Leaders

11.2.32 The Team Leaders for the project are identified within **Table 11.3** below.

Role	Name / Organisation	Contact Details
Highways Design	Stephen Taylor, Principal Engineer, Jacobs	Tel: 0113 389 1282 Email: stephen.taylor@jacobs.com
Environmental Design	Simon White, Divisional Director, Jacobs	Tel: 0113 389 1340 Email: simon.white@jacobs.com
Geotechnical Design	Mike Ball, Consultant, Jacobs	Tel: 0113 389 1379 Email: mike.ball@jacobs.com
Business Case	Simeon Butterworth, Divisional Director, Jacobs	Tel: 0113 389 1346 Email: simeon.butterworth@jacobs.com
Traffic Modelling	Paulo Humanes, Technical Director, Jacobs	Tel: 0191 213 4932 Email: paulo.humanes@jacobs.com
Stakeholder Management and Communication	Nicky Leggett, Principal Consultant, Jacobs	Tel: 0113 389 1354 Email: nicky.leggett@jacobs.com
Procurement	Dave Fenton, Partnership Manager, Lincolnshire County Council	Tel: 01522 552945 Email: dave.fenton@lincolnshire.gov.uk

Table 11.3 – Team Leaders

11.2.33 The main responsibility of each Team Leader is the production of Work Packages on time, on budget and to customer quality expectation. Team Leaders are given the autonomy to manage their Teams with minimal involvement from the Project Manager. However, Team Leaders are expected to raise or escalate issues to the Project Manager at scheduled meetings, or through frequent dialogue.

11.3 PROJECT PLAN AND MILESTONES

11.3.1 This section of The Delivery Case provides a commentary on the project plan and milestones. A continuously monitored programme is being used by LCC which demonstrates a feasible start of construction in autumn 2013. As with all major schemes there are a number of assumptions, risks and opportunities associated with the programme, some of which are detailed below.

11.3.2 Subject to a successful receipt of Programme Entry in Spring 2010, key milestones have been identified as detailed within **Table 11.4**. It should be noted that there is opportunity for programme acceleration.

Milestone	Date
Stage 1: Submit Major Scheme Business Case for Programme Entry	November 2009
Stage 2: Planning Application Submitted	October 2009
Stage 3: Planning Application Determined	February 2010
Stage 4: Public Inquiry (Orders)	May 2011
Stage 5: Secretary of State's Decision	March 2012
Stage 6: Submit Major Scheme Business Case for Conditional Approval	June 2012
Stage 7: Submit Major Scheme Business Case for Full Approval	January 2013
Stage 8: Start Construction	September 2013

Table 11.4 – Project Milestones

11.3.3 The following sections discuss the work elements behind the above milestones in more detail. For completeness, the programme for the scheme is included within **Appendix B**.

Stage 1: Submit Major Scheme Business Case for Programme Entry

11.3.4 Stage 1 of the programme is focussed on the submission of the business case to the DfT and the subsequent award of Programme Entry approval. In line with DfT guidance the programme assumes a 6 month determination period.

Stages 2 and 3: Planning Application Submitted and Determination

11.3.5 A Planning Application for the Preferred Option promoted within this submission was submitted in October 2009 and is currently being determined. The Planning Application is supported by a full Environmental Impact Assessment (EIA) and Planning Supporting Statement.

11.3.6 Planning Applications that require an EIA have a determination period of 16 weeks (Town and Country Planning (Environmental Impact Assessment) (England and Wales) Regulations 1999) which results in planning approval in February 2010. These timescales have been factored into the scheme programme.

Stage 4: Public Inquiry (Orders)

11.3.7 Land ownership / tenancy referencing will be undertaken at the earliest opportunity. A red line boundary has been determined in the Planning Application process and once planning approval is granted reference plans

can be prepared with a view to drafting Compulsory Purchase Order (CPO) plans and schedules.

11.3.8 Side Road Order (SRO) plans and schedules will also be drafted with a view to publishing the draft CPOs and SROs in July 2010. All appropriate notices shall be published prior to this date. This triggers an Objection Period of 13 weeks.

11.3.9 Due to the nature of the scheme a Public Inquiry for scheme orders is envisaged in May 2011. In the event of Planning Inquiry also being required efforts would be made to hold this alongside the CPO Inquiry.

11.3.10 It should be noted that there is an opportunity to reduce the Statutory Process or even eliminate the need for a Public Inquiry by negotiating with possible statutory objectors as early as possible and obtaining land by negotiation.

Stage 5: Secretary of State's Decision

11.3.11 Following the Public Inquiry the Inspector will prepare their report and six months has been allowed in the programme. The recommendations in the Inspector's Report will then be passed to the Secretary of State for determination.

11.3.12 The programme has a provision of four months for the determination which results in a decision being made in March 2012.

Stage 6: Submit Major Scheme Business Case for Conditional Approval

11.3.13 Once Planning Permission is granted and the Orders are sealed through the Secretary of State's decision, a business case for Conditional Approval can be submitted to the DfT as all statutory procedures will have been completed.

11.3.14 Guidance from the DfT recommends that three months is allowed in the programme for the determination of the business case at the Conditional Approval stage. This period has been included within the programme.

Stage 7: Submit Major Scheme Business Case for Full Approval

11.3.15 For Full Approval cost certainty is required and in line with DfT guidance an independent review would be sought. To facilitate this, detailed design will commence following the Public Inquiry.

11.3.16 The programme shows a business case for Full Approval is to be submitted in January 2013.

11.3.17 Guidance from the DfT recommends that one month is allowed in the programme for the determination of the business case at the Full Approval stage. This period has been included within the programme

Risk to Programme

11.3.18 There are a number of activities within the programme that are considered outside of the direct control of LCC as scheme promoter. These include the following, but it is acknowledged that the list is not exhaustive and existing and future risks will be monitored through the review of the scheme risk register and reported to the Project Board on a quarterly basis.

- The DfT determination periods are for guidance
- The Planning Determination period
- The duration of the Public Inquiry
- The time to prepare the Inspector's Report

- The deliberation period of the Secretary of State
- The construction period requires detailed contractor input
- Engagement with Network Rail

Opportunities to Accelerate the Programme

11.3.19 LCC consider that there is the opportunity within the programme to reduce the overall timeline and / or alleviate a certain about of slippage should it occur. Again, the following list includes opportunities, but should not be considered as exhaustive:

- The detailed design could start earlier
- Reduce the Statutory Process or even eliminate the need for a Public Inquiry by negotiating with possible statutory objectors as early as possible and obtaining land by negotiation
- The construction period

11.4 STAKEHOLDER MANAGEMENT

11.4.1 In accordance with DfT guidance stakeholder and community engagement has been an integral part of the scheme development process. The approach to this is outlined below.

Communications Strategy

11.4.2 A communications strategy has been developed to manage the interaction with stakeholders. Key stakeholders have been identified and contact details are included within the plan. The nature and frequency of communication with stakeholders will vary through the scheme development process but scheme progress is communicated at key stages. Responses from stakeholders are recorded and the strategy is considered to be a live document. The communications strategy will be updated at key programme milestones and as the scheme moves into the construction phase.

Route Selection

11.4.3 As outlined with the Supporting Analysis section of The Value for Money Case, statutory, non-statutory organisations, other stakeholders and members of the public have been involved in the selection of a Route Selection process for the LEB.

11.4.4 As part of this process stakeholder consultation has revealed that the Environment Agency, North Kesteven District Council and the City of Lincoln Council all support the delivery of the LEB and the revised Preferred Route (Route Z) as it is the most appropriate for securing the long-term planning growth for the Lincoln Policy Area.

11.4.5 A summary of their support of the findings of the Route Selection process is highlighted below with letters of support provided within **Appendix L** of this submission.

City of Lincoln

11.4.6 As part of the consultation on the Stage 2 Scheme Assessment results the City Council expressed support for Route Z as it is the *"…most appropriate for securing the long-term planned growth for the Lincoln Area."*

West Lindsey District Council

11.4.7 As part of the consultation on the Stage 2 Scheme Assessment results, West Lindsey District Council expressed continued support for a bypass, but did not show a preference for a particular route as "…*the part of the bypass within West Lindsey is not proposed to change.*" The northern section of the route within West Lindsey remains consistent with the alignment that received planning permission in 2005.

North Kesteven District Council

11.4.8 As part of the consultation on the Stage 2 Scheme Assessment results, North Kesteven District Council supported Route Z as it *"…would give maximum development potential within the South East Quadrant to support the proposals taking shape within the emerging Regional Spatial Strategy…"*

Environment Agency

11.4.9 As part of the consultation on the Stage 2 Scheme Assessment results, the Environment Agency expressed support for Route Z as *"the Environment Agency recognises the role of the LEB from the long term strategic perspective for the city. In particular, the growth of the city and the Bypass ultimately forming a development boundary for that growth. To this end, we would suggest that Route Z would be preferable for facilitation growth opportunities. Route X would appear the least preferable in respect of constraining those opportunities."*

Planning Application

11.4.10 As previously identified a planning application for the scheme was submitted in October 2009 and consultation with statutory stakeholders is ongoing. To date pre-application discussions with English Heritage have secured agreement of an appropriate appraisal and mitigation strategy and a letter confirming this is included within **Appendix L**. Discussions have also confirmed that the Environmental Agency agree in principle with the drainage proposals for the scheme and the Flood Risk Assessment submitted in support of the application.

Landowners

11.4.11 Negotiations with all landowners are either concluded or well advanced. The necessary acquisitions and rights will be secured prior to access being required, either by agreement or compulsory purchase as necessary.

Business Community

11.4.12 As part of the development of an outline Economic Impact Report in support of the scheme, consultation with the local business community has been undertaken in the form of a stakeholder workshop and the circulation of 1,500 questionnaires to local businesses and organisations. The study is due to conclude in late 2008. Stakeholder consultation undertaken in September 2008 has revealed considerable support for the delivery of the LEB. Attendees at the workshop included representatives from the following organisations:

- Lincolnshire County Council
- City of Lincoln Council
- Lincoln Chamber of Commerce (X3 attendees)
- Ministry of Defence (RAF Waddington and RAF Scampton)

- University of Lincoln
- Road Haulage Association
- Simons Group (local developer)

11.4.13 Stakeholders agreed that the LEB will help relieve congestion within the City Centre, improve access into the centre for leisure and tourism as well as enhancing the quality of life for local residents and improve the local environment. Business Community letters of support are included within **Appendix L**.

Public Consultation

11.4.14 Extensive public consultation has been undertaken in support of the scheme and this is reported in detail as part of the Supporting Analysis section of The Value for Money Case. Public consultation undertaken in support of the Lincoln Transport Strategy revealed that the LEB is viewed by the public as the priority scheme within the Lincoln Policy Area. As part of the Route Selection process the public reaffirmed their support for the scheme and the preferred route promoted within this business case (Route Z) received the most public support.

Regional Support

11.4.15 As previously identified, Regional support for the scheme was confirmed as part of the Regional Funding Allocation process for round 2. The LEB is included within the East Midlands Preferred Investment Package which has been endorsed by the DfT. Scheme progress continues to be reported to the Region through the project managers quarterly reports.

11.5 MONITORING AND EVALUATION

11.5.1 Monitoring and Evaluation is about objectively monitoring and assessing the outcomes of a decision. An evaluation, therefore, is an independent quantitative and qualitative assessment of the processes of implementing a scheme and its impacts. In accordance with DfT guidance an outline monitoring and evaluation plan has been developed for both *Process Evaluation* and *Impact Evaluation* and is reported below. Costs for undertaking this have been included within The Financial Case for the scheme. It is envisaged that the outline evaluation plan will be discussed and agreed with the DfT post award of Programme Entry approval.

Process Evaluation

11.5.2 Process Evaluation will be undertaken within the Governance arrangements identified above. Attention will be focused on the remaining aspects of the development, funding and implementation of the scheme including scheme costs, programme and design changes. As such this element will be predominately focused on monitoring impacts leading up to and during construction with issues monitored by the Project Manager and communicated to the Project Board via monthly ‘highlights’ reports.

11.5.3 The above programme commentary identifies the Project Milestones that will be updated at each approval stage. The progress towards these milestones will form a key part of the monthly ‘highlights’ progress report to the Project Board and the Quarterly reports to other key stakeholders such as the Region and in the future, the DfT.

11.5.4 As part of the Governance arrangements key stakeholders will also be notified of any issues which affect the programme or scheme costs as soon as they become apparent.

Impact Evaluation

11.5.5 Impact Evaluation will be focused on the evaluation of the scheme post construction in order to ensure that the benefits are being maximised as time elapses. In accordance with the following DfT document published in May 2006, 'The Evaluation of Local Authority Major Schemes: A Guide', the Council will conduct a full evaluation of the impact of the scheme in the following periods after it is opened.

- *Settling Down Period* – 12 months after initial opening when significant changes in demand are underway as the public becomes aware of the existence of the new facility.
- *After Short Term* - The period during which awareness of the scheme has stabilised, but when short term behavioural responses (e.g. changes of route, direct changes of mode and changes in timing of peak journeys) predominate. This is typically extends over one to three years after opening.
- *After Medium Term* - The period during which all of the longer term transport responses (e.g. changes of work location) and shorter term land-use/demographic responses are likely to occur. This typically extends over three to seven years after opening.
- *After Long Term* - The period during which the scheme is fully established and most of its impacts have had sufficient time to work through. Long term impacts are particularly associated with development location, business.

11.5.6 After each of the above time periods the LCC will prepare detailed evaluation reports and these will be issued to the Project Board, the Region and the DfT for comment. Unexpected effects of the scheme will be reported upon and, where appropriate, remedial measures identified.

11.5.7 The Council already has a comprehensive suite of baseline information from the data used to construct the traffic models, against which future year evaluations can be based. Evaluation will focus on assessment the actual impacts of the scheme against the following:

- Scheme Problems, Objectives and Outcomes which established the 'need' for the scheme and have driven its development (see Chapter 4 of the business case).
- Appraisal Summary Table which has established the anticipated benefits / impacts of the scheme against the Government 5 Objectives for transport (see The Value for Money Case within the business case).
- Stakeholder / Community Monitoring and Evaluation

11.5.8 As indicated the evaluation will be a combination of a qualitative and quantitative assessment of the scheme benefits / impacts. With regard to Stakeholder / Community Monitoring and Evaluation, this will be undertaken through a combination of questionnaires, interviews, focus groups, site visits and formal correspondence. It is envisaged that local residents will be consulted by means of a questionnaire. The sample size and target for the

questionnaire will be discussed and agreed as part of confirming the overall strategy.

11.5.9 Focus group members would include residents living within an appropriate distance of the scheme as well as representation from other areas of the Lincoln Policy Area. In line with current equalities legislation the demographics of the area would be reviewed using census data and other Council data to determine the appropriate blend of focus group members. This would ensure that 'hard to reach groups' are included within the exercise and that the result can be considered representative. All focus groups would be chaired by the Stakeholder and Community Engagement Team Leader identified above within **Table 11.3**.

11.5.10 At this stage it is envisaged that key activities will include:

- Correspondence with Statutory Stakeholders.
- Focus groups / consultation with local residents to assess the impact of the scheme on traffic levels within the Lincoln Policy Area and other transport issues such as public transport and freight.
- Focus groups / consultation with local residents to assess the impact of the scheme on community severance within the locality of the scheme as well as within the city centre and on key radial routes. .
- Focus groups / consultation with local residents to assess the impact of the scheme on Noise and Air Quality within the locality of the scheme and also within the city centre.
- Local non motorised user groups will be contacted to discuss the impact of the scheme on non-motorised user movements and facilities along the route, in particular the links to SUSTRANS.
- Local bus operators will be contacted to discuss the impact of the scheme on patronage levels and journey times for services currently operating within the Lincoln Policy Area.
- Local freight operators will be contacted to discuss the impact of the scheme on journey times and route choice within the Lincoln Policy Area.
- Local businesses (including the Chamber of Commerce) and the Tourist Board will be contacted to discuss the impact of the scheme on the city centre on the local economy.

11.6 GATEWAY REVIEW (ASSURANCE)

11.6.1 It is essential that large, complex and long running projects are monitored effectively. All major transport schemes have to demonstrate that a system for monitoring progress is part of the project management structure and plan. The Gateway Review process is a formal assessment of the progress of a project at the following key stages in its development:

- Gateway Review 0 – Strategic Assessment
- Gateway Review 1 – Business Justification
- Gateway Review 2 – Procurement Strategy
- Gateway Review 3 – Investment Decision
- Gateway Review 4 – Readiness for Service
- Gateway Review 5 – Benefits Evaluation

11.6.2 The Review is intended to provide assurance that the project can proceed to the next stage and the process is owned and administrated by the Office of Government Commerce. The Gateway Review process is mandatory for major schemes costing £40m or more.

11.6.3 A Stage 1 Gateway Review was undertaken for the LEB in July 2009. The Delivery Confidence Assessment was recorded as Amber with the following highlights. A copy

- *'The proposal enjoys strong stakeholder support and there is evidence of good cross- authority working e.g. Joint Planning Authority already in shadow form. There is a good understanding of how the scheme contributes to both local and central Government initiatives and strategies. This is underpinned by a very real local commitment to getting this scheme delivered.'*
- *'The current Project Team has done a good job in reaching this point and securing this level of stakeholder support.'*
- *'Our main area of concern is around the risks posed by the need to procure new suppliers during the next critical phase of the Project in the context of an increasingly litigious market.'*
- *'We feel that if the above is addressed promptly, the Project is in a good position to move forward.'*

11.6.4 A copy of the above Gateway Review Report is available on request.

11.6.5 In line with DfT recommendations, Gateway Review Stage 2 will be undertaken between Programme Entry and Conditional Funding Approval with Gateway Review Stage 3 undertaken before the submission for Full Approval.

11.7 MAJOR SCHEME DELIVERY EXPERIENCE

11.7.1 As the promoting authority, LCC has an excellent track record of the successful delivery of major transport schemes. LCC has recently delivered the following major schemes:

- **A16/A158 Coastal Access Improvement:** In partnership with Jacobs and May Gurney, LCC has recently delivered phases 1 and 2 of the Coastal Access Improvement. Scheme costs for both phases were £23.6 million. Phase 1 of this scheme was the Partney Bypass. DfT funding approval was secured in 2003 and the scheme opened in 2005. The highway works were delivered 3 months ahead of programme. Phase 1 was used by the Office of Government Commerce as a best practice example of Early Contractor Involvement. Phase 2, the Burgh Le Marsh secured DfT funding in 2005 and opened 4 months ahead of programme in 2007
- **A1073 Spalding to Eye Improvement Scheme:** This £80million improvement scheme secured full funding approval from the DfT in 2007. It is currently on sites and on programme for opening in 2010

11.7.2 As a consequence of the above the DfT can have confidence that LCC are experienced in the successful delivery of major schemes to cost and programme.

12 THE COMMERCIAL CASE

12.1 INTRODUCTION

12.1.1 This chapter of the business case sets out the Commercial element of the submission and is structured as follows:

- Opportunities for Private Finance Initiatives
- Scheme Procurement Strategy
- Conclusions

12.2 OPPORTUNITIES FOR PRIVATE FINANCE INITIATIVE (PFI)

12.2.1 The Private Finance Initiative (PFI) specifies a method to provide financial support for partnerships between the public and private sectors. The capital and other initial costs are funded through the use of private finance, in the form of private sector equity and debt, and a performance related service charge is paid by the public sector over the project life.

12.2.2 PFI procurement can be seen to deliver a number of benefits including the opportunity for greater transfer of risk. By requiring the private sector to put its own capital at risk and to deliver clear levels of service to the public over the long term, PFI can help to deliver high quality public services and ensure that public assets are delivered on time and to budget.

12.2.3 In assessing where PFI is appropriate, the Government's approach is based on its commitment to efficiency, equity and accountability and on the Prime Minister's principles of public sector reform. The Government does not intrinsically favour any one approach to contracting and risk sharing over any other as the central objective is to secure value for money for the taxpayer. PFI is only used where it can meet these requirements and deliver clear value for money without sacrificing the terms and conditions of staff.

12.2.4 The suitability of procuring the scheme through PFI funding has been considered. However, the County Council believe that there would be a low level of market interest for PFI procurement and as such it is therefore proposed that the LEB should be accepted for conventional funding.

12.2.5 In this instance LCC has procured the scheme using the existing Early Contractor Involvement (ECI) framework contract, that expires in 2011 and establishing an updated procurement methodology to take the scheme forward after that time. This process will ensure that LCC make best use of the benefits of the existing ECI contract whilst developing an updated and robust strategy for procurement beyond the life of the existing contract. LCC understand the importance of seamless delivery and risk mitigation and are therefore already in the process of exploring the best procurement options currently available. These are discussed in more detail within the following sections.

12.3 SCHEME PROCUREMENT STRATEGY

12.3.1 To date LCC has procured the scheme using the existing Early Contractor Involvement (ECI) framework contract which expires in 2011. LCC intend to take advantage of the contract until 2011 whilst ensuring that a robust procurement strategy is in place well in advance of the termination of the existing ECI contract.

12.3.2 LCC understand the importance of seamless delivery and risk mitigation and are therefore already in the process of exploring the best procurement options currently available. To inform this process, recent major scheme experience from the successful delivery of the A16/A156 Costal Access Improvement Scheme and the A1073 Spalding to Eye Improvement Scheme (which is currently under construction) will be drawn upon. The A16/A156 Costal Access Improvements Scheme was sighted as a best practice example of successful procurement by the Office of Government Commerce,

12.3.3 The various procurement options under consideration will be considered in line with the recommendations form the recent Stage 1 Gateway Review undertaken by the 4P's on behalf of the Office for Government Commerce.

12.3.4 The current procurement options under consideration for the scheme post 2011 are summarised within the following sections.

ECI FRAMEWORK CONTRACT

12.3.5 This procurement option will essentially be a continuation of the existing arrangements. LCC has now gained sufficient experience through the existing framework to be confident that one Contractor could provide the construction service required for the programme of works. This procurement vehicle has provided two schemes both to time and cost (or better) and a third scheme is currently heading to be similarly successful. This arrangement allows maximum flexibility to accommodate changes in scheme content at short notice. Key advantages include:

- Experience of arrangements
- Single round of tendering
- Partnering arrangement avoiding conflict
- Potential to involve suppliers
- "Target Cost" price certainty
- Comprehensive risk mitigation and valuation
- Designer / Contractor flexibility
- Experience of Lincolnshire topography
- Open book accounting

12.3.6 The viability of this approach could be determined by the amount of foreseeable future workload.

DISCRETE ECI CONTRACTS

12.3.7 This arrangement mirrors the existing ECI procurement method however it will only consider individual schemes. The schemes likely to be required have been subject to significant ECI under existing arrangements. Hence the scheme content will be in detail and well defined. It will include risk identification, valuation and allocation. The Highways Agency has adopted this approach to many individual schemes which have demonstrated many of the benefits of an ECI framework. This arrangement would also ensure that the supplier engagement has maximum influence on timing, quality and cost whilst maximising buildability. A possible disadvantage to this approach is that partner experience is lost on completion of the contract.

INDIVIDUAL (DISCRETE) CONTRACTS

12.3.8 This option would consist of individual contracts tailored to scheme needs and would include the 'works' package only. This arrangement most closely resembles the original "Spot Tender" arrangements used in the past. It is liable to generate the lowest tendered cost but may generate scheme tensions and final cost increases due to short tendering familiarisation period with oversights and omissions. One major drawback to this option is the European Union requirements to give notices and the time involved (up to 3 months). This could prevent LCC mobilising in short time frames.

12.3.9 Key advantages of the Individual (discrete) contracts include:

- Precise focus on scheme requirements and economy of effort due to focus on single scheme
- "Target Cost" price certainty
- Client driven risk sharing
- NEC contract
- Experience of Lincolnshire topography

12.3.10 Possible disadvantages to the Individual (discrete) contract arrangement include:

- Contractor has little time to acclimatise to scheme risk hence scheme costs could be driven up
- Loss of ECI involvement
- Possible reduction in buildability
- Risk mitigation hindered by one sided input (Designers view)
- Contractor ownership curtailed
- Expertise lost on completion of work
- Weak Designer / Contractor communication links

MIDLANDS HIGHWAY ALLIANCE (MAJORS)

12.3.11 The Midlands Highway Alliance (MHA) was set up following the publication of the National Improvement and Efficiency Strategy by Communities and Local Government in December 2007. Regional Improvement and Efficiency Partnerships (RIEPs) support councils and their partners to work collaboratively, accelerate efficiency gains and drive improvement.

12.3.12 The MHA comprises nine East Midlands councils, one East of England council and the Highways Agency. Leicestershire County Council acts as the lead council for the MHA. These organisations have common interests in improving performance and by working together are looking at making efficiency savings in the delivery of highway services.

12.3.13 The MHA is focused on delivering efficiencies through promoting joint procurement and embedding best practice for medium and major highway schemes. The objectives of the MHA are to:

- Establish and develop collaborative procurement frameworks to secure the delivery of major highway capital schemes, medium size highway schemes and professional services

- Establish, implement and develop a continuous improvement model for highway term maintenance to achieve convergence to best practices
- Embed partnering principles and construction best practice in all its work and throughout the supply chains to optimise commodity acquisition

12.3.14 Anticipated benefits of this approach include:

- Minimal tendering effort
- Large reservoir of experience available
- Risk ownership predefined
- NEC contract
- ECI
- "Target Cost" price certainty
- Open book accounting
- Complies with European Union requirements
- Financial limits suitable for the size of LCC schemes

12.3.15 Possible disadvantages of the MHA include:

- Loss of LCC control
- Lack of experience in MHA contract features
- Possible lack of experience in Lincolnshire topography
- Designer / contractor communication links

12.3.16 The MHA currently operates a medium size framework contract and the intention is to develop a major framework contract that will become operational in 2011. LCC intend to use their influence on the MHA to develop a framework contract that could potentially deliver schemes of the magnitude of the LEB by sharing their experience and knowledge of the use of a Framework Contract in Lincolnshire.

DESIGN AND BUILD CONTRACT

12.3.17 The design and build procurement route would involve discrete projects taken from a predefined point in the development process. The Design and Build contract would involve a single design-build contractor in order to minimise the project delivery risks for LCC and reduce the delivery timescales by overlapping the design and construction phases of the contract.

12.3.18 Key advantages of the Design and Build type contract include:

- "All-in" cost
- Competitive price
- Minimal risk to LCC

12.4 CONCLUSIONS

12.4.1 In summary, this chapter has discounted PFI as a procurement option and has demonstrated that LCC intends to make best use of the existing ECI Framework Contract until 2011 and explore and implement an updated strategy in order to ensure successful delivery thereafter. As previously outlined LCC intend to have a robust procurement strategy in place well in

advance of the termination of the existing ECI contract and shortly after the award of Programme Entry. The DfT and the Regions will be kept informed of progress via the quarterly reports.

13 THE FINANCIAL CASE

13.1 INTRODUCTION

13.1.1 DfT guidance states that it is essential that promoting authorities develop a sound financial plan for proceeding with a major scheme bid. This should consider all sources of funding, the conditions associated with each of them and the financial risks and contingent liabilities that may result should any funding stream fail to materialise. It should also consider the longer term financial sustainability of the scheme and have robust costs for operation or maintenance. This is particularly important in high value or complex schemes with more than one funding contributor and/or ongoing revenue implications. For simpler schemes and those which do not have ongoing revenue implications, such as the Improvement Scheme, a simpler statement is required.

13.1.2 This chapter of the report therefore sets out the estimated scheme costs and funding package for the LEB along with an explanation of how a thorough consideration of risk has been included in the development of the scheme costs.

13.1.3 The remainder of this Chapter is structured as follows:

- Scheme Costs (Base Costs)
- Independent Surveyors Report
- Inflation
- Quantified Risk Assessment (QRA)
- Quantified Cost Estimate (QCE) and Funding Package
- Section 151 Officer Sign Off

13.2 SCHEME COSTS (BASE COSTS)

13.2.1 A detailed cost breakdown has been prepared for the LEB. The process of Early Contractor Involvement (ECI) has allowed a realistic estimate of actual scheme costs (assuming a start date of September 2013) to be developed based on a clear knowledge and understanding of the scheme and the location.

13.2.2 Following confirmation of the Regional Funding Allocations for round 2, the scheme has been developed significantly in order to prepare an up-to-date scheme cost estimate in support of this business case for Programme Entry approval. This is discussed in greater within the following sections. The design development work undertaken by LCC's Design Consultants (Jacobs) has led to the take-off of quantities and the derivation of a new scheme estimate by LCC's ECI Framework Contractor (May Gurney).

13.2.3 A summary of the base costs at current prices is presented in **Table 13.1** and discussed in more detail within the subsequent paragraphs. Detailed cost breakdowns are provided within **Appendix M**.

Element	Base Cost
Works Costs	£86.108m
Land Costs	£9.145m
Ancillary / Advanced Works Costs	£2.227m
Statutory Undertakers Costs	£1.519m
Rail and Local Authority Costs	£0.586m
Preparation Costs	£5.192m
On-Site Supervision	£2.825m
On-Site Testing Costs	£0.861m
Scheme Total	£108.462m

Table 13.1 – Scheme Costs (Base Cost, Quarter 3 2009)

Works Costs

13.2.4 As stated above, LCC's Design Consultants have undertaken a significant amount of design development work to provide the appropriate level of detail to obtain a revised scheme estimate. It is considered that the level of design development work undertaken would be appropriate for a Design and Build Contract tender design.

13.2.5 The vertical and horizontal alignment have been designed to tie in with constraints of factors such as earthworks balance, severance, farming needs, landscape, environmental intrusion, cultural heritage impact and proximity to housing.

13.2.6 A significant amount of drainage design work has been undertaken, the details of which have been agreed with the Environment Agency.

13.2.7 From the design drawings and specifications, LCC's Design Consultants produced a preliminary Bill of Quantities. The Bill of Quantities used the Highways Agency Manual of Contract Documents for Highways Works. Due to the preliminary scheme design, several non-standard items were included within the Bill of Quantities where insufficient detail was available.

13.2.8 LCC's ECI Framework Contractor provided the rates to the preliminary Bill of Quantities and also included the priced items for structures on the scheme. From this a works cost estimate was produced.

13.2.9 For each of the following item descriptions, a series of drawings, standard details and specifications where produced:

- Series 200 – Site clearance
- Series 300 – Fencing
- Series 400 – Road restraint systems
- Series 500 – Drainage and service ducts
- Series 600 – Earthworks
- Series 700 – Pavement

- Series 1100 – Kerbing, footways and paved areas
- Series 1200 – Traffic signs and road markings
- Series 1300 – Street lighting
- Series 1400 – Electrical work
- Series 2700 – Accommodation Works
- Series 3000 – Landscaping and Ecology

13.2.10 LCC's Design Consultants undertook a preliminary design of all the structures along LEB. This preliminary design work established the following indicative elements for each structure:

- Size of footings
- Section depths
- Pile Loadings
- Bearing Sizes
- Abutment Details

13.2.11 LCC's Design Consultants produced a set of annotated preliminary General Arrangement drawings stating concepts, principles and dimensions. May Gurney were supplied the annotated general arrangements and produced a cost estimate for each structure accordingly.

13.2.12 LCC's ECI Framework Contractor, with their construction knowledge, prepared a Bill of Quantities and cost estimate for the preliminaries.

Land Costs

13.2.13 The cost estimates include associated land costs, which have been estimated by LCC surveyors. The costs include an estimate of the net value of the land plus allowance for compensation costs for property owners and tenants affected.

13.2.14 LCC has worked closely on the areas of land needed and the impact of the LEB on the local road network through which it passes and is confident at this stage of the scheme development that the impact has been minimised and the costs of new access arrangements have been properly identified.

Ancillary Costs

13.2.15 The Ancillary Costs associate with the scheme are advanced Archaeological Mitigation works and advanced Ecological Mitigation works.

Statutory Undertaker's Costs

13.2.16 In May 2009 LCC's Design Consultants requested budget (C3) estimates for diversionary works from public utility / statutory undertaker companies. **Table 13.2** provides a summary of the estimates provided.

Provider / Company	Budget Estimate
E-On Central Networks	£650,045
Anglian Water	£288,000
Sewerage (Anglian Water / Geodesys)	£100,000
BT (openreach)	£375,315
Energis	£0
Virgin Media	£37,349
Kinston Communications	£0
National Grid	£68,000
Total	**£1,518,709**

Table 13.2 – Budget Estimated for Diversionary Works

Rail and Local Authority Costs

13.2.17 LCC is in early dialogue with Network Rail to ensure works affecting the two railway crossings causes minimum disruption. For the work undertaken to date and going forward to detailed construction methodologies, Network Rail and LCC have entered into a Basic Asset Protection Agreement.

13.2.18 Network Rail invoice LCC for works undertaken by their staff in providing assistance to the scheme's development. They estimated this to be £24,000.

13.2.19 Similarly, they provided estimates for their office and site staff involvement once railway possessions have been booked. They estimate their costs to be £130,000 for the Lincoln to Market Rasen Railway Underbridge and £400,000 for the significant more complex Lincoln to Spalding Railway Overbridge.

13.2.20 LCC has also been in early dialogue with the Internal Drainage Board. It has been agreed that LCC would pay a commuted sum of £40,000 for the future upgrading of pumps affected by the bypass.

Preparation Costs

13.2.21 The preparation costs are the cost associated with progressing the scheme from Programme Entry through to Conditional and Final Approval from the DfT. Preparation costs cover works to be undertaken by LCC, their designer and Framework Contractor.

13.2.22 The elements covered within the preparation costs are detailed below:

- Progressing the scheme through the Statutory Process from the Publication of draft Orders to the Secretary of State's Decision following a Public Inquiry
- Detailed Design
- Conditional and Full Major Scheme Business Case funding submissions
- Design office support during construction
- Design office support during the aftercare / maintenance period

13.2.23 The Framework Contractor will incur fees as part of the ECI contract and this will include design development, value engineering, optioneering and

preparation of the target cost. All other contractor costs are included with the Works Cost estimate.

On-Site Supervision

13.2.24 Using the current Framework site staff rates and the likely appointment of a similar sized Client / Designer team as the A1073 Spalding to Eye Improvement (£80M major scheme currently being delivered by LCC), we have assumed the following permanent site supervision team for the full duration of the construction programme of a:

- Designer's Site Representative
- Supervisor
- Cost Manager
- Assistant Supervisor (Structures)
- Assistant Supervisor (Roadworks)
- Assistant Supervisor (Earthworks)
- Two Inspectors

On-Site Testing

13.2.25 LCC has produced a cost estimate for the on site testing which will be undertaken by Lincs Lab. Lincs Lab is the Service Unit which forms part of LCC. They provide laboratory and site testing services to the county as well as traffic data collection.

13.3 INDEPENDENT SURVEYORS REPORT

13.3.1 In accordance with DfT requirements an independent reviewer has been commissioned to examine the scheme cost estimates and provide a critical review of their validity and robustness.

13.3.2 This review was undertaken by Morgan Est in October 2009 and confirmed that the scheme costs developed by May Gurney and LCC represent a robust estimate based upon current market prices and conditions. This methodology was agreed with the DfT in advance of the independent review process.

13.3.3 The independent surveyors report produced by Morgan Est is included within **Appendix N**.

13.4 INFLATION

13.4.1 DfT guidance states that an allowance for inflation must be included within the scheme cost estimates.

13.4.2 Through discussion with the DfT and an understanding of market conditions a future year inflation factor of 2.7% has been agreed for the LEB.

13.4.3 **Table 13.3** provides a summary of the inflation derived for each year of the Base Cost funding profile.

Year	Inflation (£000's)
2009/10	-
2010/11	£16.064
2011/12	£32.562
2012/13	£173.521
2013/14	£1,747.004
2014/15	£6,913.999
2015/16	£6,921.349
2016/17	£1,813.913
2017/18	-
Total	£17,618.415

Table 13.3 – LEB Inflation Assumptions

13.5 QUANTIFIED RISK ASSESSMENT (QRA)

13.5.1 A QRA has been undertaken by LCC, their Design Consultants and ECI Framework Contractor as part of the preparation of the scheme estimates.

13.5.2 The QRA was developed using the Highways Agency Risk Management System (HARM). HARM is essentially a computer based programme which is used to evaluate financial risks at different stages of a project.

13.5.3 Specific risks to the delivery of the LEB were identified through a workshop undertaken on the 14th August 2009. This workshop is the third since the reconsideration of the route; the first was held on 20th November 2007 prior to the Public Consultation and the second was at Preferred Route Announcement on 12th November 2008.

13.5.4 The workshops were attended by LCC and members of the design and contractor team as detailed below. This ensured that all risks associated with the delivery of the LEB were identified and properly defined.

- David Walton (LCC, Client Services Manager)
- David Skeet (LCC, Senior Project Leader)
- Jasper Barnham (May Gurney, Eastern Area Manager)
- Peter Hallinan (May Gurney, Construction Manager)
- Peter Kirk (Jacobs, Project Director)
- Stephen Taylor (Jacobs, Project Manager)
- Simeon Butterworth (Jacobs, Business Case Lead)
- Various design discipline leads covering structures, highways, environment, drainage and geotechnics

13.5.5 Each workshop was undertaken with the same facilitator who is independent of the project and has recent project delivery experience as he is the Senior Project Leader for the A1073 Spalding to Eye Improvement scheme (see above for further details).

13.5.6 Each of the identified risks were presented in a Risk Register and allocated a distribution profile and run through a Monte Carlo simulation to assess the impact of the risk on the current scheme estimate. The Monte Carlo simulation is a sophisticated technique which uses statistical theories and random sampling to produce probabilistic outcomes resulting in different risk combinations.

13.5.7 This process resulted in a QRA of **£7,649,012**. The full QRA is included within **Appendix G**.

13.5.8 Both the Risk Register and the QRA will be reviewed and monitored throughout the scheme development process as part of the quarterly Project Manager reports to the Project Board.

13.6 QUANTIFIED COST ESTIMATE (QCE) AND FUNDING PACKAGE

13.6.1 The QCE for the LEB is summarised in **Table 13.4**. The QCE has been compiled based upon the total scheme base costs, the estimated preparatory costs between Programme Entry and Full Approval, the QRA and total inflation.

QCE Element	Cost (£m)
Base Costs	£108.463m
QRA	£7.649m
Inflation	£17.618m
Total	**£133.730m**

Table 13.4 – QCE Summary

13.6.2 The total funding package for the LEB, split down by year and funding source is summarised in **Table 13.5**. A detailed breakdown of the LEB funding package is provided within **Appendix M**.

Preferred Option	Preparatory costs between PE & CA (2010/11)	Preparatory costs between CA & FA (2011/12/13)	Cost after FA					Total
			2013/14	2014/15	2015/16	2016/17	2017/18	
Total Scheme Costs (QCE) Including Inflation and Risk Excluding Optimism Bias	£0.611	£2.886	£19.782	£52.937	£46.851	£10.662	£0	£133.730
DfT Requested Contribution	£0.050	£1.443	£11.282	£48.937	£40.851	£4.662	£0	£107.225
LA Contribution*	£0.561	£1.443	£1.720	£4.000	£6.000	£6.000	£0	£19.724
Growth Point Contribution	£0	£0	£6.780	£0	£0	£0	£0	£6.780
Third Party Contribution	TBC	TBC	TBC	TBC	TBC	TBC	TBC	TBC

Table 13.5 – Proposed Funding Package (Figures given in £m)

*** Inclusive of Local Authority Contribution and Third Party Contributions to be confirmed post Programme Entry Approval**

13.6.3 As indicated in **Table 13.5**, LCC has secured £4.9million from Growth Point Funding towards the scheme costs and a further £1.88million is expected in 2010 / 11. As indicated below LCC has also secured Section 151 Officer sign-off to £12,036,000 (and any further cost increases on the scheme) which represents the local authority contribution towards scheme costs.

13.6.4 To provide the DfT with confidence that the Financial Plan within this Programme Entry business case is robust and that due consideration of financial risk of all funding streams has been considered, LCC has also secured Section 151 Officer sign-off to underwrite any Third Party Contributions at this stage. LCC is currently negotiating Third Party Contributions with landowners and developers and these contributions will be confirmed as part of the planning approvals process. Once Programme Entry is secured, LCC will update the DfT through the provision of the Quarterly Reports for the scheme. It is currently envisaged that Third Party Contributions will be secured to support the delivery of the LEB as well as other public infrastructure and services required to support the delivery of the sustainable expansion of Lincoln in line with the Growth Point agenda and the Lincoln Transport Strategy.

13.7 SECTION 151 OFFICER SIGN OFF

13.7.1 In accordance with DfT guidance, the financial case presented within this submission has been reviewed and is supported by LCC's Section 151 Officer (LCC Chief Finance Officer).

13.7.2 The Chief Finance Officer has confirmed that the scheme costs represent the best estimates based upon available information and current market conditions and that LCC has the means to accept financial liability of the scheme going ahead as per the current guidance. The Chief Finance Officer has also affirmed that LCC is committed to meeting the proposed local authority contribution.

13.7.3 The Chief Finance Officer has made a signed declaration outlining LCC's financial commitment to the LEB. This declaration is included within **Appendix O**.