Lincolnshire County Council

NORTH HYKEHAM RELIEF ROAD

Appendix M – Option Assessment Framework (OAF)

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CONFIDENTIAL

Lincolnshire County **Council**

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WSP
St. Johns House
Queen Street
Manchester
M2 5JB

WSP.com

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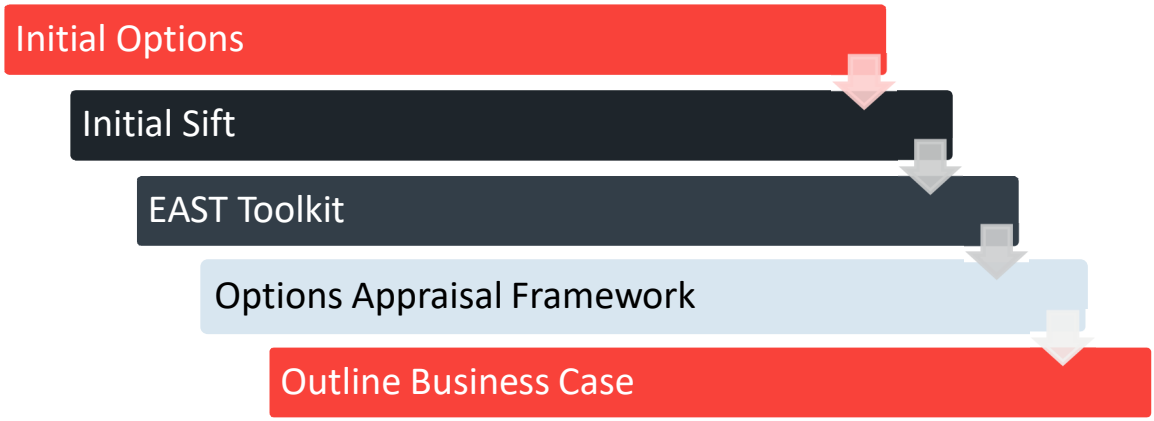
1 OPTIONS ASSESSMENT FRAMEWORK

1.1 OVERVIEW

In order to determine the better performing options for North Hykeham Relief Road (NHRR) a structured sifting process has been followed which is closely aligned with the DfT's Transport Appraisal Process Guidance (2018).

Figure 1 highlights the adopted process for this assessment. At each sifting stage options are discounted if appropriate, with each subsequent stage requiring a greater detail of analysis resulting in only the better performing options taken forward to the next stage.

Figure 1 – Option sifting process



1.2 PURPOSE OF THIS APPENDIX

This appendix follows on from 'Appendix K EAST Assessment' to present the methodology and results of the Options Assessment Framework (OAF) sifting exercise. It is one of three appendix which includes:

- Initial sifting (Appendix J);
- EAST toolkit (Appendix K); and
- **Option Assessment Framework (Appendix M).**

1.3 RESULTS OF PREVIOUS SIFTING EXERCISES

The two previous sifting exercises included an initial sift followed by one which utilised the EAST toolkit.

Initial Sift

'Appendix 3 Initial Sift' highlighted that three options are to progress to the EAST sifting stage. These options are:

- Option 1: This option would provide a single carriageway link between the A46 and the A15;
- Option 2: This option would provide a single carriageway link between the A46 and the A15 but would include enlarged junctions; and
- Option 3: This option would provide a dual carriageway link between the A46 and the A15.

EAST Sift

'Appendix 4 EAST Sift' assessed options 1, 2 and 3. The assessment identified the dual carriageway as marginally being the best performing option in relation to the objectives and overall impact. In the main this is due to the level of traffic relief that is expected to result from its implementation. However, each option is likely to deliver a high BCR. As a result, all three options were progressed to the Options Assessment Framework (OAF) sifting stage.

Methodology

This appendix is in line with 'Step 7: Development and Assessment of Potential Options' of the Transport Appraisal Process (2018) which highlights that sufficient evidence should be collected to be able to distinguish the relative costs, benefits and impacts of the options under consideration. The options are assessed against the Transport Business Case criteria. A detailed methodology can be found in Table 1.

Table 1 – Options Assessment Framework methodology

Assessment Areas	Metric	Description	Scoring Mechanism
Strategic Fit			
Regional transport and spatial strategy and local objectives fit.	Regional policy alignment	Collation and presentation of relevant objectives and review of alignment against objectives evidenced by other areas of assessment carried out.	Qualitative using a three-point scale: Wholly fulfils policy/objective; Supports policy/objective; or Neutral/marginal impact
	Local policy alignment		
Meeting intervention objectives – addressing problems and challenges.	Scheme objectives fit	Review of performance against the specific objectives for any intervention option identified.	Qualitative using a three-point scale: Wholly fulfils policy/objective; Supports policy/objective; or Neutral/marginal impact
Value for Money			
Impact on the economy	Business users and transport providers	**Business Users:** Assessment of the extent to which journeys can be made within a reasonable time and at reasonable cost, focusing on improvement in end to end journey times and money costs. The focus should be on the connectivity benefits to freight, business and commuting users only. **Transport providers:** Calculation of changes in revenue to transport providers utilising simple spreadsheet demand and revenue models drawing on travel market analysis as part of evidence base to identify need for intervention in first instance - adopt "worst case" assumptions in revenue calculation.	**Monetary Assessment:** Indicative £PV time impacts: £PV money travel costs. **Monetary Assessment:** Indicative £ PV revenue. The monetary assessment was then attributed to the qualitative assessment using a three-point scale: Neutral; Beneficial; Adverse
	Reliability	A qualitative assessment of the impact of the option on reliability. Reliability will be assessed in terms of changes to journey times, volume-capacity ratio and number of incidents.	Qualitative assessment using a three-point scale: Neutral; Beneficial; Adverse
	Regeneration	There are no identifiable regeneration areas within the study area.	N/A
	Wider impacts	No wider economic impacts are expected to be generated by this scheme.	N/A
Impact on the environment	Noise	Collation and review of all relevant and readily available baseline environmental conditions data. Desktop and GIS based identification of likelihood and potential severity of impact, given nature of intervention option.	Qualitative assessment using a seven-point scale:

Assessment Areas	Metric	Description	Scoring Mechanism
	Air quality		Large beneficial impact; Moderate beneficial impact; Slight beneficial impact; Neutral/marginal impact; Slight adverse impact; Moderate adverse impact; Large adverse impact
	Greenhouse gases	A monetary assessment was obtained from TUBA outputs based on the value of benefits in terms of vehicle emissions reduction. A judgement was then made on the level of impact in line with the qualitative assessment.	Monetary assessment: £Indicative present value of benefits *and* Qualitative assessment using a seven-point scale: Large beneficial impact; Moderate beneficial impact; Slight beneficial impact; Neutral/marginal impact; Slight adverse impact; Moderate adverse impact; Large adverse impact
	Landscape	Collation and review of all relevant and readily available baseline environmental conditions data. Desktop and GIS based identification of likelihood and potential severity of impact, given nature of intervention option.	Qualitative assessment using a seven-point scale: Large beneficial impact; Moderate beneficial impact; Slight beneficial impact; Neutral/marginal impact; Slight adverse impact; Moderate adverse impact; Large adverse impact
	Townscape		
	Historic environment		
	Biodiversity		
	Water environment		
Impact on society	Non-business users	A monetary assessment of the impact of the intervention on the reliability and connectivity of non-work and non-commuting trips based on the estimated impact on travel times and costs using TUBA outputs.	Monetary assessment: £Indicative present value of benefits *and* Qualitative assessment using a three-point scale: Beneficial impact; Neutral/marginal impact; Adverse impact
	Physical activity	A qualitative assessment based on the guidance provided in webTAG Unit A4.1 identifying whether the intervention option is likely to generate increased or decreased levels of walking and cycling within the study area.	Qualitative assessment using a three-point scale: Beneficial impact; Neutral/marginal impact; Adverse impact

Assessment Areas	Metric	Description	Scoring Mechanism
	Journey quality	Qualitative assessment of changes to the end to end journey experience of transport users (considering traveller care; travellers' views; and traveller stress) based on the guidance provided in webTAG Unit A4.1.	Qualitative assessment using a three-point scale: Beneficial impact; Neutral/marginal impact; Adverse impact
	Accidents	A review of the options' design and characteristics to qualitatively assess whether any significant accident risk is introduced.	Qualitative assessment using a three-point scale: Beneficial impact; Neutral/marginal impact; Adverse impact
	Security	A review of the options' design and characteristics to qualitatively assess whether any significant security risk is introduced.	Qualitative assessment using a three-point scale: Beneficial impact; Neutral/marginal impact; Adverse impact
	Access to services	Accessibility impacts need only be assessed where the intervention has been designed to address accessibility to the transport network. In this case evidence has been presented to demonstrate that accessibility will be "at least no worse off".	Qualitative assessment using a three-point scale: Beneficial impact; Neutral/marginal impact; Adverse impact
	Affordability	Affordability impacts need only be assessed where the intervention has been designed to address affordability of the transport system. In this case evidence has been presented to demonstrate that affordability will be "at least no worse off".	Qualitative assessment using a three-point scale: Beneficial impact; Neutral/marginal impact; Adverse impact
	Severance	Using the guidance provided in webTAG Unit A4.1, a qualitative assessment of the impact of the intervention options on severance has been undertaken based on the number of pedestrian, cycling and equestrian routes affected and potential impact that the option will have on their patronage.	Qualitative assessment using a three-point scale: Beneficial impact; Neutral/marginal impact; Adverse impact
	Option values	Qualitative assessment of the impact of the option on communities in terms of the option value associated with service additions / withdrawals based on the guidance provided in webTAG Unit A4.1.	Qualitative assessment using a three-point scale: Beneficial impact; Neutral/marginal impact; Adverse impact
Public accounts	Cost to broad transport budget	**Central Government:** Estimation of capital and operating/maintenance costs based on application of standard unit rates. Application of credible worst-case inflation and optimism bias in line with relevant guidance and discounted consistent with WebTAG to derive Present Values (£PVs).	Monetary Assessment: Indicative £PVC for both Central Government and Local Government

Assessment Areas	Metric	Description	Scoring Mechanism
		Local Government: As for central government for local government contribution to scheme costs.	
	Indirect tax revenues	Estimate of indirect tax and revenue impacts on public sector based on indicative changes in volume and fares, charge and tax rates per kilometre or trip.	Monetary assessment: Indicative £PVB (Indirect Tax Revenues)
Distributional impacts	User benefits	A high level qualitative assessment of potential social and distributional impacts based on the guidance provided in webTAG Unit A4.1 and identification of any vulnerable groups that are negatively impacted on,	Qualitative assessment using a seven-point scale: Large beneficial impact; Moderate beneficial impact; Slight beneficial impact; Neutral/marginal impact; Slight adverse impact; Moderate adverse impact; Large adverse impact
	Noise		
	Air quality		
	Accidents		
	Security		
	Severance		
	Accessibility		
	Affordability		
Indicative BCR	Cost to private sector	Estimation of capital and operating/maintenance costs to private sector based on application of standard unit rates. Application of credible worst-case inflation and optimism bias in line with relevant guidance and discounted consistent with WebTAG to derive Present Values (£PVs).	Indicative £PVC
	Indicative net present value	Present Value of Benefits (PVB) - Cost to Private Sector - Present Value of Costs (PVC)	Indicative £NPV
	Indicative economic BCR	(PVB-Cost to Private Sector)/PVC	Indicative BCR
Financial Case			
Capital and revenue costs	Outturn cost to implement	Establish likely cost of implementation (in outturn not in PV terms as per appraisal)	£outturn
	Operating and maintenance costs	Establish likely ongoing operating and maintenance costs (in outturn not in PV terms as per appraisal)	£outturn
Funding assumptions	Funding allocation	Initial assessment of funding "allocation" by source, depending on the nature of the intervention, i.e. beneficiaries and their willingness to pay.	How would outturn cost be split between different bodies? Supporting commentary relating to types of benefits associated with different sources.

Assessment Areas	Metric	Description	Scoring Mechanism
Delivery Case			
	Likely delivery agents	Establish complexity of scheme delivery. Identify delivery agent(s). Relate complexity to identified delivery agent(s).	Qualitative assessment on level of delivery agent interest and support. Identification of any potential showstoppers
	Stakeholder acceptability	Identify key stakeholders and acceptability/support criteria. Assess the potential for support / objection in context of assessed intervention impacts/performance.	
	Public acceptability/ interest	Identification of key issues that are likely to generate public interest / objection.	
	Route to market	Initial review of possible procurement routes and level of difficulty/risk - likely level of market interest.	

1.4 RESULTS

The tables and paragraphs below present the results for each of the metrics assessed as part of the OAF.

1.4.1 STRATEGIC FIT

Table 2 highlights the scoring mechanism utilised. Table 3 and 4 present the results for the strategic fit assessment and Table 5 a summary of the scores and ranking for each option to help determine the best performing option.

Table 2 – Strategic fit scoring mechanism

Scale of impact	Score
Wholly fulfils policy/objective	2
Supports policy/objective	1
Neutral/marginal impact	0

Table 3 – Regional transport and spatial strategy and local objectives fit

Assessment area	Score	Description/Key Impacts
Regional policy alignment		
Greater Lincolnshire Strategic Economic Plan 2014-2030	1 for all options	Supports policy messages with regards to improving access to national markets and providing infrastructure to reduce traffic congestion and supporting economic growth. However, there is no specific mention of the NHRR and so a maximum score of 2 has not been given.
Central Lincolnshire Local Plan 2012-2036	2 for all options	Supports the development of new housing, in particular the SWQ. Additionally, integral to the Local Plan is the delivery of proposals within the Lincoln Integrated Transport Study (LITS) which includes the NHRR.
Greater Lincolnshire Strategic Infrastructure Delivery Plan	2 for all options	A new link road in the form of NHRR is specifically mentioned within the plan and lists the following benefits: - Support agricultural businesses in and around Lincoln; - Support business growth through improved connectivity; - Improve air quality within the urban area; and - Unlock proposed SWQ with around 2,000 homes.
Midlands Engine Strategy	1 for all options	The plan broadly focuses on improving connectivity to raise productivity as well as promoting Midlands nationally and internationally to maximise trade. While there is no mention of NHRR it will improve connectivity for residence and strategic traffic to the Humber ports and airport and therefore contribute to supporting the strategies objectives.
Midlands Connect Strategy: Powering the Midlands Engine	1 for all options	The document highlights connectivity between Lincoln and the Humber Ports as an 'intensive growth corridor'. Whilst there is no specific mention of the NHRR it does provide an opportunity for it to contribute to the improvement of this corridor.

Assessment area	Score	Description/Key Impacts
Highways England North and East Midlands Route Strategy, April 2015 and Evidence Report	1 for all options	There is no mention of the NHRR however delivery of the scheme is expected to reduce demand on northern sections and improve resilience of the A46. This aligns with the strategy as the A46 has been identified as an area with unreliable journey times and delays which will be exacerbated by growth from development in the area.
Local policy alignment		
Lincolnshire Local Transport Plan 4	2 for all options	The plan specifically mentions an orbital route to the south of Lincoln and as a result NHRR will support this policy objective.
City of Lincoln Council Strategic Vision Plan 2020	2 for all options	The plan cites a southern bypass as being key to facilitating growth and employment opportunities in addition to being pivotal in completing the ring-road around the city.
Lincoln Integrated Transport Strategy (2004)	2 for all options	The NHRR has been highlighted as a key objective within the plan.
Lincoln Integrated Transport Strategy Update Revision 1 (2008)	2 for all options	The NHRR is a long-term objective within the LITS revision and identified as the next key scheme to deliver.
A Transport Strategy for the Lincoln Area (2013)	2 for all options	
North Kesteven Strategic Plan	2 for all options	NHRR will improve connectivity within and into the district which will support economic and growth aspirations. This has been highlighted as a priority within the plan.
Hykeham Neighbourhood Plan 2016-2036	2 for all options	The NHRR has been identified as a priority.
Surrounding Neighbourhood Plans including: Bassingham Billinghay Coleby Dunston Nocton & Potterhanworth Thorpe-on-the-Hill Welbourn	0 for all options	The surrounding neighbourhood plans highlight a need to improve NMU provision into the villages and enhance public transport services. The NHRR infrastructure may provide an opportunity to improve these links in the south of Lincoln.

Table 4 – Scheme objectives fit

Assessment area	Score	Description/Key Impacts
Provision of an additional east west route for local and strategic traffic.	2 for all options	Each NHRR option will provide an east west link to the south of Lincoln which will benefit both strategic and local traffic.
Improved access between the strategic A46 and the eastern side of Lincoln including the Lincoln Eastern Bypass.	2 for all options	Each NHRR option will improve access between the A46 and LEB.

Reduced rat-running traffic through South Lincoln and North Hykeham as a result of east west traffic using appropriate routes.	2 for all options	All assessed options will reduce east west demand on the local road network as traffic transfers onto the NHRR. However, the dual carriageway option is forecast to result in a greater level of traffic relief on the local road network.
Provision of a new link to unlock land allocated for the South West Quadrant.	2 for all options	All assessed options will support the delivery of the SWQ.
Increased network capacity to accommodate housing growth.	2 for all options	All assessed options will increase network capacity and will support housing growth. The dual carriageway is forecast to provide more traffic relief on the major and local road network when compared to the other options.
Improved route choice for east west movements to reduce traffic and congestion on the existing orbital network and key routes through Lincoln.	Option 1 & 2: 1 Option 3: 2	All options will reduce demand on key radial routes and most notably the A46 orbital route as traffic re-routes onto the NHRR. The dual carriageway option performs better in this respect.
Expansion of the orbital network around Lincoln.	Option 1 & 2: 1 Option 3: 2	All options will expand the orbital route around Lincoln with the dual carriageway option providing additional capacity over the single carriageway options.
Improved strategic and local route choice to improve network resilience.	2 for all options	All options improve route choice options resulting in an improvement in network resilience.

Table 5 – Strategic fit summary

	Option 1	Option 2	Option 3
Regional policy score	8	8	8
Local policy score	14	14	14
Scheme objective scores	14	14	16
Grand total	**36**	**36**	**38**
Ranking	**=2**	**=2**	**1**

1.4.2 VALUE FOR MONEY (VFM)

The Options Assessment Framework requires an assessment of options in relation to the VfM offered. Following the structure of the Transport Business Case the VfM assessment is divided across key impacts including:

- Impact on the economy;
- Impact on the environment;
- Impact on society;
- Public accounts;
- Distributional impacts; and,
- Indicative Benefit Cost Ratio (BCR)

1.4.2.1 Impact on the Economy

The results of the assessment to determine the options' impact on the economy is provided in Table 6. The impact on business users has been monetised using TUBA and a fully qualitative assessment has been undertaken against the impacts on reliability mapped on a 3 points scale (neutral, beneficial or adverse).

Table 6 – Impact on the economy results

Assessment Area	Score	Description/Key Impacts
Business Users	Indicative £PV time impacts savings	TUBA output shows that option 3 (the dual carriageway option) offers the greatest benefit in terms of time savings. For vehicle operating costs the largest benefit is for the single carriageway option 1 closely followed by option 2 and finally the dual carriageway option (option 3). Overall the dual carriageway option shows the greatest monetised benefit for business users.
	Option 1: 126,720 (£000) Option 2: 127,035 (£000) Option 3: 148,507 (£000)	
	Indicative £PV vehicle operating cost	
	Option 1: 8,606 (£000) Option 2: 8,510 (£000) Option 3: 5,418 (£000)	
	Net business impact (time impact savings + vehicle operating cost)	
	Option 1: 135,326 (£000) Option 2: 135,545 (£000) Option 3: 153,925 (£000)	
Reliability	Beneficial impact (1) for all three options.	All options will provide a beneficial impact to journey time reliability. This is through providing an additional east west route which can be utilised as a diversion route when there is an incident on the A46. Furthermore NHRR will result in traffic re-routing from the A46, key radial routes and the local road network in North Hykeham which all suffer from, to an extent, unreliable journey times.

Table 8 below applies the economic results provided in Table 6 on to a 7-point scale (see Table 7) to help determine which option is the best performing one.

Table 7 – 7-point scale

Scale of impact	Score
Large beneficial impact	3
Moderate beneficial impact	2
Slight beneficial impact	1
Neutral/marginal impact	0
Slight adverse impact	-1
Moderate adverse impact	-2
Large adverse impact	-3

Table 8 – Impact on the economy ranking

	Option 1	Option 2	Option 3

7-point score	Moderate beneficial	Moderate beneficial	Large beneficial
Overall ranking	**=2**	**=2**	**1**

1.4.2.2 Impact on the Environment

The results of the assessment to determine the options' impact on the environment is provided in Table 9. The impacts have been assessed using the seven-point qualitative assessment scale shown in Table 7 with the score for greenhouse gas impacts supported with a monetary assessment value obtained utilising TUBA.

Table 9 – Impact on the environment assessment

Assessment Area	Score	Description/Key Impacts
Noise	Slight adverse impact (-1) for all options	The scheme is forecast to reduce traffic on the major and the local road network to the south of Lincoln which has a number of receptors in close proximity (mainly housing) to the highway boundary and on to the NHRR where there are fewer receptors due to its rural location. This beneficial impact could reduce traffic in the Noise Action Planning Important Areas in Lincoln. However the NHRR could also introduce traffic impacts to new receptors and change the location of NIAs which may have adverse noise impacts on the surrounding receptors.
Air quality	Neutral/marginal impact (0) for all options	The inclusion of the NHRR is forecast to relieve a number of routes of traffic; where traffic is more free flowing it will result in less pollutants being emitted. The scheme will potentially remove traffic from the Lincoln PM_{10} and NO_2 Air Quality Management Areas. The alignment of NHRR is through a rural location where there are less receptors in close proximity to the highway boundary resulting in fewer people being affected by local air quality issues. However this may also introduce air quality impacts to new receptors.
Greenhouse gases	Option 1: -1 Option 2: -1 Option 3: -2	Based on TUBA output for greenhouse gas emissions which show: Option 1: - £4,526,000 Option 2: -£4,381,000 Option 3: -£7,494,000
Landscape / Townscape	Option 1: -2 Option 2: -2 Option 3: -3	Given the rural nature of the scheme the landscape impacts have been considered. All options will require land resulting in a detrimental impact on the landscape. Although the landscape mitigation is yet to be fully developed there is still expected to be an overall detrimental impact. The scale of impact will be more for the dual carriageway option due to the additional land requirement.

Assessment Area	Score	Description/Key Impacts
Historic environment	Slight adverse impact (-1) for all options	No listed buildings, scheduled monuments or registered parks and gardens have the potential to be directly impacted, however there could be adverse impacts from a change in setting or air, dust and noise pollution due to changes and increase in traffic levels of the proposed scheme. All options will include suitable mitigation to address the schemes impact on the historic environment.
Biodiversity	Slight adverse impact (-1) for all options	No option through close proximity directly impacts on international, national, regional or local designations. However there are non-statutory designations within the footprint of the proposed scheme which may result in direct loss of land and/or habitat degradation through indirect impacts. In addition, the introduction of a new road into a rural environment would have adverse impacts on habitats, and any associated species.
Water environment	Moderate adverse impact (-2) for all options	It is anticipated there will be a negligible change to the volume and quality discharged through suitable mitigation. However approximately 1.5km and 1km of the proposed scheme will travel through areas designated as Flood Zone 2 and Flood Zone 3 respectively. In addition, the River Witham runs directly through the proposed scheme corridor and a crossing of the Witham will be required just after the confluence of the River Brant and River Witham. The Beck stream also flows approximately 500m north and parallel to the proposed scheme north of South Hykeham.

Table 10 below applies the environmental results provided in Table 9 on to a 7-point scale to help determine which option is the best performing one.

Table 10 – Impact on the environment ranking

	Option 1	Option 2	Option 3
7-point score	Slight adverse impact	Slight adverse impact	Moderate adverse impact
Overall ranking	**=1**	**=1**	**3**

1.4.2.3 Impact on Society

The results of the assessment regarding the schemes impact on society is shown in Table 11. The seven-point scale used to score each assessment area is shown in Table 7.

Table 11 – Impact on society assessment

Assessment Area	Score	Description/Key Impacts
Non-business users	Option 1: Moderate beneficial impact (2)	Each option has been assessed against the monetary benefits for non-business users derived from TUBA. These results include:

Assessment Area	Score	Description/Key Impacts
	Option 2: Moderate beneficial impact (2) Option 3: Large beneficial impact (3)	**Option 1** Commuting benefits £39,936,000 Other £92,154,000 **Option 2** Commuting benefits £40,031,000 Other £92,613,000 **Option 3** Commuting benefits £44,708,000 Other £101,038,000
Physical activity	Slight beneficial impact (1) for all options	There are a number of PRoW within the study area the majority of which are grassed footpaths through fields or following hedgerows with some sections being dirt tracks/lanes. The existing designated cycle network consists of Regional Route 93 which is an on-road section along Newark Road up to Bracebridge where the route continues into Lincoln city centre via a traffic-free route. The route of the NHRR also crosses the Viking Way which is a prominent north south footpath through Lincoln. The Lincoln Eastern Bypass, which is currently under construction will be accompanied along its entirety by shared-use foot/cycleways and it is anticipated that NHRR will have a similar standard of NMU provision. The construction of the NHRR provides an opportunity to develop new pedestrian, cycle and equestrian routes in the south of Lincoln. It also provides an opportunity to develop new non-vehicular links between the urban extensions including the SWQ and SEQ.
Journey quality	Moderate beneficial impact (2) for all options	Journey quality is assessed using three factors which include traveller care, travellers' views and traveller stress. Traveller care represents the change in the level of service for public transport. Public transport within Lincoln is operated by Stagecoach, Centrebus, PC Coaches and Brylaine. The improvements in congestion resulting from the NHRR is likely to benefit local bus journeys. However, the direct impacts are not yet known and consequently, traveller care has not been assessed. Travellers' views represent the impact of the scheme on the surrounding countryside and townscape. The visual impacts and resulting mitigation is yet to be determined. Traveller stress can be broken down into three categories which include frustration, fear of accidents and route uncertainty. The NHRR is not expected to have a significant impact on the fear of accidents but may improve the perception of route uncertainty. It is also expected to have a positive impact on driver frustration as it provides a new east west link which better connects a number of villages to the east and west of Lincoln. It also provides an alternative route to the A46 orbital route and the local road network to the south of Lincoln where rat running occurs. It will reduce congestion on these routes resulting in

Assessment Area	Score	Description/Key Impacts
		reduced driver frustration for users who continue to use these routes and for those that now choose to use the NHRR by providing a more free-flowing route option.
Accidents	Option 1: Moderate beneficial impact (2) Option 2: Moderate beneficial impact (2) Option 3: Large beneficial impact (3)	Accidents benefits outputs extracted from COBALT show: Single carriageway (options 1 and 2): £5.4 m Dual carriageway (option 3): £14.3 m
Security	Neutral/marginal (0) impact for all options	It is anticipated that there will be no change to the likelihood of incidents of crime or fear of crime related to road users (including non-motorised).
Access to services	Neutral/marginal impact (0) for all options	The provision of the NHRR is expected to improve east west accessibility and relieve existing routes into the centre of Lincoln of traffic. This will support the improved vehicular accessibility to existing services; and There is no direct public transport provision proposed as part of the scheme and it is not expected to have a significant direct impact on public transport.
Affordability	Option 1: Slight adverse impact (-1) Option 2: Slight adverse impact (-1) Option 3: Moderate adverse impact (-2)	This covers the level of impact on the affordability of the transport system to users. In order to assess this vehicle operating costs from TUBA outputs have been utilised. The results show: Option 1 Consumer – commuting: -4,449 (£000) Consumer – other: -8,308 (£000) Business: 8,606 (£000) **Business + consumer: -4,151 (£000)** Option 2 Consumer – commuting: -4,447 (£000) Consumer – other: -8,052 (£000) Business: 8,510 (£000) **Business + consumer: -3,989 (£000)** Option 3 Consumer – commuting: -5,676 (£000) Consumer – other: -14,429 (£000) Business: 5,418 (£000) **Business + consumer: -14,687 (£000)**
Severance	Slight beneficial impact (1) for all options	Community severance is defined as the separation of residents from facilities and services they use caused by substantial change in transport infrastructure or changes in traffic flow and primarily concerns itself with the impact it has on non-motorised modes.

Assessment Area	Score	Description/Key Impacts
		Traffic is forecast to re-route from the local road network in the south of Lincoln onto the NHRR. This is expected to result in less traffic on the local road network which acts as a barrier to walking and cycling particularly at peak times where there is evidence of rat running. Overall there is expected to be a beneficial impact on severance.
Option values	N/A	The project does not result in the provision of new public transport services.

Table 12 below provides a summary of the scoring for Table 11 and provides a ranking for each option.

Table 12 – Impact on society summary

	Option 1	Option 2	Option 3
Non-business users	Moderate beneficial (2)	Moderate beneficial (2)	Large beneficial (3)
Physical activity	Slight beneficial (1)	Slight beneficial (1)	Slight beneficial (1)
Journey quality	Moderate beneficial (2)	Moderate beneficial (2)	Moderate beneficial (2)
Accidents	Moderate beneficial (2)	Moderate beneficial (2)	Large beneficial (3)
Security	Neutral/marginal (0)	Neutral/marginal (0)	Neutral/marginal (0)
Access to services	Neutral/marginal (0)	Neutral/marginal (0)	Neutral/marginal (0)
Affordability	Slight adverse impact (-1)	Slight adverse impact (-1)	Moderate adverse impact (-2)
Severance	Slight beneficial (1)	Slight beneficial (1)	Slight beneficial (1)
Overall ranking	**=2**	**=2**	**1**

1.4.2.4 Public Accounts

The costs of the scheme to public accounts has undergone a monetary assessment against the costs to the broad transport budget and the impact on indirect tax revenues. The results of the public accounts assessment are provided in Table 13.

Table 13 – Public accounts assessment

Assessment Area	Score	Description/Key Impacts
Cost to broad transport budget	Indicative £PVC (Central Government)	Funding source and profile have yet to be determined. However it is anticipated it will be a mixture of central government, local government and private sector.
	TBC	
	Indicative £PVC (Local Government)	Funding source and profile have yet to be determined. However it is anticipated it will be a mixture of central government, local government and private sector.
	TBC	
Indirect tax revenues	Indicative £PVB (Indirect Tax Revenues)	The dual carriageway is forecast to have the most significant impact.
	Option 1: -9,315 (£000) Option 2: -9,055 (£000)	

	Option 3: -15,323 (£000)	

Table 14 below ranks the public accounts results provided in Table 13 to help determine which option is the best performing one.

Table 14 – Public accounts ranking

	Option 1	Option 2	Option 3
Overall ranking	**=2**	**=2**	**1**

1.4.2.5 Distributional Impacts

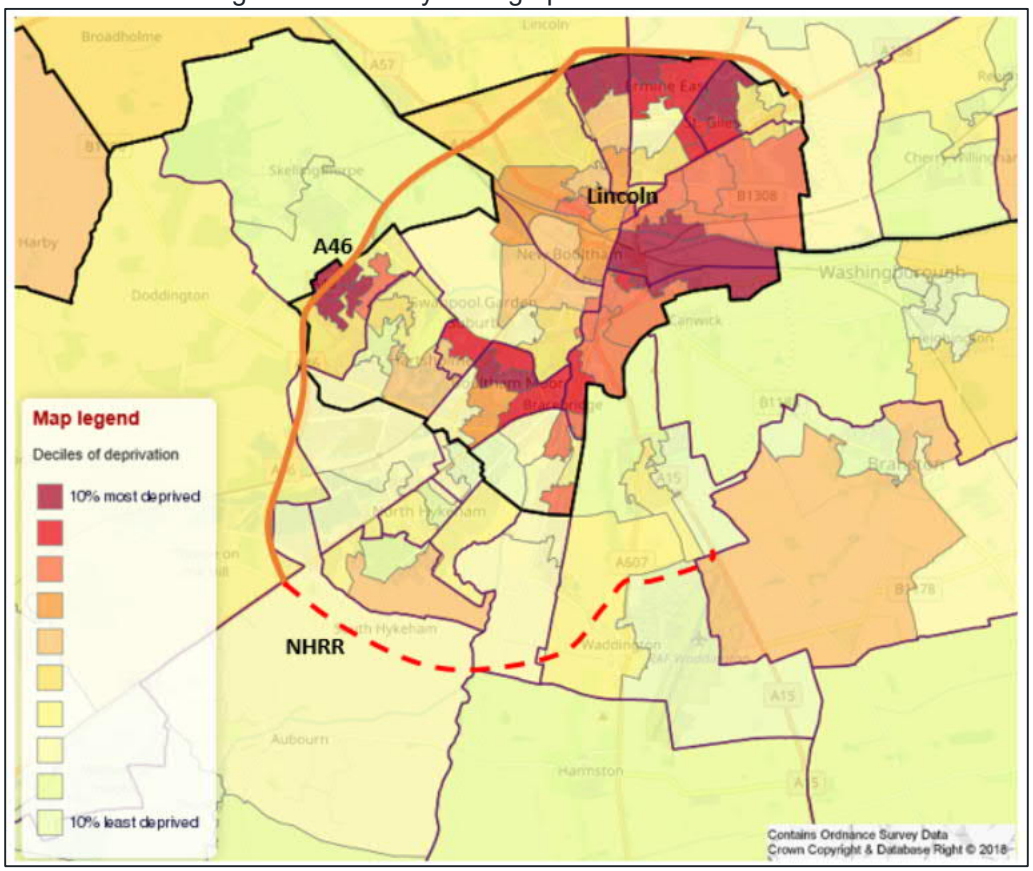
The purpose of a social distributional impact assessment is to identify the impact of a transport intervention spatially, socially and economically with particular reference to disadvantaged groups. This section provides a high-level assessment across 8 key areas:

- User benefits;
- Noise;
- Air quality;
- Accidents;
- Severance;
- Security
- Accessibility; and
- Personal affordability.

A full consideration of the social and distributional impacts (SDI) will be completed at the OBC stage. An indicative overview is provided below.

Overview

- In line with the SDI guidance the key demographic characteristics for Lincoln have been reviewed.



- Figure 2 below highlights the index of multiple deprivation (IMD) for 2015; Table 17 the percentage of the population within the key broad age groups; and
-

Table 16 percentage of households with 1 or more vehicles. The data shows:

- North Kesteven has a higher proportion of people aged over 65 than the average for England;
- Lincoln has a lower proportion of those aged over 65 than both the Lincolnshire and England average;
- The proportion of the population under the age of 19 is in line with both the county and England average for Lincoln and North Kesteven;
- Norther Kesteven has a higher proportion of households with one or more cars than the average for Lincolnshire and England. Lincoln has a much lower proportion of households with at least one car when compared to the regional and national statistics;
- The most deprived areas of Lincoln are located to the north and west of the city centre and also to the south of the city centre in the Boultham and Swanpool areas. These are all located to the north of the proposed scheme; and
- The key local services are located to the north of the scheme within the village and town centres. This includes Lincoln, Waddington and North Hykeham.

Table 17 provides an indicative overview of the potential SDI impacts.

Table 15 – Broad age groups for 2016 (ONS data)

Area	Age 0 – 19	Age 20 - 64	Age 65+
Lincoln	23%	62%	15%
North Kesteven	22%	55%	23%
Lincolnshire	22%	55%	23%
England	24%	58%	18%

Table 16 - % of households with 1 or more vehicles

Area	% households with 1 or more cars or vans
Lincoln	70%
North Kesteven	87%
Lincolnshire	82%
England	74%

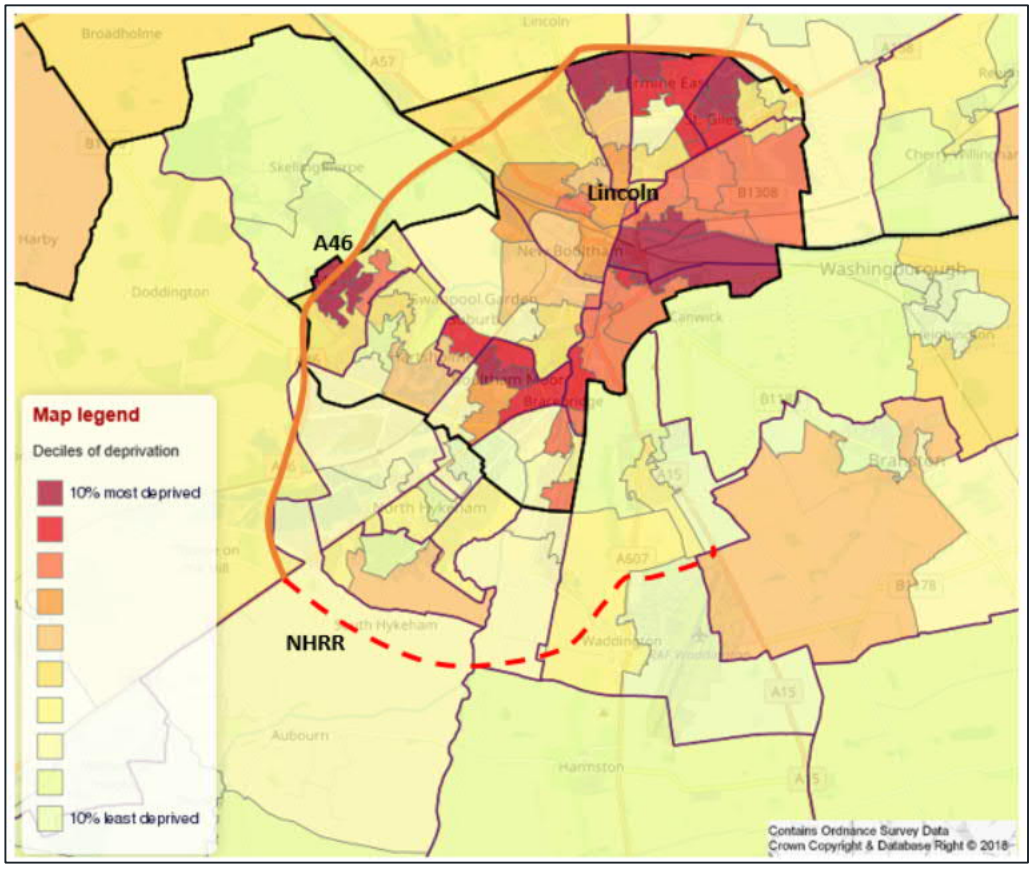


Figure 2 – Index of multiple deprivation 2015

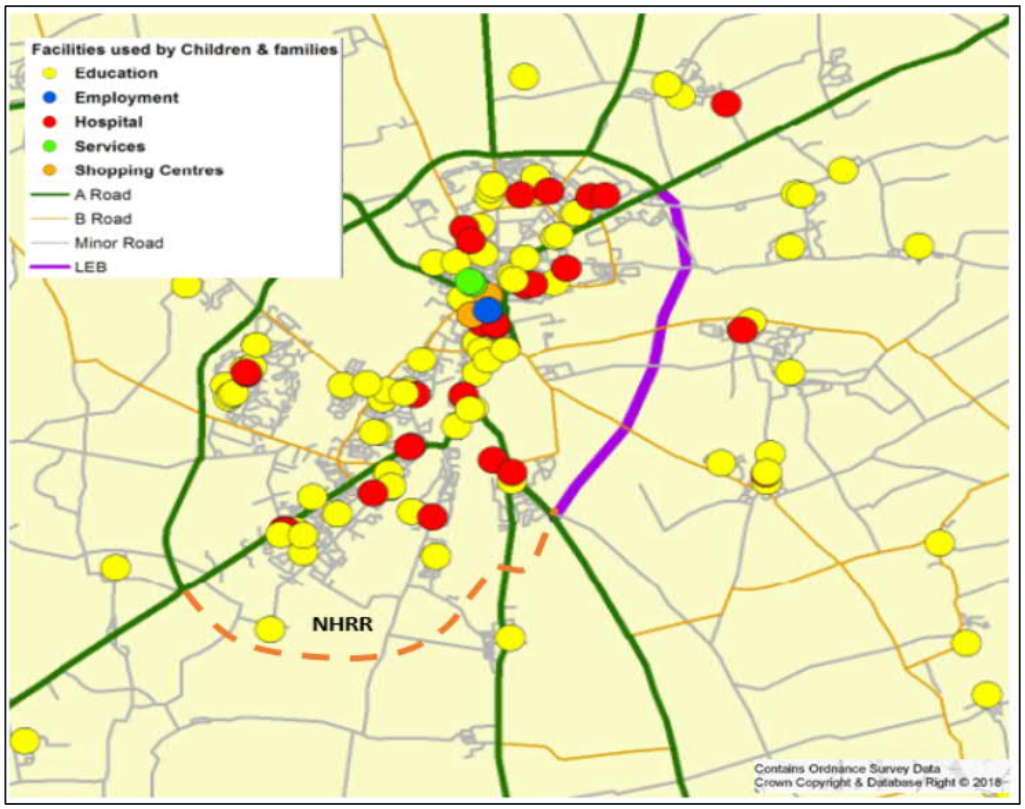


Figure 3 – Facilities used by children and families

Table 17 – Distributional impact assessment

Assessment area	Description / Key impacts
User benefits	• The initial analysis of the economic benefits for the NHRR scheme shows that all three options are forecast to generate significant transport user benefits; • The reduction in traffic flows on the major and local road network and subsequent improvement in congestion will be expected to benefit local and strategic journeys; • However, although the geographic distribution of the benefits has not been assessed it would be expected to benefit communities within the Lincoln urban area; and • The impact on vulnerable groups and members of society and the geographic distribution of the benefits will be assessed at the business case stage.
Noise	• As stated in Table 9 the scheme is forecast to reduce traffic on the major and the local road network to the south of Lincoln; • This will impact on noise within the urban area and those receptors in close proximity (mainly housing) to the highway boundary; • In addition there will be impacts along the line of the NHRR, however there are fewer receptors due to its rural location; and • The scheme could reduce traffic in the Noise Action Planning Important Areas in Lincoln. However, the NHRR could also introduce traffic impacts to new receptors and change the location of NIAs which may have adverse noise impacts on the surrounding receptors.
Air quality	• The inclusion of the NHRR is forecast to relieve a number of routes of traffic this would be expected to have a positive impact on air quality; • The scheme will potentially remove traffic from the Lincoln PM_{10} and NO_2 Air Quality Management Areas;

Assessment area	Description / Key impacts
	• The alignment of NHRR is through a rural location where there are less receptors in close proximity to the highway boundary resulting in fewer people being affected by local air quality issues. However this may also introduce air quality impacts to new receptors; and • The distributional impacts will be further explored at the business case stage.
Accidents	▪ The initial accident appraisal shows that the scheme is forecast to generate accident benefits; and ▪ The distributional impacts will be further considered at the OBC stage.
Severance	• The forecast reductions in traffic on the major and local road network is expected to result in improvements in severance particularly on routes in the south of Lincoln; • The provision of a new east west route is expected to reduce traffic through the villages of Harmston and Auborn and on existing east west routes through North Hykeham; and • The provision of a new route will also intersect existing rights of way in the south of Lincoln. The emerging NMU strategy for the scheme includes the provision of appropriate crossings to maintain connectivity along these routes.
Security	▪ The NHRR is not expected to have an impact on security.
Accessibility	▪ The provision of the NHRR is expected to improve east west accessibility and relieve existing routes into the centre of Lincoln of traffic. ▪ This will support the improved accessibility to existing services. ▪ However, there is no direct public transport provision proposed as part of the scheme and it is not expected to have a significant direct impact on public transport.
Personal affordability	▪ The initial analysis of the economic benefits for the NHRR scheme shows that all three options are forecast to generate transport user benefits; ▪ This includes benefits to car fuel and non-fuel operating costs; ▪ The reduction in traffic flows on the major and local road network and subsequent improvement in congestion will be expected to benefit local and strategic journeys; ▪ However, although the geographic distribution of the benefits has not been assessed it would be expected to benefit communities within the Lincoln urban area; and ▪ The impact on vulnerable groups and members of society and the geographic distribution of the benefits will be assessed at the business case stage.

1.4.2.6 Indicative Benefit Cost Ratio

An indicative benefit cost ratio has been calculated and the results have been presented within the table below.

Table 18 – Indicative BCR assessment

Assessment area	Output
Cost to private sector	Cost profile and available budget yet to be identified
Present Value of Benefits (PVB)	Option 1: £272,205,000 (TUBA) + £5,400,000 (COBALT) = **£277,605,000** Option 2: £272,863,000 (TUBA) + £5,400,000 (COBALT) = **£278,263,000** Option 3: £307,500,000 (TUBA) + £14,300,000 (COBALT) = **£321,800,000**
Indicative Benefit Cost Ratio (BCR)	Option 1: 3.67 Option 2: 3.12 Option 3: 2.87

Table 19 ranks each option based on the results presented within Table 18 to help determine the best performing option.

Table 19 – Option ranking for indicative BCR

	Option 1	Option 2	Option 3
Overall ranking	1	2	3

1.4.2.7 VFM summary

The table below provides a summary of the ranking for each criteria within the VFM assessment based on scores achieved. It also provides an overall ranking.

Table 20 – VFM ranking summary

Criteria	Option 1	Option 2	Option 3
Impact on the economy	=2	=2	1
Impact on environment	=1	=1	3
Impact on society	=2	=2	1
Public accounts	=2	=2	1
Distributional impact	=1	=1	=1
Indicative BCR	1	2	3
Overall ranking	**1**	**=2**	**=2**

1.4.3 FINANCIAL CASE

The Option Assessment Framework sets out the assessors requirements as per the Financial Case. It is necessary to provide a monetary assessment of the outturn costs of implementation and the outturn costs of operation and maintenance for each option.

Table 21 – Financial case assessment

Assessment Area	£outturn – Option 1	£outturn – Option 2	£outturn – Option 3
Outturn cost to implement	100 (£m)	118 (£m)	148 (£m)
Operating and maintenance costs	N/A	N/A	N/A

Please note the cost profile and funding source has yet to be determined resulting in the funding allocation assessment not being undertaken.

Table 22 ranks each option based on the results presented within Table 21 to help determine the best performing option.

Table 22 – Option ranking for financial case

	Option 1	Option 2	Option 3
Overall ranking	1	2	3

1.4.4 DELIVERY CASE

This part of the assessment examines four aspects which are:

- Likely delivery agents;
- Stakeholder acceptability;
- Public acceptability / interest; and
- Route to market.

Table 23 below presents the results for this assessment area.

Table 23 – Delivery case assessment

Assessment area	Description / Key impacts
Likely delivery agent	▪ Lincolnshire County Council (LCC) is the principal stakeholder as highway authority; ▪ The scheme is anticipated to be partly funded by the DfT; and ▪ A contractor and payment mechanism for the contractor has yet to be determine.
Stakeholder acceptability	▪ Stakeholder and public consultation events showed: • overwhelmingly supported the dual carriageway configuration (option 3) with 75% of respondents preferring this option; • 9% of respondents chose the single carriageway with enlarged junctions (option 2) as their preferred option; and • 3% of respondents chose the single carriageway option as their preferred option (option 1). ▪ The Lincoln Eastern Bypass is being constructed as a single carriageway with future proofed junctions and features. There remains an aspiration to upgrade this to a dual carriageway at some point in the future. Progressing the NHRR as a standard single carriageway could be seen as being inconsistent with the overall design approach to the LEB.

Assessment area	Description / Key impacts
Public acceptability / interest	▪ Stakeholder and public consultation events showed: • overwhelmingly supported the dual carriageway configuration (option 3) with 75% of respondents preferring this option; • 9% of respondents chose the single carriageway with enlarged junctions (option 2) as their preferred option; and • 3% of respondents chose the single carriageway option as their preferred option (option 1).
Route to market	▪ A contractor and payment mechanism for the contractor has yet to be determine.

Table 24 ranks each option based on the results presented within Table 23. It is noted that only 3% of respondents chose the single carriageway option 1 in the stakeholder public consultation events and there are aspirations of upgrading the LEB to a dual carriageway resulting in the progression of a single carriageway NHRR being inconsistent with the overall design approach of LEB. As a result the single carriageway is likely to be politically unacceptable and therefore it has been discounted on this criteria.

Table 24 – Option ranking for financial case

	Option 1	Option 2	Option 3
Overall ranking	**3**	**2**	**1**

1.5 SUMMARY

Table 25 below provides a summary of the ranking for each criterion.

Table 25 – Ranking summary

Criteria	Option 1	Option 2	Option 3
Strategic fit	=2	=2	1
Value for money	1	=2	=2
Financial case	1	2	3
Delivery case	3	2	1

In summary:

- That all three options will achieve the objectives, they will improve the east west connectivity in the south of Lincoln, help to reduce traffic levels on local urban and rural roads, support the delivery of the SUEs and help improve the resilience of the orbital and key route network through and around Lincoln;
- However, the additional traffic relief that afforded by the dual carriageway means that it has been assessed as being the better performing option in traffic impact terms;
- All three options will produce a high level of benefits with the dual carriageway option providing the highest level of benefits;
- However due to the marginal difference in benefits between the options and the lower scheme costs the single carriageway option has a higher BCR;
- The standard single carriageway is the lowest cost option and the outturn costs are expected to be in the region of £48m lower than the dual carriageway;
- The dual carriageway is significantly more expensive than the other two options and has an outturn cost of approximately £148m;
- In terms of public acceptability the dual carriageway is the best performing option;
- Progressing the NHRR as a standard single carriageway could be seen as not being consistent with the overall design approach to the LEB. This is being developed as a future proofed single carriageway and there is a clear aspiration to upgrade the route at a later date; and
- If taken forward to the OBC stage, further work will need to be undertaken to demonstrate that the dual-carriageway option will provide sufficient value for money, wider economic benefits and strategic fit for the DfT to consider funding.

St. Johns House
Queen Street
Manchester
M2 5JB

wsp.com