



North Yorkshire County Council

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# HARROGATE RELIEF ROAD REVIEW

Draft Options Assessment Report







North Yorkshire **County Council**

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# 1 INTRODUCTION

## 1.1 BACKGROUND

WSP was commissioned in March 2017, by North Yorkshire County Council (NYCC), to undertake work associated with addressing issues of urban congestion in and around the Harrogate and Knaresborough urban area, while also looking to improve longer distance strategic east-west connectivity in the region.

The purpose of this stage of the study is to examine the issues and constraints associated with the existing road network, and to carry out preliminary identification and assessment of interventions to address these issues. The assessment will consider the viability and deliverability of these interventions, identifying preferred options to inform the development of a Strategic Outline Business Case (SOBC). NYCC has previously considered relief road options as a possible intervention to address the identified issues. The historical potential alignments for a Harrogate Relief Road have been reviewed as part of the current study.

This report should be read in conjunction with the accompanying Stage 1 Report which provides greater detail on the evidence base and analysis relating to the issues and problems being experienced in the study area, outlining the need for intervention.

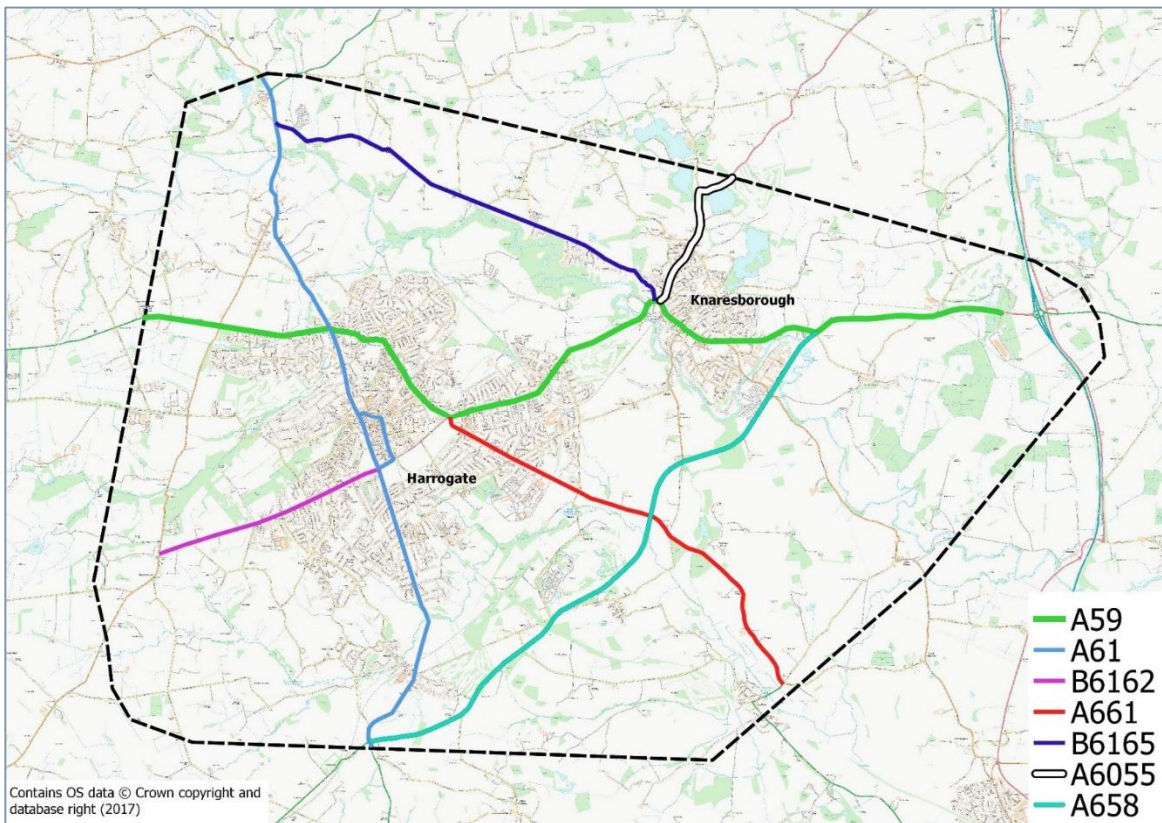
## 1.2 STUDY AREA

The towns of Harrogate and Knaresborough are located in the Harrogate Borough of North Yorkshire, and are separated by an area of green belt land.

Harrogate is strategically well placed geographically with the A1(M), 5 miles to the east of the town, providing strategic north-south links to the rest of the UK. The primary routes in the study area itself are the A59, an east-west link between Merseyside and York, and the A61, which provides direct access to Leeds to the south and Ripon and the A1M (junction 50) to the north.

The study area is illustrated in Figure 1 and discussed further in the accompanying Stage 1 Report.

**Figure 1 Study Area**



There are a number of important and environmentally sensitive areas within the study area which need to be considered as part of any proposed intervention, this includes:

- i Three nationally designated **Sites of Special Scientific Interest (SSSI)**: a statutory conservation designation denoting an area protected from development, other damage, and neglect. SSSIs are designated by Natural England due to the existence of unique flora/fauna and geological features;
- i Three **Local Nature Reserves (LNR)**: local authority areas that have statutory protection because they comprise wildlife or geological features of local scientific interest;
- i Eleven locally designated **Sites of Importance for Nature Conservation (SINC)**: designations used by local authorities for sites of substantive local nature conservation and geological value. The areas are afforded protection through the local authorities planning/development policies; and
- i One **Area of Outstanding Natural Beauty (AONB)** – Nidderdale: designated for conservation due to its significant landscape value. They are the responsibility of local authorities who have permissive power to conserve and enhance the natural beauty of the designated area.
- i **Green Belt** land between Harrogate and Knaresborough. This statutory Green Belt protects the special character of the towns of Harrogate and Knaresborough, by preventing their coalescence as well as any extension toward the southern part of the district.
- i The town of Harrogate is characterised by its large areas of parks, gardens, open land, and the protected Stray around its town centre. **The Stray** is a 200 acre area of open grassland and verges wrapped around the main urban ‘old town’ area of Harrogate. The Stray itself does not form any part of the current Green Belt land, however, it is covered by an act of Parliament which requires any loss of land in the Stray to be compensated for through provision of replacement land in close proximity.
- i Harrogate itself, as a Victorian spa town, has appealing character in terms of its buildings and architecture. The environment of Harrogate town centre is characterised by attractive historic architecture (including the Grade 1 listed St Wilfrid’s Church and Grade 2 listed Royal Hall Theatre), an established historic urban grain with interesting streets, alleys and squares, and unique open spaces including parkland, formal gardens and floral displays.

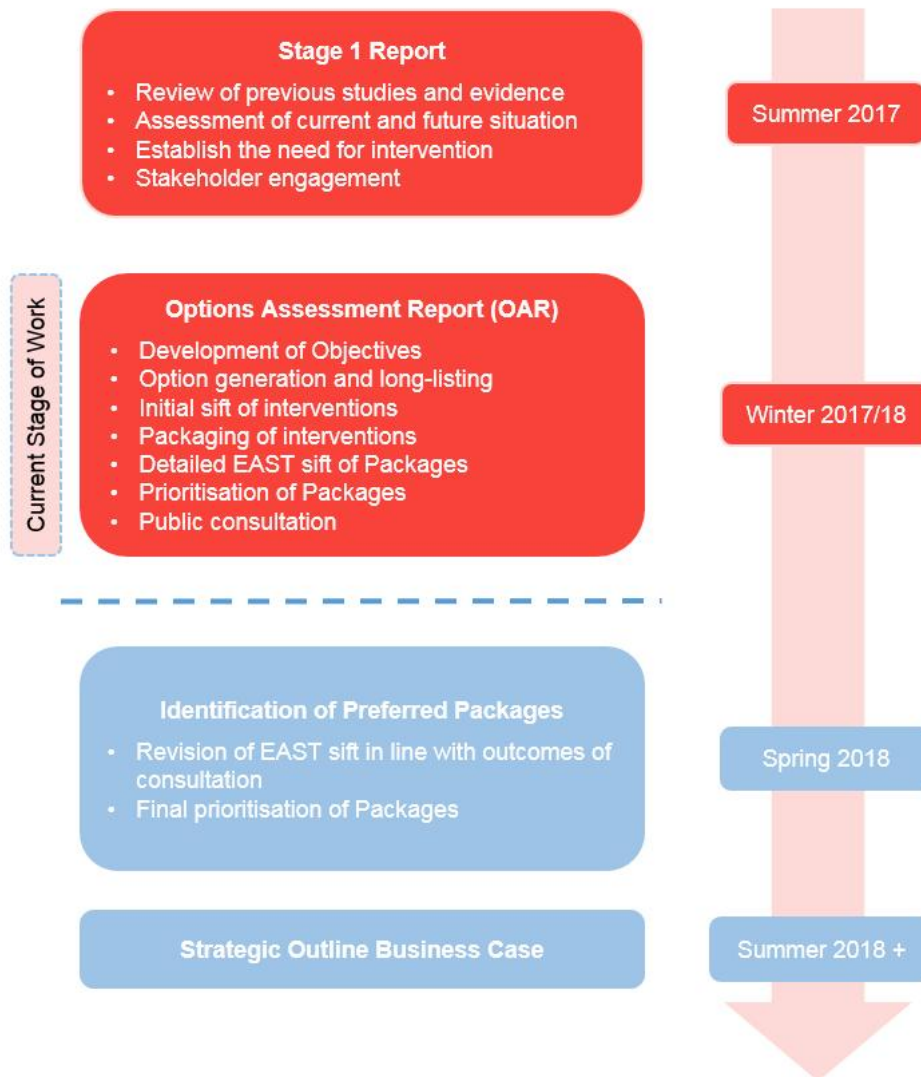
The designations and environmental sensitivities highlighted above will constrain what can be implemented within the urban area and can represent a significant constraint upon improvements being made to the existing highway network, limiting the potential to address congestion issues through localised minor improvement works.

## 1.3 STUDY APPROACH

The Harrogate Relief Road Review has been undertaken in line with the Stage 1 Option Development process as set out within the Transport Appraisal Process (Transport Analysis Guidance, 2014).

Figure 2 sets out each of the stages involved in this process, providing an overview of the work that has been undertaken to date as part of this study. This report is focussed on the options assessment element of the process leading up to and including public consultation to develop this further.

**Figure 2 Process Diagram**



Due to the availability of an existing Harrogate and Knaresborough Strategic Transport Model, initial high level appraisal has been undertaken to inform the detailed sifting process. It should be noted that no changes have been made to the model, although a strategic review has been undertaken. The model is a single mode, two peak only, VISUM software model; the two main peak periods include an AM peak of 0800-0900, PM peak of 1645-1745 with no Inter Peak (IP). The model is considered fit for purpose for what is required at this early stage of the study. However, the transport model will be reviewed and updated as necessary to support any future Outline Business Case submission, in line with Transport Appraisal Guidance (TAG).

## 1.4 PURPOSE OF THE REPORT

This report presents the results of the Option Assessment undertaken as part of the Harrogate Relief Road (HRR) Review. The prioritisation process and scheme assessment work is documented in this report, along with details of the study approach, objective setting and next steps.

To inform this Option Assessment, a Stage 1 review has been undertaken considering the existing conditions and evidence base, the forecasted future situation and culminating in an initial view on the need for intervention; this is summarised in Chapter 2 of this report and the full review is set out in the accompanying Stage 1 Report.

It should be noted that this is an early stage of the development of possible intervention options to address the issues, identified in the study area, in the Stage 1 Report. Suggested interventions are at a preliminary stage

and as such the level of assessment of each intervention, set out in subsequent sections of this report, is proportionate to this very early stage of appraisal.

## 1.5 STRUCTURE OF THE REPORT

This Options Assessment Report (OAR) builds upon the work undertaken and recorded as part of the accompanying Stage 1 Report. It sets out a summary of the need for intervention (based upon the current and future issues) and the process of option development and sifting, including preliminary high level appraisal using the Harrogate and Knaresborough Strategic Transport Model. The remainder of the document is structured as follows:

- i **Chapter 2** summarises the need for intervention, based upon a review of the current and future transport-related issues in the study area;
- i **Chapter 3** presents a clear set of strategic and specific objectives, developed based upon the issues outlined in Chapter 2, and how these have been used to inform option development;
- i **Chapter 4** sets out Option Generation and how the long list of interventions has been developed;
- i **Chapter 5** provides a summary of the process of option sifting, including an initial sift of the long-list, packaging and further detailed Early Assessment Sifting Tool (EAST) sift to produce a shortlist of prioritised interventions;
- i **Chapter 6** summarises the findings of this OAR and outlines the next steps for the Harrogate Relief Road Review.



## 2 THE NEED FOR INTERVENTION

### 2.1 OVERVIEW

The accompanying Stage 1 Report sets out detailed analysis of the current and forecasted future conditions in the Study Area, informed via evidence review and stakeholder consultation, culminating in a view on the need for intervention. This chapter provides a summary of these findings.

### 2.2 CURRENT SITUATION

Historically there is a perception of traffic congestion in the vicinity of Harrogate and Knaresborough town centres, and of a network which is extremely congested in peak times. The congestion is experienced in the town centres and on the radial routes, with key locations continuing to experience ongoing congestion throughout the day.

The Harrogate district is a popular place to live and has a diverse economy, although it is skewed in favour of low value sectors; primarily driven by the local service industry as a result of direct and indirect tourism employment. This leads to significant cross-boundary commuting between the Harrogate district and the nearby Leeds City Region, as residents travel out to access higher value employment and workers travel in from areas with more affordable housing.

Data, presented in the Stage 1 Report, suggests the existing network is characterised by high traffic volumes, delays and unreliable journey times, particularly in the morning and evening peak hours. It has been shown that the main contributors to these trips are those with either an origin or destination in the urban areas of Harrogate and Knaresborough, or those that both begin and end within the same urban area; purely internal trips are generally short in length (an average no more than 2.6km), are primarily commuting related and are predominantly undertaken by private vehicle. Through traffic, with origins and destinations external to the Harrogate and Knaresborough urban areas, is shown to have little bearing on the local network and generally bypasses the towns altogether by travelling on peripheral routes. Table 1 and Table 2 below set out the proportions of trip movements in the study area for the 2015 AM and PM peak periods. Whilst purely external trips (highlighted in red) are low (7%), trips that either start or end in areas external to the urban areas of Harrogate and Knaresborough (highlighted in green) makes up almost half (45% and 48% in the AM and PM peaks respectively) of all trips. Similarly, trips that are purely internal (highlighted in orange) represent around a half of all trips; 48% and 45% in AM and PM peaks respectively. Consequently, interventions which are designed to improve conditions in the study area must be aimed at these non-through trips.

Trip movements in the study area, for the 2015 AM and PM peak periods, are set out in Table 1 and Table 2, below.

**Table 1 Trip Movements (2015 AM Peak)**

From / To	2015 AM (0800 – 0900)			
	External	Harrogate	Knaresborough	Total
External	7%	20%	4%	31%
Harrogate	14%	37%	4%	55%
Knaresborough	7%	5%	2%	14%
<b>Total</b>	<b>28%</b>	<b>62%</b>	<b>10%</b>	<b>100%</b>

**Table 2 Trip Movements (2015 PM Peak)**

From / To	2015 PM (1645 – 1745)			
	External	Harrogate	Knaresborough	Total
External	7%	15%	7%	29%
Harrogate	20%	34%	5%	59%
Knaresborough	6%	4%	2%	12%
<b>Total</b>	<b>33%</b>	<b>53%</b>	<b>14%</b>	<b>100%</b>

In terms of journey times and traffic speeds through the study area, the Stage 1 Report included analysis of TrafficMaster data which evidenced congestion at peak times. The routes analysed are set out below and illustrated in Figure 3:

- █ A661: Empress Roundabout to junction with Deighton Road, Spofforth;
- █ A61: A658 Roundabout to B6165 Roundabout, Ripley;
- █ A59: B6161 Otley Road / Oaker Bank Roundabout to A1(M) Junction 47; and
- █ A59/A661: A658/A661 Kestrel Roundabout to A59/A61 New Park roundabout.

**Figure 3 TrafficMaster Analysis - Key Routes**

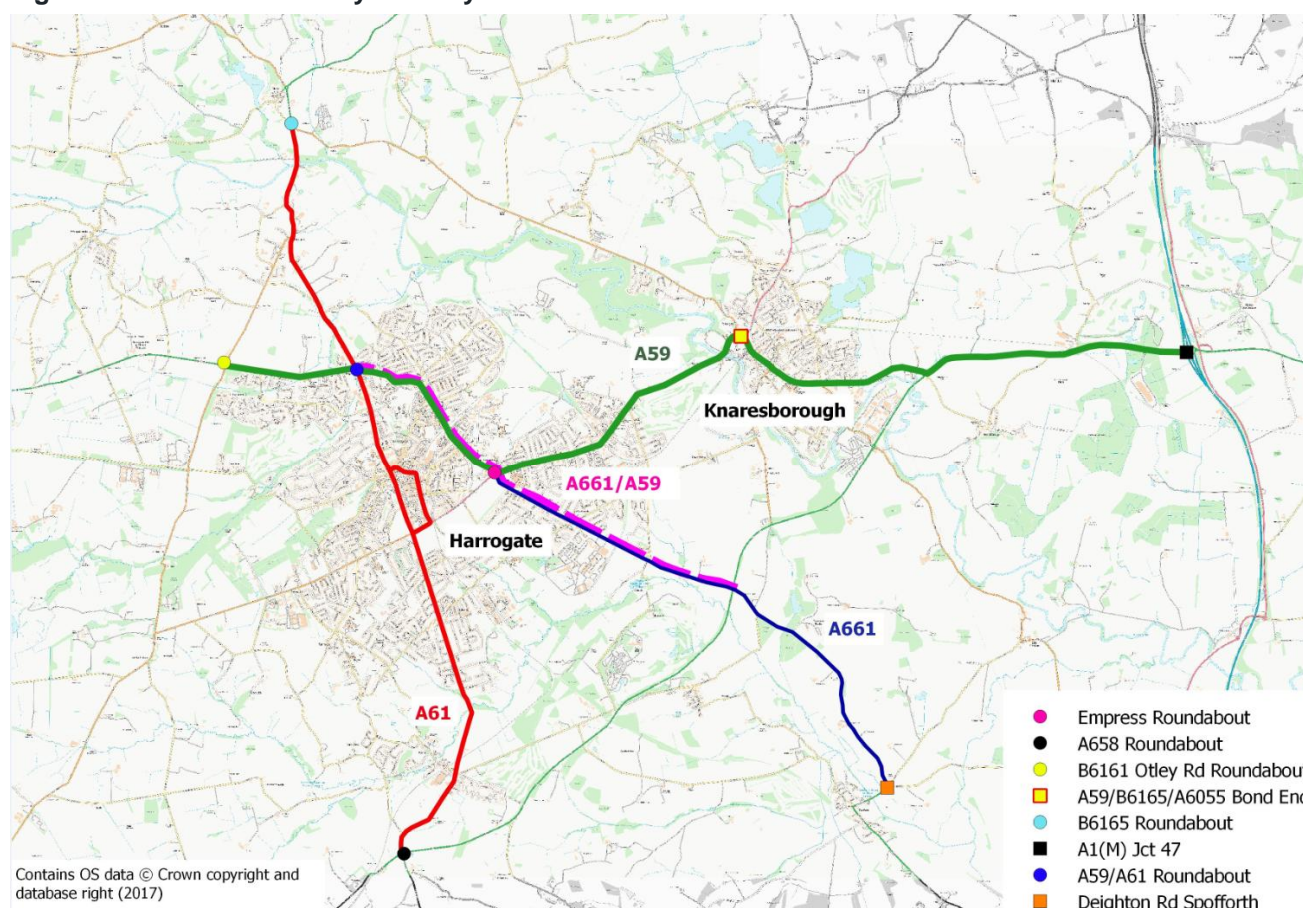


Table 3 illustrates the average speeds based on the recorded journey times along the links illustrated in Figure 3 and the average speed differences when comparing peak hours with the Inter Peak (IP) average. The IP hourly average was based on average journey times between 1000 and 1600.



**Table 3 TrafficMaster Journey Times - Routes Summary**

	Average Speeds (km / hr)			Difference from IP (km / hr)		Difference from IP (%)	
	AM	IP	PM	AM	PM	AM	PM
<b>A661 NB</b>	25.7	37.1	32.1	-11.4	-5.0	-31%	-13%
<b>A661 SB</b>	44.5	43.4	35.2	1.1	-8.2	2%	-19%
<b>A61 NB</b>	32.9	36.1	29.6	-3.2	-6.5	-9%	-18%
<b>A61 SB</b>	30.8	34.2	28.9	-3.4	-5.3	-10%	-16%
<b>A59 EB</b>	30.2	34.3	31.4	-4.1	-2.9	-12%	-8%
<b>A59 WB</b>	31.3	35.7	29.9	-4.4	-5.8	-12%	-16%
<b>A59/A661 EB</b>	21.9	29.0	22.2	-7.1	-6.9	-24%	-24%
<b>A59/A661 WB</b>	19.6	25.7	19.1	-6.1	-6.6	-24%	-26%

The analysis in the Stage 1 Report looked at these routes in greater detail and highlighted that more significant delays were identified at a localised level. For example journey times on the A661 northbound (southeast of the town centre) between the A658 roundabout and the Forest Lane junction during peak times are 138% of what is experienced in the IP. Similarly, the Hookstone Road / Leadhall Lane to Follifoot Road / Pannal Bank section of the A61 (to the south of Harrogate town centre) southbound route experiences journey times 145% higher in the PM peak when compared with the IP journey times. Further detail is provided in the Stage 1 Report but this illustrates the level of congestion that is being experienced in the urban areas at peak times.

The data presented above illustrates that, although there may be local perceptions of congestion throughout the day, the AM and PM peak journey times are significantly higher than the IP times; this confirms that it is appropriate to base analysis of the issues and potential solutions on the peak periods.

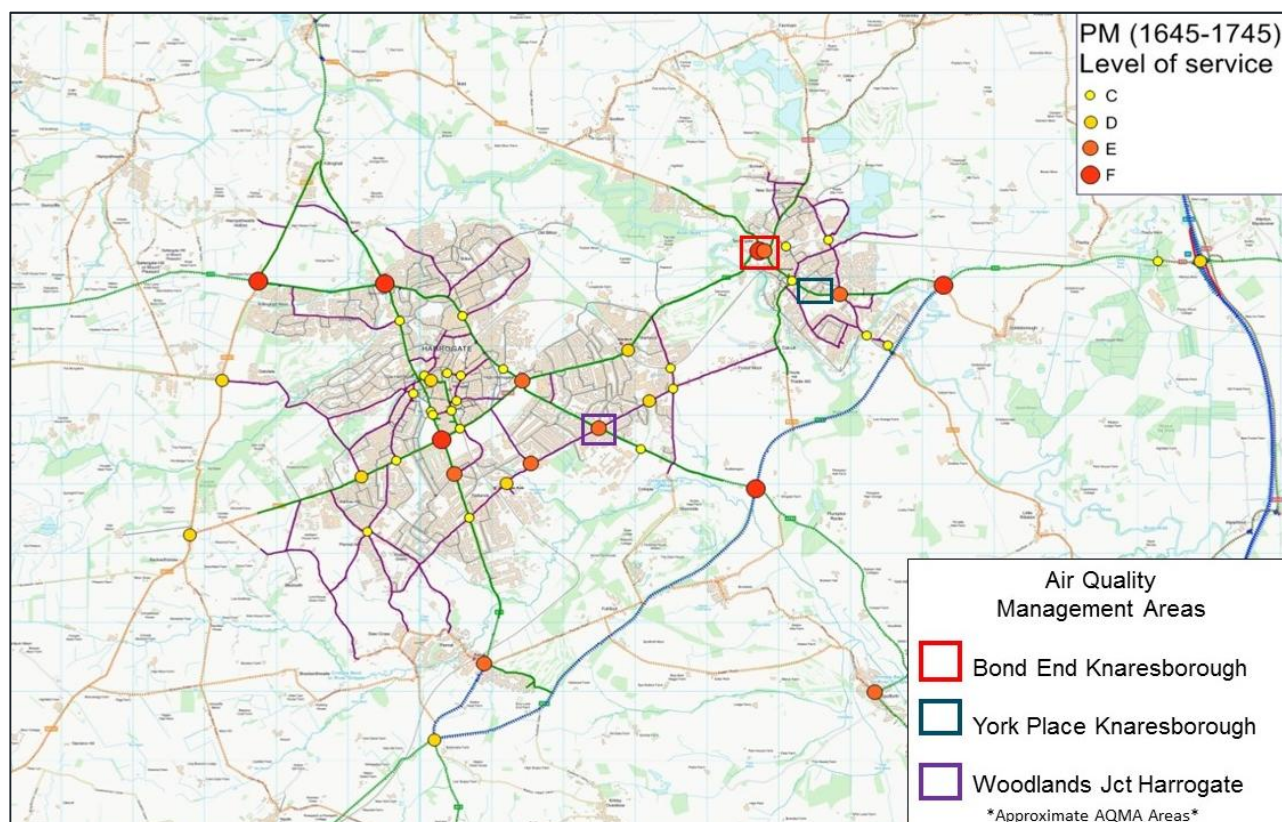
The Stage 1 Report also included analysis of the Level of Service (LoS) at the modelled junctions across the study area. LoS relates to how well the junction is performing in terms of average delay per vehicle, ranging from A (0-10 sec average delay per vehicle) to F (50+ sec average delay per vehicle); this essentially illustrates the level/severity of congestion being experienced at these junctions. Figure 4, below, illustrates the LoS afforded at the modelled junctions in the PM peak highlighting areas that experience the most delay, such as the A61/A59 junction to the north of Harrogate and A59/B6165 junction in Knaresborough. The AM peak showed delays in similar locations. Further detail is provided in the Stage 1 Report.

Aside from the impact on journey times and delay, congestion and slow moving traffic is also contributing to air quality issues in the study area. Three Air Quality Management Areas (AQMA) are now in place in Harrogate and Knaresborough (approximate locations are also illustrated in Figure 4 below). These include:

- i Bond End, Knaresborough (introduced in 2010).
- i York Place, Knaresborough (introduced in October 2017).
- i Woodlands Junction on Wetherby Road, Harrogate (introduced in October 2017).

Each location has been shown to be subject to high traffic flows and congestion, and would benefit from a reduction in traffic levels which would contribute to local air quality objectives.

**Figure 4 Level of Service of Modelled Junctions & Location of Air Quality Management Areas**



## 2.3 FUTURE SITUATION

The Harrogate district population is forecast to grow substantially; the draft Harrogate Borough Council Local Plan sets out a growth policy which seeks to provide, as a minimum, around 11,700 houses and 20-25ha of new employment land by the end of the Local Plan period in 2035. The majority of which is to be located within the urban areas.

The existing Harrogate and Knaresborough Strategic Transport Model was used to forecast a future scenario based on relevant committed developments (provided by Harrogate Borough Council at the time of model development in 2015) constrained to TEMPRO<sup>1</sup> growth levels as identified in the National Trip End Model (NTEM). The NTEM takes account of national projections of population, employment, housing, car ownership and trip rates. As this study progresses to the stage of developing a business case, the Department for Transport (DfT) guidance sets out that the core scenario needs to be constrained to NTEM. This is the DfT recognised approach for modelling future scenarios and so is the appropriate approach to take as this study progresses. It is considered that any assumptions relating to future changes in mobility, the introduction of autonomous vehicles and so on are adequately represented in the DfT NTEM. It is acknowledged that changes to how people travel and access the transportation system as a whole may significantly change during the timeframe of this study. This issue together with future technological advances in transportation, such as the increase in hybrid, electric and autonomous vehicles, will be given due consideration as the study progresses. Furthermore as any proposed measures are progressed their future applicability will need to be

<sup>1</sup> Trip End Model Presentation Program (TEMpro) software allows users to view travel forecasts from the National Trip End Model (NTEM) datasets. The NTEM forecasts the growth in trip origin-destinations (or productions-attractions) up to 2051 for use in transport modelling.

taken into account. As the study progresses to development of a business case, the Harrogate and Knaresborough Strategic Transport Model will be reviewed and updated as necessary.

The forecasting of future conditions therefore indicates that the identified growth will be reflected in the number of additional trips on the network; trips with either an origin or destination (or both) within the urban areas continue to account for the overwhelming majority of overall trips on the network. Delays and journey times will increase accordingly and through-traffic will re-route to avoid the study area altogether.

In the future year, 2035, there are forecast to be a total of 24,831 trips within the study area in the AM peak, and 27,160 trips in the PM peak; this is an increase of almost 5,700 trips in each peak. As with the 2015 data, whilst only a small percentage of trips are purely external to the Harrogate and Knaresborough urban areas (5% highlighted in red in Table 4 and Table 5) approximately half of all trips are purely internal (highlighted in orange in the tables below); 50% in the AM peak and 49% in the PM peak. Additionally, around half of all trips either start or end in the Harrogate and Knaresborough urban areas (highlighted in green in Table 4 and Table 5); 45% and 46% in the AM and PM peaks respectively. Again, this illustrates that a package of interventions that offers relief to travel from/to areas outside the urban areas and addresses purely internal trips could substantially help address the adverse impacts of traffic currently being experienced in Harrogate and Knaresborough. Trip movements in the study area, forecasted using the Strategic Transport Model for the 2035 AM and PM peak periods, are set out in Table 4 and Table 5, below. As can be seen in Table 4 and Table 5, the external to external trips, when compared with the 2015 trips in Table 1 and Table 2 have reduced in the 2035 forecasts. This suggests that drivers may choose to avoid the study area altogether due to increasing congestion on the network and that, as a result, through-traffic will be less of a contributor to congestion in Harrogate and Knaresborough than in the base year.

**Table 4 Trip Movements (2035 AM Peak)**

From / To	2035 AM (0800 – 0900)			
	External	Harrogate	Knaresborough	Total
External	5%	18%	4%	27%
Harrogate	15%	38%	5%	58%
Knaresborough	8%	5%	2%	15%
<b>Total</b>	<b>28%</b>	<b>61%</b>	<b>11%</b>	<b>100%</b>

**Table 5 Trip Movements (2035 PM Peak)**

From / To	2035 PM (1645 – 1745)			
	External	Harrogate	Knaresborough	Total
External	5%	15%	8%	28%
Harrogate	18%	36%	5%	59%
Knaresborough	5%	5%	3%	13%
<b>Total</b>	<b>28%</b>	<b>56%</b>	<b>16%</b>	<b>100%</b>

Allocations for employment and housing, including a new settlement, are primarily located in existing urban areas or adjacent to key routes and will increase pressure on a network that is already under considerable strain. Targeted growth in the visitor economy will also attract significant trips, with the overwhelming proportion of visitor trips made by car.

Complementary to the targeted growth of the urban area of the Harrogate district is the aspiration for growth of the North's economy as part of the Northern Powerhouse. A key facilitator to unlocking this growth is identified as improvements to strategic east-west connectivity; HBC, NYCC and the Local Enterprise Partnerships acknowledge the A59 as being a critical route and promote reliability improvements as a top priority.

## 2.4 NEED FOR INTERVENTION

Aspirations for economic growth that result in a more diverse and resilient economy are present in numerous agreed policy and strategy documents for the Harrogate Borough area. This growth is proposed to comprise new housing and employment development that will require mitigation as well as encourage significant investment in the district's transport system. Harrogate Borough Council (HBC) has an emerging local plan which proposes draft site allocations for development. The major sites cover; growth to the west of Harrogate, a new settlement in the Cattal/Hammerton area, significant employment land next to junction 47 of the A1(M) and development of Ministry of Defence land at Ripon. Work being undertaken by HBC has so far identified junctions that will be affected by these developments and mitigation is being identified to ensure that, at a local level, the affected areas can be improved sufficiently to accommodate the traffic generated by new developments, with no detriment to existing conditions. This effectively means that in 2035 junction congestion at these locations is not likely to be worse than if development did not take place and no additional link capacity issues are foreseen at the stage of writing. A relief road is therefore not deemed to be required necessary to specifically accommodate growth up to 2035 based upon emerging local plan work. It should however be noted that these localised mitigation improvements are only likely to return congestion to close to current levels and not bring about any significant improvements to the current situation.

Whilst it is recognised that mitigation will be planned for all planned growth identified in the Local Plan, in order to ensure adverse impacts on the wider transport network are not experienced there is also an onus on local authorities to consider future changes and pressures on the transport network and propose means of accommodating these changes. This will involve a holistic look at all transport modes and identification of opportunities to achieve reduced levels of congestion and improve air quality, as such would include considering options for:

- i Improvement to travel by public transport;
- i Making journeys safely on foot or by bike; and
- i Investment in the road network.

The local transport network is often identified as a barrier to the growth that is proposed for the district; characterised by localised congestion on key routes, and the resulting delays and unreliable journey times, it is recognised that these issues will need to be addressed if growth and inward investment are to be achieved – particularly that of high value employment. There is a recognised risk that, should the trend of low value employment continue, the district will be vulnerable in times of national and global downturns. There is therefore an aspiration, both locally and regionally, to build a more resilient and sustainable economy and to grow the amount of high value employment in the district and specifically in the urban areas.

The impact of this targeted growth, if left unmanaged, is likely to deter the further inward investment and diversification of the economy that is considered critical to ensuring resilience of the district and achieving economic growth projections, both locally and regionally.

With further aspirations of economic growth across the North, and the identification of logistics as a key enabler to unlocking this, freight movements on the A59 will continue to increase as east-west connections become more of a focus. Transport for the North's emerging work on Strategic Development Corridors, looks at the case for improving east-west connectivity in the Central Pennines corridor, which covers North Yorkshire (and the Harrogate Borough area). This work identifies congestion in Harrogate as a contributor to a lack of resilience on the A59 and includes a Harrogate Relief Road as a potential complementary measure. East-West connectivity on the A59 will be facilitated through proposed improvements to the route both east and west of Harrogate; there is a risk that the benefits of these improvements will not be fully realised if congestion on the A59 through the study area is not addressed.



## 3 IDENTIFYING OBJECTIVES

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### 3.1 OVERVIEW

The defining of objectives plays a key role in steering the development of transport interventions, as well as assessing whether they have been successful once delivered. DfT's WebTAG Transport Appraisal Process guidance has been followed in the preparation of objectives.

Objectives set out what an intervention, or package of interventions, is designed to achieve; this can be expressed at a very high level using aims or Strategic Objectives, and in detail via Specific Objectives that are associated with particular problems and issues. At this stage of the option development process, objectives should be higher level, avoiding indications of preferred solutions but enabling more specific objectives to be developed as the study proceeds and options are identified.

As per DfT WebTAG Transport Appraisal Process it is recognised that objectives should be consistent with specific challenges, identified as part of the Stage 1 evidence review, and should be based on a realistic understanding of the issues, both future and current, reflecting the specific opportunities and constraints identified. Whilst objectives should be consistent with wider local, regional and national objectives, they should focus on addressing identified need, rather than seeking to contribute to all policy objectives.

### 3.2 OBJECTIVE SETTING

As stated in DfT's WebTAG, consideration should be given to developing a hierarchy of objectives, which provides a framework for future appraisal and evaluation:

- i Strategic or High Level Outcomes: Typically expressing the desired end state and reflecting the aims and ambitions for the area or population. These are generally objectives to which transport contributes, but not always in a direct manner.
- i Specific or Intermediate Objectives: Typically representing the intermediate effects of the transport intervention, including the direct and short-term objectives that need to be achieved for the Strategic Outcomes to be realised.

The evidence underpinning the need for intervention, including draft Strategic and Specific Objectives, was presented initially to the client team (NYCC Transport Planning Team) and then to key internal stakeholders, at a workshop held on Thursday 6th July 2017. Stakeholders included representatives from across the highways and transportation teams at North Yorkshire County Council and Harrogate Borough Council.

The workshop was crucial to the option development process as it raised awareness to the client team and stakeholders of the identified challenges, issues and opportunities for the study area. This enabled the attendees at the workshop to make informed considerations as to how the issues identified could be addressed. The presentation of initial draft objectives at the workshop provided a platform for the client team, stakeholders and study team to discuss and consider the desired outcomes for any package of interventions. As part of the workshop, key themes relating to the issues and problems were identified helping inform the development of the objectives. The discussions around these themes at the workshop also provided the opportunity for stakeholders, with considerable knowledge of the local issues, to provide valuable input by identifying any additional information that would help shape the development of the draft objectives and inform development of interventions.

As a result of the workshop the initial draft objectives were amended to reflect the outcomes of the discussions. Once finalised, and agreed with the client team, these objectives have been used as the focus for shaping the development and initial assessment of the proposed interventions, to ensure that they address the identified issues. It is important to note that the sifting methodology, discussed further in Chapter 5, includes appraisal relating to the fit with Specific Objectives, allowing for an overall assessment of how each intervention performs against the identified objectives. The methodology used follows DfT WebTAG appraisal guidance and was agreed with NYCC as the study progressed.

### 3.3 OBJECTIVE MAPPING

During the objective setting process, set out above, a 'Mapping' exercise was undertaken, by the study team, to ensure that each of the Strategic Objectives was supported by appropriate Specific Objectives, and that all of the Specific Objectives contributed to at least one of the Strategic Objectives.

The finalised Strategic and Specific Objectives, as mapped in terms of their contributions, are shown in Figure 5 and Figure 6, below. Please note that objectives are not presented in any prioritised order.

**Figure 5 HRR Strategic Objectives**



Chapters 4 and 5 of this report set out the option generation and sifting process undertaken for this study. Both processes were informed by the agreed objectives set out in this chapter. Further details of how the objectives fed into the sifting process are set out in Chapter 5 of this report.



**Figure 6 HRR Specific Objectives and Mapping against Strategic Objectives**

SPD	Specific Objective (SO):	Primary Contribution to SOs					Secondary Contribution to SOs				
		S01	S02	S03	S04	S05	S01	S02	S03	S04	S05
SPD-01	Reduce congestion and delay and improve journey time reliability on routes through the study area	Yellow		Purple		Red		Blue		Green	
SPD-02	Improve network resilience and efficiency					Red	Yellow			Purple	
SPD-03	Reduce the number of HGVs in the town centres of Harrogate and Knaresborough		Blue		Green	Red				Purple	
SPD-04	Reduce the number of road user casualties		Blue								
SPD-05	Improve the safety of Non-Motorised Users (pedestrians, cyclists and equestrians)		Blue								
SPD-06	Increase modal shift to more sustainable modes of transport	Yellow	Blue	Purple							Green
SPD-07	Increase levels of walking and cycling for utility purposes (non-sport or leisure)	Yellow	Blue	Purple							Green
SPD-08	Reduce levels of pedestrian severance in and around the centres of Harrogate and Knaresborough		Blue				Yellow			Purple	
SPD-09	Contribute to improvements in air quality	Yellow	Blue		Green						
SPD-10	Contribute to local environmental targets	Yellow	Blue		Green						
SPD-11	Contribute to a reduction in greenhouse gas emissions				Green		Yellow	Blue		Purple	
SPD-12	Contribute to climate resilience	Yellow			Green						
SPD-13	Contribute to a reduced dependency on fossil fuels				Green		Yellow				
SPD-14	Reduce noise and vibration in residential areas and the town centres	Yellow	Blue		Green						
SPD-15	Reduce the impact of traffic upon the unique characteristics of the urban centres of Harrogate and Knaresborough	Yellow	Blue		Green						
SPD-16	Contribute to the improved health of local residents		Blue				Yellow				
SPD-17	Support an increase in the proportion of high value jobs in the study area			Purple			Yellow	Blue			
SPD-18	Maximise sustainable access to new development sites	Yellow		Purple							
SPD-19	Support targeted growth in the visitor economy			Purple			Yellow				
SPD-20	Improve the connectivity and accessibility of Leeds Bradford Airport from Harrogate and Knaresborough			Purple				Blue			

## 4 OPTION GENERATION

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### 4.1 OVERVIEW

This section details the full long-list of interventions that were considered to address the issues and constraints identified within the study area. The purpose of option generation is to develop a range of measures or interventions focussed on addressing the identified problem and meeting the identified objectives. An incremental approach to identifying, assessing and sifting interventions was proposed, as this was deemed the most efficient approach to eventually developing a shortlist of interventions. The sifting aspect of the process is covered in Section 5 of this report.

In order to adequately address the issues identified in the urban areas of Harrogate and Knaresborough, and to effectively meet the objectives, it was necessary to consider a wide range of interventions including all modes, infrastructure, regulation, pricing and other ways of influencing travel behaviour. This also includes measures that reduce or influence the need to travel, as well as those that involve capital spend.

### 4.2 DEVELOPING THE LONG-LIST OF INTERVENTIONS

Following the Stage 1 evidence review, and subsequent stakeholder engagement, a long-list of interventions was developed. Interventions were included as part of the long-list if it was considered that they could seek to address the identified issues and contribute towards achievement of the agreed objectives. The interventions were identified via a range of sources including:

- i A review of historical schemes that have not previously been brought forward for delivery;
- i A review of existing policies and strategies, relating to transportation in Harrogate and Knaresborough;
- i A review of both county-wide and Harrogate and Knaresborough specific transport improvements included in existing studies and proposals;
- i Consideration of the issues and opportunities identified in the Stage 1 Report;
- i Stakeholder consultation including face-to-face meetings, questionnaire responses and internal stakeholder workshop; and
- i Internal study team workshops.

The initial review of historical schemes, existing policies, strategies, studies and proposals was important in the development of the long-list. This provided the background and context to what are considered to be the key issues and priorities in accordance with existing local, regional and national priorities. It also highlighted what measures or strategies have previously been considered, agreed (and/or discounted) in relation to tackling the identified issues. This also informed the Stage 1 Report.

An internal 'problems and issues' workshop was attended by the study team technical leads from a range of disciplines, including Environment, Geotechnical, Highways, Quantity Surveying and Transport Planning. This ensured that all aspects affecting the development of options would be considered. At this workshop, the technical leads provided a summary of the key issues and constraints impacting on option development, based on desktop analysis and investigations.

Consultation with stakeholders was also undertaken at this early stage to ascertain key issues or concerns in relation to transport in the study area. This was primarily in the form of a questionnaire but briefing meetings and a workshop also provided the opportunity for issues and problems to be raised as well as suggested measures to be put forward for inclusion in the long-list of interventions. The workshop was guided by the overarching objectives which informed development of appropriate interventions. The Stage 1 Report provides further detail on the stakeholder engagement process and includes details of the stakeholders involved.

At the early stage of option generation the 'long list' includes all interventions identified from the above sources in particular taking into account feedback and comments provided from stakeholder engagement and the discussions held at the workshop. This was particularly important as it enabled the local knowledge and experience of the various stakeholders to be reflected in the proposed interventions. It should be noted that, whilst some possible interventions would 'stand-alone', others may only have value as part of a wider package or as an element in a more wide ranging intervention. Each intervention has been assessed individually, as part of the initial sift, to enable transparency and to facilitate understanding of the performance of each individual intervention; this has then been used to inform the construction of 'Packages of Interventions' and is discussed further in Chapter 5.



For the purposes of the long-list, interventions have been grouped by intervention type under the following categories:

- i Information;
- i Demand Management;
- i Highways;
- i Parking;
- i Public Transport;
- i Cycling; and
- i Walking.

A total of 38 interventions were identified, ranging from strategic interventions to targeted behaviour change initiatives; the long-list, in its entirety, is set out in Table 6 with further detail provided in **Appendix A**. It should be noted that, at this stage, the interventions are high level concepts and, consequently, assumptions have been made as appropriate in the subsequent appraisal. Furthermore, as the study progresses there will be opportunities, such as at the public consultation, for additional measures not previously identified to be given due consideration. The initial long-list, set out below, includes all interventions identified at this stage that would go some way to address the identified issues and help achieve the objectives previously stated.

**Table 6 Long-list of Interventions**

Category	Scheme Reference No	Intervention Description
Information	A1	Variable Messaging
	A2	Real Time Passenger Information (RTPI) - public transport
	A3	Area wide signage strategy - potentially including tourist, HGV and wayfinding signage
	A4	Publicity campaigns and incentives for more sustainable travel
	A5	Improved digital provision - Open Harrogate website and app, gamification/sustainable travel challenges
	A6	Personalised journey planner
Demand Management	B1	Extend pedestrianisation of Harrogate central core (potentially peak time only - controlled by rising bollards)
	B2	Traffic Management / Low Emission Zone
	B3	High occupancy (2+) lanes
	B4	Area wide travel planning - workplace travel plans, event management
	B5	Create cell system in Harrogate town centre - potential routing subject to vehicle type

	B6	Management of side road access to improve main route efficiency
	B7	HGV ban at peak times/loading restrictions
	B8	Town centre 20mph speed limits/zone
	B9	Car sharing
	B10	Car clubs (Electric vehicles)
	B11	Work with schools to ameliorate the impact of school run (e.g. encourage sustainable school travel, review start/end times etc.)
Highways	C1	Relief Road
	C2	Inner ring road
	C3	Network optimisation
	C4	Area wide signal strategy review
	C5	Reallocation of road space
Parking	D1	Area wide review of car parking management, supply and charging and development of area wide strategy
	D2	Park and Ride (bus)
Public Transport	E1	Bus/rail station interchange development and public realm improvements
	E2	Bus priority on key routes
	E3	Quality bus corridors
	E4	Focus on new developments providing sustainable transport options
	E5	Demand responsive services
	E6	Reopen disused railway lines
	E7	Shuttle bus from railway stations

	E8	Relocation of Starbeck railway station
	E9	Parkway stations
	E10	New rail halts
	E11	Improved access to stations
	E12	Encouraged use of rail for internal journeys
Cycling	F1	Implementation of the Cycling Infrastructure Plan for Harrogate, Knaresborough and surrounding area
Walking	G1	Area wide public realm strategy

## 5 OPTION SIFTING AND PACKAGING

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### 5.1 OVERVIEW

This section of the OAR sets out the process of sifting that has been applied to the long-list of interventions, the formulation of 'packages' and the assessment of these packages. This process allowed the identification of better performing packages to be taken forward for more detailed consideration appraisal, as part of a Strategic Outline Business Case.

### 5.2 SIFTING PROCESS

An incremental approach to sifting was used, as this offered the most efficient method to developing a shortlist of options from a longer list. Undertaking a sifting exercise on a large number of options is a resource intensive exercise and given the number of interventions identified as part of the long-list, it was considered that it would be inefficient to assess each of them at a high level of detail. Rather, a staged sifting process proportionate to this stage of the study has been undertaken in order to identify, at an early stage, any intervention that would not be viable to take forward to detailed assessment.

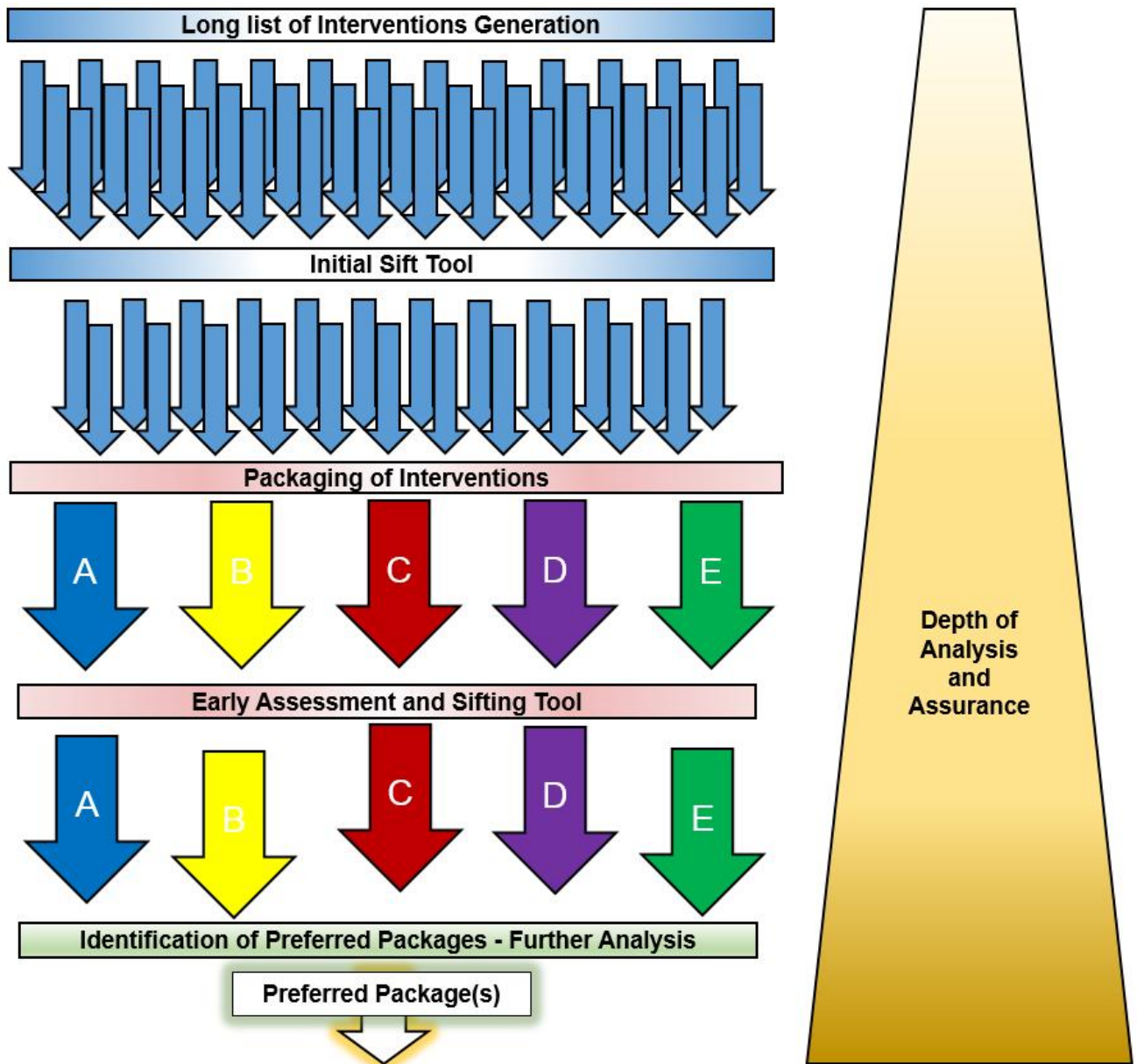
The two-stage sifting process comprised the following:

1. Initial Sift – high level qualitative assessment of individual long-list interventions to produce a subsequent short-list;
2. Early Assessment Sifting Tool (EAST) – Metric based assessment of the short-list, using DfT's EAST. Prior to the EAST assessment the short-listed interventions were, where appropriate, grouped into complementary packages – this is discussed in Section 5.4.

The methodology adopted for the initial sift is closely aligned with 'Step 6: Initial Sifting', as set out in the 'Transport Appraisal Process' WebTAG Unit. This states that, following generation of a long-list, "it is possible that some options will have been identified which do not represent sensible solutions". As such, an initial sift of the long-list of interventions was undertaken in order to identify any 'showstoppers' that would prevent an intervention progressing to a subsequent stage of the assessment process. This was based upon the wide-ranging knowledge and experience of WSP's technical team.

Figure 7 illustrates the overall sifting approach that is discussed in greater detail in this section of the report. It demonstrates the incremental build-up of depth of analysis and level of assurance as the study progresses from the initial long list of interventions toward a shortlist of options, as a more rigorous level of evidence is developed and interrogated. The initial assessment of interventions identifies better performing measures against the agreed scheme objectives. This is followed by a subsequent more detailed sift using the DfT's Early Assessment Sifting Tool (EAST) in order to develop a shortlist of better performing packages to be progressed for more detailed analysis as the study progresses to the business case stage of the study. The advantage of this proportionate approach is that analysis at the early stages can quickly demonstrate that particular interventions perform significantly better or worse than others. This allows the subsequent development and assessment of packages to be focused on particular interventions that will provide better benefits in achieving the desired outcomes and meeting objectives.

Figure 7 Sifting and Packaging Approach



### 5.3 INITIAL SIFT

As part of the initial sift, as appropriate at this early stage of the study in line with TAG appraisal guidance, a high level qualitative assessment was undertaken for each intervention using the following criteria:

1. Contribution to the Specific Objectives;
2. Deliverability;
3. Dependence upon other interventions;
4. Indicative cost; and
5. Timescales.

It should be noted that, with the exception of 'Contribution to Specific Objectives', 'scores' were not allocated to these criteria; instead, qualitative descriptors and ratings were drawn together in a framework allowing for meaningful comparisons to be made. The Initial Sift methodology was agreed with the NYCC client team and

the initial sifting exercise was undertaken by WSP, with input from transport, environment and sustainable transport specialists, with contributions from the NYCC client team.

A description of each of the Initial Sift criteria, and how the interventions have been assessed against them, is included at **Appendix B**.

Each of the Initial Sift criteria, set out above, was brought together in an overall framework, allowing for an assessment of individual interventions to be considered on an equal and consistent basis. It should be noted that interventions which, individually, may not have rated exceptionally highly could still have been considered as important elements in a package or as an element in a more wide ranging option. Further detail of the initial sift is included in **Appendix B**.

Following the Initial Sift, 15 interventions were considered not relevant for further inclusion in this particular study, in their own right, and as such did not progress to the more detailed assessment as part of the EAST appraisal. These interventions, and the rationale for not progressing them at this stage, are set out in Table 7, below. It should be noted however, that this process does not mean that any options are completely removed or discounted from potential development in the study area in the future.

This initial sift aims to provide a more focussed package of measures that will target the identified issues and positively contribute to the achievement of the objectives relating to this particular study (see Section 3 of this report). As part of the intervention sifting process it was considered that some measures, whilst not being considered appropriate for progression as an intervention in its own right could be usefully considered within another related intervention; this is also set out in Table 7.

**Table 7 Rationale for not progressing interventions beyond Initial Sift<sup>2</sup>**

Intervention	Rationale for Not Progressing	Consideration as part of alternative interventions?
B3: High occupancy (2+) vehicle lanes	<p>This intervention scored relatively poorly against achievement of the study objectives (with a score of 10 from a maximum of 40). It was considered that, although traffic volumes may be reduced, through encouragement to car-share, the overall impact would be minimal as uptake is likely to be low due to the high propensity to drive and availability of relatively low cost parking.</p> <p>It was also considered that it would be difficult to implement this intervention with sufficient coverage across the towns to effectively achieve the objectives. This is due to lack of available space for road reallocation to high occupancy lanes and the high costs which would be associated with land acquisition/CPO. Land acquisition within the urban areas of Harrogate and Knaresborough is considered to have a high impact, particularly when compared with more rural areas, due to:</p> <ul style="list-style-type: none"> <li>i Financial cost - urban land costs are high in Harrogate and Knaresborough urban areas;</li> <li>i Impact on residents/business - a higher impact in terms of CPO of land relating to residents' homes and local businesses is expected;</li> <li>i Adverse impacts to the Stray are considered to be significant.</li> </ul>	Not progressed to detailed sift.

<sup>2</sup> It should be noted that scores against each objective ranged from -2 to +2 giving a total score range of -40 to +40 for each intervention.

	<p>All of the above were considered to make delivery problematic and also considered likely to result in resistance from the public/stakeholders, impacting its overall deliverability.</p>	
<p>B5: Create cell system in Harrogate town centre - potential routing subject to vehicle type</p>	<p>This intervention had a good score against the objectives (20 out of a possible 40), with many objectives being met. However, it was considered to have significant deliverability issues.</p> <p>Implementation would require substantial restructuring of the transport network and potential CPO as land may be required to facilitate the changes to the transport network e.g. through changes to junctions and/or additional capacity for particular vehicle types. Numerous strategies would need to be developed to ensure a coordinated approach to the operation of the different transport networks and systems, this would also include changes to signage and junction layout and operations. Additionally, it was considered that it would be very difficult to ensure all land uses were adequately served by the cell system and there may be unintended adverse impacts, such as severance; whereby the routing of transport may not be suitable for particular land uses and may 'sever' linkages to other areas due to changes in the transport network operation e.g. through implementation of one way systems or access bans.</p> <p>There would be a need for various lengthy processes to be undertaken, including extensive consultation, legal processes and consents to ensure the system can be delivered and to make the system enforceable. Furthermore, there is a risk that sufficient support for particular cell attributes to be agreed for particular locations, may significantly hinder delivery.</p> <p>Given the above, public/stakeholder support for the system was considered likely to be low.</p>	<p>Not progressed to detailed sift.</p>
<p>B6: Management of side road access to improve main route efficiency</p>	<p>This scheme scored poorly against the study objectives (6 out of a possible 40).</p> <p>Whilst the cost of implementation was considered likely to be relatively low, it was also considered that residents and businesses located adjacent to the routes would suffer from disruption and connectivity issues as well as a potential impact on passing trade.</p>	<p>Not progressed to detailed sift.</p>
<p>C2: Inner ring road</p>	<p>Although this intervention demonstrated a reasonable score against the study objectives (14 out of 40), issues of deliverability were considered too great to progress the intervention to the next stage of sifting. Physical construction would require compulsory purchase of significant areas of land, a large proportion of which would be in residential areas of the study area, this is considered to be more significant, in terms of delivery, than land take in rural areas due to:</p> <ul style="list-style-type: none"> <li>i Financial cost - urban land costs are generally higher than rural areas;</li> </ul>	<p>Not progressed to detailed sift.</p>



	<ul style="list-style-type: none"> <li>i Impact on residents/business - a higher impact in terms of CPO of land relating to residents' homes and local businesses is expected.</li> <li>i Adverse impacts to the Stray are possible and considered to be a significant adverse impact;</li> </ul> <p>Taking account of the above together with the high cost of implementation, it was considered this intervention would likely result in issues of public acceptability.</p>	
<p>C5: Reallocation of road space</p>	<p>This intervention scored reasonably well against the study objectives (14 out of a possible 40), however, it would also limit accessibility to the town centre for all modes due to inadequate road space.</p> <p>The principal reason for this intervention not being taken forward in its own right to the next stage of sifting is the issue of deliverability. There is a lack of road space available for large scale reallocation across the urban areas and significant land acquisition/CPO would be required to provide the additional space. It was also considered that it would be difficult to implement this intervention across the town with sufficient coverage to effectively achieve the objectives. Land acquisition within the urban areas of Harrogate and Knaresborough is considered to have a high impact due to:</p> <ul style="list-style-type: none"> <li>i Financial cost - urban land costs are generally higher than rural areas;</li> <li>i Impact on residents/business - a higher impact in terms of CPO of land relating to residents' homes and local businesses is expected.</li> <li>i Adverse impacts to the Stray are considered to be a significant adverse impact;</li> </ul> <p>All of the above were considered to make delivery problematic and also considered likely to result in resistance from the public/stakeholders, impacting its overall deliverability.</p> <p>Targeted mode specific reallocation of road space however, can be appropriate and is considered as part of other interventions.</p>	<p>It is proposed that mode specific reallocation of road space will be considered as part of the following interventions:</p> <p>C3 (Network Optimisation) – as elements of bus priority may be achievable at specific junctions or sections of road.</p> <p>F1 (Implementation of the Cycling Infrastructure Plan for Harrogate, Knaresborough and surrounding area) – sections of road could be appropriately reallocated to use of cycles.</p>
<p>D2: Park and Ride (Bus)</p>	<p>Although a historical scheme, which has been considered numerous times for Harrogate, a Park and Ride (P&amp;R) intervention, as a stand-alone intervention, achieved a relatively poor score against the study objectives (7 out of a maximum of 40).</p> <p>It was considered that this scheme may be difficult to deliver, due to the requirement of appropriate land/sites for delivery.</p> <p>In addition, whilst P&amp;R services can reduce congestion within and along key routes into town centres, with associated environmental benefits, it can introduce adverse impacts elsewhere due to people driving to the P&amp;R site, it can also discourage use of rural bus services with people opting to drive to the P&amp;R site. Adverse environmental impacts can also be experienced from the construction and operation of the site(s).</p>	<p>P&amp;R benefits would be better realised as part of a wider package of parking measures across the study area, rather than a stand-alone intervention. As such, going forward, it will be considered further as part of intervention D1 (Area wide review of car parking management, supply and charging and development of area wide strategy).</p>



	<p>It is considered any benefits of P&amp;R would be better realised as part of a package of parking measures rather than as a standalone intervention.</p>	
E2: Bus priority on key routes	<p>This intervention, in the form of longer sections of bus lanes on key routes, has been suggested to not progress further as part of this stage of the study as a result of issues of deliverability, due to a lack of available highway space to provide adequate bus priority. Significant land acquisition would be required to provide the additional space to make the priority of buses possible which could result in issues of acceptability. Land acquisition within the urban areas of Harrogate and Knaresborough to provide large scale reallocation of road space is considered to have a much higher impact affecting delivery due to:</p> <ul style="list-style-type: none"> <li>i Financial cost - urban land costs in Harrogate and Knaresborough are high.</li> <li>i Impact on residents/business - in terms of CPO of land relating to residents' homes and local businesses is expected.</li> <li>i Adverse impacts to the Stray are considered to be significant;</li> </ul> <p>It is recognised that bus priority is not limited to large scale reallocation of road space and that it can take the form of changes to traffic signals and a more localised approach to key junctions. This element is to be considered as part of the Network Optimisation intervention.</p>	<p>Bus priority can take a number of forms and whilst large scale road space reallocation may not be appropriate, changes on particular sections of road and at specific junctions could be provided, as these are considered in intervention C3 (Network optimisation).</p>
E3: Quality bus corridors	<p>Although this intervention had a reasonable score (14 out of a possible 40) against the objectives this intervention is considered to have issues of deliverability as a result of a lack of available highway space to provide bus corridors. Whilst it is also recognised that as part of QBCs improvements in terms of bus stops, RTPI and upgrading of fleet are possible and provide additional benefit, the significant compulsory purchase of residential land would likely be required. This is considered to be problematic for delivery and may prove to be unacceptable. This is because of:</p> <ul style="list-style-type: none"> <li>i Financial costs - urban land costs in Harrogate and Knaresborough are high.</li> <li>i Adverse impact on residents/business – significant CPO of land relating to residents' homes and local businesses is expected.</li> <li>i Adverse impacts to the Stray are considered to be significant;</li> </ul>	<p>Large scale reallocation of road space for buses may not be achievable. However, changes on particular sections of roads and at specific junctions could be provided, as such is considered in intervention C3 (Network optimisation).</p> <p>RTPI is included in the progressed schemes (intervention A2)</p>
E5: Demand responsive services	<p>This was not progressed as part of this study as the uptake in usage of the services was considered unlikely to be sufficient to meet the study objectives. The intervention had a poor score against the objectives (8 out of a possible maximum of 40).</p>	<p>Not progressed to detailed sift.</p>

E6: Reopen disused railway lines	The intervention had a reasonable score (13 out of 40) against the objectives but would be extremely difficult to deliver due to the significant costs and time scales associated with reinstating the railway lines, provision of relevant infrastructure, rolling stock etc. Compulsory purchase of land may also be required in urban areas adding further difficulties to deliverability. Delivery would involve a number of different organisations including Network Rail, DfT, York, North Yorkshire and East Riding Local Enterprise Partnership (YNYER LEP), NYCC and HBC.	Not progressed to detailed sift.
E7: Shuttle bus from railway stations	It was considered that this intervention would be unlikely to have a significant uptake given the relatively small size of Harrogate and Knaresborough urban areas; as such it would not sufficiently achieve the objectives; achieving a score of 9 out of a possible 40.	Not progressed to detailed sift.
E8: Relocation of Starbeck railway station	This interventions achieved a poor score against objectives; 8 out of 40. The scheme would be extremely difficult to deliver due to the very high costs - CPO of land/buildings in the Harrogate and Knaresborough urban areas would have a high cost and impact if it adversely affects residents and businesses. Relocating a station would also have significant implications for the operation of the rail line and would need support from a wide range of stakeholders including Network Rail, DfT, YNYER LEP, NYCC and HBC.	Not progressed to detailed sift.
E9: Parkway stations	This intervention had a reasonable score against objectives (13 out of 40), due to the encouragement of sustainable modes; however, there would likely be very high costs and deliverability issues involved in implementation. Implementation would need support from a wide range of stakeholders including Network Rail, DfT, YNYER LEP, NYCC and HBC and it was considered that various permissions and consents would be required for delivery which could also include CPO in residential areas, with associated high costs and adverse impacts to those affected. This could impact delivery and timescales making this scheme unfeasible.	Not progressed to detailed sift.
E10: New rail halts	Provision of new rail halts did not progress to the more detailed sift due to issues of deliverability with a requirement for appropriate permissions, consents and land acquisition in urban areas which will likely have very high costs and adverse impacts to businesses and residents. Provision of additional halts would also likely impact timetabling and operation of the lines requiring significant input from a wide range of stakeholders including Network Rail, DfT, YNYER LEP, NYCC and HBC leading to protracted delivery timescales.	Not progressed to detailed sift.
E12: Encouraged use of rail for internal journeys	A reasonable score was achieved against the objectives (11 out of 40) as, although it could potentially encourage sustainable mode use, given the size of Harrogate and Knaresborough the practical take-up for travel by rail within the town would likely be minimal. When considering the short distances involved it was considered the overall costs of	Whilst encouragement of internal journeys per se was not progressed, interventions to encourage sustainable travel in general were included in

	<p>travel including time of travel to/from stations (at either end) time waiting for trains and financial implications may make this impractical for many short journeys. Consequently it is not considered to be taken forward.</p>	<p>interventions A4 (publicity campaigns), A5 (digital provision) and A6 (personalised journey planners).</p>
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## 5.4 PACKAGING OF INTERVENTIONS

It is considered that the complex nature of the traffic issues experienced in the Harrogate and Knaresborough urban areas, which are primarily a result of trips that have either an origin or destination in the urban areas as well as purely internal trips, are unlikely to be successfully addressed through delivery of a singular intervention. As such, a ‘packages’ approach to interventions has been adopted, with the aim of successfully addressing the combination of factors that result in issues on the highway network within the study area.

As discussed in Section 5.3, a number of interventions, when considered independently, may not have rated particularly highly as part of the Initial Sift but were still considered as having the potential to make an important contribution as part of a wider package of interventions. The value of an individual intervention, as a standalone measure, or through its inclusion within a wider package, was recorded within the Initial Sift and the potential packaging of interventions was taken forward for further consideration. This included:

- i Consideration of the potential impact on mode choice and behaviour – e.g. packages of measures which discourage car based travel and encourage sustainable modes.
- i Consideration of spatial categories – a review of whether packages could be formulated spatially, rather than being mode specific e.g. a package of measures targeting improvements for particular types of movement or in specific areas.
- i Consideration of the intervention’s ‘fit’ and contribution to other metrics including the economy, environment, feasibility and risk.

The ‘Package’ approach reflects an appreciation that no single intervention, in isolation, is likely to provide a solution to all of Harrogate and Knaresborough’s transport issues, nor fully meet all of the objectives of the study. Therefore, these packages have been formulated in order to represent groupings of interventions with common themes that it is considered would deliver positive improvements for transport in the urban areas of Harrogate and Knaresborough.

It should also be noted that, at this time, no specific funding stream has been identified for the delivery of interventions. The Packaging approach allows for the opportunity to unlock various funding sources, and to stagger the timetable for implementation with some interventions able to be delivered earlier than others, with the potential for achieving ‘quick wins’.

The outcome of the packaging process was a short-list of individual interventions, or Packages of Interventions, that were taken forward for detailed sifting, using the DfT’s EAST, as set out in the next section of this report. The process resulted in the formulation of five packages, these are:

- i **Package A** – Demand Management Package;
- i **Package B** – Demand Management and Behavioural Change Package;
- i **Package C** – Relief Road Only Package;
- i **Package D** – Relief Road and Highway Operational Improvement Measures Package; and
- i **Package E** – Relief Road, Highway Operational Improvement Measures plus Sustainable Travel and Urban Realm Improvement Package.

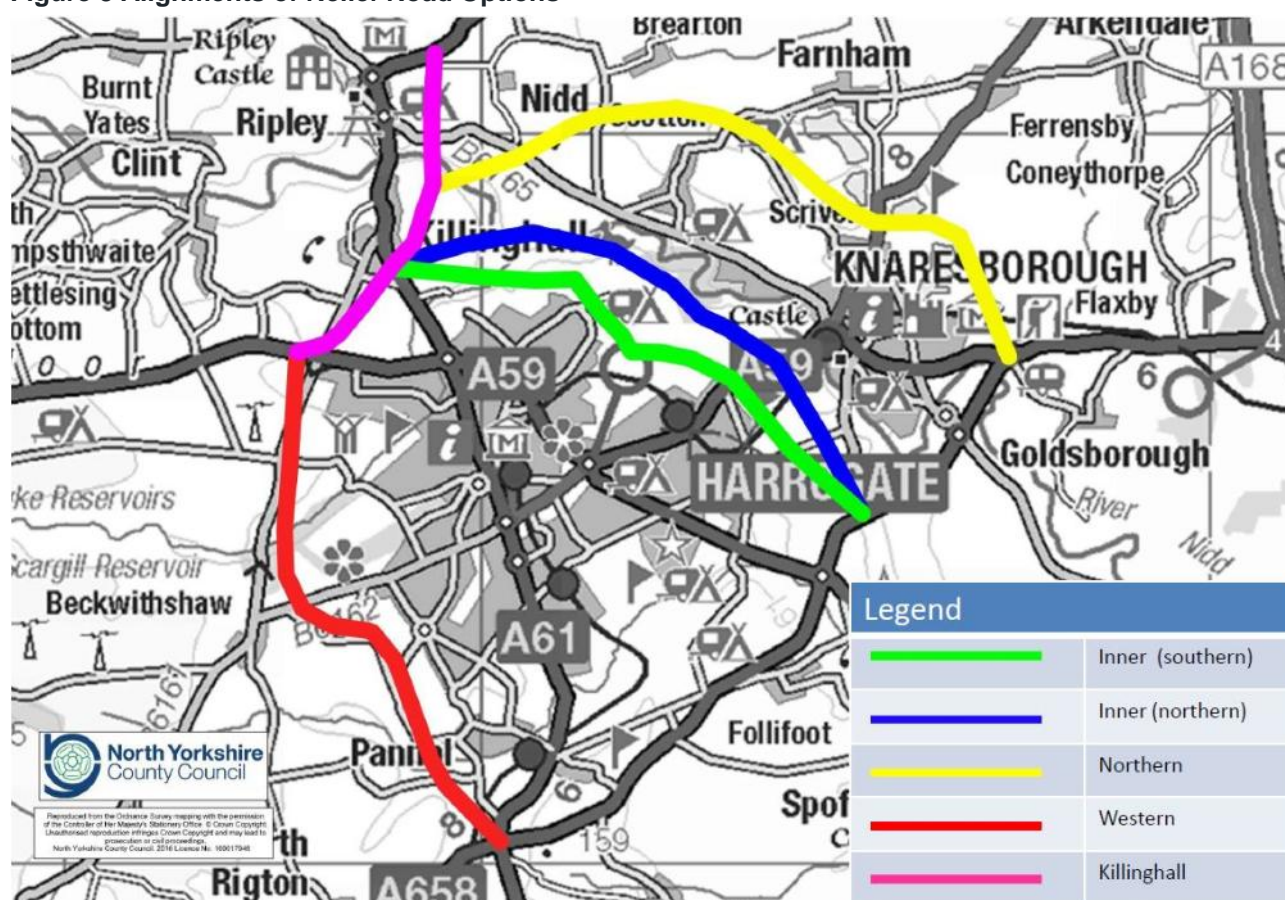
Further detail, setting out the individual interventions included in each of these packages and the supporting rationale, is included at **Appendix C**. It should be noted that the packaging process was undertaken to enable the assessment of a suite of interventions and to illustrate the benefits that they could provide cumulatively. It is envisaged that as the study progresses these packages will evolve to find the best fit of interventions to provide the desired outcomes. This means that additional interventions may be added and/or interventions removed from the packages, illustrated above and in **Appendix C**, in order to provide a better level of benefits and achievement of objectives. However, at this stage, this level of analysis and package development fits with the approach set out in TAG.

## 5.5 RELIEF ROAD CORRIDOR TESTING

The concept of a relief road for Harrogate was first put forward in the 1990s, when initial development work was undertaken to investigate potential options. Several options were developed and preferred alignments to the west and north of the town, together with a Killinghall bypass, were adopted. As with all of the proposed interventions, there has been no detailed design of relief road alignments within this study; however, a number of historical corridor proposals do exist and have previously been considered, and consulted on, as part of earlier studies. The five preferred corridor options for a relief road that have previously been identified (illustrated in Figure 8) are:

- Northern;
- Inner (Northern);
- Inner (Southern) including link to Bilton Lane;
- Western; and
- Killinghall.

Figure 8 Alignments of Relief Road Options



Following the Stage 1 evidence review it was considered that a number of the historical relief road options would be unlikely to address the nature of the issues identified within the Harrogate and Knarborough urban areas and that, if this was shown to be the case, they should not be considered further in this study. As such, high level testing was undertaken using the Harrogate and Knarborough Strategic Traffic Model, to provide an early indication of the benefits that could be realised as a result of delivering each corridor. It should be noted that the Killinghall corridor was modelled as a stand-alone option but was also included as part of each of the other corridor options as it was considered to complement each of the corridors.

High level testing of a 2035 future year scenario has suggested that the 'Inner North' and 'Inner South' options demonstrate the highest potential benefits, including a forecast reduction in flows of between 20-40% on Skipton Road. The Northern and Western alignments resulted in lower potential benefits to the town centre, in



comparison to the inner options, although the Western alignments were shown to result in significant benefit to both Ripon Road and Leeds Road. In summary, the forecast modelling highlighted the following:

- i Northern corridors would have the greatest area of influence in terms of traffic flows.
- i Inner corridors would relieve traffic on the A661 / A59.
- i A link to Bilton Lane on the Inner South corridor would bring large reductions in traffic flows on A59 and A661.
- i There would be minimal impact on traffic flows in the core of Harrogate town centre (i.e. the area bounded by A61 and Victoria Avenue) from any of the corridors.
- i The largest journey time savings would occur on the A661 / A59, particularly with the Inner corridor proposals

A summary of the results of the high level modelling assessments of the individual alignments is set out below with further detail provided in **Appendix D**. It should be noted that the Killinghall corridor was also included as part of each of the other corridor options as it was considered to complement each of the corridors.

- i Killinghall (stand-alone) offered minimal changes in traffic flows along the majority of key routes in the AM and PM peaks. However, of particular note, the A59 Skipton Road to the north of Harrogate and A61 in the town centre experienced relatively large traffic flow increases in the PM peak.
- i Northern alignment provided reduced flows in the east of the study area in particular in Knaresborough, A59 Knaresborough Road and A658. Conversely, relatively large increases were also found in some areas, most notably on the A59 to the north west of the town centre and the A61 north of the town centre.
- i Western alignment overall, demonstrated minimal changes to flows, although large reductions in flows would be experienced in the west of the study area i.e. on B6161 and B6162, particularly in the AM peak.
- i Inner North alignment showed reductions in flows on a number of key links across the study area most notably in the southern area on the A61 and in the eastern areas on the A59, A661 and in Knaresborough.
- i Inner South alignment generally provides large traffic relief across the study area but most notably in Knaresborough and along eastern routes comprising A59, A661 and northern routes including A61 and B6165.

The Stage 1 Report highlighted that the modelled hourly flow plots demonstrated that the busiest sections of the network include:

- i A59 between Knaresborough and J47 A1(M);
- i A658 between A59 and A661;
- i A661 from A658 to Harrogate;
- i A59 through Harrogate; and
- i A61 north of Killinghall.

It is considered that the Inner Northern and Inner Southern relief road alignments in general provided large reductions in traffic flows along much of these sections. Killinghall (standalone), Western and Northern alignments showed negligible change or in some cases large increases in traffic flows at points along these sections (see **Appendix D** for further details)

Overall, the results of this high level modelling assessment, which considered global factors, link flows and journey times, showed the Inner relief road options (Northern and Southern), including the Killinghall tie-in, achieving the most benefits when considering the metrics set out above. This was as expected and in line with the patterns of traffic movement across Harrogate, as identified in the Stage 1 Report. Therefore, the Northern, Western and Killinghall (stand-alone) corridors were not considered any further within this study. However, the Inner Northern and Inner Southern corridors were taken forward for further consideration within the next stage. A summary of the modelling assessments is set out at **Appendix D**.

Due to the early stage of this study, the high level nature of the modelling, and in line with TAG, the Inner Northern and Inner Southern relief road corridors have not been considered separately within the EAST appraisal; any Package of Interventions that includes a relief road has been assessed based upon the inclusion of a generic 'Inner' corridor.

## 5.6 DETAILED SIFT (EAST)

Having progressed from the long-list, through the Initial Sift and Packaging process, this second stage of sifting sought to appraise the potential interventions further, in order to identify those that will eventually be considered in greater detail as part of a business case that will form the basis of any future application for funding. It is not proposed to discount particular packages at this point, but to provide more detailed appraisal for further consideration ahead of public consultation; together this will inform which packages and interventions progress to Strategic Outline Business Case.

EAST, developed by DfT, is used as a decision support tool that summarises and presents evidence on options in a clear and consistent format. It provides relevant, high level information that enables decision makers to form an early view of the relative performance of the different options under analysis. Furthermore, EAST is suitable for the assessment and comparison of all types of interventions, across all modes, in a consistent format; this is particularly relevant in the case of this study which looks at a wide range of potential interventions in order to address complex transport issues.

It should be noted that, at this stage and in line with DfT TAG, the interventions identified are high level, at very early concept stage and full detailed proposals have not been developed. In terms of a potential relief road, while indicative corridors have been identified, detailed alignment and junction configurations have not been determined. However, the existence of the Harrogate and Knaresborough Strategic Transport Model, has allowed for high level modelling to be undertaken for the preferred relief road corridors (as set out in Section 5.5) as well as for a number of the 'softer measures'. The latter has been undertaken through modifications to the demand matrices and/or to the model network itself; the extent of these modifications has been based upon evidence of intervention outcomes in other locations, and has informed the EAST appraisal as appropriate.

As mentioned above, in order to consider the potential impacts of non-highway measures on mode shift and the use of sustainable modes in the urban areas of Harrogate and Knaresborough, research has been undertaken to identify where similar interventions have been implemented and any outcomes that were identified. In order to provide an overview of their potential effectiveness, the research on interventions has focused on identifying examples from areas that are comparable with the HRR study area, e.g. towns and urban areas in the UK with a population of less than 100,000. Where this was not possible, due to the availability of information, examples from larger towns and cities have been included where it is felt that they are still relevant.

The research undertaken, together with the professional experience of the study team, helped inform the percentage reductions to traffic demand that were applied in the traffic model scenarios. As detailed in Section 5.4 of this report a number of measures have been packaged. This has been done to allow an understanding of the opportunities for the combination of several measures, when implemented together as a package, to increase their impact as certain measures can complement others. For example, the impact of a soft measure aimed at promoting the use of sustainable travel infrastructure will be augmented by the improvement or addition of a hard infrastructure measure. Within this context, it is important to note that the percentage reductions are not cumulative (in that they would provide a total mode shift that is the sum of the reductions of all the individual measures) rather the percentage reductions relate specifically to the potential impact of a specific measure. This relates to a constraint in establishing the potential impact of individual schemes, through the research, because in practice measures are not usually implemented on their own, but tend to form part of a wider package of measures. Therefore, the mode shift or demand changes observed cannot be wholly attributed to one measure unless a suitable control has been used.

A table, setting out which of the interventions have been reflected in the model, and to what extent, is included at **Appendix E**. It should be noted that this high level modelling has been undertaken to support the EAST appraisal, by providing an indication of the impact of these softer measures.

The modelling does not represent the entirety of the assessment within the EAST appraisal but does provide a useful early indication of the level of benefit certain interventions could provide. It is recognised that all modelling is limited and should be seen as an aid to decision making rather than an end in itself.

Changes to signal timings and traffic flows sought to illustrate the type of changes, based on examples implemented elsewhere, that could result from implementation of the identified measures. As discussed earlier in this report, the traffic model used to support the EAST assessment is a single-mode VISUM model intended primarily for the appraisal of road schemes however, it is a useful tool to establish an indication of quantitative benefits or changes that could be experienced on the transport network. The use of the existing VISUM model

was considered appropriate for this stage of the study. The appraisal guidance in TAG states there is a presumption that complex models are not required for this stage of assessment and that analysis tools need to be proportionate and fit for purpose for the current stage of appraisal; more specialised modelling tools will be considered as this study progresses to Strategic Outline Business Case.

Given the wide-ranging themes covered in the EAST, and the combination of the packages being assessed, a multi-discipline WSP team was involved in undertaking the scoring of each package against the various metrics; this included:

- Transport Planners (including specialists in transport modelling and sustainable transport);
- Environmental Consultants;
- Geotechnical Consultants;
- Highway Engineers; and
- Quantity Surveyors.

Details of the EAST metrics, against which each of the Packages of Interventions has been appraised, and the scoring mechanism for each is included at **Appendix F**.

## EAST OUTPUT

A summary of the performance of each Package of Interventions, against the DfT's EAST metrics, is set out in Table 8 below.

**Table 8 EAST Appraisal Summary**

Case	Indicator	Scale	Package				
			A	B	C	D	E
Strategic	Scale of impact	1 (Very small) to 5 (Fully addresses the problem)	3	4	2	3	4
	Fit with local and regional objectives.	1 (Poor fit) – 5 (Excellent fit).	2	4	3	4	5
	Fit with wider transport and government objectives	1 (Poor fit) – 5 (Excellent fit).	3	4	2	2	4
	Key uncertainties	Qualitative	Scheme costs; funding availability; acceptability; level of benefits.				
	Consensus over outcomes	1 (Little) to 5 (Majority)	2	2	2	2	2
Economic	Economic growth	RAG scale	A	A/G	A/G	A/G	G
	Carbon emissions		A	A/G	R/A	R/A	A
	SDI		A	A/G	R/A	A/G	G
	Local environment		A	A/G	R	R/A	A/G
	Wellbeing		A	G	A	A/G	G
	Expected VfM	1 (Poor) to 5 (Very high)	Not assessed.				
Management	Implementation timetable	1 (5 years+) to 5 (< 2 years).	1	1	1	1	1
	Public acceptability	1 (Low) to 5 (High)	4	4	3	3	3
	Practical feasibility	1 (Low) to 5 (High)	4	4	3	3	3
	Quality of supporting evidence	1 (Low) to 5 (High)	3	3	3	3	3
	Key risks	Qualitative	Costs/affordability; acceptability; consents/approvals; environmental; design; construction and contractual.				

Case	Indicator	Scale	Package				
			A	B	C	D	E
Financial	Affordability	1 (Not affordable) to 5 (Affordable)	<b>4</b>	3	3	3	2
	Capital cost (£)	1 (£50m+) to 5 (<£10m)	<b>2</b>	1	1	1	1
	Revenue cost (p.a.)	1 (£500k) to 5 (<£50k)	<b>4</b>	3	1	1	1
	Cost profile	Qualitative	Cost profiles not developed at this stage.				
	Overall cost risk	1 (High risk) to 5 (Low risk)	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>
Commercial	Flexibility of option	1 (Static) to 5 (Dynamic)	<b>4</b>	<b>4</b>	1	2	2
	Where is funding coming from	Qualitative	Currently no identified funding for this. It is anticipated a Business Case will be submitted to the DfT when a funding stream is established.				
	Income generated	Yes/No	<b>5</b>	<b>5</b>	1	1	1

The highest scores for each metric, relative to each package, are indicated in bold to help illustrate the better performing packages in this assessment. The Economic Case metrics were scored on a RAG basis as per the DfT's guidance.

It should be noted that the scores in Table 8 should not necessarily be added to give a total for each column as that would assume each metric is afforded the same weight i.e. has an equal level of importance. The scores are indicative and high-level at this stage to help illustrate which packages could offer the most benefit in addressing the identified issues and problems.

The results of the EAST appraisal demonstrate that Package B (Demand Management and Behavioural Change Package) and Package E (Relief Road, Highway Operational Improvement Measures, Sustainable Transport and Urban Realm Improvement Package) generally provide the best level of fit, of all the packages, against the EAST metrics. In particular, the assessment noted that these packages scored well against the fit with the study's Specific Objectives as well as the Government's wider transport objectives. Both packages also performed well against the economic metrics, particularly economic growth, socio-distributional impacts and wellbeing.

In relation to financial metrics, in terms of affordability, all packages had relatively high costs associated with their delivery with Package E considered to be the most challenging due to the inclusion of two very high cost interventions included within the package - the relief road and bus/rail station interchange development.

It should be noted that Package A also scored well against the majority of the metrics, however it was considered to have a lesser impact in achieving the Specific and wider Government objectives. Similarly, in terms of economic and environmental benefits, Package A did not score as highly as Packages B and E, with relatively mid-level impacts expected. Package A was, however, considered to be the most affordable of all of the packages, with fewer high cost interventions. There is also an opportunity to generate income from this package, due to the inclusion of the Traffic Management / Low Emission Zone intervention.

Package D did not perform particularly well as part of the EAST appraisal, with scores being relatively moderate against the majority of the metrics. Whilst it did demonstrate reasonable scores against the Specific Objectives, fit with wider objectives was not as good as other Packages due to its limitations in terms of encouraging modal shift to more sustainable modes. This also meant that it scored relatively poorly against the environmental metrics, particularly relating to carbon emissions and impact on the local environment.

The poorest performing Package was shown to be Package C, which comprised only the relief road intervention. The delivery of a relief road, without any complementary measures, was considered to score relatively poorly against the Specific Objectives, primarily as a result of offering extremely limited improvements to sustainable transport, NMUs and the environment. This Package scored particularly poorly



against the economic metrics, specifically environment, due to the impact of construction as well as increased carbon emissions and adverse impacts on air quality forecast as a result of increased vehicle miles travelled, with no complementary interventions proposed to potentially mitigate these impacts elsewhere.

## 5.7 APPRAISAL SUMMARY

Following completion of the sifting assessments outlined above, Packages B and E are considered to be the Packages of Interventions that have the greatest level of benefits when considered against the EAST metrics. Package A also scored reasonably well and was also identified as being the likely lowest cost option of all the packages. Packages C and D have been shown to result in the lowest levels of benefit of all the Packages.

Whilst this process provides an early indication of the relative better scoring packages, no formal prioritisation is proposed at this stage, as this will be considered following public consultation. As per the TAG process at this early stage of option development the appraisal is proportionate and largely qualitative in nature. As further detail is added to the proposed interventions and packages the level of detailed assessment will be proportionately expanded to provide better confidence in proposed packages and their overall level of benefits and acceptability.

It should also be noted that as the appraisal progresses, the content of these Packages may change, with interventions being either removed or added dependent upon the outcomes of the public consultation and further analysis as part of the SOBC.

## 6 SUMMARY AND NEXT STEPS

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### 6.1 SUMMARY

This Option Assessment Report, alongside the accompanying Stage 1 Report, has presented the evidence gathering, objective setting and option generation process that has been undertaken as part of the Harrogate Relief Road Review.

The OAR has presented the Strategic and Specific Objectives and the long-list of interventions that have been considered. It has also set out the sifting methodology and results, including Initial Sift, high level modelling appraisal, short-listing and packaging of interventions and detailed EAST appraisal of these Packages.

Table 8 presents a summary of the EAST appraisal, and the fit of each Package against the EAST metrics that have been designed to reflect DfT's Five Case Model; this has been informed, as appropriate, by high level modelling of the likely impacts of interventions. At this stage of the study the benefits and costs are presented in broad range categories; interventions have been considered as concepts only and no detailed design has been undertaken. As such there are no benefit cost ratios presented in this report; this will be provided when a business case for a preferred package or packages is developed.

In terms of the relief road intervention, the initial modelling assessment, which considered global factors, link flows and journey times, highlighted that the Inner (North and South) relief road options together with the Killinghall tie-in, are likely to deliver the most benefits. As such, it was agreed that the other corridors that were considered (Northern, Western and Killinghall stand-alone) would not be considered further at this stage and that the Inner Northern and Inner Southern corridors would be taken forward as the options for this particular intervention.

The results of the detailed EAST appraisal have enabled the, relatively, better performing packages of interventions to be identified, as follows (please note that there is no implied order of prioritisation within each category):

#### **BETTER PERFORMING PACKAGES OF INTERVENTIONS:**

- i **Package B:** Demand Management and Behavioural Changes Package
- i **Package E:** Relief Road plus Highway Operational Improvement Measures, Sustainable Transport and Urban Realm Improvement Interventions

#### **NEXT BEST PERFORMING PACKAGES:**

- i **Package A:** Demand Management Package

#### **POOREST PERFORMING PACKAGES:**

- i **Package C:** Relief Road Package
- i **Package D:** Relief Road and Highway Operational Improvement Measures Package

### 6.2 NEXT STEPS

#### **PUBLIC CONSULTATION**

NYCC will undertake public consultation, on the initial outcomes of this study, in late 2017/early 2018.

The results of, and feedback from, this consultation will be used to revisit the EAST appraisal, primarily in terms of Public Acceptability; the outcome of this revised EAST will be used to finalise the appraisal and development of a preferred package of interventions, ahead of progression to Strategic Outline Business Case.

#### **STRATEGIC OUTLINE BUSINESS CASE**

It is recommended that the finalised prioritisation, following public consultation, will identify three packages for progression to SOBC.

Following further analysis and assessment of the Packages, as part of the SOBC, Preferred, Next Best and Low Cost packages will be formulated and taken forward for detailed assessment as part of an Outline Business Case. It is considered that, while these options will be based upon the existing Packages of



Interventions, the content of these Packages may change, with interventions being either removed or added dependent upon the outcomes of the public consultation and further analysis as part of the SOBC.



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