North Yorkshire County Council

HARROGATE RELIEF ROAD REVIEW

Stage 1 Report

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WSP
Dale House
Mount View
Northallerton
North Yorkshire
DL6 2YD

WSP.com

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Signature				
Checked by	Gary Billington	Gary Billington	Gary Billington	Claire Whitfield
Signature				
Authorised by	Andrew Cairns	Andrew Cairns	Andrew Cairns	David Wilson
Signature				
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1 INTRODUCTION

1.1 PURPOSE OF THE REPORT

This report sets out the activities and findings of Stage 1 of the Harrogate Relief Road (HRR) Review, which seeks to identify the potential options for addressing congestion in and around Harrogate. It considers the existing conditions and evidence base, and the forecasted future situation, culminating in an initial view on the need for intervention.

A description of this stage (Stage 1), along with Stages 2 and 3, is set out in **Table 1**, below.

Table 1 - Summary of Project Stages

Stage	Deliverable
1	¡ Review of previous study work, detailed transport analysis assessing both the current and future situation, and a summary of evidence. ¡ Preliminary view on the need for intervention. ¡ Identification of draft intervention specific objectives.
2	¡ Option generation and identification together with outline / basic cost estimates.
3	¡ Assessment of options using DfT Option Assessment Framework (OAF), identification of transport benefits and sensitivity testing.

1.2 INTRODUCTION

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

Historically, there is a perception of traffic congestion in the vicinity of Harrogate and Knaresborough, considered to be a result of both traffic with an origin or destination within the towns, but also of longer distance through traffic. The perception is of a network which is extremely congested in peak times, both in the town centre itself and on the radial routes, with key locations continuing to experience ongoing congestion throughout the day.

There is strong public demand for intervention to address this perceived congestion, with a relief road often cited as a potential solution. Many of the key routes and junctions in the towns are considered to be operating at, or close to, capacity, resulting in considerable delays. If evidence shows this traffic congestion to be a legitimate issue it has the potential to significantly impact upon the area's long-term economic growth, air quality, connectivity and future operation of the highway network.

Over the last fifteen years NYCC has made a significant number of smaller scale improvements to ease congestion in and around Harrogate, however these measures were only intended to address issues in the short-term. NYCC consider that there is a now a need to fully investigate a strategic, larger scale, intervention, or package of interventions.

At a strategic level Transport for the North's (TfN) Northern Transport Strategy Spring Report (2016), and emerging Strategic Transport Plan, sets out the need for radically improved east-west connectivity in order to realise the potential of the Northern Powerhouse and to "*create an integrated network that spreads economic benefits across the whole of the north*". Poor connectivity has been shown to act as a barrier to growth and the North's output per capita is consistently 10-15% below the rest of England excluding London (Northern Powerhouse Independent Economic Review, 2016); improving transport connectivity in the area is seen as key to helping grow the North's economy.

The York, North Yorkshire and East Riding Local Enterprise Partnership's (YNYER LEP) Strategic Economic Plan echoes the need for improved east-west connectivity, in order to support a well-connected economy. A

number of potential schemes have been identified, including improvements to the A59 and a Harrogate Relief Road to help ease congestion in the town.

NYCC has identified journey time reliability improvements for east-west connectivity, as a top priority for the area, and NYCC's Strategic Transport Prospectus sets out improvements required along the A59 to facilitate this; it also suggests a review of the Harrogate Northern Relief Road proposals in order to bring forward a scheme which contributes towards both east–west connectivity and addresses urban traffic congestion in Harrogate. It is no longer considered that a relief road is necessarily the only, or optimum, potential solution and, as such, alternative and complementary sustainable transport focussed measures will also be considered.

Background to the Scheme

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.

Following further investigation, the option for a Western Relief Road was subsequently revoked and the Northern alignment retained as the preferred route.

In 2015 NYCC, working in partnership with Harrogate Borough Council, commissioned the building of a Strategic Transport Model covering Harrogate, Knaresborough and Ripon. The model has since been used to test Local Plan development options and to undertake high level analysis of potential relief road corridors, as set out in **Figure 1** in **Appendix A**. All Figures are included at **Appendix A** and Tables not set out in the main report are included at **Appendix B**.

Subsequent high level testing of a 2035 future year scenario has suggested that the 'Inner Relief Road' options demonstrate the highest benefits, including a forecast reduction in flows of between 20-40% on Skipton Road. The Northern and Western alignments resulted in reduced 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.

Since the 1990's, when this initial development work was undertaken, the area has seen further traffic growth, as a result of inward migration and economic growth, and Harrogate and Knaresborough town centres both suffer from what is now considered to be significant traffic congestion, resulting in delays and unreliable journey times. As such, NYCC has made the decision to revisit and reappraise potential transport interventions for Harrogate including a review of the need for, and subsequent preferred alignment of, a relief road as well as the potential inclusion of alternative and/or complementary sustainable transport focussed measures.

1.3 STUDY OBJECTIVES

The high level objective of the Harrogate Relief Road Review is to identify an appropriate intervention, or package of interventions, to address urban traffic congestion, and the resulting impacts, in and around Harrogate, and to promote east-west connectivity in the North.

The study objectives are set out in **Table 2**, below. Intervention-specific objectives, based on the evidence presented including the key problems and issues that are identified, will be developed based upon the findings of this Review.

Table 2 - Study Objectives

Study Objectives	
1	Investigate the existing issue of urban congestion in and around Harrogate, on town centre and radial routes.
2	Consider measures to reduce delays and improve journey times, and journey time reliability, on the local network.
3	Identify means to support wider strategic east-west connectivity in order to maximise sustainable economic growth.

In addressing these objectives the study will take due regard of both local and strategic transport and spatial policies and strategies, as well as considering other schemes and studies being progressed locally.

1.4 STAGE 1 OBJECTIVES

Stage 1 of the HRR Review looks to gather and present the available evidence that will be used to establish the case for intervention. Stage 1 objectives are set out in **Table 3** below:

Table 3 - Stage 1 Objectives

Stage 1 Objectives	
1	Understand the current and future situation and conditions within the study area including a review of previous studies, current policy, travel patterns, road congestion and capacity, safety, journey times, sustainable transport provision, environmental constraints, future development, socio-economics and labour markets.
2	Examine if there is a case for intervention, based on the body of evidence, to demonstrate the need for an appropriate improvement scheme or package.

The overall objective of this Stage 1 Report is to review previous study work and relevant policies, and to carry out further transport analysis, in order to reach a preliminary view on the case for intervention and the specific objectives that these interventions would be looking to address.

1.5 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. The city of Leeds lies directly south, the district of Craven to the west, and York to the east.

North Yorkshire sits within the Northern Powerhouse area and is within the geography of the York, North Yorkshire and East Riding Local Enterprise Partnership (LEP); the North Yorkshire districts of Craven, Harrogate and Selby also form part of the Leeds City Region (alongside the West Yorkshire metropolitan authorities, Barnsley Metropolitan Borough and the City of York councils) and are therefore also considered part of the LCR LEP.

Harrogate is a spa town and has a number of well-known visitor attractions. The town is a popular conference and events location, centred around the Harrogate Convention Centre (HCC), Yorkshire Event Centre and the Great Yorkshire Showground - home to the annual Great Yorkshire Show. It is also close to the Nidderdale Area of Outstanding Natural Beauty (AONB) and the Stray, a 200 acre area of green space near to the town centre, which is protected by a 1985 Act of Parliament.

The town is strategically well placed geographically with the A1(M), 5 miles to the east, offering excellent north-south connections for the movement of people and goods across the UK. A number of other key strategic routes operate in the vicinity of the two towns.

- The A59 is a key east-west link that runs from Merseyside, passing through towns in Lancashire and the Craven District, before connecting to Harrogate and Knaresborough; it provides direct access to Junction 47 of the A1(M) and onwards to York. The route has the potential to carry strategic east-west trips, however, it suffers from poor journey times and reliability that affect its viability.
- The A61 is a north-south route, originating in Thirsk, passing through the centre of Harrogate and directly on to Leeds. The A61 has the potential to offer a viable route for north-south travel, however congestion and resulting unreliable journey times are currently constraining this potential.

At this early stage of the study it will be necessary to consider the towns, and the surrounding area, in their entirety in order to provide an unbiased view of the need for intervention. As such, the study area currently identified is set out in **Figure 2** in Appendix A**.** The majority of congestion issues experienced in the study area

are in Harrogate town itself; Bond End in Knaresborough also suffers congestion and queues throughout the day and is currently the subject of a separate study. Throughout this Stage 1 appraisal of the current situation, various data is presented for Harrogate as a district; it should be noted that Harrogate and Knaresborough towns have differing characteristics to the wider rural area in which they sit – where available data has been presented for the urban areas themselves, these extents are as shown in **Figures 3 and 4** in Appendix A**.**

Throughout this Stage 1 Report the nearby urban area of York has been used for the purposes of comparison; this is consistent with previous study work including that undertaken as part of Local Transport Plan (LTP), LTP2 and LTP3. York is considered to be the only conurbation in close proximity that could be used for such a purpose, given the relative scale and shared qualities such as its tourist appeal and urban / rural characteristics. However, it should be noted that there are a number of key differences between York and Harrogate and, as such, while comparisons can be made in terms of assessing the current situation and the potential that intervention may bring about, the conclusions drawn should be treated with caution. The urban area of York, which has been used for comparison with Harrogate, is as set out in **Figure 5** in Appendix A.

1.6 STAGE 1 REPORT STRUCTURE

The remainder of this Stage 1 Report is structured as follows:

- **Chapter 2** outlines the current situation in the study area in terms of policy, previous studies, travel demand and patterns, opportunities and constraints;
- **Chapter 3** considers the future transport situation, taking into account future land-use policies, changes to the transport system, traffic growth and likely travel demands;
- **Chapter 4** looks to establish the need for intervention, based on the body of evidence presented in Chapters 2 and 3;
- **Chapter 5** sets out the approach to, and initial findings of, key stakeholder engagement; and
- **Chapter 6** summaries the findings of Stage 1 and outlines the next steps for the HRR Scheme.

A summary of the key findings is provided at the end of each section.

2 UNDERSTANDING THE CURRENT SITUATION

2.1 INTRODUCTION

This section of the report looks to establish the current situation in the study area; it identifies:

- Policies and strategies of relevance;
- Previous study work;
- Socio-economic context;
- The wider-economic situation including the area's position within the York, North Yorkshire, East Riding Local Enterprise Partnership area, the importance of tourism to the local economy and the relationship with the Leeds City Region;
- The transport context including current network performance, road safety and sustainable transport;
- Environmental conditions and constraints; and
- Committed development in the area, including both transport schemes and development sites, which have the potential to impact upon operation of the existing network.

2.2 RELEVANT POLICIES AND STRATEGIES

Table 4 below summarises the strategy and policy documents considered to be of relevance to the HRR Review. A full review of the respective documents can be found at **Appendix C**.

Table 4 - Policy and Strategy Documents

Category	Document
National Policy	DfT Local Transport White Paper "Creating Growth, Cutting Carbon: Making Sustainable Local Transport Happen"
	National Planning Policy Framework
	Fixing the Foundations: Creating a More Prosperous Nation
	National Infrastructure Delivery Plan 2016 to 2021
Sub-National Policy	One North: A Proposition for an Interconnected North
	The Northern Powerhouse: One Agenda, One Economy, One North
	The Northern Transport Strategy
	Northern Powerhouse Independent Economic Review (NPIER)
	York, North Yorkshire and East Riding Local Enterprise Partnership Strategic Economic Plan and Local Growth Deal 3
	Leeds City Region Strategic Economic Plan
	A Strategic Transport Prospectus for North Yorkshire
Local Policy	North Yorkshire County Council 4th Local Transport Plan (LTP4)
	Harrogate Borough Council Corporate Plan 2014-2017
	Harrogate Borough Council Draft Local Plan 2016

	Harrogate Borough Council Local Plan
	Harrogate Borough Council Core Strategy
	Harrogate Borough Council Economy Action Plan for 2015-2020
	Harrogate and Knaresborough Cycling Implementation Plan

2.3 PREVIOUS STUDIES AND INITIATIVES

Table 5 summarises the previous studies and initiatives that have been considered. Full information on each of the respective documents can be found at **Appendix D**.

Table 5 - Previous Studies and Initiatives

Document
NYCC Local Transport Plans 2 and 3
NYCC Major Schemes Review
Harrogate and Knaresborough Integrated Transport Strategy (HAKITS)
Harrogate and Knaresborough Service Centre Transportation Strategy (SCTS)
Harrogate Park and Ride Feasibility Study
Harrogate and Knaresborough Local Sustainable Transport Fund
Access Fund – Open North Yorkshire / Open Harrogate

2.4 SOCIO-ECONOMIC CONTEXT

2.4.1. Population

North Yorkshire is the largest county in England, covering an area of around 865,400 hectares, and has a resident population of just over 600,000[1](mid-2015 estimate). Harrogate district, although only the fourth largest in North Yorkshire in terms of size, is home to the largest proportion of the County's population with approximately 157,000 residents.

The resident population of the district grew by 4% between the 2001 and 2011 Census' and, based on the 2014 population projections by the Office of National Statistics, by 2027 the district population is expected to have exceeded 160,000.The Harrogate ward itself, as one of the principal urban areas in the county, has a resident population of just over 75,000, almost half of the district population as a whole.

Approximately 60% of the resident population of Harrogate district is of working age; of these 56% are employed in professional and managerial roles, while less than 20% work in the leisure and service sectors which is at odds with the economic make-up of the district, discussed further in **Section 2.5**. These data suggest significant volumes of cross-boundary commuting for higher value employment:

The average age of residents in the district is 42 and the population is ageing rapidly. In 2014 22% (34,500) of the district's residents were over 65 years of age, significantly higher than the national average of 17%, and an

[1] http://www.northyorks.gov.uk/article/23704/North-Yorkshire-population-information

additional 17,800 over 65's are forecast by 2035; this equates to a decrease in working-age residents of 9%, or 8,000 people.

Coupled with this is a trend of outward migration of those aged between 20 and 30, driven by available employment opportunities in desirable sectors, more affordable housing opportunities, constrained local transport networks and an absence of any higher education offer after age 18.

The high rate of inward migration, coupled with the existing age structure and outward migration of the younger demographic, is predicted to constrain the labour market, impacting the potential for sustainable economic development.

2.4.2. Education

Harrogate, as a district, has strong educational attainment with 68.4% achieving grades A-C at GCSE, compared to a national average of 56.6%. This level of academic performance, coupled with the proximity to northern areas of Leeds and the comparable performance of its schools, results in cross-boundary trips into Harrogate for education purposes with a number of schools providing dedicated school bus services from north Leeds. A number of the most high profile and accessible education facilities are located in Harrogate town itself, which is perceived to increase the pressure on the local highway network particularly in the AM peak. This includes Harrogate Grammar School, Rossett School, St John Fisher Catholic High School and Harrogate Ladies College.

The impact of school traffic is discussed further in **Section 2.6**.

2.4.3. Car Ownership

Car ownership data is shown in **Table 6** (in Appendix B); in the Harrogate district the percentage of people with access to at least one vehicle is higher than the national average, with around 84% of households having access to a car or van (national average of 74%). The North Yorkshire average is also relatively high, at around 82%, reflecting the rural nature and expansive geography of the county. For residents of the Harrogate urban area this number drops slightly to 79.5%, although this is still almost 10% higher than in nearby York.

There may be a number of reasons for this difference; for example, it may be attributable to greater availability of parking in Harrogate or stricter parking controls in York, to York's higher student population, who are less likely to have access to a car, or to measures to promote sustainable transport in York, resulting in less need for a private vehicle. Parking is discussed further in **Section 2.6**.

The higher level of car ownership is reflected by a higher proportion of residents using a private car or van as the primary mode for their travel to work, impacting negatively on the operation of the local network; this is discussed further in **Section 2.6**.

2.4.4. Employment

Between January and December 2016 Harrogate's unemployment rate was recorded as 2.7%, significantly lower than the Yorkshire and the Humber and national averages over the same time period (5.2% and 4.8%, respectively).

The structure of employment in the Harrogate district clearly differs to that seen elsewhere in the UK. Employment in manufacturing is only half of the average national level while, in contrast, employment in the distribution, hotels and restaurants sector makes up one third of the district's workforce, compared to only a quarter in the wider region.

The majority of Harrogate residents also work in the district; of those residing in the main urban areas of Harrogate and Knaresborough 75% work in the Harrogate local authority area, as shown in **Table 7** (in Appendix B). A relatively high proportion of Harrogate residents (13.2%) commute into the Leeds area for work, when compared with those travelling to other areas such as York (2.2%). This is discussed further in **Section 2.6**.

Socio Economic Context - Summary
An ageing population, coupled with outward migration of the younger demographic has the potential to constrain the labour market and impact the potential for sustainable economic development.
The mismatch of the resident population's prevalent employment in high value sectors, and the dominance of low value sectors in the local economy, may be resulting in cross-boundary commuting particularly between Harrogate and Leeds City Region.

2.5 WIDER ECONOMIC CONTEXT

2.5.1. Economic Position within York North Yorkshire & East Riding LEP Area

Harrogate is one of the LEP area's principal towns and service centres. The district, in particular the town of Harrogate itself, has a diverse local economy and is a popular place for businesses to locate. There are estimated to be 13,500 businesses across the district, providing approximately 95,000 local jobs (68,000 FTE), and the business start-up rate is higher than the UK average and the highest in the Leeds City Region (LCR).

World leading businesses, including Harrogate Spring Water, Covance Laboratories, Bettys & Taylors, Belzona and TSYS and Vocalink continue to invest and grow in Harrogate and use it as a base for their national and international trade links. The district's rural areas account for a quarter of the overall economy, adding to its diversity and providing critical supply chains for the area's retail and catering industries. However, this also results in the majority of employment related trips being made to the main urban areas, particularly Harrogate town centre, culminating in the congestion issues that are a prominent feature of the town. This is compounded by the presence of a number of sizeable and popular business and retail parks, including Cardale Park, St James Retail Park and Hookstone Chase.

Conference and exhibition tourism has been a prominent feature of Harrogate since the 1940s; it is a key driver of the area's economy and a major source of direct and indirect employment. In 2016 over 300,000 visitors were attracted by the Harrogate Convention Centre alone, making it worth £60million to the local economy.

Despite the seemingly vibrant economy a number of important issues exist within Harrogate, primarily relating to the prevalence of low value jobs in the town, and the resulting level of out-commuting by well-qualified residents to access higher value jobs in the surrounding areas, particularly the LCR.

The trend of resident "out-commuting" (living in Harrogate & Knaresborough but working out of the study area) is supported by the discrepancy in average resident and worker weekly earnings. There is also a significant discrepancy between worker earnings and the high cost of living in Harrogate. The area is affluent - HBC's District Economy Objective Assessment recognises that rising house prices, and a costly private rental market, often price those working in Harrogate out of the local housing market; this is considered likely to be linked to increased inward commuting trips from less affluent surrounding areas.

A constrained local transport network is one of the factors acknowledged as having an impact on Harrogate's economy; research published by the HBC Economic Development Team states that "*road congestion and overcrowded rail services do not support an effective daily commute in and out of the district or the distribution of goods and services*". Data from the LCR Business Survey (2015) placed '*Transport Connections within your Local Area'* as the number one disadvantage to "*the success of your business at its current location*" for Harrogate businesses. This is echoed by the HBC Economy Action Plan which states that *"In our engagement with local businesses transport related issues are repeatedly highlighted as a major concern and key priority for investment and improvement".*

The LCR Business Survey also suggested that, of those Harrogate businesses looking to relocate in the next five years, 73% would consider the LCR as a suitable location compared to 65% who would continue to consider Harrogate. From this it can be taken that 35% of businesses would not consider remaining in Harrogate, likely due to local issues of which transport was identified as the number one problem. The same research goes on to say that the council has the opportunity to actively support growth in a number of high value sectors including 'Professional and Financial Services', 'Life Sciences' and 'Wholesale and Logistics'; a

key element of making this growth a reality will be addressing the issues that currently constrain the local transport network, which is identified as a barrier to further growth and additional inward investment.

HBC's Objective Economic Review also identifies an issue around the available supply of larger, accessible commercial units in the area; while supply of smaller units (under 5,000sqft) is plentiful, the demand for larger units (5,000sqft and above) far outstrips supply. This is one of the key factors cited as restricting business expansion and inward investment; not only is existing congestion on the local network one of the factors contributing to this lack of accessibility but it is also possible that future development of this scale would not receive planning support unless significant mitigation on the local network could be provided to help accommodate the associated trips.

2.5.2. Relationship with Leeds City Region

One of the aims of the LCR is to bring together businesses, local authorities and key partners to work toward the common goal of creating economic prosperity; in order to achieve this the work of the LCR focuses on economic intelligence, business innovation and growth and skills and transport.

LCR is the UK's largest economy and population centre outside of London and employment has grown by 11,000 since 2011. As part of the Northern Powerhouse, the LCR is focused on transforming connectivity and unleashing the economic potential of the North.

The LCR is becoming increasingly recognised as a national centre for financial and business services. Leeds, at the economic heart of the LCR, is the UK's second largest financial and legal centre and is located approximately 15 miles south of Harrogate, directly accessible via the A61. The proximity of Harrogate and Leeds goes some way to explaining the significant number of cross-commuting trips between the two areas. Approximately 4,000 Harrogate residents travel into Leeds for work, with roughly the same number travelling in the opposite direction; this supports the evidence presented on Harrogate resident and worker wages, with Harrogate residents travelling to Leeds to access higher value jobs and vice versa.

The LCR is committed to supporting infrastructure projects that will ease the flow of goods and people within the city region, and which will improve the economy in the long term. This particularly applies to transport projects designed to improve connectivity across the region and connect principal cities across the north.

2.5.3. Visitor Economy

Tourism is a significant contributor to the Harrogate district economy. During 2015 the district attracted a total of 5.4 million visitors, 4.7m of which were day trips, generating in the region of £300m and supporting in excess of 8,000 jobs.

Across the district there are a wide variety of tourist attractions that draw both national and international visitors to the area. These include Nidderdale AONB, Nidd Gorge, Fountains Abbey World Heritage Site, RHS Harlow Carr Gardens, Mother Shipton's Cave, Lightwater Valley, Ripley Castle and Gardens and Betty's Tea Rooms.

In addition to these permanent attractions there is also a significant calendar of events that take place throughout the year, with one such event being the Great-Yorkshire Show. The Show takes place annually in July, on the designated showground located on the A661 Wetherby Road, and in 2016 attracted over 135,000 visitors. The Harrogate Flower Show, held twice a year in spring and autumn, is also housed on the showground and consistently attracts almost 100,000 visitors and 1,000 exhibitors.

In 2014, Harrogate was one of the towns on the Tour de France route, significantly increasing its international profile and injecting an estimated £102m into the Yorkshire economy. Following the success of the Tour, the Tour de Yorkshire has become one of the biggest events in the international cycling calendar. Launched in 2015 it has become an annual event with Stage 2 of the April 2017 race finishing in Harrogate; this is expected to have attracted over 200,000 visitors to the district bringing a local economy boost of between £5-7 million.

Other annual events that take place across the district include Ripon International Festival, Harrogate Comedy Festival and Harrogate Christmas Market.

The additional trips into the area, generated by these events (the Great Yorkshire Show is estimated to bring 45,000 car trips into the town over the three days), has an inevitable impact upon the local transport network with road closures and diversion routes introduced during the Great Yorkshire Show and Tour de Yorkshire.

The impact of event traffic is discussed further in **Section 2.6**.

The town also has an enduring reputation as a leading European destination for conferences and exhibitions, with much direct and indirect employment stemming from this.

Harrogate Convention Centre (previously Harrogate International Centre) is located in the town centre. The facility is one of the country's leading events venues and in 2016 brought in 300,000 visitors and contributed £60m to the local economy. The Harrogate District Visitor Accommodation Study 2015 highlights the importance of accommodation to the continued success of both the Harrogate Convention Centre and the events held throughout the year at the Yorkshire Showground; it states that "*The HIC* [Harrogate Convention Centre] *has reported lost conference trade in the past as a result of the deficiencies in accommodation (although this is also attributable to a number of other factors including the town's transport links with the rest of the UK)".*

The same research goes on to quote research from Welcome to Yorkshire which, in 2009, found that car was by far the most dominant form of visitor transportation to the region making up 84% of all trips compared to 8% for train and 4% for public bus or coach, placing additional strain on the already congested network.

The prevalence of car use for visitor trips may be due, in part, to the availability of parking in the area, including the town centre, discussed further in **Section 2.6**. Occupancy data for Harrogate town centre, provided by HBC, demonstrates that car parks were operating significantly below capacity suggesting that parking supply currently outstrips demand.

In addition, relatively poor train services that undermine the attractiveness of using rail may be contributing to high car mode share in Harrogate; a 2013 Outline Business Case for rail improvements, produced by WSP, demonstrated that the Leeds – Harrogate – York Rail Line suffers from comparatively poor journey times as well as having relatively low levels of service frequency, poor rolling stock quality, reliability, and capacity issues.

HBC's Economic Action Plan acknowledges the issue of transport as a weakness in terms of the local economy identifying the constraint of "*relatively poor and under pressure transport networks*" while a 2008 report, produced by Deloitte and titled 'The Economic Case for the Visitor Economy' states that "*the capacity and quality of transport infrastructure as well as service provision has a significant impact on the visitor economy"*.

2.5.4. Airport Connectivity

The airport in closest proximity to the study area is Leeds Bradford (LBA), located in Yeadon, approximately 12 miles south of Harrogate town centre via the A61.

Research undertaken as part of the LBA's Airport Masterplan 'Route to 2030' states that the majority of airport employees live in Leeds, Bradford, Harrogate and York and almost a quarter of passenger trips (23.4%) originate in North Yorkshire, primarily Harrogate District and York.

Although there are direct bus services to LBA from Harrogate, **Figure 6** (in Appendix A) shows that 90% of passengers from the Harrogate district arrived at the airport via private vehicle (car or taxi). This suggests that direct accessibility and time are key factors for passengers travelling to the airport and that increases in journey times, or worsening journey time reliability, as a result of local congestion are likely to negatively impact airport connectivity.

The Airport has significant growth aspirations and the UK Aviation Forecasts (January 2013) state that, by 2030, passenger numbers could increase by 114% to 7.1 million people per annum. Growth will be aimed at positioning of the Airport as an economic hub and international gateway.

To support these aspirations an Airport Surface Access Strategy (ASAS) has been prepared, setting out measures to 2030 that include improved public transport (both rail and bus) and delivery of a new highway link. The ASAS states that "*the approach to developing surface access improvements needs to be truly multi-modal, with a recognition of the origins, needs and expectations of all of those who will use the Airport in the future"*.

2.5.5. Freight

Freight and logistics is a critical element of the UK economy; although the North is only home to 24% of the UK population, it handles 56% of the country's rail freight tonnage, 35% of road freight tonnage and 35% of ports tonnage[2].

The North is an important source of freight movements, particularly to and from its ports on the Humber, Tees, Tyne, and Mersey (accessed via the A59); the geographical locations of these ports make good east-west connections of critical importance for the movement of goods.

North Yorkshire has a strong freight, logistics and distribution industry; it is the base for a number of haulage and distribution companies such as Reed Bordall at Boroughbridge, Alfred Hymas near Knaresborough, the Bowker Group in Selby & Melmerby and Preston's of Potto near Northallerton, which together operate over 500 vehicles.

Within the study area the A59 operates as a key strategic east-west route; NYCC traffic count sites for 2015 (**Figure 7** in Appendix A) demonstrate AADT HGV movements of between 748 and 1,586 on the A59 in the study area; a limited amount of data is available for 2016 and demonstrates that AADT HGV flows remain broadly the same, in terms of both vehicle numbers and proportion of total traffic, on the A59 Knaresborough Road but reduce by 261 vehicles (0.6%) at A59 Bilton Railway Bridge.

The count site with the highest proportion of HGV traffic on the local network in 2015 (9.1%) is located at the western extent of the study area – this is the main route to Skipton and beyond to Eastern Lancashire & Merseyside.

In 2015 the highest number of HGVs in the study area are experienced on the A59 east of Knaresborough (1,586 AADT), the A658 Harrogate Southern Bypass (1,524 AADT) and on the A661 Wetherby Road (1,376 AADT rising slightly to 1,394 in 2016); this route forms part of the signed route to Harrogate from the A1(M) and York. In addition there are various key retail and business locations that are accessible via this route, including Sainsbury's supermarket and Hookstone Chase, where Taylors of Harrogate is based. It is also the location of the Great Yorkshire Showground, which during show periods attracts a higher number of HGV trips.

As well as contributing to congestion through Harrogate and Knaresborough (almost 1,000 HGVs per day access the Empress Roundabout from the east in both 2015 and 2016), HGVs also impact upon the atmosphere and character of the town; AADT counts demonstrate that approximately 600 HGVs used the A61 just north of Parliament Street, the main road through the town centre of Harrogate, on a daily basis in both 2015 and 2016. Likewise, almost 750 HGVs travelled on the A59 through the centre of Knaresborough each day in 2015. Comparative flows for York show high numbers of HGVs utilising the outer ring road, but no more than 323 AADT on any of the radial routes, between the ring road and the city centre. This suggests that HGV traffic in the study area is comparatively high, within the urban areas, when considered against similar locations that carry a broadly similar level of overall traffic; it should be noted that HGV data for York has been taken from DfT counts as no locally collected data is available.

Looking at peak hour trips across the study area, 2015 data demonstrates that HGVs consistently make up a higher proportion of AM peak hour movements than in the corresponding average IP and PM peak hours in all but two count locations (A61 North and Pot Bank / Otley Road); this is shown in **Figure 8** in Appendix A**.** Data collected during 2016, available for a select number of sites, displays the same pattern of trips across the time periods.

Within the IP period the highest proportion of HGV trips, in any one hour, is recorded as being 10.00-11.00am in each count location (2015 and 2016).

With aspirations of economic growth across the north, and the identification of logistics as a key enabler to unlocking this, freight movements, particularly on the A59, will continue to increase as east-west connections become more of a focus. With no alternative route these vehicles will continue to route through the towns of

[2] Northern Freight and Logistics Report (TfN)

Harrogate and Knaresborough contributing to worsening congestion and negatively impacting the character of the area.

Wider Economic Context - Summary
The high proportion of the district economy that is concentrated in the urban areas is leading to associated commuter trips which are focussed on the towns as a destination.
Tourism is an important contributor to the local economy but results in direct and indirect low value jobs, driven by the dominance of the service industry. It also adds high numbers of trips to the network with 84% of visitors arriving by car.
The prevalence of low value jobs in Harrogate, and the significant discrepancy between worker earnings and the high cost of living, is resulting in increased cross-boundary commuting trips into the area.
A lack of supply of larger, accessible commercial units in the area is restricting business expansion and inward investment but is unlikely to be achievable without improvements to traffic conditions.
Existing HGV trips through the main towns add to local congestion issues and impact character, atmosphere and deterioration in road condition.
The local transport network is often identified as a barrier to further growth and additional inward investment; making growth a reality will require these issues being addressed.

2.6 OPERATION OF THE LOCAL TRANSPORT NETWORK

The Harrogate district has strong links to the surrounding North Yorkshire area and beyond. The town of Harrogate itself is effectively located on the crossroads of two longer distance routes (the A59 and A61) which, locally, carry a mix of through traffic, traffic with one local trip end and also entirely local internal traffic.

In addition to local traffic these routes, and the rest of the local highway network, are of considerable importance for the movement of recreational traffic; aside from the extensive tourist attractions within the Harrogate district itself, the area is also seen as one of the gateways to the Yorkshire Dales National Park, which attracted 3.62 million visitors in 2015.

The A59 passes along the northern edge of the main built up area of Harrogate, and continues through the centre of Knaresborough; the A661 links to the A59, via the A658, to form the signed “through route” from the A1(M). Existing constraints on the A59, including congestion leading to delays and unreliable journey times, limit its potential; TfN’s aim for a strong northern economy rely on improved east-west connectivity, something that will need to be significantly improved if the aspiration is to be realised.

The A61 in this area links Harrogate with Leeds, to the south and provides a connection to the A658, which links to Leeds Bradford Airport, affording opportunities for international travel, employment and trade.

There is significant parking provision in Harrogate, with 33 car parks across the district in addition to both free and Pay & Display on-street parking. NYCC is responsible for on-street parking and HBC for the majority of the off-street car parks; as in other North Yorkshire towns, a disc parking scheme allows for free on-street parking for up to 4 hours.

Sunday parking charges have recently been introduced in Harrogate town, aimed at ensuring the turnover of spaces for short-stay spaces for shoppers and visitors, with the potential for this to be extended to evening charging. It is also considered that this may positively impact existing traffic flow by encouraging those requiring long-stay parking to use off-street facilities rather than using the congested network to find an on-street space close to their final destination.

The availability of parking, and the comparably low cost, may be contributing to the high level of car use within the towns, particularly for short, internal trips which could potentially be shifted onto other, more sustainable, modes.

In terms of sustainable transport, discussed further in **Section 2.7**, the Leeds-Harrogate-York railway line serves the following stations in the study area; Harrogate, Knaresborough, Starbeck, Pannal and Hornbeam Park. Onward rail connections to the rest of the country are provided from Leeds and York, where many major UK cities including London and Edinburgh can be reached within 3 hours.

Bus provision consists of relatively high frequency local bus services connecting Harrogate and Knaresborough as well as provision of longer distance services which connect with Leeds, Wetherby and Ripon.

Public transport in the more rural areas, to the north of Harrogate, is restricted to the local bus network with some areas experiencing service levels that limit accessibility to essential services, and local service centres, by non-car modes.

High traffic flows, and the resulting congestion, also cause issues in relation to road safety with roads operating at and above capacity increasing the danger to more vulnerable road users (e.g. cyclists) which can discourage more sustainable travel options.

This section goes on to discuss existing trips on the network, within the study area, and considers the impact of existing traffic flows and travel patterns, on congestion and delay, based on data and analysis taken from existing sources including the 2015 Strategic Transport Model.

The Harrogate and Knaresborough model was constructed in 2015 and covers the extents of the district. To inform the model, Road Side Interviews (RSIs) were conducted across Harrogate in 2015 with 16 individual RSI sites in the Harrogate and Knaresborough urban areas. The surveys collected data relating to:

- Origin;
- Destination;
- Trip Purpose;
- Trip Frequency; and
- Car Occupancy.

This RSI data has been reviewed and analysed to inform this section of the report.

2.6.1. Traffic Flows

Figure 7, in Appendix A, shows Average Annual Daily Traffic (AADT), and the corresponding proportion of HGVs, on key routes in the study area for 2015; the data was collated from NYCC's traffic count database.

The A59 through Knaresborough carries around 12,000 two-way trips per day, which increases significantly when moving toward the Harrogate urban area. A number of the main routes, some passing close to Harrogate town centre, carry very high traffic volumes for the standard of the roads (generally single 7.3m carriageway) resulting in the capacity issues that are characteristic of the town.

The A61 to the north of the town centre has a two-way AADT of almost 19,000 while the A661 Wetherby Road, to the south east of the town, carries almost 23,000 vehicles per day. The highest flows were recorded on the A59 Skipton Road, to the east of the town centre, with an AADT of almost 29,000. NYCC count data is unavailable for the York Place approach to the Prince of Wales Roundabout which is one of the main routes into the town centre, a key location for congestion; DfT count data suggests an AADT of approximately 24,000 for this section of the network.

Looking to the urban area of York as a comparison (**Figure 9** in Appendix A); while the outer ring road carries high volumes of traffic (up to 43,000 vehicles in one location), the main radial routes into the city carry a broadly similar amount of traffic to those into Harrogate town centre. This is despite a significant difference in worker population; approximately 34,190 people work in Harrogate urban area, while more than double that figure (71,423) are employed within York urban area.

Hourly flows, taken from the 2015 Strategic Transport Model, for the AM and PM peak hours (08:00-09:00 and 16:45-17:45, respectively) are shown in **Figures 10 and 11** in Appendix A. A review has been undertaken of the Local Model Validation Report (LMVR), produced alongside the construction of the model; this

demonstrates that, across the district, the model provides a good fit between modelled and observed traffic flows and journey times. This provides confidence that the model accurately reflects real-life traffic conditions.

The modelled hourly flow plots demonstrate that the busiest sections of the network are:

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

The plots show that the three routes linking Harrogate to Knaresborough (A59, Forest Moor Rd and A658) carry around 3,600 vehicles in each peak hour; the model also suggests that Forest Moor Road is being used to avoid delay due to the level crossing at Starbeck and congestion on the A661 Wetherby Road.

Given the classification of the roads, there are also what would be considered high flows on the B6165 Ripley Road, from Knaresborough to the A61 north of Harrogate, and on the B6161 Oaker Road / Otley Road, along the western edge of Harrogate town. This suggests that through traffic, as well as traffic travelling to Knaresborough from the north, are using these peripheral routes to avoid congestion on the internal network.

Traffic data, collected in and around Harrogate and Knaresborough urban areas, suggests that congestion can continue to be experienced throughout the day, as well as at typical AM and PM peak times. Traffic data for the A661, near its junction with the A59 (Empress Roundabout), shows that traffic volumes do not vary greatly throughout the day (between 07:00 and 19:00). The average hourly weekday flow, recorded in June 2016, ranges from 1,375 to 1,475 vehicles traveling in both directions, with an average of 1,429 per hour. The data identifies an AM peak hour of 07:00-08:00, with 1,474 2-way vehicles, and a PM peak hour of 14:00 – 15:00 with 1,456 2-way vehicles. The A59 Knaresborough Road exhibits similar results, with the average weekday AM peak hour being 11:00-12:00, with 1,554 2-way vehicles, and the PM peak being 17:00-18:00, with 1,765 vehicles per hour.

2.6.2. Congestion and Delay

Delays at Junctions

Data extracted from the Strategic Transport Model has been analysed in order to identify the junctions experiencing the greatest levels of delay. Base year traffic flows are for 2015; it is not anticipated that flows for 2017 will be significantly different.

Junctions within the model are graded, in terms of delay, by 'Level of Service', (LoS) as set out in **Table 8** below, based on average delay across all arms. Junctions with a LoS of C to F, in the AM peak, are shown in **Figure 12** (in Appendix A). Junctions with a LoS of C to F, in the PM peak, are shown in **Figure 13** (in Appendix A).

Table 8 - Level of Service (LoS) Definitions

Level of Service	DELAY PER VEHICLE (SECS)		
	Priority	Roundabout	Signals
A	0-10	0-10	0-10
B	10-15	10-15	10-20
C	15-25	15-25	20-35
D	25-35	25-35	35-55
E	35-50	35-50	55-80
F	50+	50+	80+

The figures demonstrate that the junctions experiencing the most delay, in both peak hours, are the key intersections along the A59, A61, A658 and A661. Another route highlighted as experiencing significant delay

at junctions is the east-west route along Hookstone Chase and Hookstone Drive, which feed into the Woodlands junction.

Looking at delays of 35 seconds and above, the junctions that display a LoS of E or F in both time periods are as follows:

- A59 / B6161 (Oaker Bank / Otley Road);
- A59 / A61 (Skipton Road / Ripon Road);
- A61 Prince of Wales Roundabout;
- A61 / Pannal Bank;
- A59 Empress Roundabout;
- A661 Wetherby Road / Woodlands Dr / Hookstone Chase / Hookstone Dr;
- A59 Bond End;
- A59 York Road / B6164 Wetherby Road;
- A661 Wetherby Road / A661 Harrogate Road / A658;
- A658 / B6164 Wetherby Road; and
- A59 / A658 York Road Roundabout.

Journey Times

Using TrafficMaster data, journey times in the study area have been assessed to understand connectivity and constraints for drivers. The following key routes have been considered and are illustrated in **Figure 14** (in Appendix A):

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

Table 9, below, sets out a summary of the journey time comparison, assessed against the IP, for each of these routes. It shows, that over the length of the route, maximum delay is experienced on the A661 northbound in the AM peak when journey times are 44% longer than in the IP. The A59/A661 route also experiences significant delay in peak times with journey times being over 30% longer in the AM and PM peaks than in the corresponding IP.

Table 9 - TrafficMaster Journey Times - Routes Summary

	Avg Journey Time (sec)			Difference from IP (sec)		Difference from IP (%)	
	AM	IP	PM	AM	PM	AM	PM
A661 NB	1021	708	818	313	110	44%	16%
A661 SB	591	606	747	-15	141	-2%	23%
A61 NB	1181	1076	1312	105	236	10%	22%
A61 SB	1315	1183	1400	132	218	11%	18%
A59 EB	1772	1561	1704	211	143	14%	9%
A59 WB	1720	1506	1800	214	294	14%	20%
A59/A661 EB	1022	772	1011	250	291	32%	31%
A661/A59 WB	1144	871	1171	273	300	31%	35%

When looking at the routes in sections (**Tables 10 to 17** in Appendix B) it can be seen that delay is more significant at a localised level and, that for the same route and time period, journey times between the A658 roundabout and the Forest Lane junction are 138% of what is experienced in the IP.

Similarly, the Hookstone Road / Leadhall Lane to Follifoot Road / Pannal Bank section of the A61 southbound route experiences journey times 145% higher in the PM peak than in the IP. Looking at the A59 eastbound, the section between the A61 Ripon Road Roundabout and Kings Road / Woodfield Road junction experiences journey times that are 108% higher in the AM peak than in the IP.

Full analysis of each of the routes is included at **Appendix E**.

Average Speeds

The journey time comparison, discussed above, has also been used as an indicator of changes to average speeds on the key routes (A661, A61, A59 and A661/A59) throughout the day. A summary of each route, along its entire length, is shown in **Table 18**, below; section-by-section analysis is set out in **Tables 19 to 26** (in Appendix B)**.**

Table 18 - Average Speed Comparison on Key Routes

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

Across the entire length of the routes, the A661 northbound sees the greatest difference with average speeds in the AM peak of 26km/hr compared to 37km/hr in the Interpeak (a 31% reduction). Looking at the route section-by-section, the greatest reduction in speed is experienced between the A658 and Forest Lane (as is also the case with journey time variation) where average speeds reduce by almost 30km/hr (58%) in the AM peak to just over 20km/hr.

The A61 sees the greatest overall reduction in average speeds on the northbound route in the PM peak; this is heavily impacted by the two sections between the Prince of Wales Roundabout to Crescent Road and on to the A59 Skipton Road Roundabout. The first section, through Harrogate town centre itself, sees average speeds fall to just over 11km/hr in this time period. On the A61 southbound, as in the review of journey time variations, the greatest difference in average speeds is experienced between Hookstone Road / Leadhall Lane to Follifoot Road / Pannal Bank in the PM peak; on this section of the network, in this time period, average speeds fall by almost 30km/hr (59%) to just under 20km/hr.

The A59 experiences the greatest overall reduction in average speeds on the westbound route in the PM peak; as with the A61, this is impacted primarily by two sections of the network – Empress Roundabout to East Parade and on to Kings Road. Both sections of the route see average speeds fall to just over 12km/hr, a reduction of between 40-48% from IP speeds.

The A59/A661 route experiences similar proportional reductions in speed in both the AM and PM peaks (24-26%). The greatest proportional reduction is along the westbound route in the PM peak, although the largest difference in actual speed in on the eastbound route during the AM peak.

These variations in average speeds, on each of the key routes through the study area, demonstrate the issues with journey time reliability on Harrogate's highway network. Existing congestion, resulting in speeds that can be almost 60% lower in the peak hours than in the Interpeak, is impacting commuter trips, deliveries and other business related journeys, and will continue to remain a barrier to inward investment in the local area if left unaddressed.

Event Traffic

Trafficmaster analysis has been undertaken to assess the impact of large scale events, such as the Great Yorkshire Show, on the highway network in and around Harrogate. **Table 27,** overleaf sets out average journey times (June 2016) compared with average journey times during the Great Yorkshire Show (12th-14th July 2016).

Table 27 - Average Journey Time Comparison on Key Routes (Great Yorkshire Show)

Route	Direction	Average Journey Times (secs)					
		June 2016			Great Yorkshire Show (Time difference from average June data)		
		AM Peak 0800-0900	Interpeak 1000-1600	PM Peak 1645-1745	AM Peak 0800-0900	Interpeak 1000-1600	PM Peak 1645-1745
A59	Eastbound	1772	1561	1704	3518	1559	2145
					(+1746)	(-2)	(+441)
	Westbound	1720	1506	1800	2539	1528	1995
					(+819)	(+23)	(+195)
A61	Northbound	1181	1076	1312	1499	1000	1871
					(+318)	(-76)	(+559)
	Southbound	1315	1183	1400	2104	1179	1742
					(+789)	(-3)	(+342)
A661	South-eastbound	591	606	747	669	519	1362
					(+78)	(-87)	(+615)
	North-westbound	1021	708	818	906	570	570
					(-115)	(-138)	(-248)

It can be seen that these large scale events can have a significant impact upon journey times, adding up to around 30mins, and doubling journey times, in the AM peak in some locations.

It should be noted that there may be a reduction in journey times recorded on some routes, during the Great Yorkshire Show as local residents may decide not to travel at peak times due to anticipated congestion and increased journey times; they may also reroute in order to avoid the associated congestion.

School Traffic

As with event-related traffic the impact of school traffic has also been considered, as there is a perception that congestion and delay in the vicinity of Harrogate increases in school term times; a comparison of average journey times has been undertaken using Trafficmaster data. **Table 28,** overleaf, illustrates the difference between average journey times in June 2016 and a week in July 2016 (non-school term time) when there were no other large events taking place that may affect travel patterns.

Table 28 - Average Journey Time Comparison on Key Routes (School Traffic)

Route	Direction	Average Journey Times (secs)					
		June 2016			July 2016 (Non-Term Time) (Time difference from average June data)		
		AM Peak 0800-0900	Interpeak 1000-1600	PM Peak 1645-1745	AM Peak 0800-0900	Interpeak 1000-1600	PM Peak 1645-1745
A59	Eastbound	1772	1561	1704	1623	1702	2086
					(-149)	(+141)	(+382)
	Westbound	1720	1506	1800	1555	1645	1957
					(-165)	(+139)	(+157)
A61	Northbound	1181	1076	1312	993	1108	1357
					(-187)	(+32)	(+45)
	Southbound	1315	1183	1400	1245	1285	1605
					(-69)	(+102)	(+205)
A661	South eastbound	591	606	747	520	558	734
					(-71)	(-47)	(-12)
	North westbound	1021	708	818	589	698	782
					(-432)	(-10)	(-36)

The analysis of journey time data suggests that school-related traffic has some level of impact on the local highway network, specifically in the AM peak period when the 'school run' coincides with general commuting traffic. During school holidays, in the AM peak period, there is an improvement in journey times on most routes, although this varies across the network. The data shows that this impact is generally between a 1 and 3 minute reduction in average journey time, with the exception of the A661 north-westbound which experiences increased average journey times of 7 minutes. Reductions in PM peak journey times are less pronounced and are only experienced on the A661.

The observed trends in the PM peak are considered to be partially attributable to school finishing times being earlier than the peak period for general commuting traffic However, during school holidays, there is also an increase in visitor traffic to attractions in Harrogate, Knaresborough and the surrounding areas. Most of this additional traffic is observed on the network in the Inter Peak and PM peak periods and, as a consequence, journey times are seen to increase on the majority of routes.

The analysis set out above suggests that the impact of school related traffic, on the local highway network, is limited. It should also be noted that the impact of school related traffic is not consistent across the network, and is largely dependent upon the locations of educational institutions and visitor attractions.

2.6.3. Travel Patterns – Commuter Flows

The data set out in this section has demonstrated that there is an issue of congestion across Harrogate and Knaresborough, with the greatest delays experienced primarily in the AM and PM peak hours suggesting that they are related to commuting trips.

Table 29 (in Appendix B) sets out commuting patterns for residents of Harrogate district (those living within the local authority area), as recorded in the 2011 Census. The data shows that almost 18,500 residents travel outside of the district for work; this is an increase of 2,500 (16%) in the decade since analysis was undertaken

as part of LTP2, although the proportion of these residents travelling to a destination in Leeds or Bradford has decreased (from 69% to 53%) over the same time period.

Levels of outward commuting from Harrogate district to Leeds and Bradford has remained constant since LTP3 analysis undertaken in 2011, with 15% of Harrogate residents leaving the district to access employment in the LCR.

Table 30 (in Appendix B) shows the corresponding inbound commuter trips into Harrogate district, by workers who are residents of other local authority areas. Since the LTP2 work was undertaken commuter trips into Harrogate originating in Leeds or Bradford have increased by approximately 1,500 to total 7,504. Overall, there is a net loss of workers to the Leeds authority area from the Harrogate district, with around 2,500 more residents travelling from Harrogate to Leeds for employment than in the opposite direction.

These movements to and from Leeds and Bradford, in addition to the 4,000 two-way trips to and from York, are facilitated primarily by the A61 and the A59 and, as such, are subject to the delays and unreliable journey times that are a result of congestion on these links.

Looking specifically at the commuting patterns of residents of Harrogate urban area the data, as set out in **Table 31** (in Appendix B), shows that 59% both live and work in the urban area itself, resulting in purely internal trips. A further 4% travel the short distance to Knaresborough for work and 24% leave the Harrogate district completely to access employment; of those who do leave the district, the majority (13%) travel to Leeds, likely utilising the A61.

Looking at the same data for Knaresborough residents, as shown in **Table 32** (in Appendix B), while the majority work in Harrogate town (35%), a significant proportion (23%) also work within Knaresborough resulting in over 1,000 internal work related trips in the town. When also accounting for jobs in the wider Harrogate area (15%), only 28% (1,471) of Knaresborough residents leave the district for work, with half of these travelling to Leeds.

When considering Harrogate urban area's worker population (those who work in the town), as set out in **Table 33** (in Appendix B), their travel to work shows similar patterns and proportions of movements. More than half (52%) of those working in Harrogate also live in the town, a further 5% travel in to the urban area from Knaresborough and 17% travel from the remaining wider district. Mirroring the travel patterns of the resident population, the largest proportion of employment related trips for people who live outside the district are from the Leeds and Bradford areas (15%).

The travel patterns of Knaresborough's worker population also mirror that of its residents, as set out in **Table 34** (in Appendix B); 27% of workers live in Harrogate town, 24% in Knaresborough itself and 29% travel in from outside the district – primarily from Leeds and York (10% and 6%, respectively).

Table 35 (in Appendix B) shows that, conversely to the pattern in the wider district, there is a net flow of commuting into the Harrogate urban area with almost 4,000 more workers travelling into the town to access employment than in the opposite direction.

2.6.4. Traffic Flows – Vehicle Trips & Trip Destinations

Travel patterns across Harrogate and Knaresborough have been examined in order to allow identification of the broad patterns of trips within the study area. This has been done by cordoning the Strategic Transport Model and aggregating the zones to form 8 sectors; there are 6 external sectors, and a sector each to represent Harrogate and Knaresborough. The sectors are based around the main radial routes into Harrogate and Knaresborough and are shown diagrammatically in **Figure 15** (in Appendix A). Cordoning the model in this way removes any trips that do not pass through, begin or end in the study area and the aggregation of trips from zones to sectors allows identification of the broad patterns of trips.

Across the modelled area there are a total of 19,143 vehicle trips in the AM peak (0800-0900) and 21,487 in the PM peak (1645-1745); the nature of these movements are set out in **Tables 36 to 39**, below, with the sectors grouped into three areas; 'External', 'Harrogate' and 'Knaresborough'. Trips carried out wholly within the urban areas of Harrogate and Knaresborough are shaded orange, trips with one external trip end are shaded green and purely external trips are shaded red. More detailed information on origins and destinations is included in **Table 40 and 41** (in Appendix B).

Table 36 - Cordoned Model Trip Movements (2015 AM Peak)

	2015 AM (0800-0900)			
From / To	**External**	**Harrogate**	**Knaresborough**	**TOTAL**
External	1307	3760	917	5984
Harrogate	2623	7094	796	10514
Knaresborough	1308	961	376	2646
TOTAL	5238	11816	2089	19143

Table 37 - Cordoned Model Trip Proportions (2015 AM Peak)

	2015 AM (0800-0900)			
From / To	**External**	**Harrogate**	**Knaresborough**	**TOTAL**
External	7%	20%	4%	31%
Harrogate	14%	37%	4%	55%
Knaresborough	7%	5%	2%	14%
TOTAL	28%	62%	10%	100%

Table 38 - Cordoned Model Trip Movements (2015 PM Peak)

	2015 PM (1645 - 1745)			
From / To	**External**	**Harrogate**	**Knaresborough**	**TOTAL**
External	1443	3216	1588	6246
Harrogate	4240	7271	1083	12594
Knaresborough	1183	956	508	2646
TOTAL	6865	11443	3179	21487

Table 39 - Cordoned Model Trip Proportions (2015 PM Peak)

	2015 PM (1645 - 1745)			
From / To	**External**	**Harrogate**	**Knaresborough**	**TOTAL**
External	7%	15%	7%	29%
Harrogate	20%	34%	5%	59%
Knaresborough	6%	4%	2%	12%
TOTAL	33%	53%	14%	100%

The data above demonstrates that trips that either start or end in areas external to the urban areas of Harrogate and Knaresborough (highlighted in green) make up almost half of all trips (45% and 48% in the AM and PM peaks respectively). Similarly, trips that are purely internal (highlighted in orange) represent around half of all trips (48% and 45% in AM and PM peaks respectively). Aside from these local trips, the main movements into and out of Harrogate are in the direction of Bradford and Leeds (via the A61S/A658), Knaresborough, Ripon (via the A61N) and Wetherby and A1(M) (via the A661).

Trips originating externally and travelling in to the urban areas of Harrogate and Knaresborough account for 24% of all trips in the AM peak and 22% in the PM peak; trips originating in the towns and travelling externally are 21% of total trips in the AM peak and 26% in the PM peak.

External-to-External trips, i.e. trips with both origin and destination outside of the study area, are shown to be relatively low in both the AM and PM peak periods, accounting for 7% of all vehicle trips in both peaks. This suggests that through-traffic is not a significant contributor to the congestion issues experienced in Harrogate and Knaresborough.

Looking specifically at Harrogate urban area, trips entering in the AM peak are higher than those leaving, supporting the findings of the Journey to Work data; as would be expected, this trend is reversed in the PM peak. A breakdown of the origins and destinations of all Harrogate urban area trips is set out in **Table 42** (in Appendix B).

Greatest flow tidality occurs to / from the A61S/A658, Knaresborough and A61N while flows to/from the A661 are the most balanced relative to the volume of trips.

Modelled trip movements to and from Harrogate and Knaresborough urban areas are shown diagrammatically in **Figures 16 to 19** (in Appendix A).

External-to-External trip movements are shown in **Figures 20 and 21** (in Appendix A); for diagram clarity only the four highest trip movements are shown. Although these movements represent the highest numbers, in terms of External-to-External trips, they are considered unlikely to have a significant impact upon the highway network within Harrogate and Knaresborough as they do not require movement through the urban area. Only the north-south movement, between A61N and A61S/A658, will result in a proportion of trips being made through Harrogate itself, though examination of the traffic model shows that the majority of these trips utilise the B6161 along the west of the town.

2.6.5. Trip Purpose

Road Side Interviews (RSI's), undertaken in Harrogate and Knaresborough to inform the construction of the traffic model, cover a number of metrics including the reason for/purpose of travel. **Table 43 (**in Appendix B) sets out trip purpose by time period, as recorded for cars with an origin and/or destination in Harrogate urban area.

As would be expected, the largest proportion of trips in the AM and PM peak are commuting trips; the proportion of commuting trips in the PM peak is lower than in the AM, which is balanced by an increase in shopping, social / recreational and visiting trips. The highest proportion of Interpeak trips are shopping related.

Education accounts for a slightly higher proportion of trips in the AM peak than in the IP or PM peak – 6% compared to 4.4% and 5.2%, respectively.

Analysis of travel patterns, set out in the previous section, identified that 37% of trips in the AM and 34% of trips in PM both begin and end in Harrogate urban area. The trip purpose for these internal trips is set out in **Table 44** in Appendix B.

This shows lower proportions of trips associated with commuting or employer's business in all peak periods, when compared to trips with an origin or destination in Harrogate urban area, but still the highest proportion overall. The proportion of other trips (holiday, personal business, shopping, social, visiting and other) increase by 14%, in both AM and PM peaks, for trips that are internal to the Harrogate urban area. The proportion of internal trips for Education purposes also increases to 8%, 5.5% and 7.6%, respectively in the peak hours.

Caution should be used in drawing firm conclusions from RSI data, given the limitations on sample size, but this pattern suggests that trips with a purpose other than commuting and business may be a significant contributor to network issues in the study area during the AM and PM peak hours.

Despite this, internal commuting has been shown to be one of the main contributory factors to trips on the local highway network within the study area.

Commuting Trips

Table 45, below, sets out Journey to Work mode share data as collected during the 2011 Census (dataset WU03EW); this data in this table includes resident journeys to work, regardless of destination, and is not representative of purely internal trips within the urban areas which has been assessed separately. Mode share is discussed further below and, in relation to sustainable transport, in **Section 2.7**.

Table 45 - Journey to Work Mode Share (Census 2011 Dataset WU03EW)

	Journey to Work Trips by Mode (%)					
Location	**Car**	**Train**	**Bus**	**Walk**	**Cycle**	**Other**
England	59.5%	5.8%	8.5%	11.6%	3.4%	11.3%
North Yorkshire	67.3%	2.2%	3.6%	16.7%	2.7%	7.5%
Harrogate District	67.0%	2.7%	4.6%	16.0%	2.6%	7.0%
Harrogate (Urban Area)	59.7%	3.4%	6.2%	20.6%	3.1%	7.1%
Knaresborough (Urban Area)	60.2%	4.4%	8.5%	16.9%	1.7%	8.3%
York (Urban Area)	44.1%	2.7%	8.1%	24.1%	14.3%	6.7%

The data demonstrates that, of those people in work, 67% of Harrogate district residents travel to work by car (the average for England is 59.5%). This could be considered attributable to the rural nature of the district, however a similar pattern is evident for internal trips within Harrogate urban area itself.

As shown in **Figure 22** (in Appendix A), 56% of Harrogate residents who live and work within the urban area travel to work by car or motorcycle. These internal commuting trips are hosted entirely upon the local network, exacerbating issues of local congestion and resulting delay. The equivalent proportion for Knaresborough (**Figure 23** in Appendix A) is 33% which is offset by a significant proportion of trips being made on foot (61.7%)

Looking at the city of York as a comparison (**Figure 24** in Appendix A), mode share for journeys to work is relatively consistent with that in Harrogate, with the exception of private vehicle use and cycling. In York, cycling makes up 17% of all internal commuter trips undertaken entirely within the urban area; in Harrogate the equivalent figure is 6% which is considerably lower and in Knaresborough is 1.3%. This suggests that, in York, vehicle trips are being substituted by bicycle use which may demonstrate some potential for mode shift in Harrogate.

However, other factors should be noted and given due consideration when making this comparison; these include availability and cost of car parking within the urban area of York (typical costs for car parking in the centre of York are around £2.50 per hour compared with around £1.40 per hour in Harrogate town centre) and also the infrastructure and support available for cyclists.. Furthermore, the availability of Park and Ride options in York is likely to be affecting commuting patterns within the city which could also be reflected in the lower car mode share and higher bus mode share in York when compared with Harrogate.

Figures 25 and 26 (in Appendix A) demonstrate the potential for walking and cycling within the study area, for those accessing Harrogate town centre. This shows that the whole of the Harrogate urban area could access the town centre itself within 20 minutes for a cycle trip and within 40 minutes when walking; residents living toward the western extent of Knaresborough could also reach Harrogate town centre in 18-20 minutes if cycling.

For Knaresborough, **Figures 27 and 28** (in Appendix A) demonstrate that the entire urban area of the town could be accessed within 10 minutes for a cycle trip and 20 minutes for a walking trip. This suggests that there may be potential to substitute for short, internal trips that are currently being made by private vehicle if the correct conditions were achieved.

Trip Length

Distance travelled has been reviewed as part of the RSI survey data analysis; RSI surveys do not collect information on routing, and therefore all distances quoted are as the crow flies.

Average distance travelled by time period, for trips with an origin and/or destination in Harrogate urban area, are shown in **Table 46** (in Appendix B). Average distance travelled by time period, for internal trips within Harrogate urban area, are shown in **Table 47** (in Appendix B).

The analysis shows that, while maximum internal trip distances are between 7 and 10km, the average distance of internal trips within Harrogate urban area is very short - no more than 2.6km in any peak period. As

internal trips account for up to 37% of all vehicle trips in the AM and PM peak hours, this suggests that a significant proportion of traffic within the Harrogate urban area is travelling very short distances and contributing heavily to the levels of congestion on the local network.

As stated above the average distances are as the crow flies, and therefore the actual trip distance will be longer. Also, some trips within Harrogate may be multi-purpose and the origin and destination postcodes quoted are the beginning and end of a circuitous trip. However, even accounting for this, the analysis shows that internal car trips in Harrogate are travelling very short distances suggesting that there may be potential for mode shift to more sustainable modes.

2.6.6. Road Safety

In order to identify any locations at which traffic conditions may be resulting in a road safety issue, cluster sites across the study area have been plotted and are shown in **Figure 29** (in Appendix A), annotated with the cluster reference number. The methodology used to determine these sites takes every collision point, identifies up to 100 other collisions that have occurred within 50m and clusters them by severity.

The analysis clearly shows a number of cluster sites across Harrogate urban area and select sites on the main radial routes; there are no cluster sites identified in Knaresborough.

Figures 30 and 31 (in Appendix A) show the Harrogate urban area cluster sites in more detail, along with cluster reference numbers that have been used in the analysis.

Analysis of the cluster sites is set out in **Table 48** (in Appendix B) which is looking to identify collisions that may have been a result of traffic conditions on the local network.

The data demonstrates that, of 272 individual incidents identified at cluster sites, traffic conditions were recorded as a contributor on 32 occasions (11.7%); this suggests that traffic congestion is not a significant contributor to road safety issues on the local network.

Two fatal accidents have been recorded within the study area, over the last five years; both incidents involved pedestrians who were struck by vehicles however, traffic conditions are not recorded as a contributory factor in either incident.

However, a significant number of incidents at cluster sites, particularly on the internal road network, involved vehicles and non-motorised users (NMUs) – primarily cyclists. This may be resulting in suppressed demand for cycling as a result of the perception of safety; as such, there may be road safety benefits to more vulnerable road users if a proportion of the existing or potential future traffic were removed from the local network.

Although not an identified cluster site, incidents that have occurred in the vicinity of the Bond End junction in Knaresborough have been examined given the congestion issues currently experienced in that location. Ten incidents have been recorded in the last five year period; three of these had stationary traffic recorded as part of the incident record, although they were primarily a result of driver error, and resulted in three slight casualties (1 cyclist). Of the remaining incidents, two involved pedestrians and three involved cyclists; as with the incidents at the cluster sites, it does not appear that traffic conditions are a major contributor to road safety issues although the removal of traffic may have some benefit to NMUs.

Local Transport Network - Summary
There is a plentiful supply of parking which may be contributing to the high private vehicle mode share, particularly for short internal trips that could potentially be shifted onto more sustainable modes.
The main routes in the urban areas carry very high traffic volumes for the standard of the roads resulting in the capacity issues that are characteristic of the town.
Traffic flows suggest that through traffic, as well as traffic travelling to Knaresborough from the north, are using these peripheral routes to avoid congestion on the internal network.
Junctions experiencing the most delay are the key intersections along the A59, A61, A658 and A661 as well as junctions on the east-west route along Hookstone Chase and Hookstone Drive, which feed into the Woodlands junction.
Sections of the network experience journey times that are up to 145% higher in the peak hour than in the IP and average speeds that can fall by anything up to 30km/hr, resulting in issues of journey time reliability that impacts commuter trips, deliveries and other business related journeys, and will remain a barrier to inward investment in the local area if left unaddressed.
The number of residents travelling outside of the district to access employment is increasing; with movements facilitated primarily by the A61 and the A59 these trips are subject to the delays and unreliable journey times that are a result of congestion on these links.
Over 90% of trips in both the AM and PM peak periods either start or end in the Harrogate/Knaresborough urban area, and slightly less than half of all traffic, in both the AM and PM peak periods, is made up of trips that are wholly within the Harrogate and Knaresborough urban areas.
External-to-External trips are low in both the AM and PM peak periods, and are unlikely to use the central network, suggesting that through-traffic is not a significant contributor to the congestion issues experienced in Harrogate and Knaresborough.
In Harrogate, over half of internal commuting trips are made by private vehicle despite internal trips having an average length of no more than 2.6km in any peak period. These internal trips are hosted entirely upon the local network, exacerbating issues of local congestion and resulting delay – there may be some potential to switch a proportion of these trips onto more sustainable modes.

2.7 SUSTAINABLE TRANSPORT

As can be expected in an area as large and geographically diverse as Harrogate, the level of sustainable transport provision varies, particularly in relation to rail and bus services. Additionally, while walking and cycling in the more rural parts of the area may be attractive for recreational and leisure time, the geographical size of the district limits the level of trips that can be made into the urban area itself by these most sustainable of modes. This is reflected in the data presented in **Section 2.6** which demonstrates that the vast majority of trips into the towns of Harrogate and Knaresborough are made by private vehicle, contributing to the congestion and delays that are have become characteristic of the area.

The number of internal trips being made by private vehicle are high in Harrogate when compared to York; this suggests that there may be potential to shift a proportion of these trips to more sustainable modes with the support of appropriate interventions. With that said, it must be recognised that traffic issues do not only impact

trips in terms of journey times and delays; roads operating at or above capacity increase the danger to vulnerable road users (non-motorised user) which can then in turn discourage more sustainable travel choices.

This potential has not gone unrecognised and investment has been, and continues to be made, in Harrogate's sustainable transport offer. NYCC received funding through DfT's Local Sustainable Transport Fund (LSTF), and more recently through Access Fund, to target this mode shift by making sustainable modes more attractive.

The LSTF package included improvements to cycling infrastructure, including links to key areas such as the Great Yorkshire Showground and development of the 'Open Harrogate' website and app - providing residents and visitors with transport information including a journey planner.

2.7.1. Walking

Walking is well supported in Harrogate; the wider area has an extensive Public Right of Way (PRoW) network and there is also a town centre network of leisure routes, as shown in **Figure 32 and Figure 33** (in Appendix A), respectively. The character and natural beauty of the town, and the surrounding areas, make walking an attractive option when coupled with the level of access afforded by the combination of footpath and bridleway provision.

Walking Mode Share - Journey to Work

Table 49, below, shows that 16% of Harrogate district residents walk as their main mode of travel to work; this is higher than the national average, which stand at 11.6%.

Table 49 – Percentage of Adults that Usually Walk to Work (Resident Population)

Area	2011 Census
England	11.6%
North Yorkshire	16.7%
Harrogate (District)	16.0%
Harrogate urban area	20.6%
Knaresborough urban area	16.9%
York urban area	24.1%

When considering the study area in isolation, **Table 49** also sets out the percentage of Harrogate and Knaresborough urban area residents that walk to work, as defined using Census 2011 MSOAs. The walking mode share for Harrogate residents is 20.6% and for Knaresborough residents is 16.9%. To provide a relevant comparison, walking mode share for York urban area residents is also included in the table.

Census 2011 data has also been extracted for journeys to work that start and finish in the same urban area (internal commuting trips); these are shown in **Table 50**, below.

Table 50 – Walk to Work Mode Share for Internal Commuting Trips

Area	2011 Census
Harrogate urban area	32.5%
Knaresborough urban area	61.7%
York urban area	31.4%

This demonstrates that walking accounts for approximately one third of internal commuting trips in Harrogate, a similar level to that of York. In Knaresborough, around two-thirds of internal commuting trips are on foot which may be due to it being a geographically smaller area resulting in trips being made over a shorter distance.

2.7.2. Cycling

As a mode, cycling has the potential to substitute for short trips currently made by private vehicle, particularly those less than 5km.

LSTF investment in cycling in Harrogate looked to increase provision and promotion of viable cycle routes within Harrogate "*to tackle congestion, improve access to jobs, address the low model share of cycling and improve health".* Specifically this related to reducing congestion in problem areas, leading to reduced delays and improved journey times, improving air quality by reducing traffic emissions and supporting the local economy and facilitating economic development.

Cycling Routes and Infrastructure

There are a number of designated cycle routes in the main Harrogate and Knaresborough urban areas, shown in **Figure 34** (in Appendix A); some of the routes are off-highway while others are a mix of on and off-highway sections. Standard blue cycle route signage is prevalent throughout the town, to direct cycle users towards key destinations. The designated routes shown on the figure below are not displayed on the signage with the exception of NCN67. **Figure 35** (in Appendix A) shows cycle routes through the urban areas, as promoted by NYCC.

The majority of the existing network is made up of on-carriageway sections that are predominantly on quieter roads; no specific cycle provision is provided on these routes over and above signage. Cycle routes on the main highway corridors (A61, A59 and A661) are limited but there are various points where routes cross these corridors and Toucan crossings are provided in some locations. Oatlands Drive has on-carriageway provision in the form of advisory cycle lanes between Knaresborough Road and Hookstone Drive.

The off-carriageway, but still on-highway, provision is mainly limited to small sections of shared footway/cycleway around junctions and roundabouts and leading to Toucan crossings. There is one continuous section of off-carriageway provision along Jennyfield Drive, which consists of a shared footway/cycleway between Crowberry Drive and The Hydro leisure centre.

Off-highway provision within the town consists of shared foot and cycle paths that cross parkland, such as the route along the southern edge of the Stray and the Luchon Way. On the edge of the town, and further afield, off-highway cycle routes make use of former railway alignments such as the Nidderdale Greenway.

A number of the on-highway routes provide links across the town on roads that are lightly-trafficked and low speed. The main constraint of the quiet route network is that, in some cases, the routes are not the most direct way of reaching key destinations, such as the town centre, as the use of quiet roads has been prioritised.

As highlighted above, there is a lack of cycle routes on the main highway corridors in the area and, as such, limited cycle infrastructure. The busy nature of these roads, and the lack of cycle infrastructure, is likely to form a barrier to cycle use and may be a contributory factor to incidents involving cyclists on these routes, as set out in the road safety analysis at **Section 2.6**.

Cycle parking is available across the town centre and those nearest the main retail area have been observed as well used during the day. Sufficient cycle parking in close proximity to key destinations appears to be an issue and may be a barrier to encouraging higher rates of cycling.

A bike hire scheme 'Bike and Go' operates from Harrogate Railway Station; 10 bicycles are available for hire on a short term basis between 06:15 and 19:00 Monday to Saturday and 06:15 and 18:00 on Sundays. Users are charged an annual subscription fee and a daily charge for hiring the bicycles.

Cycle Mode Share – Journey to Work

Table 51 below, shows that 2.6% of Harrogate district residents cycle as their main mode of travel to work; this is slightly lower than, but generally comparable to, the regional and national averages which stand at 2.7% and 3.4% respectively.

Table 51 - Percentage of Adults that Usually Cycle to Work (Resident Population)

Area	2011 Census
England	3.4%
North Yorkshire	2.7%
Harrogate District	2.6%
Harrogate urban area	3.1%
Knaresborough urban area	1.7%
York urban area	14.3%

When considering the study area in isolation, **Table 51** also sets out the percentage of Harrogate and Knaresborough urban area residents that cycle to work, as defined using Census 2011 MSOAs. The cycling mode share for Harrogate residents is 2.6%, largely in line with local and national averages, and for Knaresborough residents is 1.7%.

When compared to cycle mode share in the York urban area (17.1%) the rates for Harrogate and Knaresborough are significantly lower. However, given the comparable statistics, it is the York mode share percentage which is the anomaly; this may potentially be attributable to factors such as the topography of the area, parking availability and charges and quality of cycling infrastructure.

Census 2011 data has also been extracted for journeys to work that start and finish in the same urban area (internal commuting trips); these are shown in **Table 52**, below.

Table 52 - Cycle to Work Mode Share for Internal Commuting Trips

Area	2011 Census
Harrogate urban area	4.5%
Knaresborough urban area	1.3%
York urban area	17.1%

This demonstrates that cycling accounts for 4.5% of internal commuting trips in Harrogate; in Knaresborough 1.3% of internal commuting trips are made by bicycle which is likely to be being offset by the high walking mode share

The comparison with York suggests that there may be an opportunity to increase the level of cycling for commuting trips within the study area, and particularly for internal trips within the urban areas themselves given that average trip lengths do not exceed 2.6km in any peak. However, the differences between the two

areas should be considered along with any provision or supporting measures in place in York but not in Harrogate and the wider area.

It is also possible that the heavily trafficked roads, and associated congestion, may be discouraging cycling and resulting in suppressed demand; this is reinforced to some extent by data collected at collision cluster sites which record high levels of cyclist casualties in these locations.

NYCC Cycle Counters

NYCC has a series of permanent cycle counters within the study area, which record the number of cycle trips on particular routes; the location of these sites is shown in **Figure 36** (in Appendix A).

Table 53 (in Appendix B) presents count data from 2010 or 2011 onwards, showing the average number of cycles recorded in both directions per day Monday to Friday and Monday to Sunday. Where gaps in the data were found, whereby a full year had not been recorded, data for this year has been excluded. The analysis has also excluded any data that appeared abnormally high or low compared to the average readings; this can be linked to one-off events, such as the Tour de France, which passed through Harrogate in July 2014.

The data shows that Oatlands Drive is by the far the busiest count site for bicycle traffic. There is a general trend across all sites with Monday to Friday average figures higher than the Monday to Sunday equivalent, which potentially suggests that a notable proportion of these trips are employment related. The data shows year-on-year increases at all the sites with the exception of Grimbald Road, which has seen a decrease in average daily use between 2011 and 2016.

A cycle counter has recently been installed on the Nidderdale Greenway; initial data for 2017 shows that an average of 165 cycles are pass the count site each day. The busiest periods fall in the inter-peak between 10:00-16:00, suggesting that the route is mainly used for leisure activities rather than travel to work or education.

2.7.3. Rail

Routes and Stations

The study area is served by the York-Harrogate-Leeds line, which connects with Leeds to the south and York to the east. Five stations on the line fall within the study area – Harrogate, Hornbeam Park, Knaresborough, Pannal and Starbeck; these are shown in **Figure 37** (in Appendix A). York and Leeds provide excellent onward connections to the rest of the UK while one direct service per day, operated by Virgin Trains East Coast, operates in each direction between Harrogate and London King's Cross.

Harrogate Railway Station is the principal station within the study area and is located on the eastern edge of the town centre. The station is well located for serving the town centre and the main attractions within Harrogate; Harrogate Bus Station is located immediately to the north of the railway station providing a convenient interchange facility. Parking for both bicycles and vehicles is available facilitating access to and from the station from the wider district area.

Hornbeam Park station, which opened in 1992, serves the residential areas to the south of Harrogate town centre along with Hornbeam Business Park, which includes the campus of Harrogate College. Knaresborough station is located to the north of the town centre and immediately to the east of the River Nidd, Pannal station is located within the village of the same name approximately 4km south of Harrogate and Starbeck station is located in the eastern suburbs of Harrogate, predominantly serving the residential area of the same name.

There are identified issues with the level crossing at Starbeck, due to the requirement for it to be closed when a train is in the station; NYCC surveys demonstrate that this can be up to 23 minutes in the hour (07:00-08:00) and between 15 and 19 minutes in the traditional AM and PM peak hours. While this exacerbates congestion and resulting delays there is no evidence that it is causing a safety issue; only one of the incidents analysed cited the level crossing closure with the resulting collision a result of driver error.

Rail Services

As shown in **Table 54** (in Appendix B) there is currently one service per hour to York and two services to Leeds from stations within the study area, increasing during peak times. Harrogate also has one additional service to Leeds as a result of the Virgin Trains East Coast service to London King's Cross which travel via Leeds.

Passengers can connect to a range of destinations at both York and Leeds. Long distance services are available for onward connections to destinations including Newcastle, Edinburgh, Birmingham, Manchester, Sheffield and London. Connections are also available to local stations across the region.

Within the study area, the stations are connected by a 2-3 per hour service in the peaks and 2 per hour service outside the peaks in each direction Monday to Saturday. This may result in the potential to substitute rail trips for private vehicle trips for short journeys within the study area.

Station Usage

Annual patronage figures are made available by the Office of Rail Regulation, allowing for comparisons of station usage; **Table 55** (in Appendix B) shows passenger numbers in terms of station entries and exits.

Harrogate, the main station in the study area, has seen growth of 13.6% since 2011/12. Two stations in the study area, Pannal and Hornbeam Park, have seen increases in use of 27% and 30.8% respectively; these increases are significantly higher than the county, regional and national average increase over the same period. High levels of patronage at these stations is likely a result of cross-boundary commuting to the LCR, as both stations are south of Harrogate on the route to Leeds. This also potentially aligns with journey time information, taken from TrafficMaster and discussed in **Section 2.6**, which shows significant delays in the AM and PM peaks in the vicinity of these stations.

Knaresborough and Starbeck have seen more modest increases of 7.3% and 7.2%, a slower rate of growth than seen at the other stations in the study area and for the regional and national trends.

Rail Mode Share – Journey to Work

Journey to work data, as set out in **Table 56,** below, shows that rail mode share for residents of the Harrogate urban area is 3.4%, which is slightly higher than the local and regional average but below the national average; in Knaresborough the level is considerably lower at 4.4%, the lowest of all the areas considered.

Table 56 - Journey to Work Mode Share for Rail

Area	2011 Census
England	5.8%
North Yorkshire	2.2%
Harrogate (District)	2.7%
Harrogate urban area	3.4%
Knaresborough urban area	4.4%
York urban area	2.7%

York urban area has a slightly lower rail mode share for residents than the Harrogate equivalent; however, within York there is only one railway station whilst there are three within the Harrogate urban area, along with Starbeck and Knaresborough, meaning that Harrogate residents have the choice of more stations in locations more convenient to their homes. The provision of only one railway station also means that residents of York cannot commute by rail for internal trips, whereas residents of Harrogate could realistically commute from home to work between stations within the same urban area.

2.7.4. Bus

Bus Network and Services

Figure 38 (in Appendix A) illustrates the bus network within the Harrogate urban area; provision consists of a mixture of local services that operate in loops within the Harrogate and Knaresborough area in addition to longer distance services connecting with destinations such as Leeds, Wetherby and Ripon.

Bus service frequencies are shown in **Table 57** (in Appendix B) services that provide a provision of 4 buses per hour Monday-Friday (off-peak) have been classified as high frequency and are highlighted in darker green.

Services with a frequency of 2 buses per hour Monday-Friday (off-peak) are referred to a medium frequency and are shaded in light green. All other services are designated as low frequency with some of these routes only operating once per day. Saturday frequencies are largely the same as the Monday-Friday frequencies; on Sundays many of the medium and low frequency services do not operate.

Bus Usage Data

Transdev, the parent company of the Harrogate Bus Company, has provided bus usage data in order to assist with review of the current situation in the study area.

Passenger usage data for a number of principal routes has been provided for five years, from 2012 to 2016. The relative changes in passenger usage compared to the 2012 base are presented below in **Table 58**.

Table 58 – Bus Passenger Usage Changes 2012–2016

Service	2012	2013	2014	2015	2016	% Change 2012–2016
1/1A/1B/1C	1.000	0.919	0.935	0.950	0.930	-7.0%
2A/2B	1.000	0.946	0.933	0.904	0.872	-12.8%
3	1.000	0.937	0.923	0.895	0.882	-11.8%
6	1.000	0.886	0.603	0.574	0.537	-46.3%
36 (Harrogate–Leeds)	1.000	0.986	0.975	0.952	0.986	-1.4%
36 (Harrogate–Ripon)	1.000	1.026	1.063	0.951	0.969	-3.1%
36 (Combined)	1.000	1.002	1.011	0.951	0.979	-2.1%
Total	**1.000**	**0.958**	**0.950**	**0.921**	**0.921**	**-7.9%**

The data shows that there has been an overall reduction in passenger usage of 7.9%, averaged across all services, between 2012 and 2016. Individual services have experienced varying levels of change but, without exception, passenger usage has gone down on all services.

The 6 service, a medium frequency route between Harrogate and Pannal Ash, has seen a reduction in passenger usage of almost 50% since 2012 while the 36 services, between Leeds-Harrogate-Ripon, has seen only a small reduction in usage over the same period. Discussions with Transdev indicate that they consider this to align with national trends, which show interurban services performing better than local services in terms of usage.

Between 2015 and 2016 the data shows that the 36 service began to reverse the decline in usage, which may be related to investment in vehicles on the route.

Bus Mode Share – Journey to Work

Journey to work data, as set out in **Tables 59 and 60** below, shows that bus mode share for residents of the Harrogate urban area is 6.2%, which is lower than the national and regional average but higher than the district and county average; in Knaresborough the level is slightly higher at 8.5%.

Table 59 - Journey to Work Mode Share for Bus

Area	2011 Census
England	8.5%
North Yorkshire	3.6%
Harrogate (District)	4.6%
Harrogate urban area	6.2%
Knaresborough urban area	8.5%
York urban area	8.1%

Table 60 - Bus to Work Mode Share for Internal Commuting Trips

Area	2011 Census
Harrogate urban area	5.9%
Knaresborough urban area	3.5%
York urban area	9.5%

When considering internal commuting trips that both start and end within the same urban area, bus mode share is 5.9% in Harrogate, compared to a share of 9.5% in the York urban area; this falls to 3.5% in Knaresborough although, again, this may be offset by the high levels of walking for internal trips and the shorter distances.

2.7.5. Behaviour Change Initiatives

There are currently a number of behaviour change initiatives in place that aim to encourage and facilitate sustainable travel in Harrogate.

As part of the LSTF project (2012-15) the 'Open Harrogate' application was developed with a view to making travel in and around Harrogate easy and enjoyable. The app is aimed at both residents and visitors and works to encourage walking, cycling and public transport use by providing journey planning tools and navigation to areas within the town. Interactive maps are accessed via the mobile app, logging and providing information on the distance the user has cycled or walked, as well as the calories burned and CO_2 produced.

NYCC has recently been awarded almost £1m, through DfT's Access Fund, for projects to encourage walking and cycling; the Open Harrogate app is set to be developed further using this funding to help improve its function and increase awareness and usage.

Sustainable Transport - Summary
The scope for walking, as an alternative for short internal trips currently being undertaken by private vehicle in the study area, may be limited. Mode share is already high, particularly in Knaresborough, suggesting that there may not be a great level of suppressed demand.
There may be an opportunity to increase the level of cycling for commuting trips within the study area, and particularly for internal trips within the urban areas themselves given that average trip lengths do not exceed 2.6km in any peak.
The heavily trafficked roads, and associated congestion, may be discouraging cycling and resulting in suppressed demand.
There may be potential to encourage the use of rail for internal journeys, and for journeys between Harrogate and Knaresborough, due to the provision of railway stations across the study area.
Access Fund investment may present an opportunity to encourage mode shift within the urban areas through education and additional investment in infrastructure.

2.8 ENVIRONMENTAL CONTEXT

Harrogate, as a district, covers a large and geographically diverse area; the environment is of exceptionally high quality – something that is reflected in the number and geographical scale of areas that are formally subject to environmental designations designed to protect the natural and built environment.

The study area is located at a point of transition between two National Character Areas (NCAs). The western extent of the study area, comprising Harrogate, falls within NCA 22 “Pennine Dales Fringe” while the eastern extent comprising Knaresborough falls within NCA 30 “Southern Magnesian Limestone”.

Land use in the surrounding areas is predominantly agricultural; other notable uses in the area include tourism and a complex network of Public Rights of Way (PRoWs), trails and cycle paths which run in various directions across both towns, linking communities and settlements.

2.8.1. Air Quality

Local authorities in the UK have statutory duties for managing air quality under Part IV of the Environment Act 1995. In line with this, Harrogate Borough Council is required to carry out regular reviews and assessments of air quality against standards and objectives prescribed in the Air Quality (England) Regulations 2000 and the Air Quality (England) (Amendment) Regulations 2002. If one or more of the air quality objectives for each of the seven pollutants specified in the regulations are exceeded an Air Quality Management Area (AQMA) must be declared.

The declaration of an AQMA means there is a requirement for additional monitoring of pollutants, as well as production of an action plan to seek reduction in pollutant levels. Action plans need to be written in conjunction with public and stakeholder consultation, within 12 months of declaring the site, and identify measures and actions key stakeholders can take to improve air quality at the specific location.

There are three designated AQMAs within the study area, at the following locations:

- Bond End, Knaresborough (introduced in 2010).
- York Place, Knaresborough (declared in October 2017).
- Woodlands Junction on Wetherby Road (A661), Harrogate (declared in October 2017).

The AQMAs were declared due to the level of Nitrogen Dioxide (one of the identified seven pollutants) exceeding the air quality objective of 40 micrograms per cubic metre.

Each of these sites are on the key routes through the study area, identified as carrying high traffic flows and suffering from existing congestion, characterised by variations in journey times and average speeds. Reductions in traffic from these locations would contribute to air quality objectives by reducing emissions.

In relation to air quality, Harrogate Borough Council has also developed an action plan to reduce carbon emissions by 40% by 2020 and 80% by 2050 in order to help combat the adverse issues relating to climate change.

2.8.2. Existing Conditions and Constraints

There is the potential to positively impact the environment in some areas, through the removal of traffic, while other locations may be adversely impacted, particularly those that are considered a sensitive area.

Environmental designations are set out below; the corresponding Environmental Sensitivities Plan is included as **Figure 39** (in Appendix A).

Environmental Designations

Within the study area there are:

- 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;
- Three **Local Nature Reserves (LNR)**: local authority areas that have statutory protection because they comprise wildlife or geological features of local scientific interest;
- 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
- 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.

Green Belt

Harrogate district incorporates parts of the West Yorkshire and York Green Belts; currently 14,510 hectares across Harrogate are designated Green Belt, equivalent to 11% of the total area of the district.

The West Yorkshire Green Belt was established in the 1960s and extends over the southern fringe of the district, including the narrow gap between the towns of 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

The extent of the Green Belt limits potential growth locations, resulting in likely future concentration of development within the existing urban areas themselves and placing further demand on the already constrained network.

The Stray

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 - Harrogate Stray Act 1985. The Act, and its byelaws, determine how it can be used while protecting the land and preserving it as an area of open space.

Paragraph 4 of the Harrogate Stray Act states that they Council shall not "*inclose any part of the Stray unless they have, in exchange for the land comprised in such enclosed part, dedicated as public open space other land within the borough not being (i) less in area than the inclosed part and being equally advantageous to the inhabitants of the borough as public open space; and (ii) as measured from its nearest point to any part of the Stray more than 100m therefrom*".

This requirement to replace land taken from the Stray is a significant constraint upon improvements being made to the existing highway network, limiting the potential to address congestion issues through localised minor improvement works.

2.8.3. Landscape and Townscape

The district's landscape is rich and varied and includes high heather moorland, intensively cultivated farmland, woodland areas and carefully tended gardens and historic parks. In addition the district contains Fountains Abbey and Studley Royal World Heritage Site, the Nidderdale AONB and the special historic interest site of Newby Hall near Ripon. The majority of the district lies within three national character areas: the Yorkshire Dales, Pennine Dale Fringe and Southern Magnesian Limestone.

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 high levels of traffic passing through the town centre on a daily basis, and the resulting congestion, are seen to be eroding this character and reducing its attractiveness to NMUs and to visitors.

Environmental Context - Summary
High traffic flows and existing congestion are likely contributing toward Air Quality issues on key routes. Removal of traffic from these locations would contribute to air quality objectives by reducing emissions.
Green Belt designation limits potential growth locations, resulting in likely future concentration of development within the existing urban areas themselves and placing further demand on the already constrained network.
The Stray is a significant constraint upon localised minor improvement works on the existing highway network, due to the requirement to replace land taken.

2.9 COMMITTED DEVELOPMENT

2.9.1. Transport Schemes and Initiatives

There are a number of transport schemes and initiatives of note within the study area, which are either programmed or are currently being investigated and option tested.

Highway Schemes

NYCC has recently had a business case approved, by the York, North Yorkshire, East Riding (YNYER) LEP, for improvement works at Junction 47 of the A1(M) where it meets the A59, east of Knaresborough. The existing junction is subject to queuing, particularly on the slip roads, which can reach back to the mainline carriageway in the peak hours. The upgrade, which will include localised widening and signalisation of the junction, is programmed to be completed in 2018, however, it is understood that the improvements will be combined with developer funded works to provide capacity up to 2027 (based on forecast traffic growth); a longer term solution is being investigated that would allow for growth to the end of the Local Plan period.

Although not within the immediate study area, work is currently being undertaken to investigate potential realignment of the A59 at Kex Gill, to the west of Harrogate. The stretch of road, which has the potential to serve as a key east-west corridor, is vulnerable to landslips, which leads to closures and subsequent diversion routes that can often result in traffic re-routing via Harrogate. The planned improvements at Kex Gill will contribute to the aspiration of improved east-west connectivity in the North, and will result in a more resilient and reliable trans-Pennine route. However, failure to address the issues currently experienced on the A59, in and around Harrogate and Knaresborough, will continue to limit the routes potential.

Junction Improvements

NYCC is making numerous improvements to junctions across the study area, in an attempt to alleviate congestion issues at specific locations.

Planned improvement locations include:

- Bond End, Knaresborough (part of the Manse Farm development);
- Chain Lane, Knaresborough (part of the Manse Farm development);
- Gracious Street, Knaresborough (part of the Manse Farm development);
- A61 / Kings Road / Crescent Road, Harrogate (Harrogate Convention Centre);
- Oaker Bank / Pennypot Lane, Harrogate;
- Otley Road / Pot Bank, Harrogate; and
- A61 Leeds Road / Burn Bridge Lane, Harrogate (Local Safety Scheme).

While these schemes are designed to improve junction operation at a local level, it is considered that the benefits are likely to be short term and that a more strategic and long term solution is required as noted in various policy and strategy documents.

Access Fund

In January 2017 NYCC was awarded £1m in funding, through DfT's Access Fund, for its project 'Open Yorkshire'. The aim of the project is to support the implementation of targeted sustainable travel behaviour change strategies to help promote economic growth and reduce congestion, recognising that existing levels of congestion are a barrier to this growth.

One of only 25 schemes across the country to be funded (37 were unsuccessful) Open Yorkshire directly targets Harrogate's urban centre, alongside Scarborough and Skipton, and is based around four core elements:

- Travel behaviour and training;
- Sustainable travel promotion and marketing;
- Sustainable access to public transport and Wheels 2 Work; and

- Cycle infrastructure.

As part of the 'Travel Behaviour and Training' element, key employment sites within Harrogate will be provided with dedicated travel planning support.

Public Transport Improvements

Rail

From December 2017 an additional two services per hour will operate directly to Leeds, on the York – Harrogate – Leeds line, doubling the number of existing services (Monday to Saturday). Two trains per hour will operate a fast service from Harrogate, calling only at Horsforth and Leeds with a total journey time of 28 minutes; the remaining services will call at each of the stations on the line, including local Harrogate and Knaresborough stations, with a total journey time of 37 minutes.

By 2019 it is planned that there will be 7 direct services per day operating between Harrogate and London Kings Cross (the current number of services is 2 per day); these services will call only at Harrogate and not at the remaining local stations within the study area.

Bus

Significant improvements are planned for Harrogate's bus services with the Harrogate Bus Company unveiling a five year vision for public transport in the town, including the introduction of low emissions technology across their fleet.

Also set to be introduced are:

- Smoother integration with other bus and rail services;
- Stronger relationships with local authorities, key employers, schools, retailers, hotels and visitor attractions to encourage more people to switch mode; and
- Advanced ticketing systems including contactless payment, on-board Wi-Fi and next stop announcements.

The improvements are to be funded as part of a £2.25m investment by the operator's parent company Transdev, following a successful bid for Government funding.

Urban Realm Improvements

A regeneration project is planned for the Station Parade area, incorporating the railway and bus stations; the scheme will be funded through the YNYER LEP with monies received as part of the Local Growth Deal.

Identified as a priority regeneration area, the aim of the scheme is to improve the passenger experience and to open up potential housing and employment opportunities, while improving the perception of the town.

At present, high traffic flows, congestion and slow moving traffic in this area are seen to be eroding the town's appeal; the removal of traffic from the centre of Harrogate would likely benefit this scheme.

2.9.2. Development Sites

There are currently 4,500 dwellings and 56,000sqm of employment space with existing planning permission across the Harrogate district.

The larger housing sites (200+ dwellings), with current permissions, are shown **Figure 40** (in Appendix A) and employment sites over 4,000sqm GFA are shown in **Figure 41** (in Appendix A).

Manse Farm

Manse Farm, an urban extension to the east of Knaresborough and located on the A59, has planning permission for the provision of:

- 600 dwellings;
- 2.5ha employment land;
- 2,800sqm retail;
- Primary school; and

- Rail halt.

The site will be accessed via two roundabout junctions from the A59.

Flaxby Green Park

An outline planning application for land adjacent to the proposed Flaxby site (discussed further in Chapter 3), for development of a business park was approved by HBC in June 2016. Flaxby Green Park is promoted as having the potential to contribute to Harrogate's economic diversification targets over the 13ha site. It is also proposed that a new rail halt will be part of the development, which would provide more sustainable access to the site.

Committed Development - Summary
Improvements are being investigated to Junction 47 of the A1(M) and also to the A59 west of Harrogate (Kex Gill). With both schemes likely to be taken forward the A59 through Harrogate will remain a pinch point on an otherwise improved east-west link.
Enhancement of local public transport, and investment in cycling and walking through Access Fund, may provide a catalyst for increasing the number of short internal journeys made using these modes.
Removal of traffic would complement urban realm improvements in Harrogate town centre.
Committed development sites are generally located within the main study area, adjacent to the local highway, on key routes identified as already being subject to the highest levels of traffic flows. As this development comes forward the associated trips will place additional pressure on the already congested network.

3 UNDERSTANDING THE FUTURE SITUATION

3.1 INTRODUCTION

DfT's Transport Analysis Guidance (WebTAG) states that an understanding should be developed of the future transport situation, taking into account:

- Future land-uses and policies;
- Future changes to the transport system; and
- Future travel demands and levels of service.

This chapter looks at how Harrogate and the surrounding area is expected to grow, highlighting locations of significant development and the potential impact this would have on a Do Nothing scenario transport network (i.e. where no transport interventions are implemented).

3.2 POPULATION, HOUSING AND EMPLOYMENT GROWTH

3.2.1. Population Growth

At the time of the 2011 Census Harrogate district had a resident population of approximately 158,000 with the urban areas of Harrogate and Knaresborough accounting for over half (56%) of this total.

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 new houses and 20-25ha of new employment land by the end of the Local Plan period in 2035. The majority of this development is to be located within the urban areas. If this growth follows current patterns of distribution, which is considered likely, this will result in significantly more residents in the urban areas of Harrogate and Knaresborough by 2035. This additional population will increase demands on infrastructure in the region, in particular the transport infrastructure as the resident population travel to work, education, to access services and facilities and for leisure purposes.

In terms of population demographics, the draft Local Plan states that over the plan period (to 2035) there will be a notable increase in the older population and that the total number of people aged 65 or over is expected to increase by 56%. While this is unlikely to impact significantly upon trips in the AM and PM peaks, which are primarily commuting related, evidence suggests that Harrogate and Knaresborough also have issues of congestion throughout the day, as discussed in **Section 2.6**.

RSI data, collected as part of the 2015 Strategic Transport Model construction, as set out in **Chapter 2**, suggests that IP traffic is primarily internal non-work related trips, being made by private vehicle, with the highest proportion being shopping related; an increase in older residents is likely to increase the number of trips for these purposes in the IP.

3.2.2. Housing and Employment Growth

The YNYER Strategic Economic Plan sets out a key ambition for doubling housebuilding across the LEP area, meaning that at least 5,000 new homes will be built each year up to 2021 and beyond; Harrogate is identified as one of the growth towns in the A1/A19 corridor and, as such, would be a focus for new development in the region. The LCR Strategic Economic Plan also sets out priorities to deliver growth across the City Region, through an increase in housebuilding to deliver homes as well as supporting economic growth and employment opportunities.

The draft HBC Local Plan[3], published for consultation in November 2016, sets out provision for approximately 11,700 new homes and 25 hectares of employment land across the district by 2035 (from a 2014 baseline). This is based on an assessed need for 557 dwellings per annum and the Council's Employment Land Review, which forecast 7,930 additional jobs across all sectors, over the same period.

[3] Harrogate District Draft Local Plan, Harrogate Borough Council (2016)

The Strategic Housing and Economic Land Availability Assessment[4] (SHELAA), carried out in 2016, states that approximately 5,500 dwellings and 7.8 hectares of employment land is expected to be delivered in Harrogate itself. **Figure 42** (in Appendix A) illustrates the locations identified for housing development in the Harrogate and Knaresborough area; locations identified for employment related development are shown in **Figure 43** (in Appendix A).

Analysis of the current operation of the transport network, set out in **Chapter 2**, has demonstrated a series of key routes and junctions that are already under considerable strain resulting in congestion and delay across the network. It is recognised that new development will be required to mitigate any impacts it will have. However, the planned growth, set out above, together with wider strategic growth (set out below) will likely increase demand and could exacerbate existing issues; this is reflected by the identification of the need for improved infrastructure, set out in numerous strategies, as being necessary for facilitating this growth.

3.2.3. Strategic Growth Sites

New Settlement Options

HBC's Draft Local Plan proposes the majority of new housing and employment growth in the main settlements, as set out above, in line with ensuring development is provided in the most sustainable locations.

However, it is acknowledged that there is insufficient available and suitable sites, within these areas, to meet development needs. As such, proposals are put forward for a development of a new residential settlement, which will help to meet growth needs within the Local Plan period and beyond; two options are currently being considered for this:

- Land at Flaxby; and
- Land at Hammerton (Green Hammerton / Kirk Hammerton / Cattal).

The Flaxby site, shown in **Figure 44** (in Appendix A), is located adjacent to the A59 and A1(M) and is currently a golf course; the Draft Local Plan proposes that this would be developed to provide a yield of 3,244 dwellings over 196ha.

The Hammerton site, shown in **Figure 45** (in Appendix A), surrounds the village of Green Hammerton and is also located on the A59, 6km west of Junction 47 of the A1(M) approximately half way between Harrogate and York. The Draft Local Plan sets out that the site could accommodate around 2,800 dwellings together with community uses and local employment opportunities.

HBC has already undertaken a significant amount of work regarding infrastructure provision. This has indicated that development of a new settlement at either of the proposed locations would have an impact on Junction 47 of the A1(M).

Wider Strategic Growth

In addition to growth within the Harrogate district itself consideration has also been given to strategic growth in neighbouring authorities, particularly those that contribute significantly to trips on the highway network within the study area.

Figure 46 (in Appendix A) summarises housing and employment growth, as set out in Local Plans, for the neighbouring authorities of Craven, York, Leeds and Bradford. Planned growth across these areas, excluding Harrogate, includes in excess of 136,000 new houses and over 700ha of employment space.

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.

[4] Strategic Housing and Economic Land Availability Assessment, Harrogate Borough Council (2016)

The major sites set out in the draft Local Plan include the following; 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, to date, 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, congestion at junctions in 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 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 designed 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 to 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:

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

Population, Housing and Employment Growth - Summary
The level of development proposed across Harrogate, both employment and housing, will place significant additional demand on an already constrained local network; as such mitigation will be required (primarily by developers). The impact of this growth on the network may deter the further inward investment and diversification of the economy that is considered critical to ensuring the economic resilience of the district.
With the trend for cross-boundary commuting both from and to Harrogate, particularly from the LCR and to a lesser extent York, allocations across the wider area will have a direct impact on Harrogate's network in the peak hours, over and above the impact from Harrogate-based development.
If current patterns continue, with Harrogate workers being priced out of the housing market and Harrogate residents travelling to the LCR to access high value employment, this growth in both housing and employment across the wider area are likely to seriously exacerbate the existing issues on the network, particularly the A61 and A661.
Although growth to 2035, as set out in the emerging Local Plan, will be addressed by associated mitigation this is intended to ensure that traffic conditions do not worsen from their current state and is not intended to improve significantly upon current conditions.

3.3 KEY GROWTH FACTORS

3.3.1. High Value Sectors

'A Strong Local Economy' is HBC's number one corporate priority; this encompasses an economy that is resilient, diverse and expanding, that offers a vibrant tourism experience, excellent travel, transport connectivity and world class conferencing facilities.

The district's economy is anticipated to continue to grow, with economic forecasts suggesting that this increase in GVA will be 8.8% from 2016 to 2021. The largest contributor to the growth in GVA will be delivered

by wholesale, finance, professional services and media activities; accommodation, food services, public services, finance, insurance and wholesale sectors will provide the most FTE jobs in the district.

Business growth across the Harrogate district, particularly of high value sectors, is a key objective for HBC, and will be essential to ensure an economy that is resilient. The local economy is currently skewed in favour of low value sectors, which leaves it vulnerable. This trend is only set to increase, with Harrogate Borough Council's five year forecasts[5] (to 2021) predicting significant growth in the 'Accommodation and Food Services' and 'Residential Care and Social Work' sectors (total additional 708 FTE jobs), as shown in **Figure 47** (in Appendix A). When considered against **Figure 48** (in Appendix A) it can be seen that the sectors with the most significant forecast growth are also those at the lower end when it comes to earning potential; this growth, if left unmanaged, will further skew the local economy in terms of lower value employment.

There is a concern that this overdependence on low value sectors leaves the local economy vulnerable during times of national and global downturn; at the peak of the last recession (2007 – 2009) Harrogate's economy contracted by 5.8% compared to the 4.5% average experienced across the UK.

HBC's Economic Growth Strategy highlights the need for a good supply of quality employment space, in appropriate locations to encourage business growth and inward investment. Based on current trends it is extremely likely that the vast majority of business and employment growth will be focussed within Harrogate itself, which will add to the already significant number of commuter trips within the town.

In 2015 Harrogate district's economy was worth £3.85billion Gross Value Added (GVA) to the regional economy, growing to £3.9bn in 2016. Forecasts show that the district's economy is likely to grow by almost 9% between 2016 and 2021; although this may seem positive it should be noted that, to 2025, this forecasted growth is at a slower rate than that of the wider LCR, Yorkshire and Humber and the UK. In a Do Nothing scenario it is forecast that the district's GVA will grow to £5.8bn by 2026; however, if action is taken, in line with Harrogate Borough Council's Economic Growth Strategy, there is the potential for GVA to grow to £10.22bn over the same timeframe[6].

The need for improvements to the transport network in the Harrogate area is identified throughout local policy documents, in particular traffic congestion in Harrogate and Knaresborough which is considered an economic constraint. There is also a need for good connections to key locations, such as Leeds Bradford Airport, that are seen as imperative to ensuring that the district is highly accessible.

3.3.2. Visitor Economy

The visitor economy generates significant economic and social activity for both visitors and residents of Harrogate; this helps to build distinctive communities and enhance the image of an area, which in turn attracts commercial investment from other sectors. In line with this, HBC's Economic Plan sets out an aim to further grow the already extensive tourism sector in Harrogate.

The Harrogate Town Centre Master Plan is based on the aspiration that "*By 2025 Harrogate Town Centre will be a leading UK destination for shopping, leisure and business tourism…This distinctiveness will be characterised by an exceptional town centre environment".* At present, the level of traffic and congestion experienced in the town centre is a threat to this aspiration; the removal of traffic would help to achieve the quality public realm that is a distinct part of this vision.

There is also an aspiration to grow the events industry, with Priority 2d of HBC's Economy Action Plan relating specifically to '*Encouraging development of new events'*; this acknowledges the potential for events to draw significant numbers of new visitors to an area resulting in positive economic and community impacts.

As the number of events increase, and the permanent attractions continue to draw more visitors year-on-year, there is an obvious threat to the operation of an already constrained and congested highway network both for residents and workers in Harrogate and for those travelling to the events themselves. Addressing the existing transport issues will be a critical element of any strategy that looks to grow what is already a substantial

[5] HBC Economic Development Team Objective Economic Assessment (October 2016)
[6] HBC Economic Development Team Objective Economic Assessment (October 2016)

calendar of events. There are a number of venues for large scale conferencing in Harrogate such as the Yorkshire Event Centre, Pavilions of Harrogate and The Harrogate Convention Centre, amongst others. The Harrogate Convention Centre in particular is one of the key elements for growth targeted through HBC's Economy Action Plan; as well as looking to continue to secure repeat business there is also an aspiration to grow and secure new business in order to maximise resilience.

Local traffic conditions are also a threat to this growth; the Chartered Institute of Personnel and Development's annual conference, which had been held in Harrogate for 60 years attracting more than 5,000 visitors and the second largest event in the annual calendar, pulled out of the town in 2008 due to negative feedback from delegates, with poor transport links cited as one of the key issues. If the aspiration to grow the conference and events market further is to be achieved, the issue of congestion and connectivity must be addressed.

In addition, a proposal for a new parkway rail station connecting to Leeds Bradford Airport forms part of a £270million strategy of improvements to transport in Leeds. The proposal is in its early stages but it is envisaged that a new parkway station could be built on the existing Leeds to Harrogate line, connecting to the wider rail network. Provision of a new rail station has the potential to create jobs and employment opportunities as well as increasing rail connectivity between Harrogate and Leeds, with benefits to both economies.

3.3.3. Freight

With aspirations of economic growth across the north, and the identification of logistics as a key enabler to unlocking this, freight movements on the A59 may increase as east-west connections become increasingly viable through the improvements to the A59. This will be facilitated through the upgrade of Junction 47 of the A1(M) and further proposed improvements to the A59 west of Harrogate, including realignment at Kex Gill; there is a risk that the benefits to the wider economy of these improvements will not be fully realised if congestion on the A59 through Harrogate and Knaresborough is not addressed. Additionally, the potential for additional freight movements through the Harrogate area as a result of the east-west connectivity improvements may adversely impact on air quality and erosion of character in the town.

The A59 acts as a key freight route across North Yorkshire linking to the areas east and west of Harrogate. The increased use of this route for freight movements will need to be considered.

Key Growth Factors - Summary
Business growth, particularly of high value sectors, is a key objective for HBC and will be key to ensuring an economy that is resilient. Continued overdependence on low value sectors leaves the local economy vulnerable during times of national and global downturns.
Investment in infrastructure has to potential to see the district's GVA grow by an additional £4bn, against a Do Nothing scenario, in the period to 2026.
It is acknowledged that, in order to maximise Harrogate's economic potential, there is a need to plan, not only for the expansion of existing businesses, but also to attract the inward investment required to generate new, high value jobs. Transport connectivity is key to achieving this.
HBC has a number of aspirations for growth, including making Harrogate town centre a leading UK destination. Existing traffic and congestion is a threat to this aspiration; the removal of traffic would help to achieve the quality public realm that is a distinct part of this vision.
Growth of the events industry is also a key target; it will be necessary to address issues of congestion and queuing if the attractiveness of the area for investment is to be maximised, and the targeted growth achieved in a sustainable manner.

For the tourist industry to grow in the Harrogate district it is recognised that the right infrastructure needs to be in place; the district's infrastructure (including transport) helps to reinforce and shape the distinctiveness of the area and make it an easy place to visit. If the number of visitors to the area increases, without complementary infrastructure improvements designed to facilitate this growth, this will place additional stress on the transport network. As a result the impacts of congestion already being experienced in Harrogate and Knaresborough will be exacerbated, negatively impacting the attractiveness of the area.

With aspirations of economic growth across the north, and the identification of logistics as a key enabler to unlocking this, freight movements on the A59 may increase as east-west connections become more viable, particularly for freight movements. This will be facilitated through the upgrade of Junction 47 of the A1(M) and the improvements to the A59 west of Harrogate, including realignment at Kex Gill; there is a risk that the benefits of these improvements will not be fully realised if congestion on the A59 through Harrogate and Knaresborough is not addressed.

3.4 CHANGES TO THE TRANSPORT SYSTEM

This section sets out proposed longer term changes to the transport system, as set out in relevant policy and strategy documents, which have the potential to influence connectivity and accessibility in and around Harrogate.

3.4.1. Transport for the North (TfN) – Initial Major Roads Report

Emerging TfN work, around the Central Trans-Pennine Strategic Development Corridor, will consider interventions aimed at improving wider east-west connectivity and it is anticipated that improvements across the A59 corridor will be reviewed.

TfN's '*Initial Major Roads Report Strategic Transport Plan Evidence Base'*, published in June 2017, references the A59 and identifies resilience issues as a result of urban congestion on sections including Harrogate. A Harrogate Relief Road is identified as a potential complementary, but currently unfunded, scheme than would complement 'Connectivity Priorities' "*providing both enhanced connectivity and resilience across the Pennines and to international connectivity assets*".

3.4.2. North Yorkshire County Council (NYCC) – Local Transport Plan Four (LTP4)

NYCC's LTP4 sets out a range of strategic transport priorities for the period 2016 to 2045. These priorities include the need to improve east-west connectivity, in line with TfN and LEP aspirations, and enhancing the reliability of the transport network.

The plan stresses that improvements to east-west routes are necessary to boost the economic performance of North Yorkshire as a whole, by improving access to employment, unlocking housing growth and improving accessibility from other areas of the country via the strategic transport network (e.g. A1(M) and East Coast Mainline). This wider connectivity and accessibility is also key to attracting the inward investment that is critical for the economic diversification and growth of high value sectors that is seen as essential to building a resilient economy in Harrogate.

LTP4 highlights the A59 as one of two primary east-west corridor which currently experiences poor journey times and reliability and, as such, identifies the route for improvements during the LTP4 period.

Further review of the potential for a Harrogate Relief Road is cited as one of three main priorities for the A59. The two remaining schemes are improvements between Harrogate and Skipton, including the realignment at Kex Gill and at Junction 47 of the A1(M), both discussed in **Section 2.9**. The business case for realignment of the A59 at Kex Gill is currently being developed to seek funding for its implementation and the Junction 47 of the A1(M) scheme has been approved for funding by the YNYER LEP. These improvements will improve connectivity to the east and to the west of Harrogate and the study area; longer term there is an aspiration to further improve Cross-Pennine connectivity between Craven and East Lancashire. Without intervention the

A59 through Harrogate is likely to remain a pinch point that will inhibit overall east-west trans-Pennine connectivity.

Improvements are also proposed for rail, with an upgrade of the York – Harrogate – Leeds Railway line being a key priority including double tracking of the single track sections. At present there are no definitive timescales as to when this will be carried out.

Improving access to the rail network is also a priority set out as part of LTP4, with an aim of ensuring that at least 85% of the County's population are within 40 minutes journey time (by road or rail) of an HS2 gateway at York, Leeds or Darlington. The existing congestion, delays and unreliable journey times currently experienced through Harrogate, which will be exacerbated in future years by new development and associated traffic growth, may threaten the ability to achieve this aim as the A61 (to Leeds) and the A59 (to York) become more congested leading to longer journey times.

3.4.3. A Strategic Transport Prospectus for North Yorkshire (2015)

In 2015, NYCC published a Transport Prospectus for North Yorkshire, outlining how NYCC intended to work with the government, TfN and the Northern City Regions to ensure that improved transport connections allow North Yorkshire to both contribute to and share in the economic benefits of the Northern Powerhouse. The prospectus sets out a number of initiatives for improvements to the county's transport network by 2030.

As with LTP4 one of the key priorities in that Strategic Transport Prospectus is for improved east-west connectivity; to 2030 this will be targeted by improving journey time reliability and will incorporate the three main schemes, also set out in LTP4, A1(M) Junction 47, further investigation into the potential for a Harrogate Relief Road and an A59 'Overtaking Opportunities Package', between Harrogate and Skipton and including Kex Gill.

A separate study is currently being undertaken, by WSP and Regeneris, aimed at assessing the economic benefits of proposed transport schemes (as set out in NYCC's Strategic Transport Prospectus) on east-west connectivity within North Yorkshire. The review includes the following schemes:

- A59 Overtaking Opportunities;
- Harrogate Relief Road;
- A1(M) Junction 47 Improvements; and
- Harrogate-Leeds Rail Improvements.

The study compares journey times and reliability in 2030, based on Do Minimum and Do Nothing scenarios, and identifies reductions in congestion and journey times as a result of implementation of the schemes. The findings of the study are being taken forward for further consideration.

Whilst all these improvements seek to improve east-west connectivity, and improvements to A1(M) Junction 47 now coming forward and realignment at Kex Gill being developed, their impact will be limited if there continues to be a risk of congestion and poor journey time reliability on the A59 through Harrogate which is central to the A59 route.

Changes to the Transport System - Summary
Emerging work by TfN, in relation to the Strategic Development Corridors, highlights congestion in Harrogate as a contributor to resilience issues on the A59 and identifies a Harrogate Relief Road as a potential complementary scheme.
Without improvement the A59 through the study area will remain a constraint on the entire route, limiting the benefits of improvements in other locations and its potential as a strategic east-west corridor.
Ongoing congestion, and the resulting delays and unreliability of routes, has the potential to threaten NYCC's aim for 85% of the County's population to be within 40 minutes journey time of an HS2 gateway.

3.5 FUTURE OPERATION OF THE LOCAL TRANSPORT NETWORK

In order to allow for consideration of the future operation of the highway network within the study area, a future year model, forecasting traffic conditions in 2035 (the end of the Local Plan period), has been constructed from the 2015 base model.

Demand forecasting is based on traffic models that were used to assess emerging Local Plan sites; the models contain committed development and background growth. The highway network remains relatively unchanged, save from the addition of site access points.

3.5.1. Future Year Traffic Flows

Hourly flows, taken from the 2035 Strategic Transport Model, for the AM and PM peak hours are shown in **Figures 49 and 50** (in Appendix A). Additionally **Figures 51 and 52** (in Appendix A) illustrates the changes in flows between the 2015 and 2035 modelled flows on the transport network; changes in flow, for key routes, are also set out in **Table 58** (in Appendix B).

The model shows forecast increases in traffic flows to the west of Harrogate, around Cardale Park, and at the junctions of B6161 Oaker Bank / Pennypot Lane and A59 / B6161 Otley Road, suggesting increasing trips bypassing the centre of Harrogate.

Within Harrogate town centre greatest forecast increases are on the A59, which aligns with the location of committed developments; there is also a forecast increase in flows on the east-west route north of Harrogate from Killinghall to Boroughbridge via Farnham. Forecast higher flows on this route are likely due to traffic avoiding increasing congestion in the towns.

3.5.2. Future Year Congestion and Delay

Delays at Junctions

'Level of Service' (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).

As with the base model, plots identifying junctions with a Level of Service from C to F have been produced and are presented in **Figures 51 and 52** (in Appendix A). **Table 59,** below sets out the change in LoS between the base and future years at all key junctions.

Table 59 - Delay at Junctions - LoS Comparison (2015 / 2035)

Junction	AM Base	PM Base	AM 2035	PM 2035
A59 / A658 York Road Roundabout	F	F	F	F
A59 / A61 (Skipton Road / Ripon Road);	E	F	F	F
A661 Wetherby Road / A661 Harrogate Road / A658	E	F	F	F
A658 / B6164 Wetherby Road	E	F	F	F
A59 Bond End	E	F	F	F
A661 / Castle Street, Spofforth	F	E	F	F
A59 Empress Roundabout	F	E	F	F
A59 / B6161 (Oaker Bank / Otley Road);	F	F	E	F
A61 Prince of Wales Roundabout	E	F	E	F
A661 Wetherby Road / Woodlands Dr / Hookstone Chase / Hookstone Dr	E	E	E	E
A59 York Road / B6164 Wetherby Road	E	E	E	E
Hookstone Road / Oatlands Drive	D	E	E	E
A59 / A6055 Boroughbridge Road	D	E	E	E
Starbeck Level Crossing	D	D	E	E
A61 / A658	D	D	E	E

B6161 Oaker Bank / Penny Pot Lane	D	D	E	E
A61 / Pannal Bank	E	E	D	E
A61 / South Drive	D	E	D	E
Boroughbridge	C	D	D	E
A61 Ripon Road / A61 Kings Road / A61 Parliament Street / Crescent Road	E	D	E	D
B6161 Pot Bank / B6162 Otley Road	E	D	D	D

The forecasting demonstrates that, in 2035, the majority of key junctions on the network are likely to operate with a LoS of F. Across the wider study area all junctions are forecast to operate with a LoS of D to F in the future year.

Journey Times

Modelled journey times, in the base and future year, were compared in order to further understand future traffic conditions; as they are based on modelled flows, these are presented for comparative purposes only.

Journey times were compared on the following routes, which are shown in **Figure 53 (**in Appendix A);

- A59 Chain Bar Lane, west of Harrogate to J47 A1(M), east of Knaresborough;
- A61 Killinghall to Walton Head Rd, south of Harrogate;
- A661 Empress Roundabout to Plompton Rd, south of A661 / A658 junction; and
- A59/A661: A658/A61 Kestrel roundabout to A59/A661 New Park roundabout.

The modelled journey time comparisons are shown in **Table 60 and Table 61,** below.

Table 60 - Modelled Journey Time Comparison – 2015 to 2035 (AM Peak)

Route	Dist (km)	AM 2015 (min)	AM 2035 (min)	JT Diff
A59 EB	15.4	32.6	35.3	8.2%
A59 WB	15.4	30.8	33.1	7.5%
A61 SB	10.6	20.8	24.9	19.7%
A61 NB	10.3	18.7	19.9	6.1%
A661 SB	3.9	9.8	10.9	11.1%
A661 NB	3.9	15.1	15.1	0.1%
A661/A59 SB	8.7	20.8	22.0	5.6%
A661/A59 NB	8.7	25.0	25.3	1.4%

Table 61 - Modelled Journey Time Comparison – 2015 to 2035 (PM Peak)

Route	Dist (km)	PM 2015 (min)	PM 2035 (min)	JT Diff
A59 EB	15.4	34.1	37.5	10.2%
A59 WB	15.4	33.5	34.1	1.7%
A61 SB	10.6	21.2	23.0	8.5%
A61 NB	10.3	20.9	22.4	7.1%
A661 SB	3.9	9.9	10.6	6.7%
A661 NB	3.9	12.8	16.2	26.8%
A661/A59 SB	8.7	22.5	22.3	-0.8%
A661/A59 NB	8.7	25.4	27.2	7.1%

The largest percentage increase is seen northbound on the A661 Wetherby Road in the PM peak; this is also the slowest route, with average speeds of between 14 and 18 km/hr, across all modelled years. No change in journey time is observed for northbound trips on the A661 Wetherby Road in the AM peak; this is considered to be due to the route having already reached saturation in the base year with vehicles 'rat running' to avoid it. This may also be the case westbound on the A59 and northbound on the A661/A59, in the PM peak, where little change in journey time is observed.

Across the remaining modelled routes increases in journey times are generally between 5-11%; however, it should be noted that these increases are on top of an already congested local network.

The exception to this is southbound on the A61 in the AM peak, north to south across Harrogate, where journey times increase by almost 20% between the base and future years. This is also the highest increase in terms of actual time (4 minutes) demonstrating that, despite rerouting of trips elsewhere, the internal Harrogate network will continue to attract growing levels of traffic which is likely to have resulted in capacity issues at one or more of the routes' signalised junctions; this increase in traffic reflects planned growth of the town, in terms of housing and employment, and the existing trend of high levels of car use for internal trips in the AM and PM peaks.

3.5.3. Future Year Travel Patterns

Cordoned trip movements have been taken from the Strategic Transport Model, for the 2035 future scenario, to provide a comparison with the base year data discussed in **Section 2.6**. These are set out in **Tables 62 to 65** overleaf, with the sectors simplified into three areas; 'External', 'Harrogate' and 'Knaresborough'. Trips undertaken within the urban areas are shaded orange, trips with one external trip end are shaded green and purely external trips are shaded in red. More detailed origin and destination data is presented in **Tables 66 and 67** (in Appendix B).

In the future year 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.

Table 62 - Modelled Trip Movements (2035 AM Peak)

	2035 AM (0800-0900)			
From / To	**External**	**Harrogate**	**Knaresborough**	**TOTAL**
External	1187	4377	1178	**6742**
Harrogate	3621	9538	1130	**14288**
Knaresborough	1865	1352	585	**3801**
TOTAL	**6672**	**15266**	**2893**	**24831**

Table 63 - Modelled Trip Proportions (2035 AM Peak)

	2035 AM (0800-0900)			
From / To	**External**	**Harrogate**	**Knaresborough**	**TOTAL**
External	5%	18%	4%	**27%**
Harrogate	15%	38%	5%	**58%**
Knaresborough	8%	5%	2%	**15%**
TOTAL	**28%**	**61%**	**11%**	**100%**

Table 64 - Modelled Trip Movements (2035 PM Peak)

	2035 PM (1645 - 1745)			
From / To	**External**	**Harrogate**	**Knaresborough**	**TOTAL**
External	1240	4171	2169	**7580**
Harrogate	5014	9673	1443	**16130**
Knaresborough	1463	1261	725	**3450**
TOTAL	**7718**	**15106**	**4337**	**27160**

Table 65 - Modelled Trip Proportions (2035 PM Peak)

	2035 PM (1645 - 1745)			
From / To	**External**	**Harrogate**	**Knaresborough**	**TOTAL**
External	5%	15%	8%	**28%**
Harrogate	18%	36%	5%	**59%**
Knaresborough	5%	5%	3%	**13%**
TOTAL	**28%**	**56%**	**16%**	**100%**

As with the 2015 data, approximately half of all trips are purely internal (highlighted in orange in the tables above); 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 the tables above); 45% and 46% in the AM and PM peaks respectively.

Aside from these internal trips, the main movements into and out of Harrogate are forecast to continue to be in the direction of Bradford and Leeds (via the A61S/A658) and Knaresborough. Trips originating externally and travelling in to the urban areas of Harrogate and Knaresborough are forecast to account for 23% of all trips in both future year peak periods; trips originating in the towns and travelling externally are also 23% of total trips in both peaks. This is largely in line with the trends observed in the base year.

The proportion of External-to-External trips, i.e. trips with both origin and destination outside of the study area, has decreased slightly to approximately 5% of all vehicle trips in both peaks, which is also a reduction in actual

trip numbers. 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.

As in the base year, there are forecast to be more trips entering Harrogate urban area than leaving it in the AM peak, with the reverse trend in the PM peak. The opposite is true for Knaresborough, with a net loss of trips in the AM peak. Modelled forecast trip movements are shown diagrammatically in **Figures 54 to 59** (in Appendix A).

Future Operation of the Local Highway Network - Summary
There is a forecast increase of almost 5,700 trips in each peak hour, across the study area, by 2035.
The greatest increases in flows are on the A59, which aligns with the location of development identified in the Draft Local Plan.
Predominant movements continue to be trips with either an origin or destination (or both) in the Harrogate and Knaresborough urban areas.
Aside from purely internal trips, the main movements into and out of Harrogate continue to be in the direction of Bradford and Leeds and Knaresborough. Trips originating externally and travelling in to the urban areas align largely with the trends observed in the base year.
The proportion of external-to-external trips decrease slightly by 2035, which is also a reduction in actual trip numbers. This may suggest that vehicles are avoiding the study area altogether due to increasing congestion on the network. As a result, through-traffic is less of a contributor to the congestion issues experienced in Harrogate and Knaresborough than it was in the base year.
Forecast traffic flows suggest increasing trips using routes on the periphery of the urban areas and bypassing the centre of Harrogate.
By 2035 the majority of key junctions on the network are now operating with a LoS of F (delays over 50 seconds).
Increases in journey times are generally between 6-11% although this increases to 26% on one section of the network; it should be noted that these increases are on top of an already congested local network.
Despite rerouting of trips, the internal Harrogate network will continue to attract growing levels of traffic; this reflects planned growth of the town, in terms of housing and employment, and the existing trend of high levels of car use for internal trips in the AM and PM peaks.

4 ESTABLISHING THE NEED FOR INTERVENTION

4.1 INTRODUCTION

This chapter summarises the body of evidence gathered and analysed and outlines how the evidence, as well as the wider strategic context, supports the need for intervention.

4.2 SUMMARY OF EVIDENCE AND INFORMATION

The summary has been presented in tabular format, according to the main sections of the report. Key evidence, deemed to be of particular relevance or importance to the study, has been included.

Establishing the Need for Intervention	
Strategies and Policies	**National Policy** ¡ At national level there are key transport policies that have reaffirmed the focus on schemes that enhance connectivity and contribute to economic growth across the North. **Sub-National Policy** ¡ **The Northern Powerhouse: One Agenda, One Economy, One North** identifies east-west road connections as a constraint to the pan-Northern economy. The highways vision plan includes a range of aims and aspirations that are of direct relevance to the HRR study such as 'Improving east-west road links to ensure better and more reliable journey times'. ¡ The **Northern Transport Strategy** sets out its ambition for rebalancing and growth of the economy, stating that transport provision is critical to delivering this through a faster and less congested network. · A key objective is for improved east-west major road links, to ensure better and more reliable journey times which will improve access to local employment as well as markets for goods and services. · Improved strategic local connectivity is highlighted as a key issue and the solution requiring a network that not only joins the major urban centres, but also provides local links to the strategic network. · The Northern Powerhouse Independent Economic Review identifies a need for transport investment to support productivity growth and employment growth to create more and better paid jobs. Transport can also help to promote higher productivity, by improving the attractiveness of an area for investment. ¡ The **Strategic Economic Plan and Local Growth Deal 3** identifies 'a well-connected economy' as a strategic economic priority with the importance of strengthening east-west connectivity across the region recognised; the A59 between the A1(M), Harrogate and Skipton is identified as a priority route. · Easing congestion in Harrogate is identified as a key priority and a Harrogate Relief Road is mentioned as a key project to facilitate this and improve east west connectivity. ¡ **A Strategic Transport Prospectus for North Yorkshire** recognises action is needed urgently to address the variable journey times on the A59. A relief road around Harrogate is cited as a potential scheme to address this, in addition to helping to address urban congestion in the town. The document supports the aspiration for high speed connected cities and describes a High Level Conditional Output Statement which includes transformational change on the York – Harrogate – Leeds line, improving east-west connectivity.

	Local Policy ¡ NYCC's **LTP4** sets out objectives of 'economic growth', 'access to services' and 'healthier travel' recognising a need to ensure the transport network and services are as reliable and efficient as possible, both to support the existing economy and to help facilitate future economic growth. · Congestion is identified as a constraint on this economic growth, due to resulting long and unreliable journey times, with Harrogate identified as a priority town for tackling congestion. · LTP4 identifies the A59 between the A1(M), Skipton and onwards to East Lancashire as a priority for improvement and includes a proposal for a Harrogate Relief Road to help ease congestion through the town centre, to improve journey time reliability along this corridor and to remove the adverse impacts associated with congestion. ¡ **HBC's Draft Local Plan** sets out a Vision that includes continued economic growth resulting in a more diverse and resilient economy; new housing and employment development that has enabled and encouraged significant investment in the district's transport system and supported bus services; greater opportunities to make journeys safely on foot or by bike; and investment in the road network that has achieved reduced levels of congestion and improved air quality. ¡ **Harrogate Borough Council Corporate Plan** sets out priorities for a resilient, diverse and expanding economy with excellent travel and transport connectivity. ¡ **Harrogate and Knaresborough Cycling Implementation Plan** looks to support the continued economic development of Harrogate through a reduction in traffic congestion and the promotion and implementation of sustainable travel options. ¡ **Harrogate Borough Council Economy Action Plan** focuses on achieving four key goals which are 'a resilient, diverse and expanding economy', 'a vibrant tourism experience', 'excellent travel, transport and broadband connectivity' and 'a major conference and exhibition centre'. · Priority 3b of the Action Plan relates to promoting improvements to transport networks and states that: - Traffic congestion in Harrogate and Knaresborough has been identified as an economic constraint by the YNYER LEP; and - New infrastructure is essential to improve the quality and provision for those able to travel by more sustainable means. ¡ **HBC's Economic Growth Strategy** (2016) sets out the need for change in relation to the weaknesses in the district's economy which are restricting business expansion, limiting opportunities for inward investment and preventing sustainable economic growth. A number of strategic themes have been determined including 'Creating the right conditions for growth; digital, telecoms, transport and quality of place', emphasising the importance of good transport links to a strong and stable economy.
Previous Studies and Initiatives	¡ **LTP2 and LTP3** identified the trend of cross boundary commuting between Harrogate and Leeds to access employment opportunities. ". It also identified that congestion is not limited to the traditional peak periods but that peak hour results in traffic queues throughout the day, both on the town centre roads and on major radials leading into the town. · LTP3 identifies congestion as having contributed significantly to air quality issues at A661 Woodlands junction and A59 Bond End, with the highest concentration of CO2 emissions in North Yorkshire occurring in Harrogate.

	¡ As part of a **Major Schemes Review** (NYCC, 2008) 'Harrogate Northern Relief Road' was considered on the basis that daily trips through the town were resulting in traffic congestion, delays and accidents in Harrogate and Knaresborough. · The review identified that the removal of traffic from the town would improve journey times, reliability of public transport in and make the town safer for NMUs. · The economy was also anticipated to benefit with the removal of through traffic having the potential to increase Harrogate's attractiveness in terms of tourism and as a local service centre. · The Value for Money assessment showed 'High' value for money for the scheme, returning a BCR of 3.4. This BCR ranked the scheme fifth, of fifteen, in terms of value for money of the major schemes reviewed. ¡ Stakeholder and public consultation, undertaken to inform the **Harrogate and Knaresborough Integrated Transport Strategy**, set out a proposed package of measures to address transport issues in the area. The proposals for a Northern Relief Road received a significant amount of support. · A number of junctions on the A59, Skipton Road benefited from improvements aimed at easing traffic flow and relieving congestion. Evaluation, undertaken between 2006 and 2009 suggested that these improvements, together, achieved a reduction in peak period journey times in the order of 15%. ¡ **Harrogate Park and Ride Feasibility Study** was a high-level investigation into the potential of implementing a park and ride site on existing routes within Harrogate, in order to alleviate congestion on the existing road network and remove the existing strain of town centre parking. · The results of the options testing suggested that the A661 site would attract the most traffic to use the Park and Ride, which was considered realistic as analysis had shown that most traffic travelled to Harrogate from the east and south. ¡ NYCC's **Local Sustainable Transport Fund** (LSTF) bid for Harrogate and Knaresborough focussed on a long term strategy to reduce congestion, and its negative impacts on the environment and economy. A range of infrastructure schemes, aimed at facilitating walking and cycling into - and around – Harrogate, were delivered as part of the LSTF project.
Socio-Economic Context	**<u>Population and Employment</u>** ***Current Situation*** ¡ Harrogate as a district has an outstanding educational record, considered to result in in cross-boundary trips into Harrogate from north Leeds for education purposes. A number of the most high profile and accessible education facilities are located in Harrogate town itself, which increases the pressure on the local highway network particularly in the AM peak. ¡ 56% of Harrogate residents are employed in professional and managerial roles, while less than 20% work in the leisure and service sectors – this correlates with the higher than average earnings of residents but not with the area's economic make up reinforcing the trend of out-commuting for higher value jobs, and converse in-commuting for lower value jobs. ¡ The high level of car ownership in Harrogate is reflected by a higher proportion of residents using a private car or van as the primary mode for their travel to work.

	¡ The rate of inward migration, coupled with the existing age structure and outward migration of the younger demographic, is predicted to constrain the labour market, impacting the potential for sustainable economic development. ***Future Situation*** ¡ Harrogate, along with York, has the largest growth requirements of anywhere in the LEP area with a combined total of almost 30,000 homes due to be delivered in the next plan periods across both authority areas. HBC's draft Local Plan sets out that there will be provision for approximately 11,700 new homes and around 25 hectares of employment land across the district. As such the population of the district is forecast to increase substantially. ¡ HBC's Employment Land Review forecasts 7,930 additional jobs across all sectors in the district, over the period 2014-35. ¡ Planned growth across the neighbouring authorities of Craven, York, Leeds and Bradford includes in excess of 136,000 new houses and over 700ha of employment space. With the trend for cross-boundary commuting both from and to Harrogate, particularly from the LCR and to a lesser extent York, allocations across the wider area will have a direct impact on Harrogate's network in the peak hours, over and above the impact from Harrogate-based development. ¡ Harrogate district's population is ageing rapidly and an additional 17,800 over 65's are forecast by 2035; this equates to a decrease in working-age residents of 9%, or 8,000 people. ¡ The high rate of inward migration, coupled with the existing age structure, is predicted to constrain the labour market impacting the potential for sustainable economic development. It is also likely to impact significantly upon IP trips and congestion, as travel in this time period is shown to be primarily non-work related. ¡ Key routes and junctions on the network are already under considerable strain resulting in congestion and delay. The level of growth, set out above, will increase demands on infrastructure in the region, in particular the transport infrastructure as the resident population travel to work, education, to access services and facilities and for leisure purposes.
Wider Economic Context	**<u>Economic Position</u>** ***Current Situation*** ¡ There are estimated to be 13 ,500 businesses across the Harrogate district providing approximately 95,000 local jobs (68,000 FTE); 75% of the economy is contained within the more urban areas resulting in the majority of employment and business related trips being made to the main urban areas, particularly Harrogate itself. This is compounded by the central locations of sizeable and popular retail and business parks. ¡ Harrogate resident earnings are high while workplace earnings are much lower with Harrogate falling into the bottom 16% of England's Local Authority areas. ¡ There is also a discrepancy between worker earnings and the high cost of living in Harrogate resulting in increased commuting trips into the area from less affluent surrounding areas. ¡ The low-wage economy is driven by the daily export of many of the high-earning residents of Harrogate, combined with the dominance of low value sectors primarily related to the service and hospitality industry. ¡ The LCR Business Survey (2015) placed 'Transport Connections within your Local Area' as the number one disadvantage to "the success of your business at its current location" for Harrogate businesses. This is echoed by the HBC Economy Action Plan which states that "In our engagement with local businesses transport related issues are repeatedly highlighted as a major concern and key priority for investment and improvement".

	¡ Of those Harrogate businesses looking to relocate in the next five years, 73% would consider the LCR as a suitable location compared to 65% who would continue to consider Harrogate. ¡ The demand for accessible larger units (5,000sqft and above) far outstrips supply, a key factor cited as restricting business expansion and inward investment. Existing congestion on the local network contributes to the lack of accessibility but is also a barrier to future development of this scale receiving planning support without significant mitigation on the local network in order to accommodate the associated trips. ***Future Situation*** ¡ 'A Strong Local Economy' is HBC's number one corporate priority; this encompasses an economy that is resilient, diverse and expanding. ¡ There is an aspiration amongst NYCC, HBC and the YNYER and LCR LEPs, to attract more high value sectors and increase the number of high value jobs in Harrogate in order to bring about a more resilient, sustainable and less vulnerable economy. Issues relating to transport, in particular connectivity, congestion and journey times, are acknowledged barriers preventing this type of growth. ¡ In 2015 Harrogate district's economy was worth £3.85billion Gross Value Added (GVA) to the regional economy, growing to £3.9bn in 2016. In a do nothing scenario it is forecast that the district's GVA will grow to £5.8bn by 2026; however, if action is taken on aspects including transport and accessibility there is the potential for GVA to grow to £10.22bn over the same timeframe. ¡ Sectors with the most significant forecast growth (to 2021) are also those at the lower end when it comes to earning potential; this growth, if left unmanaged, will further skew the local economy in terms of lower value employment. ¡ It is extremely likely that the vast majority of business and employment growth will be within Harrogate itself, which will add to the number of commuter trips within the town most of which are made by car. ¡ In order to maximise Harrogate's economic potential, there is a need to plan, not only for the expansion of existing businesses, but also to attract the inward investment required to generate new, high value jobs. Transport connectivity is key to achieving this. **<u>Visitor Economy</u>** ***Current Situation*** ¡ During 2015 the district attracted a total of 5.4 million visitors, 4.7m of which were day trips, generating in the region of £300m and supporting in excess of 8,000 jobs. ¡ In addition to permanent attractions there is also a significant calendar of events that take place throughout the year. The Great Yorkshire Show attracted over 135,000 visitors in 2016, resulting in 45,000 additional car trips into the town over the three days. ¡ The Tour de France in 2014 injected an estimated £102m into the Yorkshire economy. The 2017 Tour de Yorkshire was expected to attract up to 200,000 visitors to the district, bringing a local economy boost of between £5-7 million. ¡ Harrogate Convention Centre is one of the country's leading events venues and in 2016 brought in 300,000 visitors and contributed £60m to the local economy; it is one of the key elements for growth targeted through HBC's Economy Action Plan. ¡ The Chartered Institute of Personnel and Development's annual conference, which had been held in Harrogate for 60 years attracting more than 5,000 visitors, pulled out of the town in 2008 due to negative feedback from delegates, with poor transport links cited as one of the key issues.

	¡ Car is by far the most dominant form of visitor transportation to the region making up 84% of all trips compared to 8% for train and 4% for public bus or coach, placing additional strain on the already congested network. ***Future Situation*** ¡ The Harrogate Town Centre Master Plan is based on the aspiration that *"By 2025 Harrogate Town Centre will be a leading UK destination for shopping, leisure and business tourism…This distinctiveness will be characterised by an exceptional town centre environment".* ¡ There is an aspiration to grow the events industry further; as the number of events increase, and the permanent attractions continue to draw more visitors year-on-year, there is an obvious threat to the operation of an already constrained and congested highway network both for residents and workers in Harrogate and for those travelling to the events themselves, which in turn will impact on the attractiveness of the area for inward investment. ¡ For the tourist industry to grow in the Harrogate district the right infrastructure needs to be in place; the district's infrastructure (including transport) helps to reinforce and shape the distinctiveness of the area and make it an easy place to visit. **Freight** ***Current Situation*** ¡ The North is an important source of freight movements, particularly to and from its ports on the Humber, Tees, Tyne, and Mersey (accessed via the A59); the geographical locations of these ports make good east-west connections of critical importance for the movement of goods. ¡ 2015 traffic counts, on the A59 in the study area, show AADT HGV movements of between 748 and 1,586. ¡ The count site with the highest proportion of HGV traffic on the local network (9.1%) is located on the A59 at the western extent of the study area – this is the main route to Skipton and beyond to East Lancashire and Merseyside. ¡ The highest number of HGVs in the study area are experienced on the A59 east of Knaresborough, the A658 Harrogate Southern Bypass and on the A661 Wetherby Road. ¡ Approximately 600 HGVs use the A61 north of Parliament Street, the main road through the town centre of Harrogate, on a daily basis. Likewise, almost 750 HGVs travel on the A59 through the centre of Knaresborough each day and almost 1,000 access Empress Roundabout from the east. ¡ As well as contributing to congestion through Harrogate and Knaresborough HGVs also impact upon the atmosphere and character of the town. ¡ The AM peak experiences the highest proportion of HGVs of all the peak hours (AM, PM and IP average). The highest off peak movements are between 10:00-11:00am. ***Future Situation*** ¡ With aspirations of economic growth across the north, and the identification of logistics as a key enabler to unlocking it, freight movements on the A59 will increase as east-west connections become more of a focus. ¡ There is a risk that the benefits of wider A59 improvements will not be fully realised if congestion on the A59 through Harrogate and Knaresborough is not addressed. ¡ The A59 provides a key opportunity for movements with an origin or destination in the west of the country; however, if improvements are not brought forward, not only will it impact the potential of the route to carry these trips, but they will also negatively impact the already congested network.

Transport Context	**Traffic Flows** ***Current Situation*** ¡ Key routes carry high traffic volumes for the standard of the roads (generally single 7.3m carriageway) resulting in the capacity issues that are characteristic of the town. ¡ In York, the main radial routes into the city carry a broadly similar amount of vehicles to those into Harrogate town centre despite a significant difference in worker population. ¡ The busiest sections of the network in the study area are on key routes; A59 between Knaresborough and the A1, A59 through Harrogate, A661 Wetherby Road, A658 between Knaresborough and Wetherby Road and A61 north of Killinghall. ¡ The three routes linking Harrogate to Knaresborough (A59, Forest Moor Rd and A658) carry around 3,600 vehicles in each peak hour; the model suggests that Forest Moor Road is being used to avoid delay due to the level crossing at Starbeck and congestion on the A661 Wetherby Road. ¡ High flows on the B6165 Ripley Road and on the B6161 Oaker Road / Otley Road suggest that through traffic, as well as traffic travelling to Knaresborough from the north, are using peripheral routes to avoid congestion on the internal network. ¡ Data suggests that congestion can continue to be experienced throughout the day, as well as at typical AM and PM peak times, with flows on some links remaining relatively constant across the day. ***Future Situation*** ¡ By 2035, across the study area, there will be an increase of almost 5,700 trips in each peak hour, from the base year. ¡ Increases in traffic flows to the west of Harrogate and at the junctions of B6161 Oaker Bank / Pennypot Lane and A59 / B6161 Otley Road, suggest increasing trips bypassing the centre of Harrogate. ¡ The observed net gain of trips into Harrogate urban area, as witnessed in the base year, will continue in the future year. Knaresborough will continue to experience a net loss of trips. **Congestion and Delay** ***Current Situation*** ¡ Junctions experiencing the most delay, in both peak hours, are the key intersections along the A59, A61, A658 and A661. The east-west route which feeds into the Woodlands junction, where an AQMA has recently been declared, is also identified. ¡ Northbound journey times on sections of the A661 are, on average, 44% longer in the AM peak with individual sections experiencing journey time delays of up to 138% when compare with the IP. ¡ The Hookstone Road / Leadhall Lane to Follifoot Road / Pannal Bank section of the A61 southbound route experiences journey times 145% higher in the PM peak than in the IP. The section of the A59 eastbound, between the A61 Ripon Road Roundabout and Kings Road / Woodfield Road junction, experiences journey times that are 108% higher in the AM peak than in the IP. ¡ On the A59 through Knaresborough there are decreases in journey times, from the IP in both the AM and PM peaks, in the vicinity of Bond End; this suggests that congestion in this location is greatest during the IP period which is more likely to be linked to non-work related trip purposes such as personal business, visiting, shopping and tourism. ¡ There are significant differences in average speeds when comparing the AM and PM peaks with the IP. The A61 through Harrogate town centre sees average speeds fall to just over 11km/hr in the PM peak.

- The greatest difference in average speeds is experienced on the A61 southbound, between Hookstone Road / Leadhall Lane to Follifoot Road / Pannal Bank, in the PM peak where average speeds fall by almost 30km/hr (59%) to just under 20km/hr.
- Large scale events have a significant impact upon journey times, adding up to around 30mins, and doubling journey times, in the AM peak in some locations. If the number of events continues to grow, in line with HBC aspirations, there will be an increase in the impact on the local network.
- Despite perceptions, school related traffic has a limited impact upon operation of the highway network with an average increase in journey times of between 1-3 minutes in the AM peak.

Future Situation

- In 2035 the majority of key junctions on the network operate with a LoS of F (50+ seconds).
- The largest percentage increase in future journey times is northbound on the A661 Wetherby Road in the PM peak; this is also the slowest route, with average speeds of between 14 and 18 km/hr.
- No change in journey time for AM peak northbound trips on the A661 (26.8%) Wetherby Road suggesting the route had already reached saturation in the base year. This may also be the case westbound on the A59 and on the A59/A661 southbound route in the PM peak, where little change in journey time is observed.
- The A61 southbound, across Harrogate, in the AM peak shows journey times increase of almost 20% and the highest actual increase in terms of time (4 minutes) demonstrating that the internal Harrogate network will continue to attract growing levels of traffic. This reflects planned growth of the town, in terms of housing and employment, and the existing trend of high levels of car use for internal trips in the AM and PM peaks.

Travel Patterns

Current Situation

- Traffic congestion across Harrogate and Knaresborough is experienced throughout the day but the highest flows are in the AM and PM peak periods, suggesting that they are related to commuting trips.
- Almost 18,500 residents travel outside of the district for work; this is an increase of 2,500 (16%) since analysis was undertaken as part of LTP2.
- Commuter trips, into Harrogate district, originating in Leeds or Bradford have increased by approximately 1,500 in the last 10 years to total 7,504. These movements, in addition to the 4,000 two-way trips to / from York, are facilitated primarily by the A61 and the A59 and, as such, are subject to the delays and unreliable journey times that result from congestion on the links.
- 59% of Harrogate urban area residents both live and work in the town itself, resulting in purely internal trips. The majority of Knaresborough residents also work in Harrogate town (35%); 23% also work within Knaresborough resulting in over 1,000 internal work related trips in the town.
- Over 90% of trips, in both the AM and PM peak periods, have either an origin or destination (or both) in the Harrogate and Knaresborough urban areas.
- Approximately half of all traffic, in both peak periods, is made up of trips that are carried out wholly within the Harrogate and Knaresborough urban areas. A similar number include either an origin or destination within the urban areas.
- Purely internal trips, that both start and end within Harrogate urban area, account for 37% of all movements in the AM peak and 35% in the PM peak.
- External-to-External trips account for 7% of all vehicle trips in both peaks suggesting that through-traffic is unlikely to be a significant contributor to the town-based congestion issues.

	Future Situation ¡ As in the base year over 90% of trips, in both peak periods, continue to start or end (or both) in the Harrogate and Knaresborough urban areas. ¡ Internal trips are forecast to account for a slightly higher proportion of trips on the network (38% and 36% respectively in the AM and PM peaks). Trips with either an origin or a destination outside of the towns remains consistent with the base year statistics. ¡ The proportion of External-to-External trips decreases slightly in both peaks, as does the number of trips which may suggest through-traffic avoiding the study area altogether. **Trip Purpose** ¡ The largest proportion of trips in the AM and PM peak are commuting trips. ¡ 56% of Harrogate residents, who live and work within the urban area, travel to work by car or motorcycle despite the average distance of internal trips being no more than 2.6km in any peak period. ¡ A comparison of mode share for journeys to work demonstrates that, in York, cycling makes up 17% of all internal commuter trips within the urban area; in Harrogate the equivalent figure is 4.5% and in Knaresborough is 1.3% (although offset by very high walking rates). ¡ Internal trips within the IP are primarily for a non-work trip purpose (i.e. holiday, other, personal business, shopping, social and visiting) suggesting that trips of this nature are the most significant contributor to local congestion during the IP period. **Road Safety** ¡ There are numerous collision clusters across the study area, primarily in Harrogate urban area itself with some on the key radial routes; there are no clusters in Knaresborough. ¡ Analysis of the cluster sites, in addition to incidents in the vicinity of Bond End and fatal incidents, suggests that traffic conditions are not a significant contributor to road safety issues on the local network (recorded at approx. 11% of incidents at cluster sites). ¡ A higher proportion of incidents involve NMUs, particularly cyclists; this may suggest issues of safety related to these modes that could be suppressing demand.
Sustainable Transport	¡ There may be potential to substitute walking for car trips, for short internal trips. However, the already high level of walking may indicate that there is not a great deal, if any, suppressed demand. ¡ There may be an opportunity to increase the cycling for commuting trips within the study area, and particularly for trips within the urban areas themselves. It is possible that the heavily trafficked roads, and associated congestion, may be discouraging cycling and resulting in suppressed demand. ¡ Pannal and Hornbeam Park railway stations have seen increases in use of 27% and 30.8%, respectively, since 2011/12; these increases are significantly higher than the county, regional and national average increase over the same period. ¡ Bus mode share for internal trips is 5.9% in Harrogate, compared to a share of 9.5% in the York urban area; this falls to 3.5% in Knaresborough, although this may be offset by the high levels of walking for internal trips. ¡ NYCC has recently been awarded almost £1m, through DfT's Access Fund, for projects to encourage walking and cycling; the existing Open Harrogate app is set to be developed further using this funding to help improve its function and increase awareness and usage.

Environmental Context	¡ There is an existing AQMA at Bond End, Knaresborough and two additional AQMAs have recently been declared for York Place in Knaresborough and Woodlands junction (Wetherby Road) in Harrogate. ¡ The extent of the Green Belt limits potential growth locations, resulting in likely future concentration of development within the existing urban areas themselves. ¡ This requirement to replace land taken from the Stray is a significant constraint upon improvements being made to the existing highway network, limiting the potential to address congestion issues through localised minor improvement works. ¡ High levels of traffic passing through Harrogate town centre, and the resulting congestion, are seen to be eroding the town's character and reducing its attractiveness to NMUs and to visitors.
Development	**<u>Transport Schemes and Initiatives</u>** ***Current Situation*** ¡ Improvement works at Junction 47 of the A1(M) where it meets the A59, east of Knaresborough, are to be funded through the Local Growth Fund. ¡ Work being undertaken to investigate potential realignment of the A59 at Kex Gill, to the west of Harrogate. The stretch of road is vulnerable to landslips, which leads to closures and subsequent diversion routes that can often result in traffic re-routing via Harrogate. ¡ NYCC are undertaking numerous improvements to junctions across the study area, in an attempt to alleviate congestion issues at specific locations. ¡ NYCC received £1m in funding, through DfT's Access Fund, for its project 'Open Yorkshire' (2017-20). The project will support the implementation of targeted sustainable travel behaviour change strategies to help promote economic growth and reduce congestion. ¡ The number of hourly rail services to Leeds will double from December 2017; an additional 5 direct services per day, from Harrogate to London Kings Cross, will are planned by 2019. ¡ Bus improvements, to include low emissions technology, integration and advanced ticketing are to be funded as part of a £2.25m investment by the operator's parent company Transdev, following a successful bid for Government funding. ¡ Regeneration project planned for the Station Parade area, incorporating the railway and bus stations; the scheme will be funded through the YNYER LEP with monies received as part of the Local Growth Deal. ***Future Situation*** ¡ Key focus is east-west connectivity, particularly targeting the A59 through A1 J47 improvements and 'Overtaking Opportunities Package' between Harrogate and Skipton. This is currently being assessed through a separate WSP / Regeneris study which aims to identify potential journey time and reliability improvements. ¡ TfN's emerging work on Strategic Development Corridors, and publication of its Initial Major Roads Report, identifies congestion in Harrogate as a contributor to a lack of resilience on the A59 and discusses a Harrogate Relief Road as a potential complementary measure to work being undertaken elsewhere on the network. ¡ Improving access to the rail network is a priority, set out as part of LTP4, with an aim of ensuring that at least 85% of the County's population are within 40 minutes journey time (by road or rail) of an HS2 gateway at York, Leeds or Darlington.

	Development Sites ***Current Situation*** ¡ There are currently 4,500 dwellings and 56,000sqm of employment space with existing planning permission across the Harrogate district. ¡ Planning permission for Manse Farm which will be an urban extension to the east of Knaresborough located on, and accessed from, the A59. ¡ Outline planning application submitted for development of a business park with associated rail halt. Flaxby Green Park is promoted as having the potential to contribute to Harrogate's economic diversification targets over the 13ha site. ***Future Situation*** ¡ Development will be targeted in urban areas to maximise sustainable access; 5,500 dwellings and 7.8 hectares of employment land is expected to be delivered in Harrogate itself. ¡ The Draft Local Plan also puts forward proposals for delivery of a new settlement at Flaxby or Hammerton, both located off the A59, in order to meet housing growth targets.

5 STAKEHOLDER ENGAGEMENT AND CONSULTATION

Engagement with a wide range of stakeholders has been undertaken, as part of the preparation of this Stage 1 Report, in order to ascertain their views and perceptions. A number of themes were raised by stakeholders and these are summarised at Appendix F; a list of stakeholders, and the level of consultation is also included.

The key themes identified by stakeholders, as part of this consultation, are:

- School Traffic;
- Public Transport;
- Traffic Signal Operation and Coordination;
- Car Parking;
- Economy;
- Environment;
- Poor Visitor Experience; and
- Provision of Sustainable Transport.

It should be noted that these are not the views of the study team and they are reported to reflect stakeholder perception.

Stakeholders also provided feedback on potential improvement schemes and interventions; these are also included at Appendix F and will be considered as part of the determination of the long-list of interventions.

6 SUMMARY AND CONCLUSIONS

6.1 SUMMARY

This Stage 1 Report has presented information, data and analysis aimed at understanding the current and forecasted future conditions, within the defined study area, and has set out the case for intervention.

Harrogate and Knaresborough are popular locations in which to live and visit; the district is currently home to the largest proportion of the County's population with residents who are well-educated and predominantly employed in high value jobs. 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 district has a vibrant and diverse economy, with economic activity overwhelmingly concentrated in Harrogate and Knaresborough where there is plentiful provision of both off and on-street parking; however, this economy 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 Harrogate 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. There is a recognised risk that, should this trend 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 local transport network is often identified as a barrier to this growth; 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.

Complementary to this 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.

Data, presented in this report, suggests an existing network 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 short in length (an average no more than 2.6km), are primarily commuting related and are predominantly undertaken by private vehicle. Through traffic, with external origins and destinations, is shown to have little bearing on the local network and generally bypasses the towns altogether by travelling on peripheral routes.

Aside from the impact on journey times, this congestion and slow moving traffic is also contributing to air quality issues in the study area; three AQMAs have been declared in the study area. 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.

Significant growth is proposed for Harrogate to the end of the Local Plan period in 2035; 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.

Forecasting of future conditions indicates that this 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.

With 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. TfN's emerging work on Strategic Development Corridors 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 planned 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 Harrogate and Knaresborough is not addressed.

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.

6.2 CONCLUSIONS AND NEXT STEPS

The summary presented above discusses a local transport network and traffic conditions that require intervention if targeted growth, and economic diversification, is to be achieved.

The evidence base from this Stage 1 Report will be used to develop a set of intervention specific objectives. It will also inform the development, and subsequent refinement, of a long-list of interventions.

These intervention specific objectives will then be used to sift and appraise the interventions identified, to develop a short-list of options as part of Stage 2 of the study. Detailed appraisal work will then be undertaken as part of Stage 3.

Dale House
Mount View
Northallerton
North Yorkshire
DL6 2YD

wsp.com