Bromsgrove Transport Package

Report on Phases 1-3

May 2012

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Executive Summary

Introduction

Bromsgrove's location at the intersection of the busy Birmingham to Bristol and Redditch to Kidderminster transport corridors saw the town grow as an affluent rural market settlement throughout its halcyon age, from circa 1650 to 1850. However, the advent of the industrial revolution heralded a change in Bromsgrove's fortunes, with the rapid economic growth and success of nearby settlements (specifically Birmingham and Redditch); Bromsgrove's regional economic prominence has gradually declined. The town is now a net generator of labour for its larger neighbours. Travel demand for journeys to, from and across the town has increased, placing pressure on the network and which has resulted in a number of transport-related issues. These issues have been quantified as part of this work and provide the baseline data to begin the process of identifying the transport infrastructure and services needed to support Bromsgrove's planned growth. It must be noted that the work so far undertaken is not sufficient to populate the transport elements of an Infrastructure Delivery Plan to a level compatible with scrutiny at an Evidence in Public.

Purpose of the Report

This report was commissioned to specify the existing and forecast transport issues in Bromsgrove to inform the content of the Bromsgrove LTP3 Package (representing Phases 1-3 of the process) and to collect the baseline data on which to begin the development of the transport related Infrastructure Delivery Plan for the District's Draft Core Strategy. The first three phases involve significant data gathering and analysis to develop a robust evidence base upon which to develop a clear strategy going forward. It brings together a significant evidence base which provides a comprehensive view of the current operation of Bromsgrove's transport infrastructure and services, and how this is forecast to change as planned new residential and commercial developments generate travel demand. In particular, this report seeks to highlight those areas where investment is required to resolve current and forecast transport related issues insofar as these adversely impact on the achievement of agreed policy objectives.

The report highlights where investment in infrastructure and services will be required to support enhanced economic activity, reduce carbon emissions and support planned growth in Bromsgrove and surrounding areas. It highlights a number of broad schemes, which, subject to the findings of this report being supported by key stakeholders and suitable funding being identified, will be planned, developed and delivered.

Background

The nascent Bromsgrove District Core Strategy and Worcestershire LTP3 Compendium provide a number of shared goals for the Bromsgrove Transport Package. These are, broadly:

- *Enhancing economic activity and growth,*
- *Reducing the impacts of transport on the local environment (noise and air quality),*
- *Improving the safety and security of the transport network,*
- *Enhancing accessibility to key services and facilities for all modes,*
- *Conserving and improving the natural and historic built environments and*
- *Enhancing the overall quality of the transport asset.*

Bromsgrove is reliant on its local transport networks to enable the efficient movement of people and goods; supporting economic activity and social cohesion. The proposed approach must consider identified issues for all modes of transport, ultimately resulting in a package of interventions which deliver an efficient transport network (across all modes of transport) and enhanced transport choice across the network, leading to a result which meets the desired objectives.

Issues with the Transport Network in Bromsgrove

Bromsgrove is located such that that it should have, in theory, excellent access to the strategic motorway network, the Worcestershire Principal Route Network and the rail network. The town is fully bypassed by the M5, the M42 and the A38 (Bromsgrove Eastern Bypass), and is served by a number of reasonably frequent interurban bus services, providing links to the wider sub-region. However, despite this, there are a number of serious issues with Bromsgrove's transport network.

These include:

- *Significant congestion across the local transport network*
  - *The A38 strategic corridor and approaches and the town centre suffer significant congestion, particularly at peak times. On average over a 12-hour period, delay accounts for 23% of total journey times on the highway network*
  - *The transport network in Bromsgrove is car dominated (particularly for local trips), which is resulting in environmental deterioration. There are approximately 441,400 vehicle trips made through the Bromsgrove Transport Package Area network during a weekday 12-hour period. By 2026, this figure is forecast to grow by 20% to approximately 526,500.*
  - *The designation of two Air Quality Management Areas within the study area and the identification of areas where transport-related noise is experienced above safe levels is also a serious concern.*
  - *Junction design across Bromsgrove is of variable quality and in some cases poor (for example, at Slideslow and Parkfield Junctions). This leads to congestion as junctions are not suitably designed to accommodate current demand, let alone future growth.*
- *Poor accessibility to regional destinations by passenger transport*
  - *Low frequency rail services and inadequate station infrastructure reduce the attractiveness of rail for medium and long distance commuting. Access to Bromsgrove station by sustainable modes (walk, cycling and local passenger transport) is particularly poor, which further disincentivises the use of rail. In addition, off-street parking provision at Bromsgrove station is inadequate, leading to on-street parking in residential areas and consequent problems for residents.*
  - *Rail services are frequently overcrowded; particularly on services heading into Birmingham as a result of poor service frequencies and inadequate infrastructure and services to accommodate demand.*
  - *Strategic (inter-urban) bus routes are exposed to significant congestion through Bromsgrove, which impacts on the punctuality, reliability, and frequency of strategic bus services, reducing the attractiveness of these services.*

- *Poor accessibility to local trip attractors in and from Bromsgrove*
    - *High traffic flows and deteriorated public realm (footpaths, lighting etc) cause severance and make walking and cycling unattractive in the town.*
    - *Local road based passenger transport provision is limited and infrequent (average journey times in Bromsgrove can fluctuate by up to 20%), and punctuality is similarly variable, with some bus services in the package area arriving between 8% earlier and up to 27% later than timetabled.*
    - *Passenger transport infrastructure is broadly of a poor quality across the town, which directly impacts on the perception of, attractiveness and use of the bus for local journeys. 4% of stops with bus shelters in Bromsgrove are deemed to be in poor condition, 19% have no scheduled passenger transport timetable information and 38% are unmarked.*
    - *Walking and cycling networks in Bromsgrove are fragmented, poorly defined and insufficiently waymarked. This has a significant impact on the attractiveness of walking and cycling in the town.*
    - *Transport information availability in Bromsgrove is poor. This disincentivises the use of sustainable modes (walking, cycling and passenger transport) in particular, as user uncertainty and stress is increased.*
    - *Parking supply is poorly managed, with no coordinated approach to managing on-street and off-street parking capacity. In some areas, parking supply far exceeds demand, whereas in other areas (particularly around the rail station) the opposite is the case, leading to congestion as a result of poorly enforced parking.*

If the planned growth identified in the Bromsgrove District Core Strategy is delivered (and results in the forecast circa 20% uplift in travel demand), it can be expected that many of the problems identified above will worsen (significantly so in some locations) without a planned investment programme in Bromsgrove's transport infrastructure and services, highlighting the importance of the transport elements of the Core

Strategy's Infrastructure Delivery Plan

Conclusions and Recommendations

Transport has a critical role to play in defining Bromsgrove's future. The analysis of the data collected and presented within this report have enabled the identification of a series of broad areas where enhancement of the network will be required to deliver a more efficient transport network which meets the objectives identified for the Bromsgrove Transport Package. Further work will be required to develop the package of measures to a stage where they can be shown to represent value for money, meet LTP3 policy objectives and for those schemes required to support Bromsgrove District Core Strategy planned growth, are capable of withstanding scrutiny at an Evidence in Public.

The broad areas of enhancement include:

- *Bromsgrove Eastern Bypass (A38) Corridor Enhancement*
- *Bromsgrove Town Junctions Enhancements*
- *Bromsgrove Walking and Cycling Network Development*
- *Bromsgrove Road Based Local and Strategic Passenger Transport Infrastructure Enhancements*
- *Bromsgrove Rail Interchange Scheme*
- *Bromsgrove Local Bus Service Enhancements*
- *Bromsgrove Town Centre Public Realm Enhancement Scheme*
- *Development and Delivery of a Parking Management Strategy for Bromsgrove*
- *Bromsgrove Smarter Choices Programme*

Next Steps

This report has resulted in the development of a significant evidence base, which has identified key transport issues for Bromsgrove, and suggested a number of potential areas where investment will be required to address these. Going forward, the detail and outcomes of this report will be shared with key stakeholders to agree the proposed approach, as outlined in Phases 4 and 5. This will involve the agreement of the key issues and proposals identified in this report, prior to the development of a detailed intervention strategy.

Subject to this agreement, and suitable funding being identified, the next phases (5-7) will involve the development of the business cases and detailed designs of the proposed schemes. This technical work must include the identification of any likely impacts of future planned development growth on the transport network, in terms of trip generation, demand and traffic flows and the measures required to mitigate adverse impacts.

Contents:

1. Introduction

1.1 Background

1.1.1 This study has been commissioned to provide the evidence base for the development of the Bromsgrove Transport Package. This package has its basis in the third Worcestershire Local Transport Plan (LTP3), and will be developed to best address the identified transport related issues/problems in Bromsgrove meet the agreed outcomes of this project and be consistent with local objectives outlined in the Bromsgrove District Core Strategy (Revised Draft, 2011) and the Bromsgrove Town Centre Action Plan (2011).

1.1.2 The plan is likely to include a multi-modal package of measures and schemes, bringing together funding from a variety of sources to support the Bromsgrove economy and environment through improvements in travelling conditions within and across the town for all modes of transport. It should be noted that the resulting investment strategy for the Bromsgrove Transport Package will not include schemes which involve the strategic highway network (Highways Agency) or which involve major rail infrastructure (Network Rail), other than the proposed enhancements to Bromsgrove station.

1.1.3 The purpose of this report is to provide a detailed evidence base, from which to identify and develop the Bromsgrove Transport Package for the Bromsgrove urban area. This package of investment must address any current and forecast issues and challenges identified, whilst being consistent with the agreed objectives of the Worcestershire LTP3, namely:

- *To support Worcestershire's economic competitiveness and growth through delivering a reliable and efficient transport network*
- *To reduce the impacts of transport in Worcestershire on the local environment, by reducing noise and transport-related emissions of carbon dioxide and other greenhouse gases, with the desired outcomes of tackling climate change and reducing the impacts of transport on public health*
- *To contribute towards better safety, security, health and longer life-expectancy in Worcestershire, by reducing the risk of death, injury or illness arising from transport and promoting healthy modes of travel*
- *To optimise equality of opportunity for all of Worcestershire's citizens with the desired outcome of creating a fairer society.*
- *To enhance the quality of life for Worcestershire's residents by promoting a healthy, natural environment, conserving our historic built environment and preserving our heritage assets*
- *To enhance the quality of Worcestershire's Transport Asset, through sensitive and appropriate design with the desired outcome of reducing the costs and inconvenience of maintenance works*

1.1.4 Bromsgrove District Council is currently in the process of developing a Town Centre Area Action Plan for Bromsgrove Town Centre. The draft report identifies the following core aim:

- *"Bromsgrove will be a thriving market town which attracts residents and visitors into the Town Centre, both for the shopping experience and its programme of events, activities and markets. The Town Centre will be significantly enhanced with an attractive and safe environment which will provide a focal point for the community."*

1.1.5 Additionally, the draft Town Centre Area Action Plan identifies a series of objectives, of which the following have specific relevance to transport:

- *Upgrading the public realm and Primary Shopping Zone to a high quality including resurfacing and refurbishing the High Street*
- *To reduce reliance on car use and reduce transport related carbon emissions*
- *An improved road network including the reengineering of junctions and traffic flows*
- *Improved pedestrian priority, accessibility, permeability, linkages and mobility within and across the Town Centre for pedestrians and cyclists*
- *Improved public transport infrastructure including the new or upgraded Bus Station, and new Town Centre bus routes*
- *Improved pedestrian and cycle linkages between Bromsgrove Station and the Town Centre, and the promotion of shuttle bus services between the two destinations*
- *A rationalisation of car parking provision in the Town Centre*

1.1.6 It is not anticipated that the core aim and objectives will change markedly when the final version of the document is produced following public consultation, however, any changes to the policy framework will be taken into account by this study as these arise.

1.2 Introduction to Bromsgrove

1.2.1 Bromsgrove District is situated in north Worcestershire lying to the south west of the West Midlands conurbation. The District is bounded by Birmingham, Dudley, Solihull, Redditch, Wyre Forest, and the largely rural Districts of Wychavon and Stratford-on-Avon. The District covers approximately 21,714 hectares. Although located only 22km (14 miles) from the centre of Birmingham, the District is predominantly rural with approximately 91% of the land designated green belt.

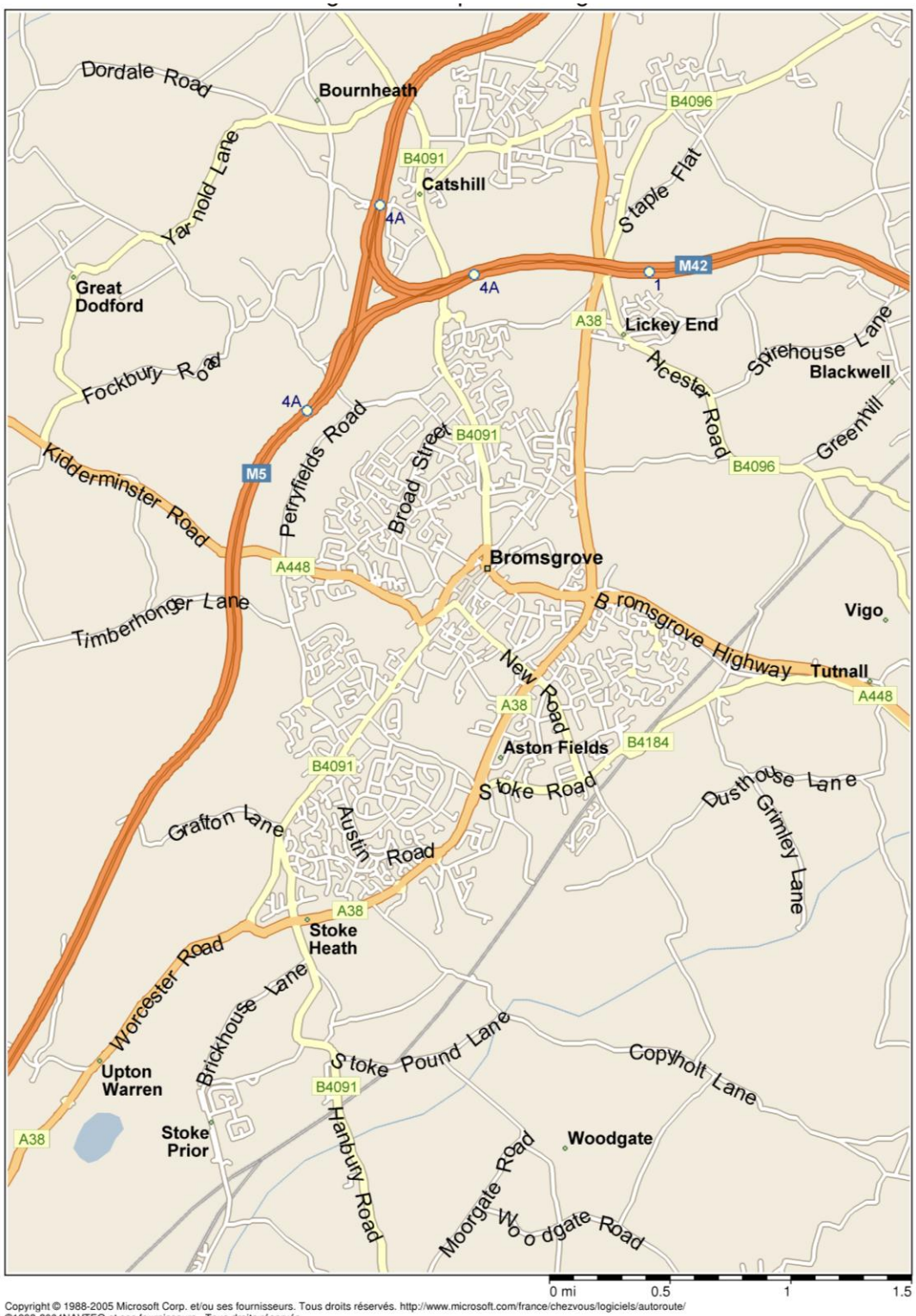
1.2.2 The Bromsgrove Transport Package study area is well served by motorways, with the M5 running north to south and the M42 from east to west. The M5 and M42 connect with the M6 to the north of Birmingham and the M40 to the east. The town also benefits from access to regional passenger transport connections into the West Midlands conurbation and to the nearby urban areas of Redditch, Droitwich Spa, Worcester and the Wyre Forest towns.

1.2.3 Bromsgrove evolved as a market town, serving a wide and predominantly rural hinterland, although its present attractions are limited and disadvantaged by the greater range and scale of retail opportunities in neighbouring centres such as Birmingham, Worcester, Redditch, Solihull, and Merry Hill (Dudley).

1.3 Purpose of Report

1.3.1 The Bromsgrove Transport Study is focussed on the Bromsgrove town urban area, and the main highway routes into the urban area. A plot showing the scope of the study is provided in Figure 1.1.

Figure 1.1 - Bromsgrove Transport Package - Study Area



1.3.2 This report brings together evidence from a wide range of sources, which will be used to identify current and likely future network conditions. This will enable a robust investment strategy to be identified which meets both local and Worcestershire LTP3 objectives as set out above. Following this introduction the report is structured as follows:

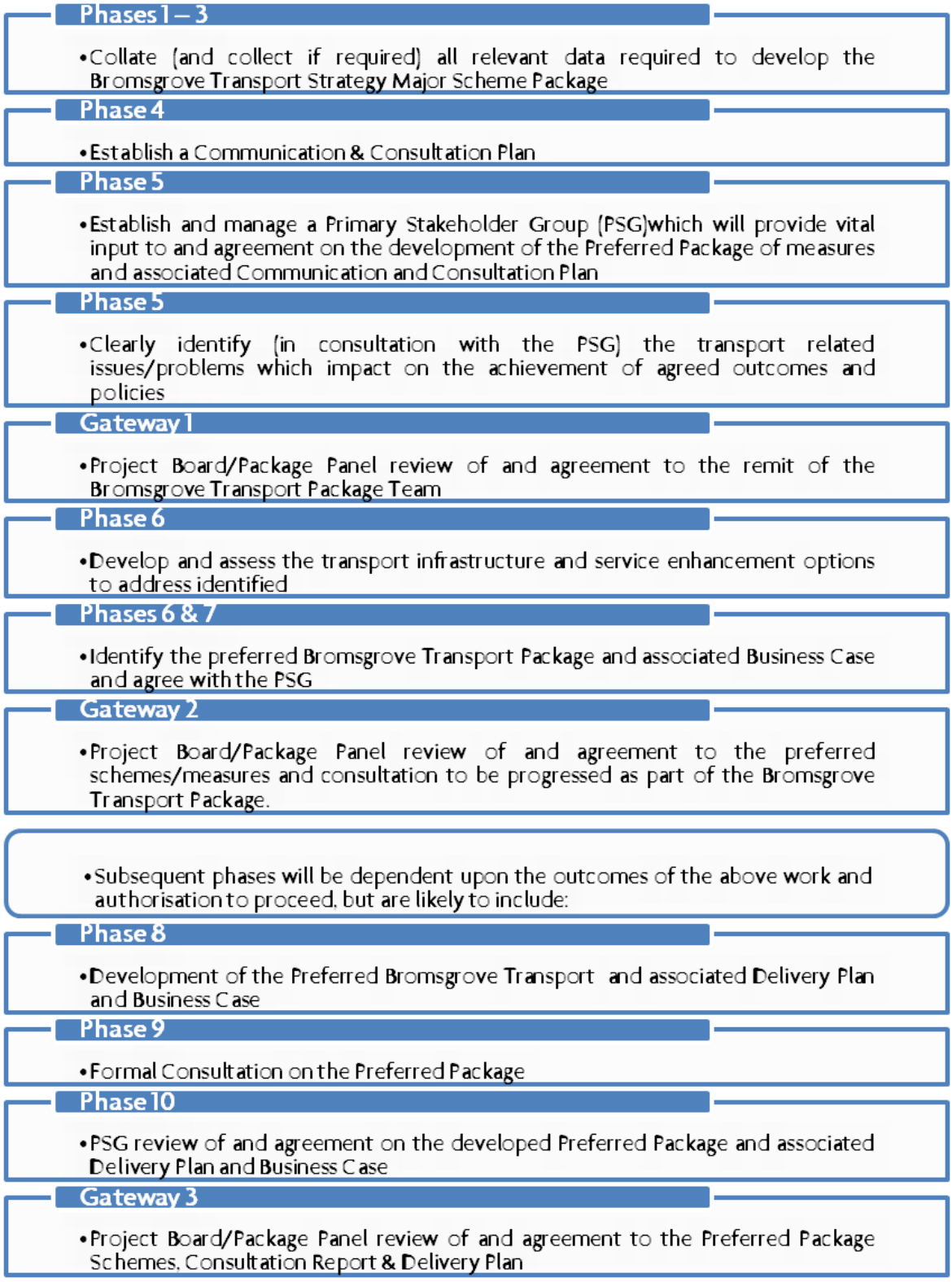
- *Section 2: Methodology*
- *Section 3 Local Economic Performance*
- *Section 4: Socio-Demographic Characteristics*
- *Section 5: Highway Network Performance*
- *Section6: Passenger Transport Network Performance*
- *Section 8: Walking and Cycling Network Performance*
- *Section 9: Parking Supply and Demand*
- *Section 10: Environmental Quality*
- *Section 11: Conclusions and Recommendations*

2. Methodology

2.1 Introduction

2.1.1 This section sets out the methodology used to develop sections 1-3 of the Bromsgrove Transport Package from the problem identification stage through to the identification of and agreement on the preferred package, preparatory to it being taken forward to detailed design. Figure 2.1 below sets out the ten distinct development phases of the Bromsgrove Transport Package, which go from Phases 1-3 (this report) to Phase 10 (development of the preferred package of measures):

Figure 2.1 - Bromsgrove Transport Package - Development Phases



2.1.2 This report covers the development of the Bromsgrove Transport Package from Phase 1 to Phase 3 (Data Collection and Interpretation). The methodology by which this study has been developed is detailed in this section.

2.2 Phase 1 - Data Collection

2.2.1 Available data for the Bromsgrove Transport Package study area has been collated and an analysis undertaken to identify "gaps" in datasets. Where the gap analysis indicated missing datasets crucial to the development and justification of the Bromsgrove Transport Strategy, additional surveys were commissioned and undertaken during autumn 2011.

2.2.2 Data was collated under the following headings

- *Economic performance*
- *Socio-Demographic characteristics*
- *Travel Demand*
- *Highway network performance*
- *Passenger transport network performance*
- *Walking and cycling network performance*
- *Parking Supply and Demand*
- *Environmental Quality*
- *Land-use planning assumptions*
- *Consultation Evidence*

2.2.3 The sources of information are summarised in Section 3, and more detailed information is available in the Appendices.

Economic Performance

2.2.4 Data was gathered relating to the local economic performance of the Bromsgrove Transport Package study area. Key datasets included:

- ***Employment by Industrial Sector*** *– to identify the industries in which Bromsgrove residents are employed in and around the study area, identifying the type and scale of the local economy*
- ***Unemployment and Economic Activity –*** *to identify* ***the*** *size of the labour force in the area and economic development opportunities*
- ***VAT Registrations*** *– to identify economic vitality in the study area (entrepreneurship and business population)*

Socio-Demographic Characteristics

2.2.5 In this area, the following datasets were collected to inform the Bromsgrove Transport Package study:

- ***Age Profile*** *– to show the total population and spread of different age groups living in the study area.*
- ***Forecast Population Growth*** *– to show how the population of the area is likely to change in the future, in particular, the impact that this will have on the future age profile.*
- ***Population Classification*** *– using ACORN classifications, which classifies and categorises the study area's population into a number of groupings.*
- ***Annual Mean Earnings*** *– to identify the relative prosperity of the study area.*
- ***Indices of Multiple Deprivation*** *– to identify areas where deprivation exists in the study area.*
- ***Annual Mean Expenditure*** *– to identify how residents spend in the study area.*
- ***Car Ownership*** *– to identify access to cars in the study area.*
- ***Normal Mode of Travel to Place of Work*** *– to identify existing mode shares (particularly during the weekday peak periods).*

Travel Demand

2.2.6 This section summarises data which identifies travel demand across all transport modes, including:

- *Cordon flows (classified)*
- *Link flows*
- *Turning movements*
- *Bus demand*
- *Rail demand*
- *Cycle demand*
- *Pedestrian demand*
- *Key trip attractors and generators and associated volumes of demand (by mode, including freight)*

Highway Network Performance

2.2.7 This section focuses on the performance of the Bromsgrove Transport Package study area's highway network. In particular:

- *Queue lengths*
- *Journey times*
- *Journey time variability*
- *Over capacity junctions*
- *Highway safety and security*
- *Highway condition and maintenance*

Passenger Transport Network Performance

2.2.8 This section considers the performance of the Bromsgrove Transport Package study area's passenger transport networks. Specifically:

- *Punctuality*
- *Journey times*
- *Infrastructure quality and maintenance*
- *Information systems*

Walking and Cycling Network Performance

2.2.9 A major focus of the Bromsgrove Transport Package will be to improve footfall, particularly in the town centre to boost the local economy. This section brings together the following datasets to identify the performance of walking and cycling networks in Bromsgrove:

- *Infrastructure condition, quality and maintenance*
- *Journey times to key destinations*
- *Operational quality*
- *Barriers to movement*
- *Safety*

Parking Supply and Demand

2.2.10 This section focuses on the supply and demand for parking in the Bromsgrove Transport Package study area. Key datasets include:

- *Quantum of Parking Capacity (off street, on-street and Private Non-Residential)*
- *Parking Demand (volumes and duration)*
- *Parking Revenues*
- *Freight Parking*
- *Areas of Excessive Parking Demand (and causes)*

Environmental Quality

2.2.11 This section considers environmental quality issues, including:

- *Noise,*
- *Air quality*
- *The built environment*
- *The natural environment*

Land Use Planning Assumptions

2.2.12 This section focuses on proposed land-use changes in the Bromsgrove Transport Package study area, including:

- *The Bromsgrove Draft Core Strategy and phasing*
- *Speculative development*

Consultation Evidence

2.2.13 This section summarises any consultation exercises that have taken place in the study area in recent times, which relate to transport network performance and proposed transport schemes.

2.3 Phase 2 – Data Analysis and Interpretation

2.3.1 Phase 2 of the Bromsgrove Transport Package reports on the analysis and interpretation of the data collected in Phase 1, to identify the overall performance of the Bromsgrove Transport Package study area, and forecast how this might change in future.

Identification of Current Network Performance

2.3.2 This section considers the assessment of current performance of the Bromsgrove Transport Package study area networks, relating specifically to the achievement of LTP3 and Bromsgrove Core Strategy objectives, this covers:

- *Accessibility (by all modes)*
- *Journey time/cost issues across all modes of transport and as influenced by:*
  - *System capacity*
  - *Infrastructure*
  - *Congestion*
  - *Parking availability and charging*
  - *Service Frequency*
  - *Fares / User charges*
  - *Location of Trip Generators / Attractors*
  - *Safety across all modes of Transport*
  - *Environmental Issues*

2.3.3 As an output of this work, a series of existing (current and short term) transport problems and issues are identified and presented, together with the supporting evidence.

Identification of Forecast Network Performance (Future Year Assessment)

2.3.4 This section reports on the analysis of the forecast trends in travel demand and network performance in Bromsgrove. In particular, this analysis considered:

- *Committed changes to transport network infrastructure and services*
- *Planned land use development*
- *Background changes in travel demand*

2.3.5 Forecast medium to long-term transport problems and issues are reported, together with the supporting evidence.

2.4 Phase 3 – Identification and Consideration of Transport Problems and Issues to be addressed by the Bromsgrove Transport Package

2.4.1 This phase involved the consolidation of previous technical work undertaken in Phases 1 and 2 to identify the range of current and forecast issues and problems that face Bromsgrove's transport networks. These issues and problems have been developed into a series of evidence-based and focussed objectives which the package will seek to deliver against.

3. Local Economic Performance

KEY FACTS – Local Economic Performance

- ***Service industries dominate Bromsgrove's economy:*** *15% of businesses are in professional, scientific and technical roles, 14% in construction, 13% in the wholesale and retail trade, and 7% in health and education in Bromsgrove. All of which rely (to a greater or lesser extent) on the provision of a good quality, well connected transport network to support economic activity.*
- ***Approximately 13% of Bromsgrove Town's labour force is employed in education.*** *This suggests that peak travel times in Bromsgrove are likely to broadly coincide with school opening and closing times.*
- ***3.3% of Bromsgrove residents are currently unemployed;*** *however, trends suggest that this is decreasing.*
- *VAT registrations in the study area are significantly higher than de-registrations: implying that* ***Bromsgrove is experiencing economic growth, despite the recession.*** *It is essential that the local transport network operates efficiently to ensure that economic activity and growth can be maintained.*
- ***Businesses in Bromsgrove are typically small.*** *73% of Bromsgrove businesses employ less than 4 people, 7% employ over 20 people, but only 0.8% employs over 100 people. This suggests that, rather than large, major trip attractors, Bromsgrove will instead have a much larger number of smaller trip attractors, which are typically more challenging to cater for in terms of public transport provision.*
- ***Only 42% of Bromsgrove district residents work in the district.*** *The remaining 58% commute to work elsewhere in Worcestershire (13%) or outside the county (45%). Bromsgrove is therefore a net exporter of labour, and so will require efficient transport links to neighbouring areas to enable commuters to access employment.*

3.1 Introduction

3.1.1 This section considers datasets drawn from a wide range of sources including Worcestershire County Council and the Office of National Statistics. This data has been gathered to develop an understanding of the current makeup and performance of the local economy, which will provide a clearer understanding of the role that transport plays in supporting the local economy.

3.2 Employment by Industrial Sector

3.2.1 The employment structure of a location influences the vulnerability of the workforce to changing economic conditions. During the current recession, people employed in banking, finance and construction were particularly at risk of redundancy in the early stages. However, as the slow-down progressed, those employed in manufacturing and retail sectors suffered as consumer confidence fell and productivity slowed. Furthermore with the scale of public debt, cuts are expected across most of the public sector in the coming years. This could be of particular concern for Bromsgrove, where public sector employment accounts for 14% of the total workforce.

3.2.2 Table 3.1 below provides information on the make up of Bromsgrove District's local economy, in terms of the various industrial sectors. It is interesting to note that the largest sector represented in Bromsgrove is the professional, scientific and technical sector (14.8%), followed by construction (14%) and retail (8.5%), suggesting that service and high tech sectors dominate the local economy. The service sector in particular is heavily reliant on efficient transport links to enable service delivery.

Table 3.1 - VAT/PAYE Based Enterprises by Industry (%) 2010 (Source: ONS, 2010)

Local Units in VAT and/or PAYE Based Enterprises by Industry, 2010 (%)				
Industry	Bromsgrove District	Worcestershire	West Midlands	England
Agriculture, Forestry and Fishing	4.0	6.5	5.5	4.3
Production	6.2	7.8	8.0	6.0
Construction	14.1	11.3	10.9	11.0
Motor trades	3.5	3.6	3.5	3.0
Wholesale	4.6	5.8	5.6	5.0
Retail	8.5	10.3	11.8	11.0
Transport & storage	2.6	3.0	3.8	3.2
Accommodation and food services	5.3	5.9	6.1	6.5
Information & communication	6.3	5.4	4.7	6.5
Finance & insurance	2.4	2.1	2.3	2.6
Property	4.9	3.7	3.3	3.6
Professional, scientific & technical	14.8	13.1	11.6	14.0
Business administration & support services	8.4	7.5	7.3	7.4
Public administration & defence	0.4	0.7	1.0	0.9
Education	2.3	2.4	2.6	2.5
Health	4.8	4.3	5.5	5.4
Arts, entertainment, recreation & other services	6.9	6.6	6.6	7.2

3.3 Unemployment/Economic Activity Rate

3.3.1 Unemployment data provides an indication of the scope for economic development opportunities. It needs to be in the context of the qualification and skills of a potential workforce. As of January 2012, the overall unemployment level in Bromsgrove is 3.3%, compared with 4.4% across Worcestershire. There has been a net decrease in the number of unemployed persons in the district, which suggests that the local economy is continuing to grow, despite the economic downturn.

3.3.2 The Worcestershire Economic Assessment 2010-2011 identifies that only 42% of Bromsgrove district residents work in the district. The remaining 58% commute to work elsewhere in Worcestershire (13%) or outside the county (45%). Bromsgrove is therefore a net exporter of labour, and so will require efficient transport links to neighbouring areas to enable commuters to access employment.

Table 3.2 - Unemployment Trending in Bromsgrove (Source: ONS Annual Population Survey 2011)

Employment Rate (Q02 2010 to Q02 2011)		
Bromsgrove	41,900	72.7%
Worcestershire	257,200	72.9%
West Midlands	2,318,900	67.4%
England	23,665,000	70.4%

3.4 Business Size

3.4.1 The majority of businesses in Bromsgrove (73%) have four or less employees. Bromsgrove only has 7% of its businesses employing over 20 people and 0.8% with over 100 employees. Therefore, the local economy is dominated by Small and Medium sized Enterprises (SMEs). Smaller firms tend to thrive in high tech (scientific, technical and professional) and service industries. Both of which require good access to an efficient transport network in order to access potential markets and labour pools.

3.5 VAT Registrations and De-registrations

3.5.1 VAT registrations and de-registrations are the best official guide to the pattern of business start-ups and closures. They are an indicator of the level of entrepreneurship and of the health of the business population in the District. Enterprise is a key driver of economic growth. Increases in the number of firms will help to increase the output capacity of the economy. In 2007, Bromsgrove District had significantly more registrations than de-registrations, indicating economic growth. The percentage of registrations was almost equal to the national and above regional levels, which implied that the business economy was relatively strong. Table 3.3 shows how Bromsgrove compares, in terms of VAT registered businesses, against the West Midlands and UK percentage averages.

Table 3.3 - VAT Registered Business (Source: BERR VAT Registrations/De-Registrations by Industry, 2007)

VAT Registered Business (% are Based on Stock at End of Year)				
	Bromsgrove	Bromsgrove District	West Midlands	Great Britain
Registration	390	10.0%	9.4%	10.2%
Deregistration	250	6.4%	7.2%	7.3%
Stock (at end of year)	3,705	-	-	-

3.5.2 If economic vitality and growth is to be nurtured in Bromsgrove, it will be critical that the town's transport networks, including both infrastructure and services, are well maintained and provide the level of accessibility, journey times and journey costs consistent with supporting economic growth.

3.6 Journeys to Work Data

3.6.1 Figures 3.1 identify the numbers of people commuting within Worcestershire. This identifies that in 2001 at the time of the last Census, 404 more people commute into Bromsgrove to work than commute out of it.

3.6.2 It should be recognised that at this time, the Longbridge motor works were still in operation. As part of this site falls within Bromsgrove district, it can be anticipated that this would have been a significant employer at the time of the census. However, the closure of this major employer will have had an impact on commuting patterns, such that it is now assumed that Bromsgrove will have a net outflow of commuters to other areas for employment.

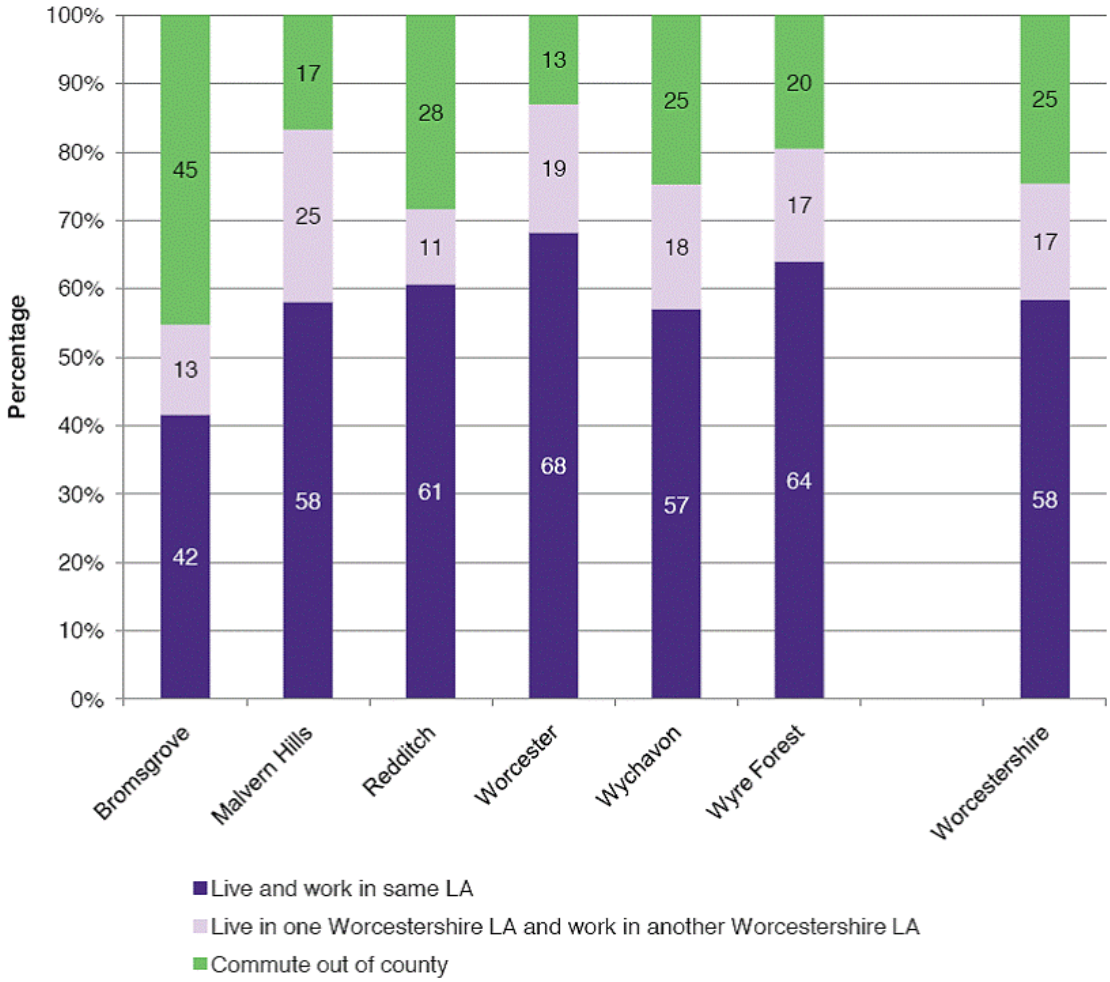
Figure 3.1 – Net Commuting in Worcestershire (2001)

Authority	Net commuting
Bromsgrove	404
Malvern Hills	-3,097
Redditch	612
Worcester	5,635
Wychavon	1,001
Wyre Forest	-4,555

A negative figure indicates that more people commute out of the authority than into it.
Source: Office for National Statistics, 2001. Census.

3.6.3 Figure 3.2 identifies commuting patterns of Worcestershire residents by district, again sourced from the Census of 2001. This indicates that 42% of Bromsgrove's residents live and work in Bromsgrove District.

Figure 3.2 – Commuting Patterns in Worcestershire by District (2001)



Source: Office for National Statistics, 2001. Census.

4. Socio-Demographic Characteristics

KEY FACTS – Socio Demographic Characteristics

- ***Transport issues are 3 of the 5 most important issues for residents in Bromsgrove (Viewpoint Survey, 2011)***
- ***The residents with higher incomes live in periurban / rural areas and have higher levels of car ownership***
- ***The residents with lower incomes live in central urban areas and have lower levels of car ownership***
- ***The average weekly spend on transport in the Package area is £28.90, this is likely to increase as a result of global economic factors and the performance of the transport network worsens***
- ***Bromsgrove has a higher than average (Worcestershire) percentage of working age residents****. The current demographic profile for the study area suggests that over 60% of residents are aged between 16 and 64. Also, 29% of residents are aged under 24. This means that trips on the transport network are generated for journeys to work in the peak hours*
- ***Bromsgrove has an ageing population.*** *The population in Bromsgrove is forecast to significantly change the demographic profile, from a predominantly young population, to a much older one where over 40% of residents are aged over 65.*
- ***Bromsgrove residents are relatively affluent.*** *75% of residents fall are classified by ACORN data as being at least 'comfortably off'.*
- ***Car ownership in Bromsgrove is the highest in Worcestershire.*** *88% of Bromsgrove's residents have access to a car and 85% use their cars to access employment opportunities.*
- *Passenger transport is essential for a proportion of the population to access employment opportunities*

4.1 The Demography of Bromsgrove

4.1.1 Bromsgrove occupies an enviable location in the heart of the West Midlands, and subject to congestion and levels of passenger transport services should be easily accessible using the region's strategic road and passenger transport infrastructure. The accessibility of the town by passenger transport and the highway network has a direct influence on travel choice and the social and economic characteristics of the town. Social and economic factors also have an influence on trip generation and demand on the local (Bromsgrove) and strategic transport network. .

4.2 The Social Characteristics of Bromsgrove

4.3 ACORN Categories

4.3.1 ACORN[1] data enables profiling of the population on the basis of social and economic factors. A profile of the population based on ACORN categories is provided in Figure 4.2 .This data identifies that Bromsgrove residents are relatively affluent, with approximately 75% in the Wealthy Achievers, Urban Prosperity and Comfortably Off categories. This is similar to the Worcestershire average, although higher than the UK average. The distribution of Wealthy Achiever and Hard-Pressed households in the Package area are illustrated in Figures 4.1 - 4.4.

4.3.2 The data provided in Figure 4.2, and illustrated in Figures 4.3 and 4.4 indicates that:

- *75% of the Package area population (Wealthy Achievers, Urban Prosperity and Comfortably Off) more likely to have higher car ownership and longer commute (by all modes) = greater trip generation on strategic network (highway and PT)*
- *25% of the Package area population (Moderate Means, Hard Pressed) –lower car ownership, shorter journeys to work, greater demand for local and inter-urban PT services and local highway network. Wealthy Achiever households are located in periurban/ rural areas in close proximity to the strategic highway network and railway stations (Bromsgrove and Barnt Green stations). These areas are less accessible by passenger transport services (bus) as demonstrated in Section 7, therefore these areas have a greater reliance on the car, and this is reflected in high car ownership levels in these areas.*
- *Hard Pressed households are located in locations with relatively better levels of passenger transport accessibility (as illustrated in Section 7), in close proximity to the passenger transport network. These households are located in areas where dependence on the car is lower; this is reflected in car ownership levels.*

4.3.3 The above supports the findings of Section 3, which identified that there were a high proportion (58%) of residents commute out of Bromsgrove district to access (seemingly high paid) employment.

[1] For further information about ACORN data, please visit www.caci.co.uk/acorn-classification.aspx.

Figure 4.1 – ACORN Population Classification in Bromsgrove

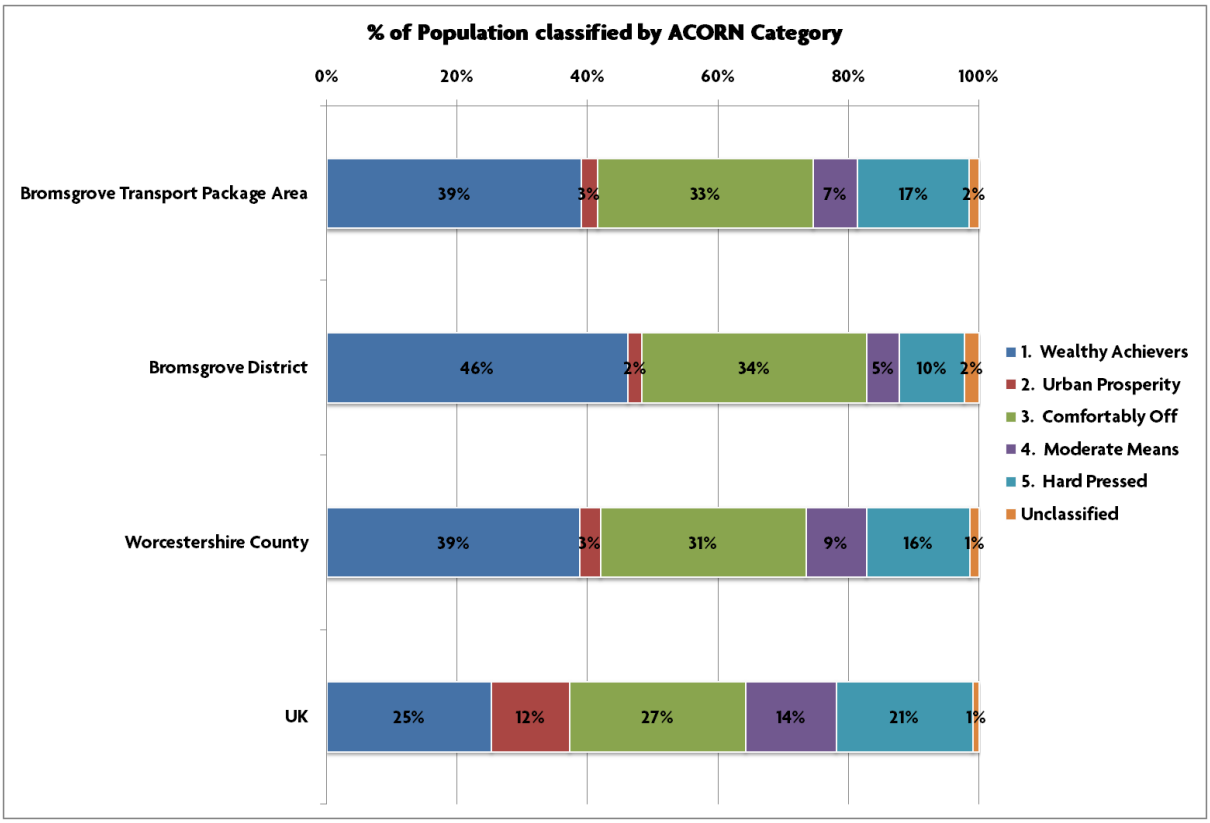


Figure 4.3 – Distribution of Wealthy Achiever Households in Bromsgrove – Percentage of Households within Output Area

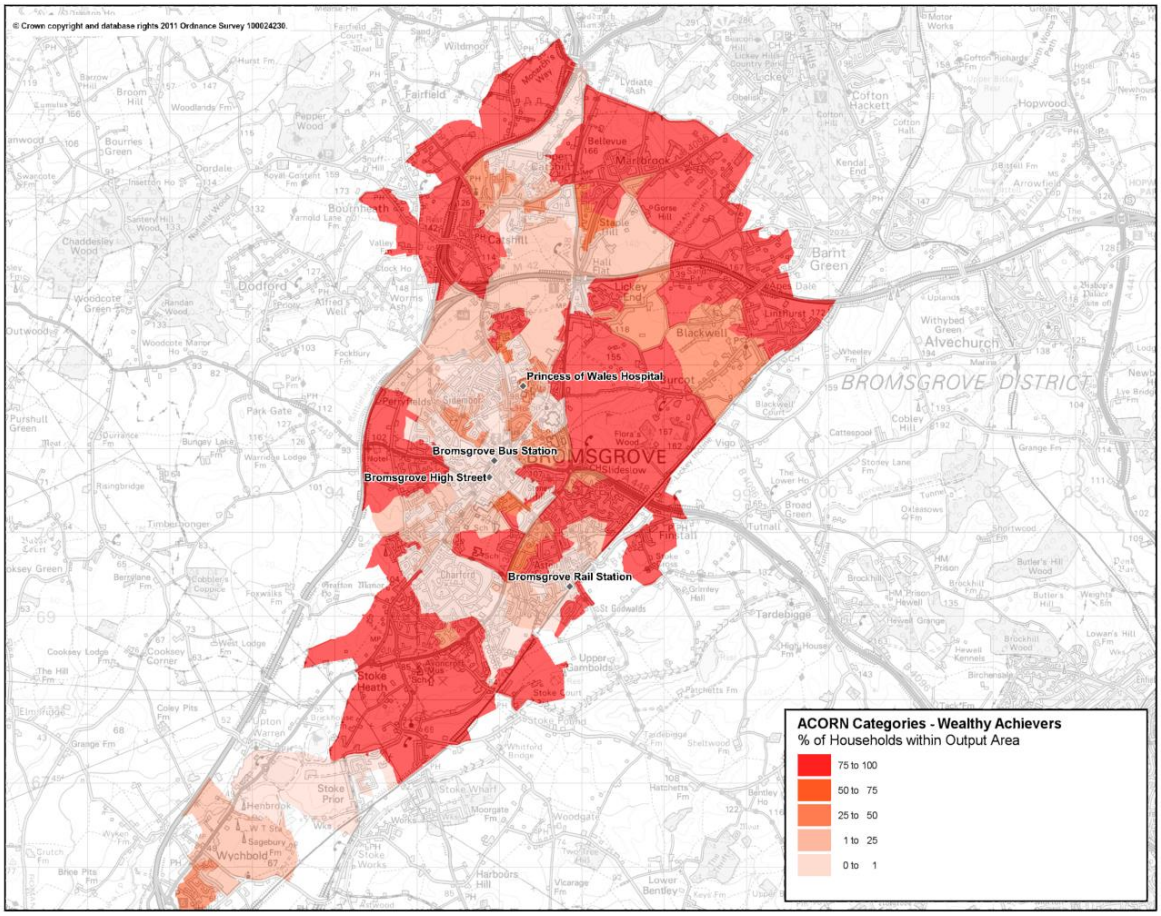
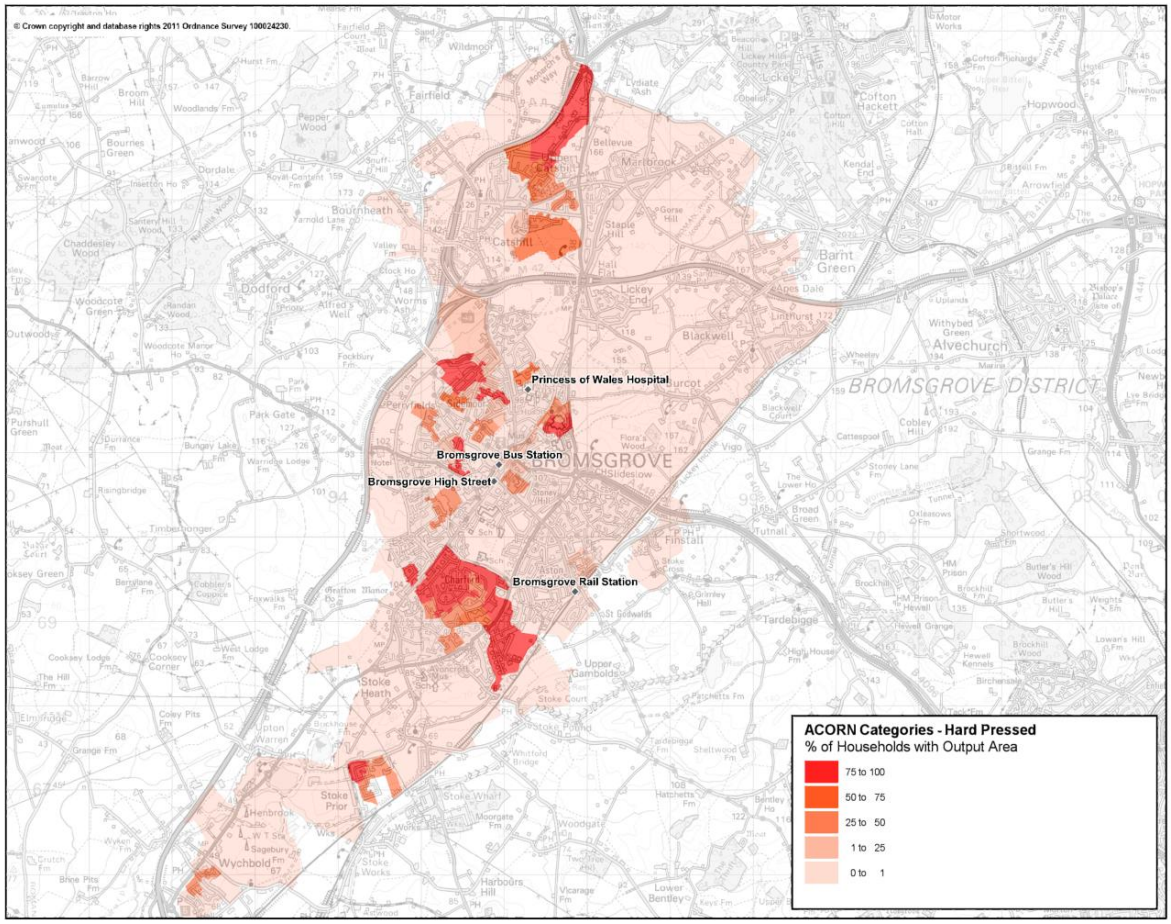


Figure 4.4 – Distribution of Hard-Pressed Households – Percentage of Households within Output Area



4.3.4 The location and distribution of higher and lower income households has different implications for the transport network of Bromsgrove:

- *Higher income households are located in more car dependant locations; and therefore generate a greater number of vehicular trips on the local (Bromsgrove) and strategic highway network for all trip purposes*
- *Lower income households are located in more central and less car dependant locations therefore generate trips by all modes on the local (Bromsgrove) and strategic transport network*

4.3.5 The trip generation and travel choice of these households is influenced by a range of other social and economic factors which are discussed in the following sections.

4.4 Income and Economic Activity

4.4.1 The mean income of those living within Bromsgrove District (residence earnings), and the mean income of people employed within the District (workplace earnings) provides an indication of the nature of journey to work, in particular the volume and distribution of commuter trips on the local (Bromsgrove) and strategic transport network.

4.4.2 Table 4.1 indicates that residence-based earnings in general are higher than workplace earnings across Worcestershire, with the exception of Redditch. The largest differential can be seen in Bromsgrove where, the average (mean) annual earnings of people who work within the District is £20,229 compared with the average annual earnings for residents of Bromsgrove District, which is £28,063 (ASHE, 2010). This suggests that a proportion of the population in the District are employed outside of the District, whereas the remained of the population work within the District. This results in:

- *Greater generation of commuting trips of a longer distance*
- *Demand on the local and strategic transport network*

4.4.3 The mode choice for these journeys is influenced by the performance of the local and strategic transport network, car ownership and the accessibility, location and type of employment opportunities.

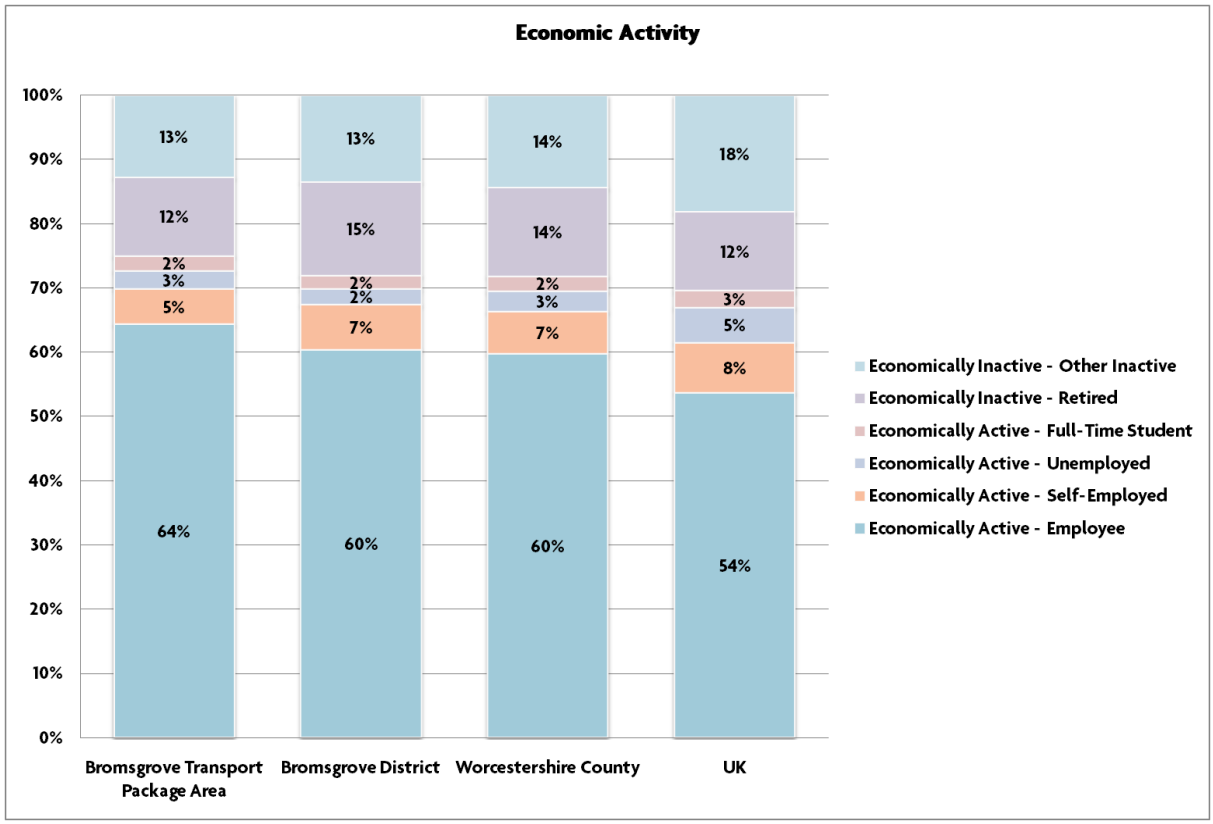
Table 4.1 – Annual Mean Earnings for all Employees by District (Source: ONS, 2010)

Annual Mean Earnings for all Employees by District (2010)			
District	Residence Based Earnings	Workplace Based Earnings	% Difference between Residence and Workplace Earnings
Bromsgrove	£27,995	£20,229	38%
Malvern Hills	£28,063	£21,395	31%
Redditch	£20,656	£23,290	-11%
Worcester City	£24,248	£22,205	9%
Wychavon	£25,947	£22,254	17%
Wyre Forest	£22,259	£17,788	25%
Worcestershire	£24,800	£21,455	16%

4.4.4 The economic activity / inactivity of the population have an influence upon the demand on the transport network during different time-periods (peak, inter-peak). In the Package area 75% of the population is Economically Active, whilst 25% of the population is Economically Active (see Figure 4.5). The data provided below demonstrates that:

- *Demand on the transport network will be greatest in the peak hours for journeys to work and training opportunities from the Economically Active population (75%)*
- *Inter-peak demand on the transport network will be greatest from the Economically Inactive population to access health and social opportunities*

Figure 4.5 – Economic Activity – Percentage of Population Economically Active / Inactive



Source: ACORN, 2011

4.4.5 The demand on the transport network will be greatest in the AM and PM peak time-periods as a result of journeys to employment. The impact of this demand on the local and strategic network will vary depending upon the Normal mode of transport to work. This is discussed in the following section.

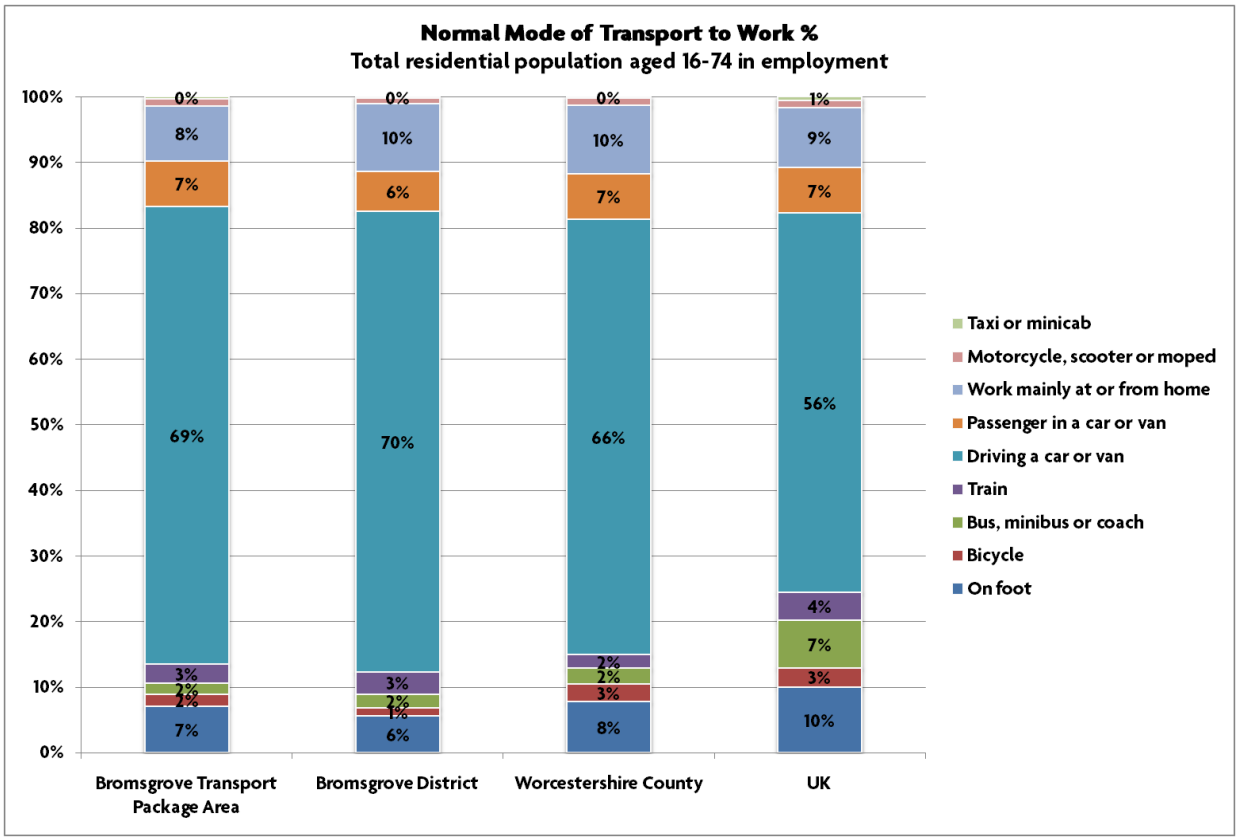
4.5 Journey to Work – Mode of Travel

4.5.1 Figure 4.6 illustrates the primary mode of transport that those of working age in the Bromsgrove Transport Package Area use to get to and from their normal place of work. This data identifies a striking reliance on cars, vans or motorcycles, with approximately 85% either driving or travelling as a passenger to their place of work (of which 78% are drivers, and 7% are passengers). Approximately 8% work from home, with the remaining 7% walking, cycling or using passenger transport to get to work. This is significantly lower than the UK and (to a lesser extent) Worcestershire averages for walking, cycling and passenger transport.

4.5.2 This data suggests that:

- *Passenger transport (bus and rail) demand is currently low compared to the UK average.*
- *Car use is high in the Bromsgrove Transport Package study area. This suggests that highway infrastructure offers an attractive means of accessing employment, whereas existing public transport, walking and cycling infrastructure and levels of service are not sufficiently attractive (in terms of the convenience and costs of travel) to support and promote modal shift.*

Figure 4.2 – Mode of Travel to Place of Work



4.5.3 Figures 4.7, 4.8 and 4.9 illustrate the locations where demand on the transport network from each mode of travel to work is generated.

Figure 4.7 – Journey to Work by Car – Percentage of People within Output Area using Car (driver and passenger)

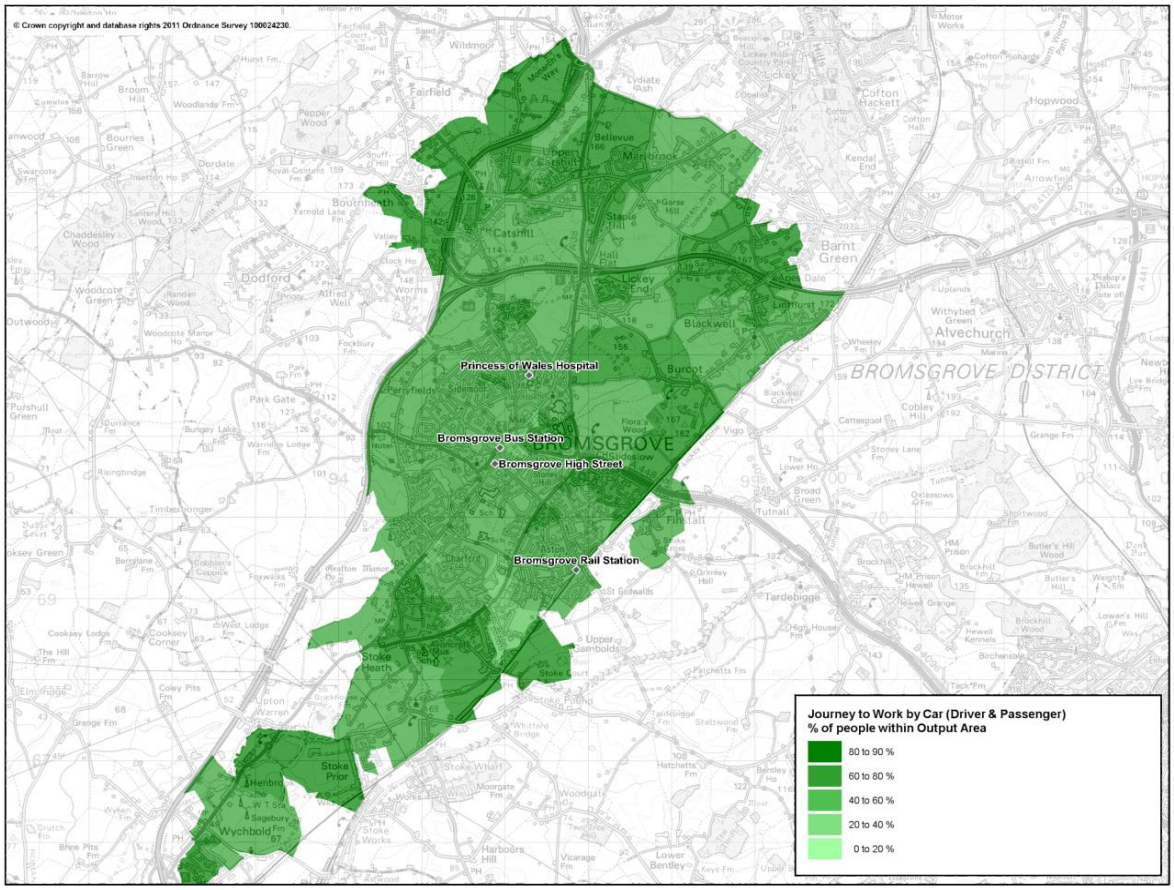


Figure 4.8 – Journey to Work by Bus – Percentage of People within Output Area using Bus

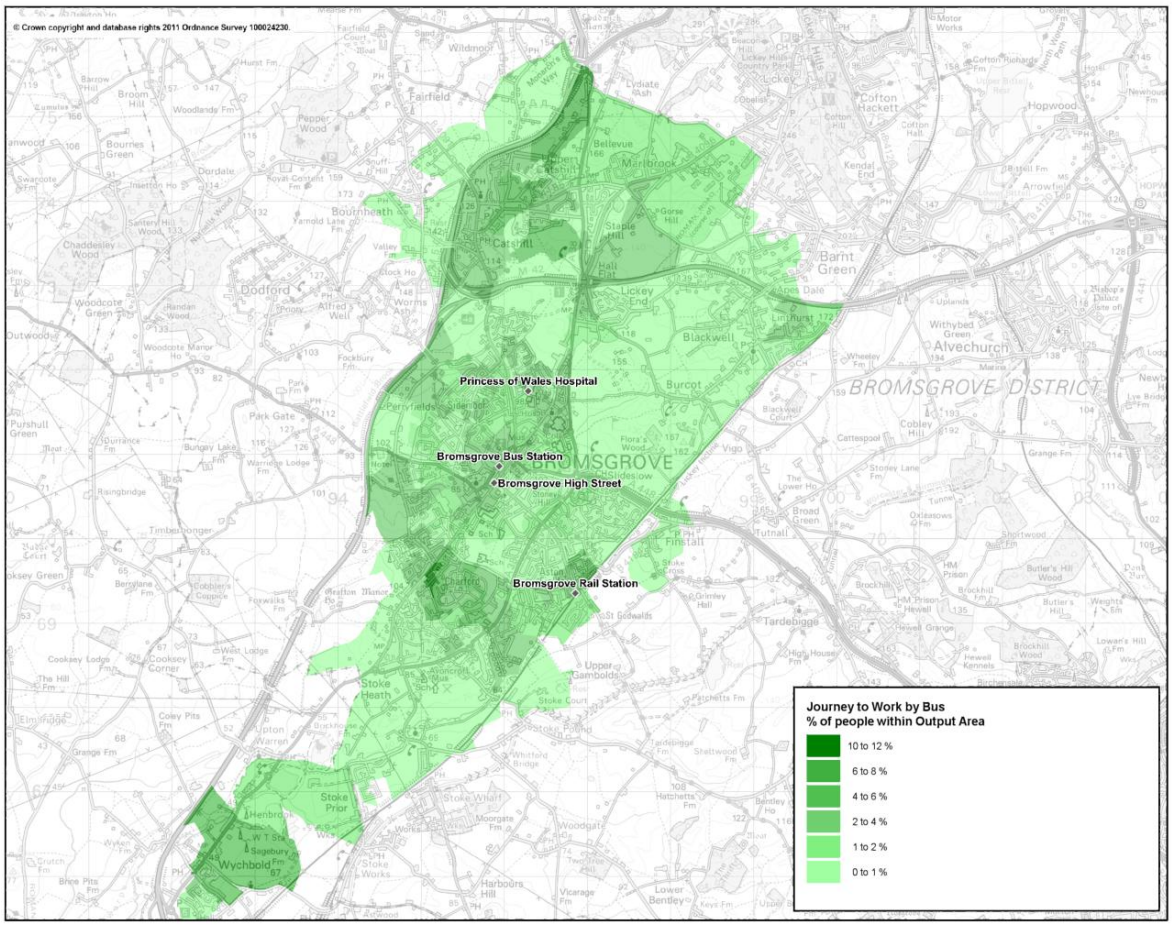
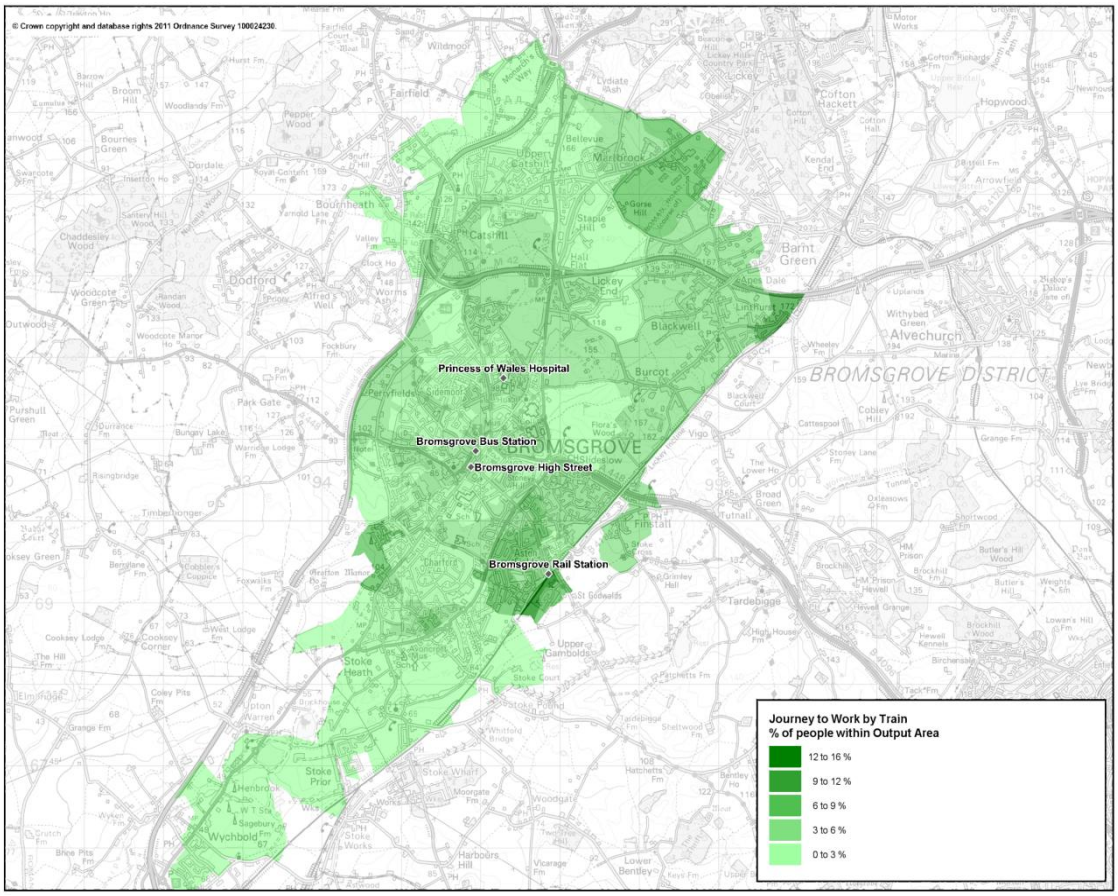


Figure 4.9 – Journey to Work by Rail – Percentage of People within Output Area using Rail



4.5.4 The data presented in Figures 4.7, 4.8 and 4.9 above illustrate that:

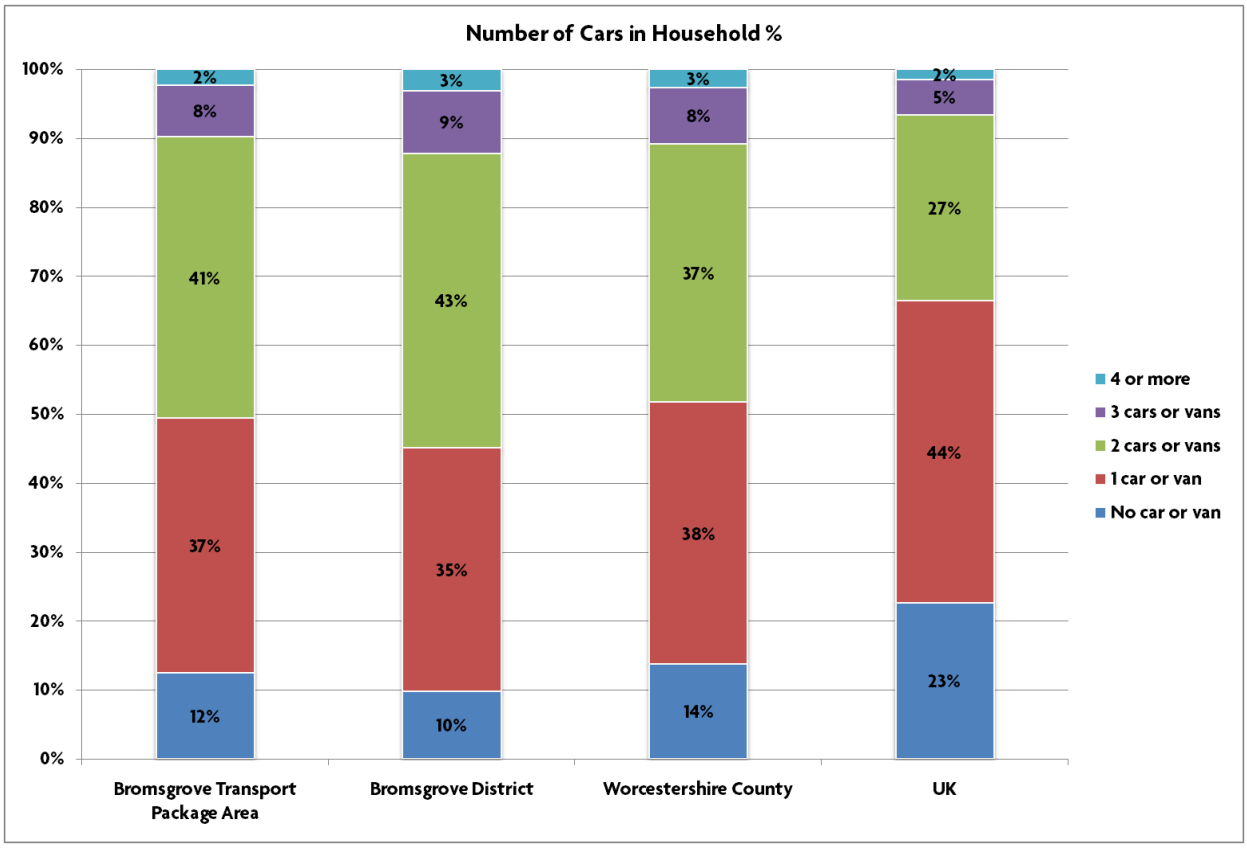
- *Journeys to work by car are undertaken by a minimum of 20% of the population in the output areas. This percentage is higher in the periurban / rural locations in the Package area*
- *The number of people travelling to work by bus is highest from the Charford, Sidemoor and Catshill areas*
- *The highest numbers of people travelling to work by rail are located in close proximity to Bromsgrove and Barnt Green rail stations. These areas are in central Bromsgrove and periurban areas.*

4.5.5 The data illustrates that the car is the dominant mode of transport to work from the Package area, however the use of bus and rail is highest in locations which are in close proximity to inter-urban bus and rail services.

4.6 Car Ownership

4.6.1 Figure 4.10 illustrates the level of car ownership in the Bromsgrove Transport Package Area, compared with Bromsgrove District, Worcestershire and the UK. The data identifies that household car access in Bromsgrove is very high, with 88% of all households enjoying access to at least one car. Conversely, some 12% of households do not have access to a car, which will make these households more reliant on non-car alternatives, such as passenger transport, walking and cycling. The percentage of households with no / one car is higher in the Package area than the District; this indicates that car ownership is higher across Bromsgrove Districts.

Figure 4.10 - Number of Cars per Household (%)



4.6.2 The data provided in Figure 4.11, 4.12 and 4,13 below illustrate the distribution of car ownership for households across the Package. Car ownership levels illustrate the following:

- *Locations where impacts on the highway network would be highest*
- *Locations where demand for passenger transport, walk and cycle services and infrastructure would be higher*
- *Length of trips to access social and economic opportunities and key services and facilities*

4.6.3 The distribution of car ownership levels has an influence on mode choice, demand on the transport network (highway and passenger transport) and is influenced by the performance of the transport network and social and economic factors such as those included in the ACORN categories discussed above.

Figure 4.11 – No Car/Van per Household – Percentage of Households within Output Area with No Car/Van

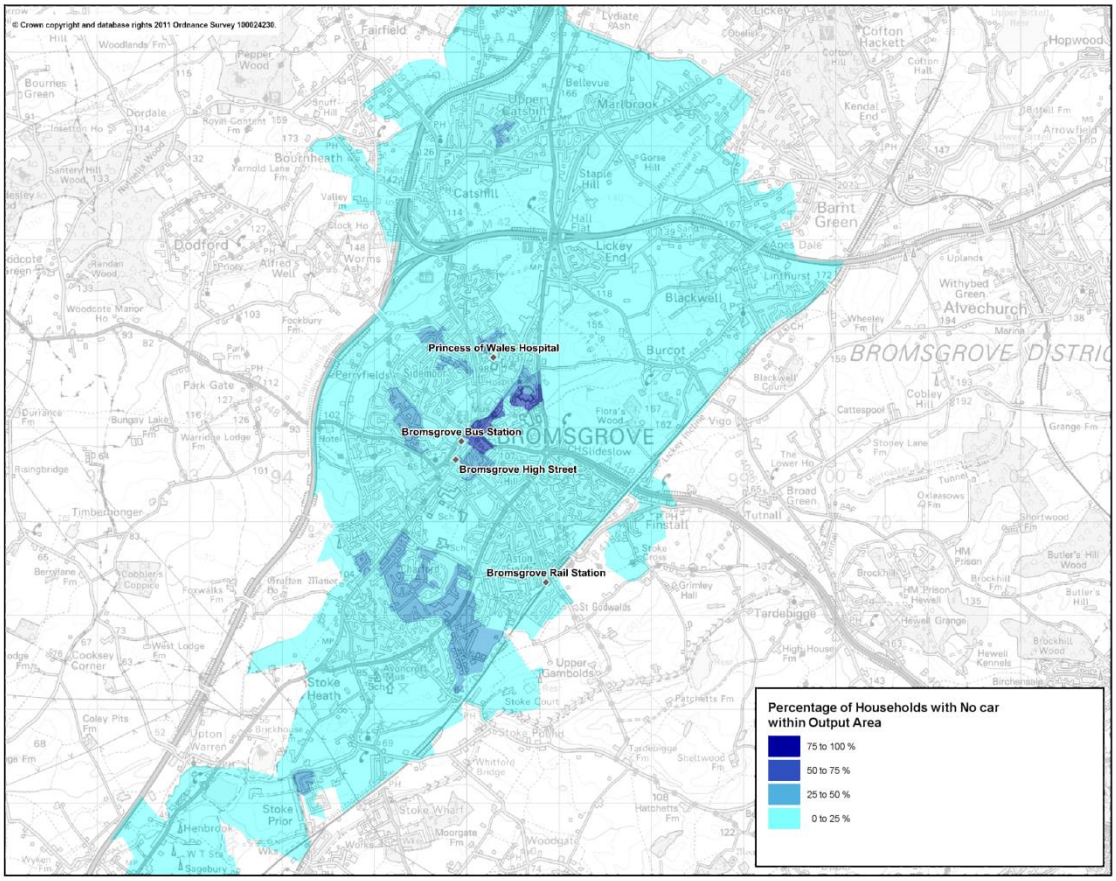


Figure 4.12 - One Car/Van per Household – Percentage of Households within Output Area with One Car/Van

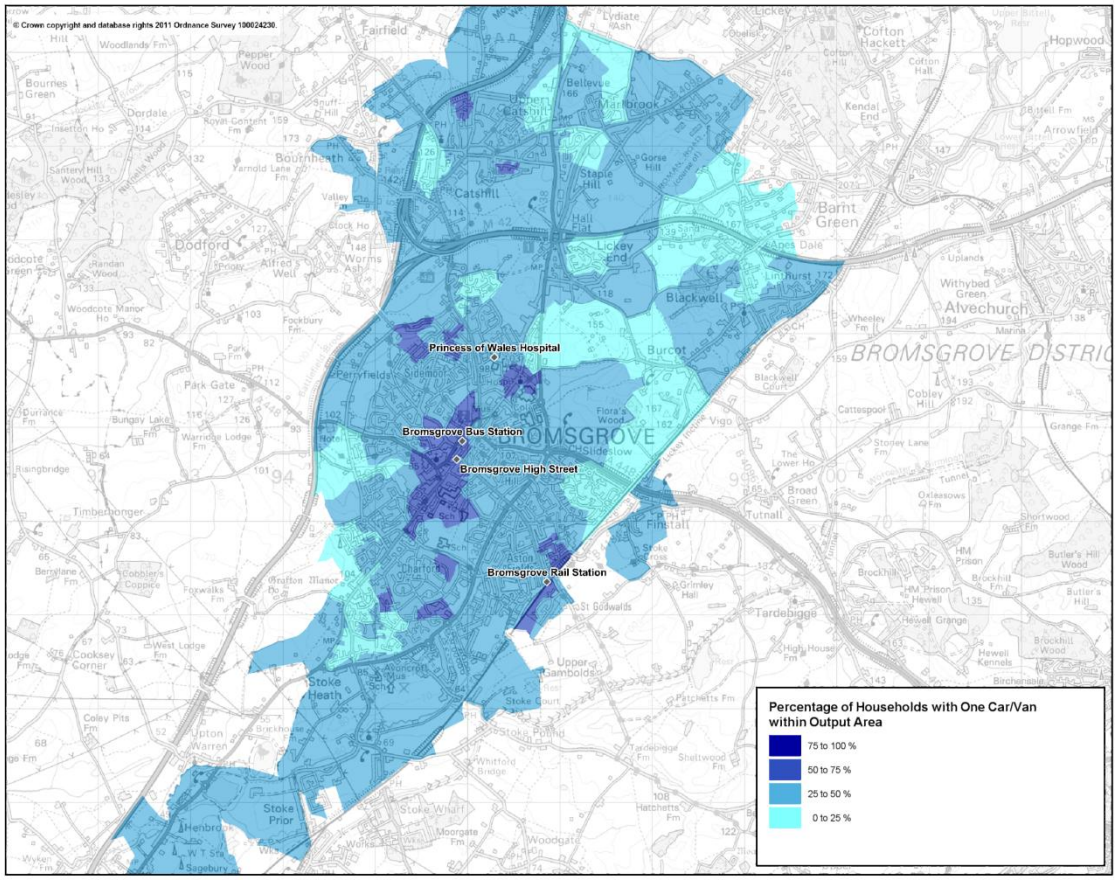
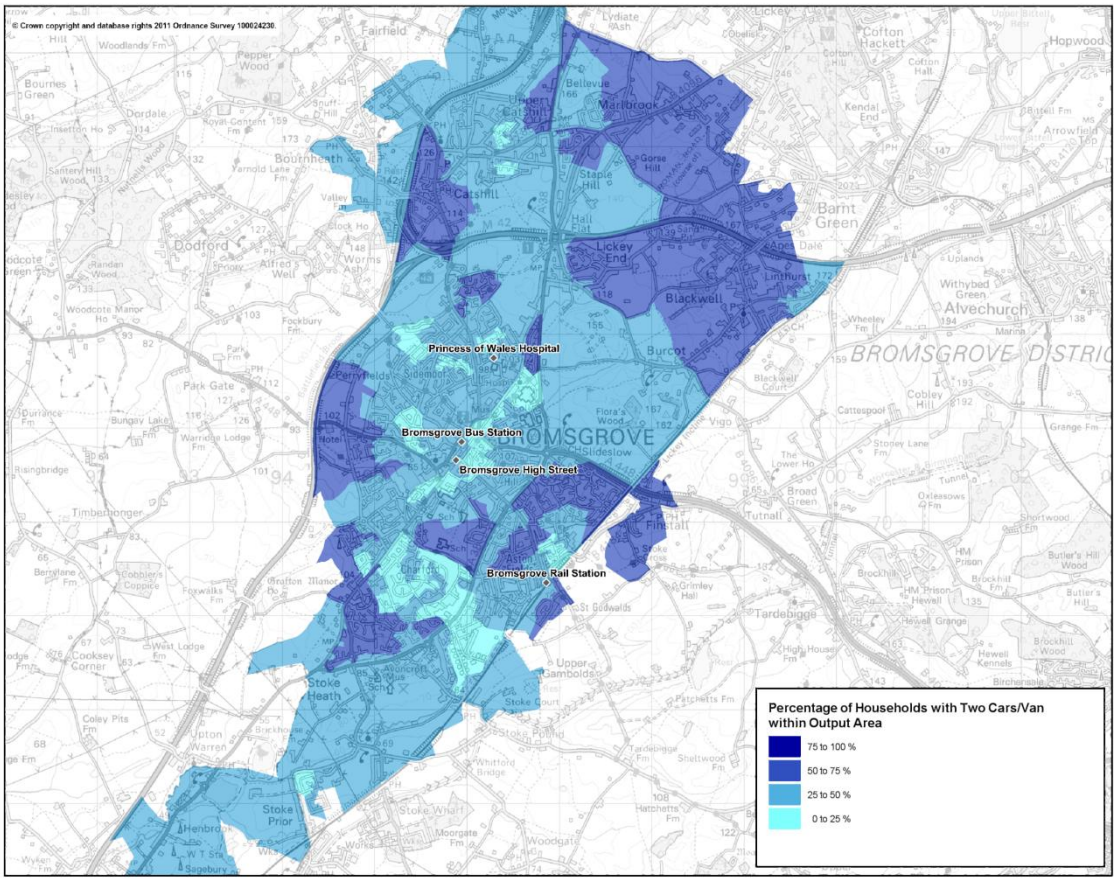


Figure 4.13 - Two Cars/Vans per Household – Percentage of Households within Output Area with Two Cars/Vans



4.6.4 The data provided in Figures 4.11, 4.12 and 4.13 illustrates:

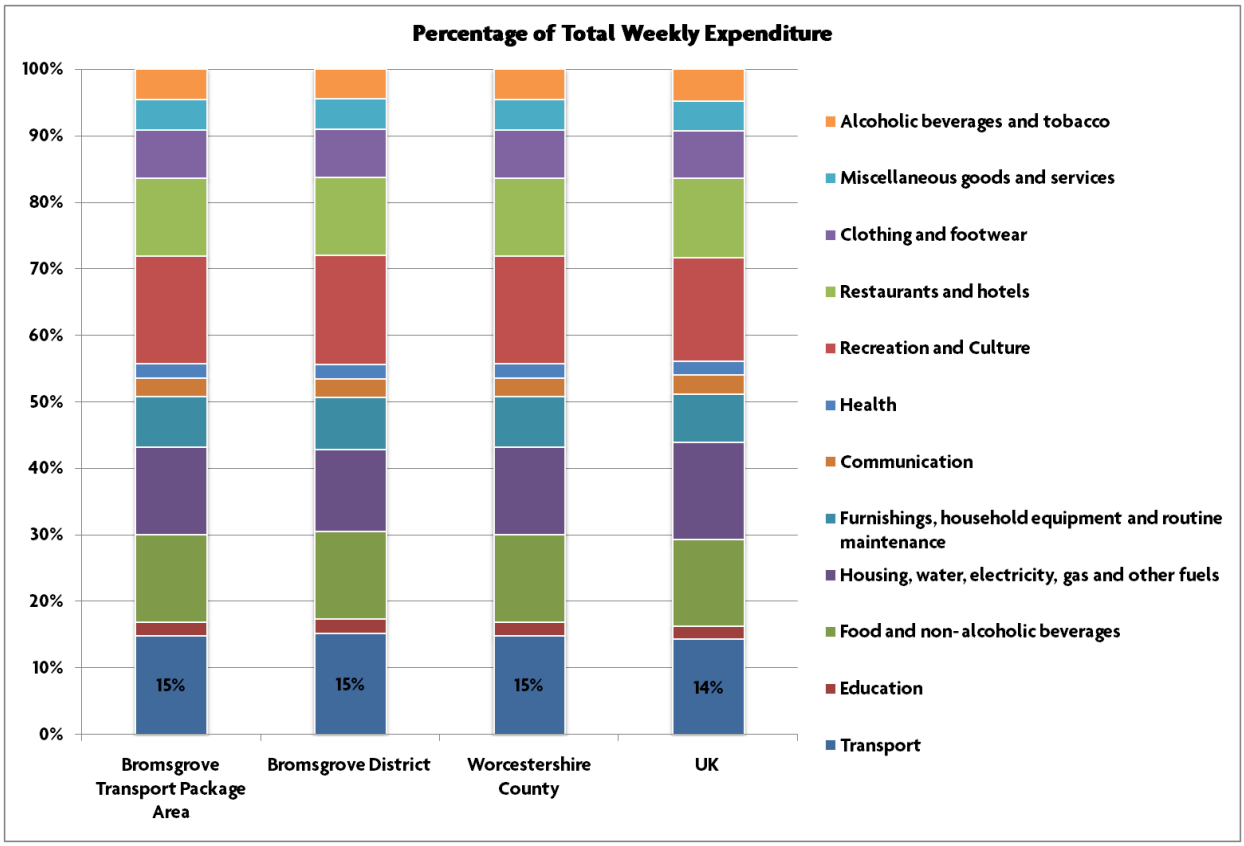
- *Households with low car ownership (no / one car) are concentrated within the town, in particular: Charford, Sidemoor, town centre and close proximity to Bromsgrove railway station. These are areas where the 25% of lower income households are located.*
- *Higher numbers of households with access to two cars are concentrated in the periurban and rural areas. These areas are where the 75% higher income households are located.*

4.7 Household Weekly Expenditure

4.7.1 Figure 4.13, derived from ACORN data, identifies weekly expenditure for the population of Bromsgrove. It is interesting to note that average weekly expenditure on transport in the Bromsgrove Town Package area 15% of total weekly household expenditure which is broadly similar to Worcestershire and UK averages.

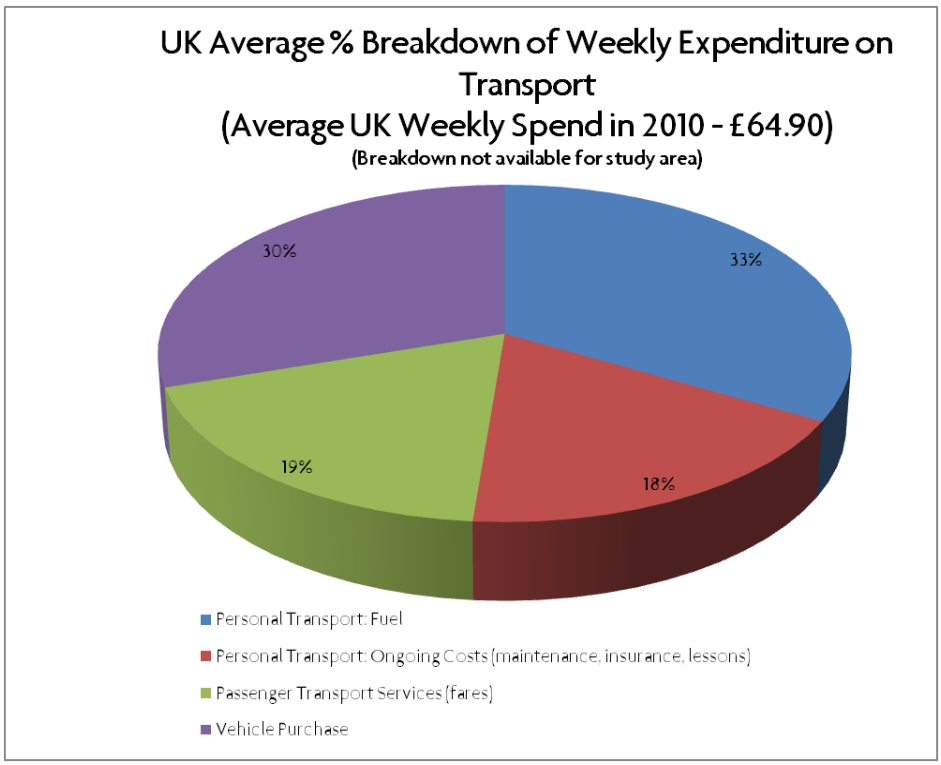
4.7.2 The UK average breakdown of transport weekly spend is provided in Figure 4.15. This data illustrates that spending on personal transport (car) is 61% of household spend on transport per week, whilst spending on public transport fares is 19%. The data demonstrates that average households expenditure on the private car equates to average of 9% of total weekly expenditure. Costs will influence current and future car and passenger transport demand, particularly if costs rise resulting from global economic factors. Transport costs are also influenced by the performance of the local and strategic transport network.

Figure 4.13 - Average Total Household Weekly Expenditure



Source: ACORN, 2011

Figure 4.15 – Weekly Expenditure on Transport – UK Average % Breakdown (car costs – fuel, maintenance, Passenger Transport fares, vehicle purchase) Source: Family Expenditure Survey, ONS, 2010

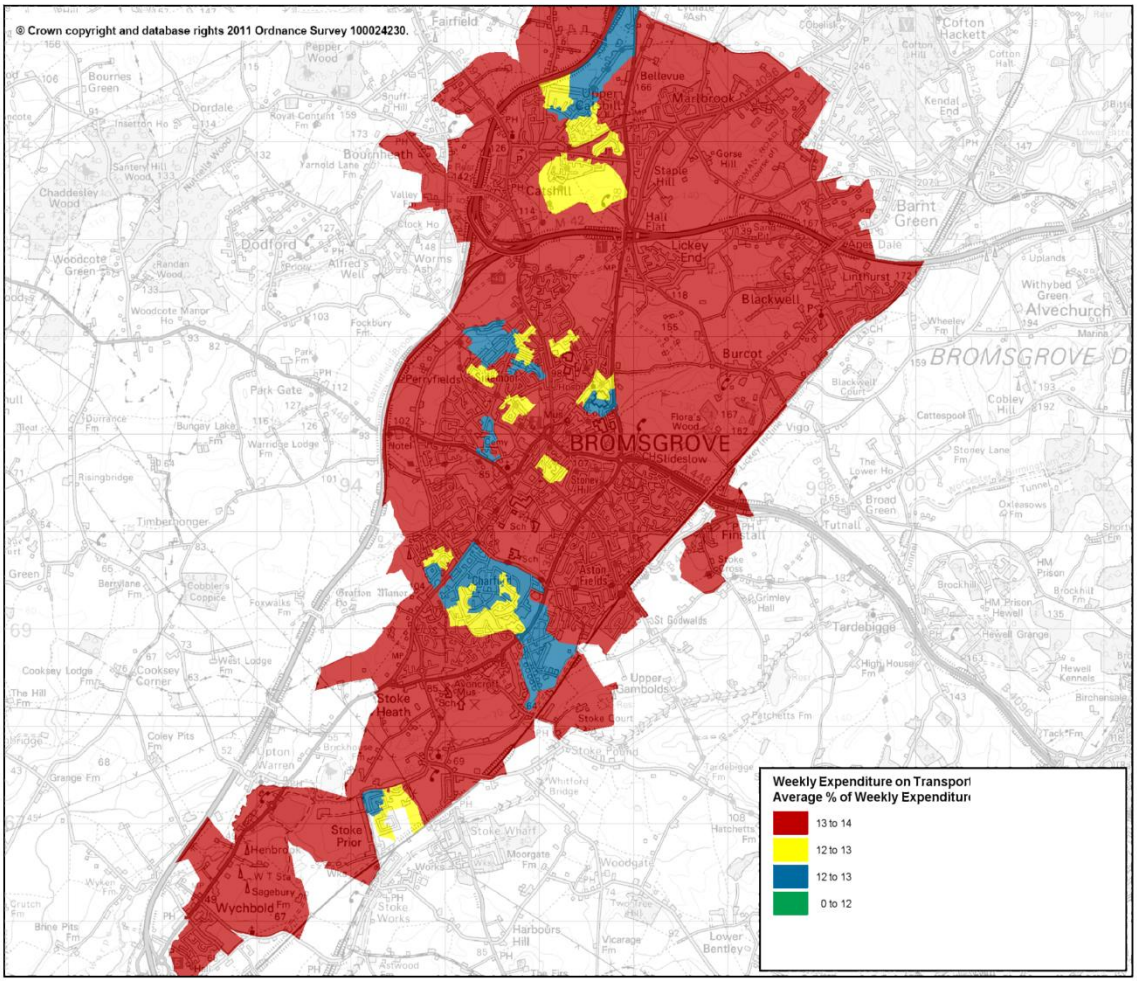


4.7.3 Figure 4.16 below illustrates the differentiation between areas based upon weekly spends on transport as a percentage of total weekly spend. The data illustrates that:

- *Across the majority of the Package area, transport is on average 13 - 14 % of weekly household expenditure*
- *The areas where spend on transport is lower are Charford, Sidemoor and Catshill. These areas also have lower car ownership and higher number of lower income households*

4.7.4 The data demonstrates that there is a correlation between household income, as discussed above, and expenditure on transport. The level of car ownership is also a key factor influencing household expenditure on transport.

Figure 4.16 - Average Weekly Spend on Transport in the Bromsgrove Area – Transport as a Percentage of Total Weekly Spend by Output Area



4.8 Areas of Highest Need

4.8.1 Figure 4.17 illustrates the areas in Bromsgrove which have been identified as Areas of Highest Need. These areas have been identified as areas in which issues relating to health, access to employment, education and training, crime and anti-social behaviour and access to services are particularly acute.

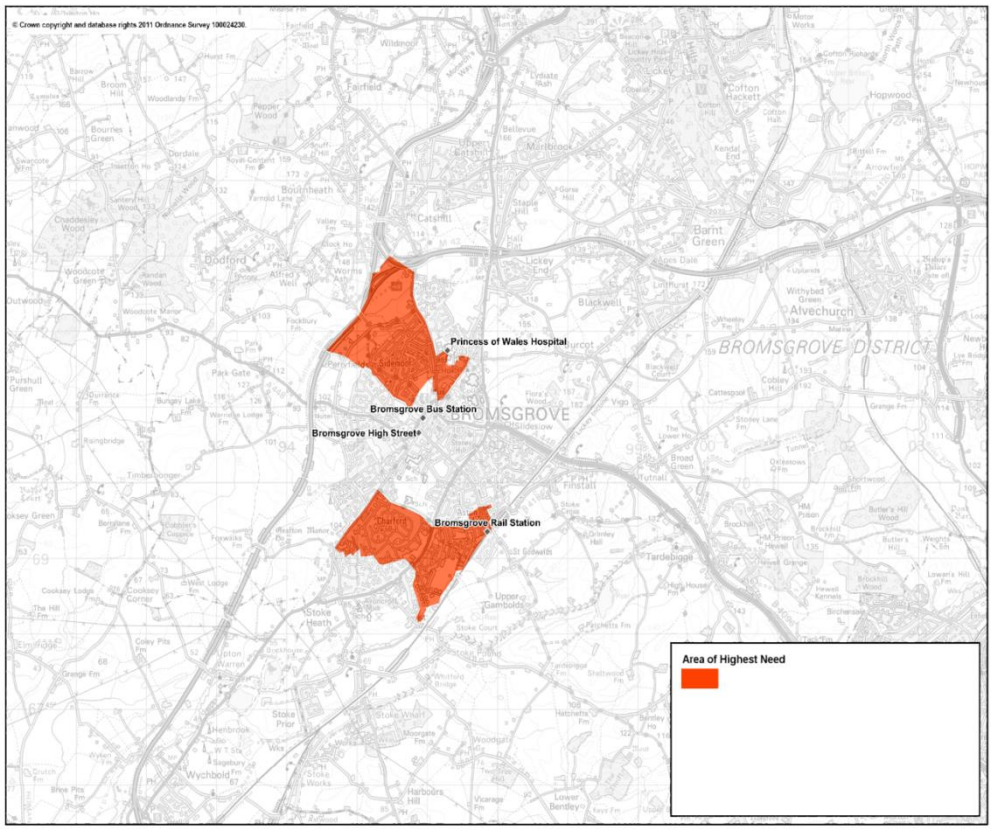
4.8.2 These areas also have lower levels of car ownership, greater dependence upon passenger transport to access employment and social opportunities and are located in relatively accessible areas as demonstrated in Section 7. The provision of alternatives to the car is important in order to address some issues in these Areas of Highest Need, in particular for providing access to training, employment and social opportunities.

4.8.3 These areas correspond with areas identified in the data presented above, these areas generally have:

- *Higher concentration of lower income households*
- *Greater number of people using the passenger transport network to access employment*
- *Lower car ownership*
- *Lower average household expenditure on transport per week*

4.8.4 This means that these areas are less dependent, and rely upon the passenger transport network to access local and strategic employment opportunities and other social and economic opportunities.

Figure 4.17 - Map Showing Areas of Highest Need in Bromsgrove



Source: Worcestershire County Council, LAA, 2011

4.9 Worcestershire Viewpoint Survey 2011

4.9.1 The Worcestershire Viewpoint survey undertaken in 2011 includes responses which specifically relate to the transport. The data in Figure 4.18 illustrates that the transport network is a high priority for residents of Bromsgrove – resident's priorities cover all elements of the transport network.

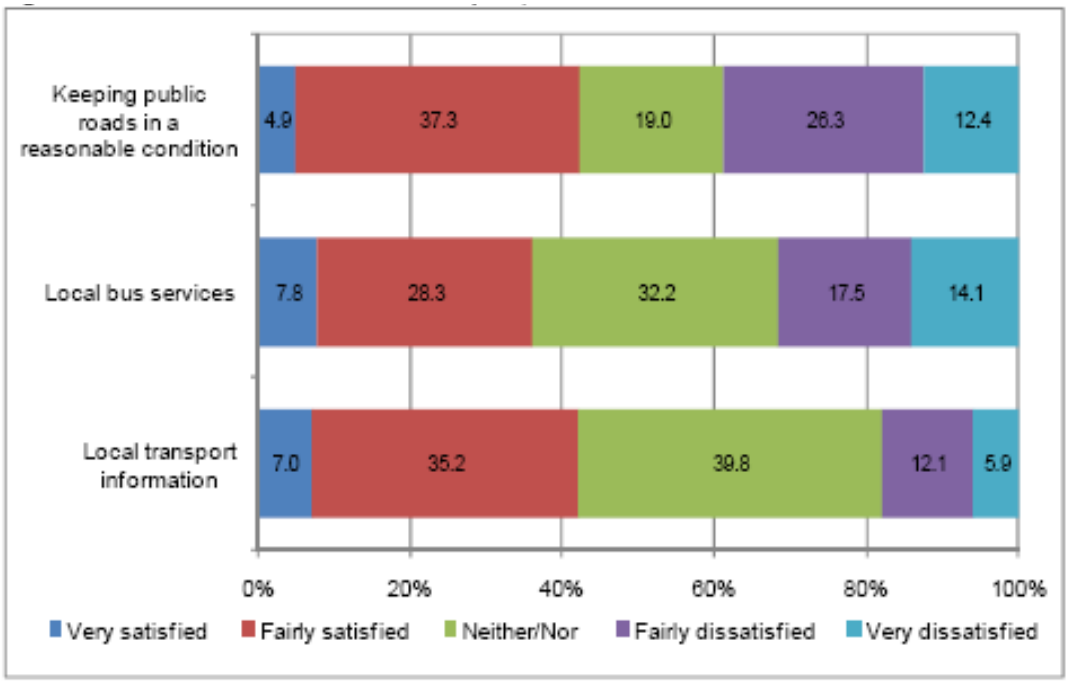
Figure 4.18 - Top 5 'things that need improving' by District – Respondent's Views (Viewpoint Survey 2011)

	1st	2nd	3rd	4th	5th
Bromsgrove	Road/ Pavement Repairs	Level of Traffic Congestion	Activities for Teenagers	Public Transport	Job Prospects
Malvern Hills	Road/ Pavement Repairs	Public Transport	Activities for Teenagers	Job Prospects	Level of traffic Congestion
Redditch	Road/ Pavement Repairs	Activities for Teenagers	Job Prospects	Level of Crime	Clean Streets
Worcester City	Level of Traffic Congestion	Job Prospects	Road/ Pavement Repairs	Public Transport	Activities for Teenagers
Wychavon	Road/ Pavement Repairs	Activities for Teenagers	Public Transport	Job Prospects	Affordable decent housing
Wyre Forest	Road/ Pavement Repairs	Job Prospects	Activities for Teenagers	Level of Traffic Congestion	Public Transport

Source: Worcestershire Viewpoint Survey, 2011, WCC (R&I, PEP)

4.9.2 The data provided in Figure 4.19 shows respondent's views on the satisfaction with local transport services in Worcestershire.

Figure 4.19 - Satisfaction with local transport Worcestershire – Respondent's Views (Viewpoint, 2011)



Source: Worcestershire Viewpoint Survey, 2011, WCC (R&I, PEP)

4.10 Age Profile

4.10.1 Figure 4.20 identifies the age profile for the study area. The results suggest that Bromsgrove has a larger percentage of infants, children, teenagers and young adults (under 24) than the Bromsgrove District and Worcestershire averages. It also has a larger percentage of residents between 16 and 64 (working age), which will result in high demand on the transport network in the peak hours for commute based journeys by all modes, the data provided above indicates that the majority of commuter trips made from the Package area are made by car.

4.10.2 Table 4.2 shows forecast population growth across Worcestershire and its six districts under four scenarios, with 2010 being the current scenario, and 2016, 2021 and 2026 forecast years. The data suggests that the population of Bromsgrove District (in which Bromsgrove is the largest settlement) is forecast to grow by approximately 10% by 2026 from 93,800 to 103,500 residents.

Figure 4.20 - Population by Age Group (%) in the Bromsgrove Transport Package Study Area

Table 4.2 - Forecast Population Growth in Worcestershire

Population	Forecast Year	Worcestershire	Worcestershire Percentage Composition	Worcestershire Percentage Forecast Year Percentage Change	Bromsgrove District	Bromsgrove District Percentage Composition	Bromsgrove District Percentage Forecast Year Percentage Change
Total Population	**2010**	558.600	100%	-	93.800	100%	-
	2016	571.000	100%	2.22%	97.000	100%	3.41%
	2021	583.700	100%	2.22%	100.300	100%	3.40%
	2026	596.100	100%	2.12%	103.500	100%	3.19%
	2010 - 2026			6.57%			10.00%
Age 0- 14	**2010**	94.500	17%	-	16.000	17%	-
	2016	94.000	16%	-0.53%	16.200	17%	1.25%
	2021	95.100	16%	1.17%	16.700	17%	3.09%
	2026	94.200	16%	-0.95%	16.800	16%	0.60%
	2010 - 2026			-0.31%			4.94%
Age 15- 64	**2010**	356.900	64%	-	59.300	63%	-
	2016	347.700	61%	-2.58%	58.900	61%	-0.67%
	2021	346.400	59%	-0.37%	59.300	59%	0.68%
	2026	346.200	58%	-0.06%	59.900	58%	1.01%
	2010 - 2026			-3.01%			1.02%
Age 65 Plus	**2010**	107.200	19%	-	18.500	20%	-
	2016	129.300	23%	20.62%	22.000	23%	18.92%
	2021	142.200	24%	9.98%	24.200	24%	10.00%
	2026	155.600	26%	9.42%	26.600	26%	9.92%
	2010 - 2026			40.02%			38.84%

Source: Mid 2008 Population Estimates, ONS, 2010

4.10.3 It is particularly important to note that the majority of this forecast population growth is expected to occur in the 65+ age group with a 40% forecast increase from 18,500 currently to 26,600 in future. This is likely to have a significant impact on travel choice in the district in future in terms of:

- *Changes in demand on the highway and passenger transport network, in particular changes to peak hour demand*
- *Access to key services and facilities by all modes of transport*
- *Mode choice, in terms of mobility*

4.10.4 The current population age structure indicates that there is a greater demand on the transport network for journey to work, however as the population in Bromsgrove is forecast age the demand on the transport network is likely to shift from commute based trips to all trip purposes.

4.11 Conclusions

4.11.1 The data provided in this section highlights that the social and economic characteristics of the Package area have an influence on the transport network in Bromsgrove, and vice versa. The data illustrates that:

- *Demand on the highway network in Bromsgrove is high in the peak hours due to high levels of out-commuting and high-levels of car ownership (particularly in periurban and rural areas)*
- *Demand on the passenger transport network is relatively lower however it is evident that bus and rail is used by people across the Package area to access employment, training and social opportunities*

4.11.2 The data provided above highlights that all elements of the transport network – highways, walk, cycle and passenger transport (bus and rail) – are critical in order for residents of Bromsgrove to access employment, training and social opportunities. The data however highlights that different demands on the transport network are generated by different socio-economic groups and from different locations.

5. Highway Network Performance

KEY FACTS – Highway Network Performance

- ***There are approximately 441,360 vehicle trips made through the Bromsgrove Transport Package Area network during a weekday 12-hour period. By 2026, this figure is forecast to grow by 20% to approximately 526,520.***
- ***During a 12-hour period, the cordon analysis shows that 45% of trips are travelling into Bromsgrove, whereas 55% are travelling out of the town.***
- ***Evidence suggests that inefficient junction design is the principal cause of congestion in Bromsgrove.*** *Key pinch points across the network include the Slideslow Roundabout and Parkfield Junction. Conversely, transport links are currently not over capacity.*
- ***On average over a 12-hour period, delay accounts for 23% of total journey times on the highway network***
- ***New Road, Stratford Road, Charford Road and Old Birmingham Road all experience congestion at their junctions with the A38 corridor, with significant queuing observed on all arms as a result of mainline (A38) route congestion.***
- ***School traffic is a major contributor to network delay in the AM peak.*** *Significant highway demand is generated in the proximity of all schools in the AM peak. This is particularly evident at junctions in the vicinity of Charford Road. This pattern of demand is not replicated in the PM peak, which is thought to be because the PM peak lies outside normal school hours.*
- ***If the Bromsgrove Core Strategy is approved, the town will grow significantly.*** *2,410 dwellings and 11.1 hectares of employment are proposed in the Bromsgrove Town Package Area between now and 2026.* ***This is anticipated to generate an approximate 20% uplift in traffic across the network.***
- ***Without investment in the transport network, Bromsgrove will suffer significant additional congestion, potentially to the point where the highway network will be gridlocked during peak and shoulder peak periods.*** *It will be essential that developers are required to undertake robust transport assessments, aligned with appropriate financial contributions to ensure that new developments do not cause detriment to the efficiency of the strategic and local transport network in the Bromsgrove Transport Package Area.*

5.1 Introduction

5.1.1 This section discusses the findings of the analysis of Highway Network Performance in the Bromsgrove Transport Package (BTP) area for the current year (2012) and a forecast year (2026). It sets out the highway related problems and issues which adversely impact on Bromsgrove residents, businesses and environment both now and in the future.

5.1.2 Measures developed as part of the BTP to address these (and other) issues will be tested in terms of highway capacity, delay and journey times to determine their impact on the network performance issues highlighted.

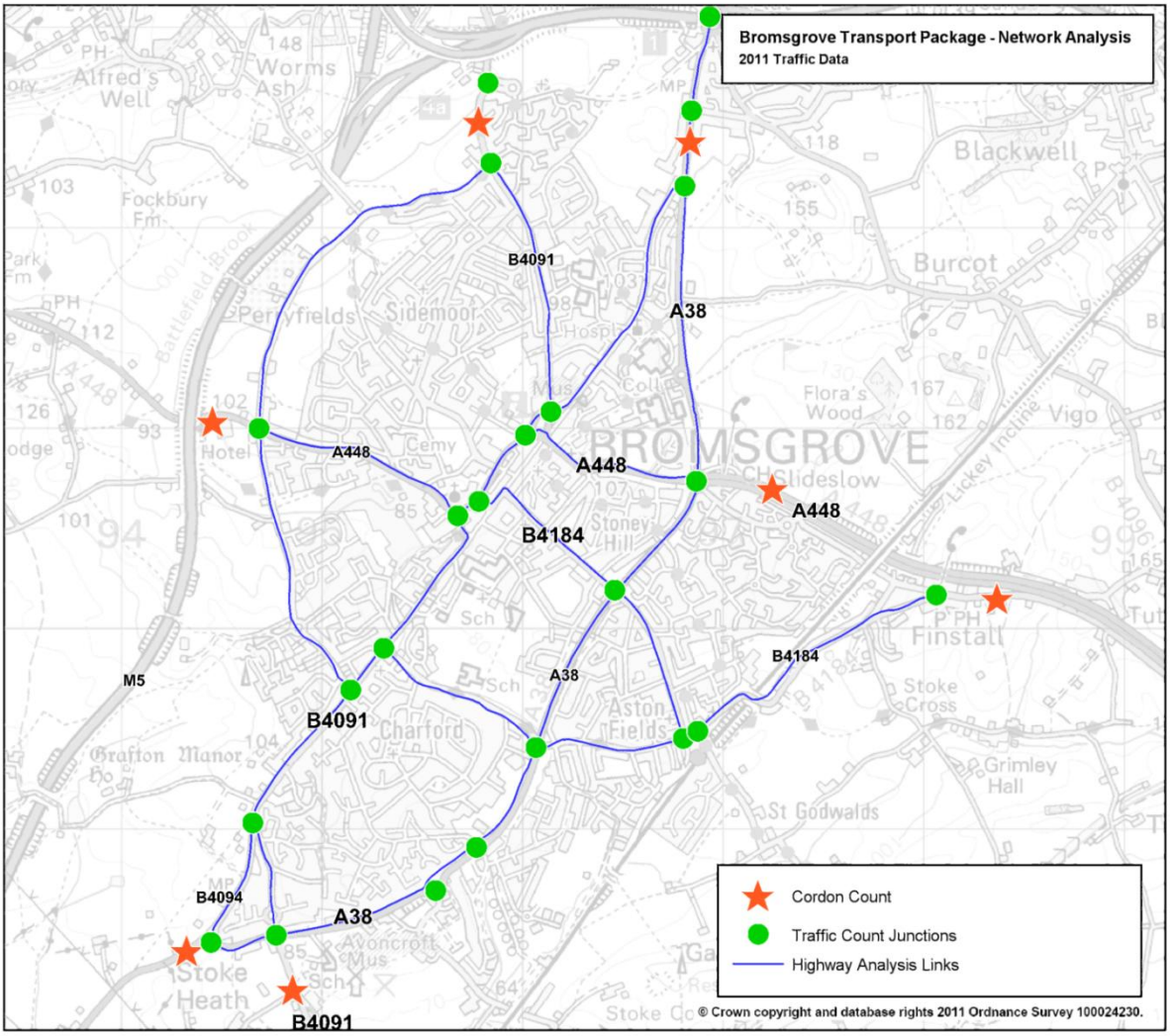
5.1.3 This assessment has been undertaken to highlight the performance of the highway network in terms of;

- *Highway Network Supply*
- *Link Performance*
- *Route Performance in terms of:*
    - *Current and future travel demand on the highway network*
    - *Queue Lengths*
    - *Journey Times and Delay*
    - *Cordon Counts*

5.2 Highway Network Supply

5.2.1 Bromsgrove's highway network comprises of a number of nationally important strategic routes (the M42 and the M5), regionally important routes (the A38 and the A448), and a wider network of local routes, linking residential, employment, retail and the wider rural hinterland into the strategic highway networks. Figure 5.1 illustrates the extent of the Bromsgrove Transport Package area highway network which is covered by this report.

Figure 5.1 – Bromsgrove Transport Package – Extent of Area Highway Network Covered by this Report



5.2.2 The local network within the Bromsgrove Transport Package area is comprised of:

- *1km of dual carriageway (A448)*
- *10.5km of single carriageway A roads (A38 & A448)*
- *9.5km of single carriageway B roads (B4091, B4184 and B4094)*
- *The remainder of the network is made up of minor (predominantly residential) roads*

5.2.3 There are **22** major junctions on the network (where significant traffic flows are observed), of which:

- ***5** are signalised*
- ***6** are gyratory (roundabouts)*
- ***11** are priority junctions.*

5.3 2011 Baseline Network Performance Assessment

Introduction

5.3.1 This section sets out the results of the 2011 baseline network performance assessment in terms of;

- *Global Network Statistics*
    - *Highway Network Demand – Max and Average flows during the AM Peak (08:00 – 09:00) /PM Peak (17:00 – 18:00) and 12 Hour (07:00 – 19:00) periods:*
        - *Junction Flows*
        - *Cordon Flows*
    - *Average, Max and Linear Queue Length Analysis*
- *Link Results*
    - *Link Demand – Max and Average flows during the AM Peak (08:00 – 09:00) /PM Peak (17:00 – 18:00) and 12 Hour (07:00 – 19:00) periods:*
    - *Link Journey Times*
    - *Link Distances*
    - *Link Speeds*
    - *Link Delays*
- *Route (Corridor) Results*
    - *Route Demand – Max and Average flows during the AM Peak (08:00 – 09:00) /PM Peak (17:00 – 18:00) and 12 Hour (07:00 – 19:00) periods:*
    - *Route Journey Times*
    - *Route Distances*
    - *Route Speeds*
    - *Route Delays*

5.4 Global Network Performance Statistics – Cordon Flows

5.4.1 Figure 5.1 identifies the locations of cordons used to assess cordon (full network) flows across Bromsgrove.

5.4.2 Table 5.1 presents the Total number of vehicles (expressed in Passenger Car Units or PCUs) entering and exiting the Bromsgrove Package Study Area across all cordons during the AM Peak and the PM Peak. This is shown as average and maximum flows across all cordons during the survey period.

Table 5.1 – Cordon Demand (PCUs) AM and PM Peak Hour

	Inbound Flows in PCUs (into Bromsgrove)	Outbound Flows in PCUs (out of Bromsgrove)
AM Peak Hour Average Flows	6180	7699
PM Peak Hour Average Flows	5485	7627
AM Peak Max Flows (in terms of max at any one time	6463	8010
PM Peak Max Flows	5485	5531

5.4.3 Table 5.2 And Figures 5.2 and 5.3 identify the results of the cordon counts graphically in both the AM and PM Peak periods.

Table 5.2 – AM and PM Peak Cordon Counts

	AM Peak	PM Peak	Difference
Cordon 1	848	836	12
Cordon 2	1452	1270	183
Cordon 3	1057	985	72
Cordon 4	348	327	21
Cordon 5	354	388	-34
Cordon 6	993	851	142
Cordon 7	736	662	74

Figure 5.2 – AM Peak Period Cordon Counts (PCUs)

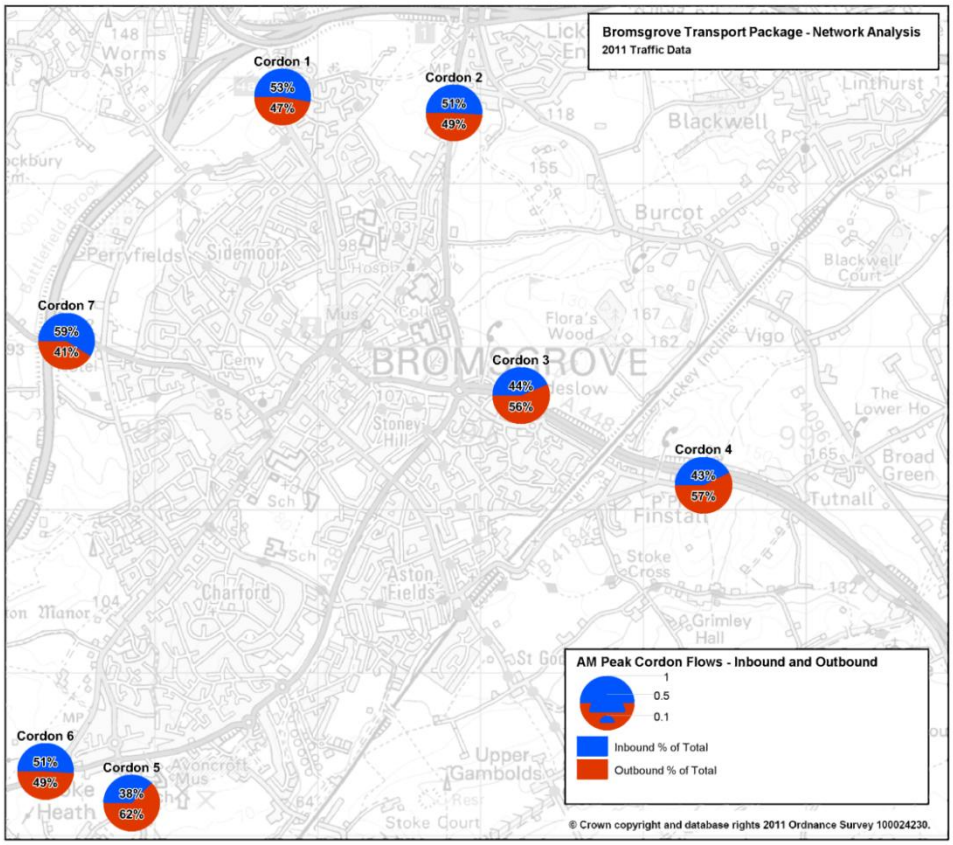
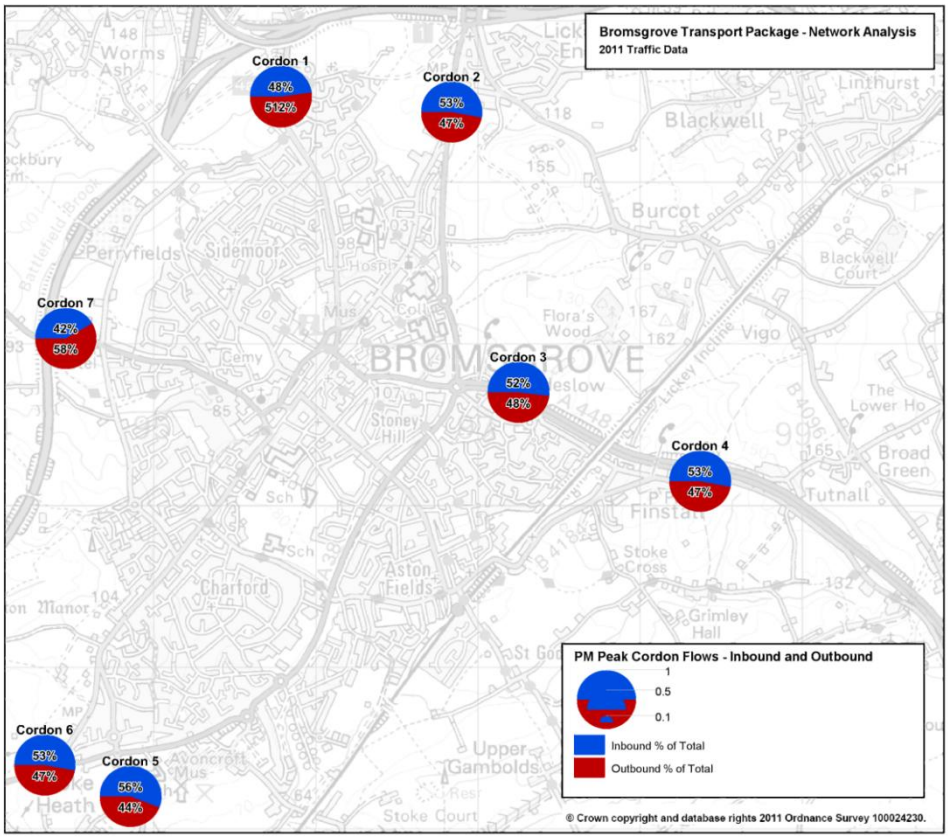
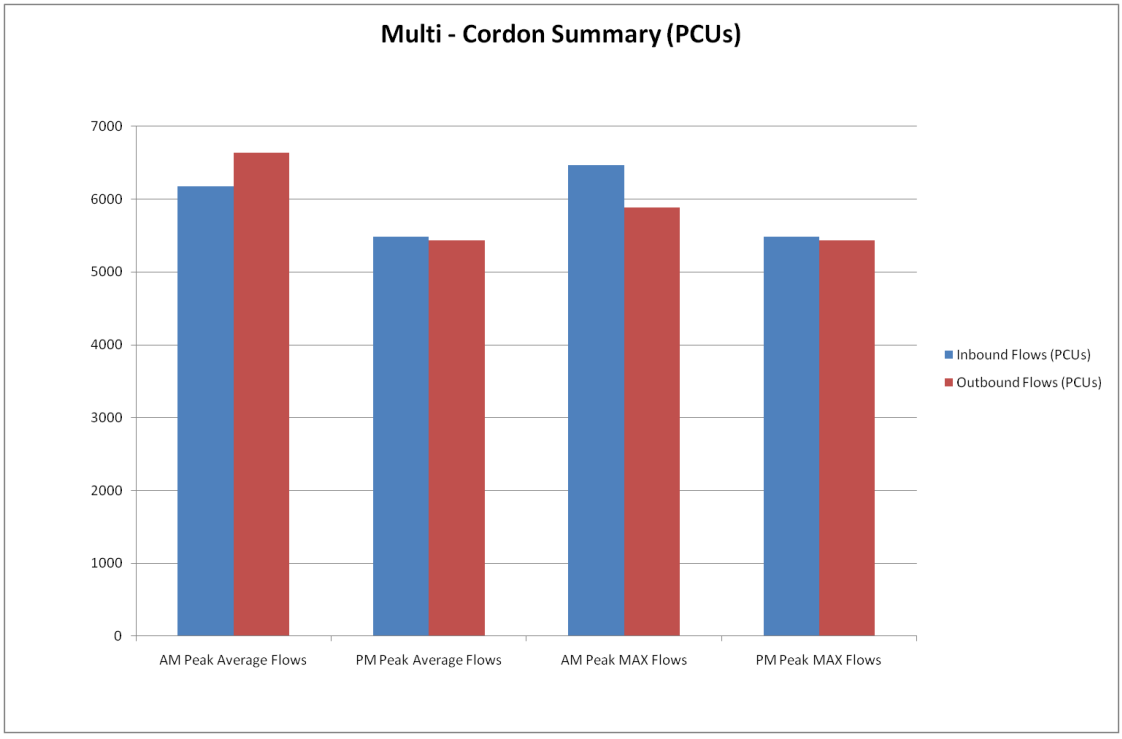


Figure 5.3 – PM Peak Period Cordon Counts (PCUs)



5.4.4 The plots shown above are discussed in detail in Paragraph 5.4.6. The distribution of traffic into and out of Bromsgrove at these cordon points is split approximately 45% inbound and 55% outbound respectively during the AM and PM Peaks. Figure 5.4 shows cordon flows in AM Peak and PM Peaks for inbound and outbound journeys.

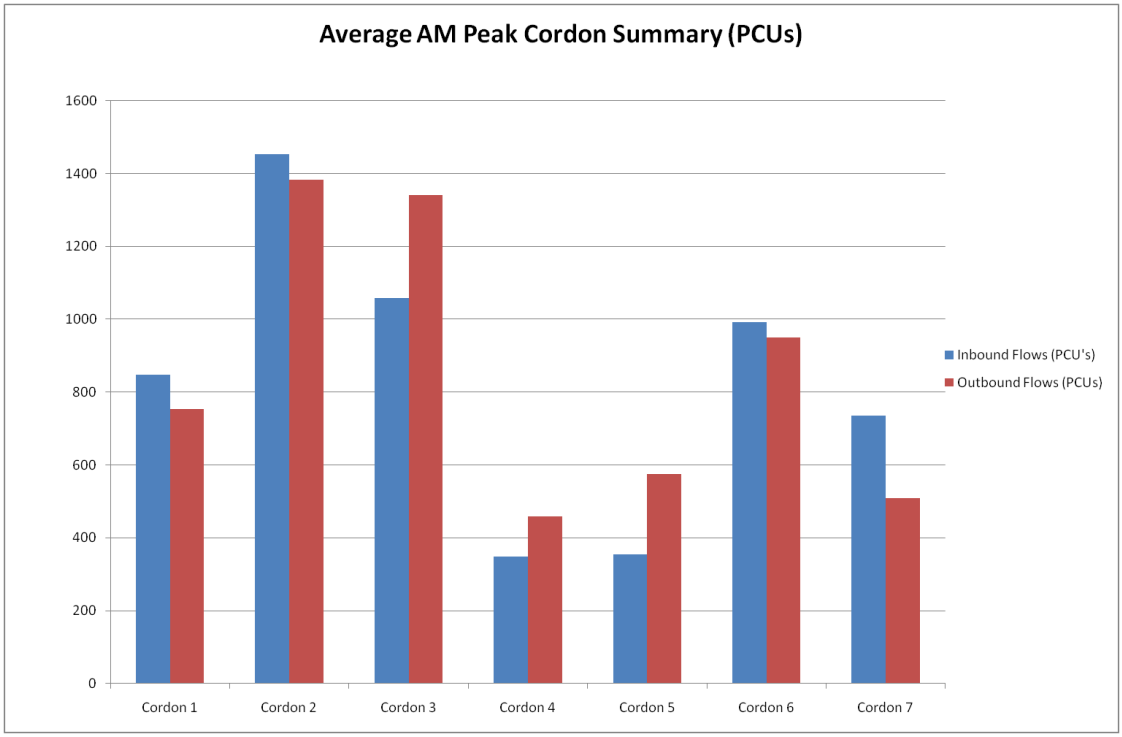
Figure 5.4 – AM & PM Peak Cordon Demand (PCUs)



5.4.5 Figure 5.5 illustrates the AM Peak period traffic flows on a cordon by cordon basis and split between inbound and outbound trips during the AM Peak period. The cordons are located at:

- ***Cordon 1*** *– B4091 Stourbridge Road (North Western Cordon)*
- ***Cordon 2*** *– A38 Lickey End (Northern Cordon)*
- ***Cordon 3*** *– A448 Bromsgrove Highway (Eastern Cordon Major)*
- ***Cordon 4*** *– B4184 Alcester Road (Eastern Cordon Minor)*
- ***Cordon 5*** *– B4091 Hanbury Road (South Eastern Cordon)*
- ***Cordon 6*** *– A38 Worcester Road (Southern Cordon)*
- ***Cordon 7*** *– A448 Kidderminster Road (Western Cordon)*

Figure 5.5 – AM Peak Cordon Demand (PCUs)

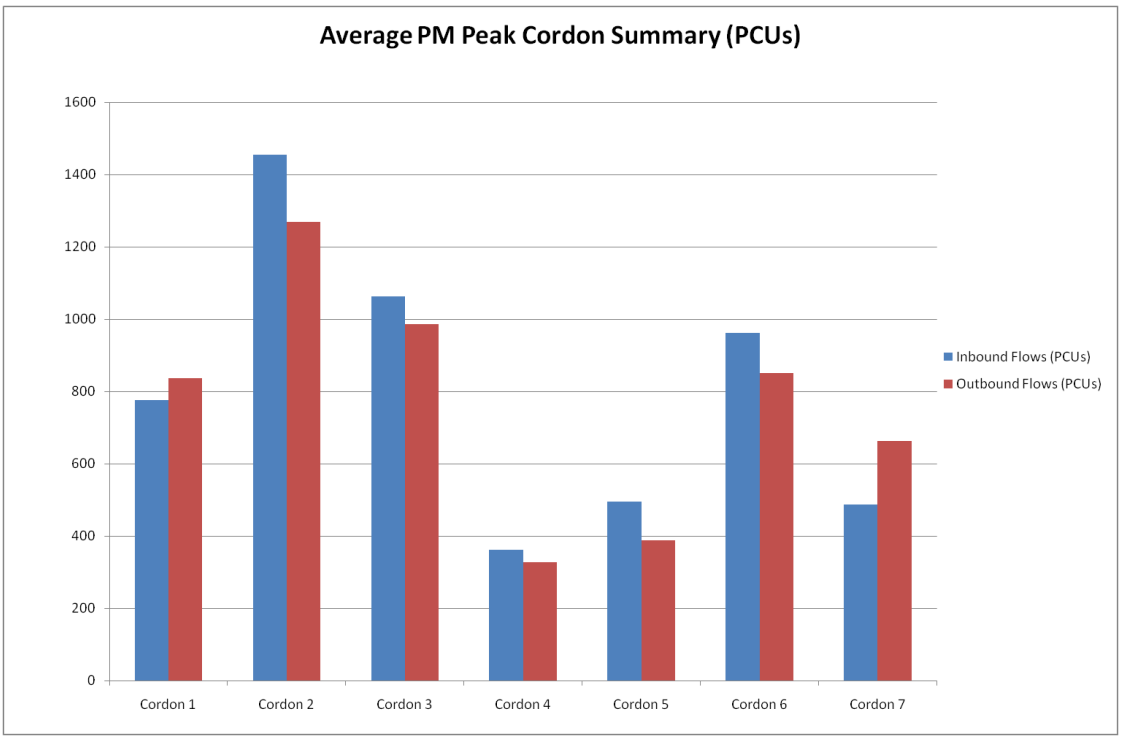


5.4.6 This highlights that:

- *Cordon 2, located to the north of Bromsgrove on the A38, just to the south of M42 Junction 1, has the highest AM Peak Period traffic flow (both inbound and outbound). The predominant movement is for inbound (southbound) flows along the A38 toward destinations both within Bromsgrove and to wider destinations via the strategic road network (including the M5, A38 and A448).*
- *Cordon 3, east of A38 Slideslow Roundabout on the A448 Bromsgrove Highway also exhibits high flows with the predominant flow shown to be inbound (into Bromsgrove) movements. There would appear to be significant demand coming from Redditch for trips into Bromsgrove and onto the A38 for access on to strategic road network using M42 Junction 1.*
- *Cordon 4 (located at Finstall on the B4184) and 5 (located to the south of the Hanbury Turn Public House on the B4091 Hanbury Road), whilst the flows are not as large as the other cordons mentioned above, these have significant outbound flows. Both these cordons are located at points which were considered as potential rat-running routes for journeys to Junction 5 of the M5 (Cordon 5) by avoiding the A38 corridor and Redditch by avoiding the congestion at Slideslow roundabout and the A448 Bromsgrove Highway. Additionally, there is a significant industrial area at Stoke Works, which is likely to attract a significant journey-to-work flow from within the Bromsgrove Transport Package area.*
- *Cordon 6, located on the A38 south of Bromsgrove town centre exhibits the third highest flow. Here, the predominant movement is outbound (southbound). Junction 5 of the M5 is located 2 miles south of this Cordon point for journeys to destinations south of Bromsgrove such as Droitwich, Worcester etc.*

5.4.7 Figure 5.6 illustrates the PM Peak period traffic flows on a cordon by cordon basis and split inbound and outbound trips during the PM Peak period.

Figure 5.6 – Average PM Peak Cordon Demand (PCUs)



5.4.8 The analysis shows

- *Total PM Peak flows through the cordons are reasonably evenly spread between inbound and outbound movements*
- *Cordon 2, situated on the A38, south of M42 Junction 1 has the highest volumes of traffic during the PM Peak and the predominant movement is inbound (southbound) flows.*
- *PM Peak outbound flows through Cordon 3 are lower in terms of PCU volumes exiting the Bromsgrove area than in the AM Peak.*
- *Cordon 6 also exhibits differences between AM and PM Peak inbound volumes with ~140 vehicles fewer entering the Bromsgrove study area than exiting in the PM Peak.*
- *Cordons 1 and 7 are the only cordons where outbound flows are the predominant movement in the PM Peak. Cordon 1 is located on the route to Catshill which is a major generator of travel demand in Bromsgrove and Cordon 7 is located on the Kidderminster road where there are high levels of demand for journeys into Bromsgrove during the AM peak.*

5.5 Global Network Performance Statistics – Junction Flows

5.5.1 Table 5.3 sets out the demand for each of the 21 junctions assessed as part of this study across a 12 hour study period. Figure 5.7 illustrates the locations of the junctions which have been assessed as part of this study.

Figure 5.7 – Junction Turning Count Locations in the Bromsgrove Transport Package Area.

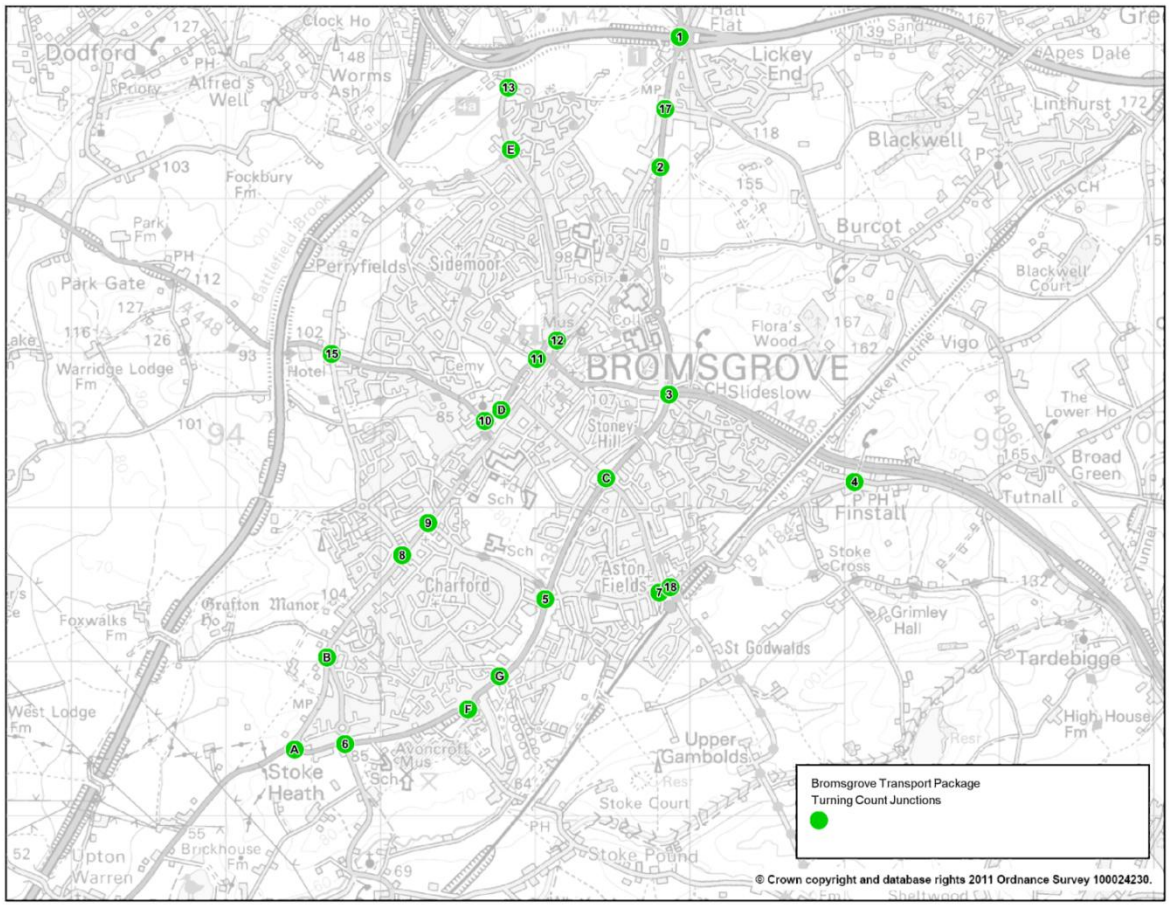
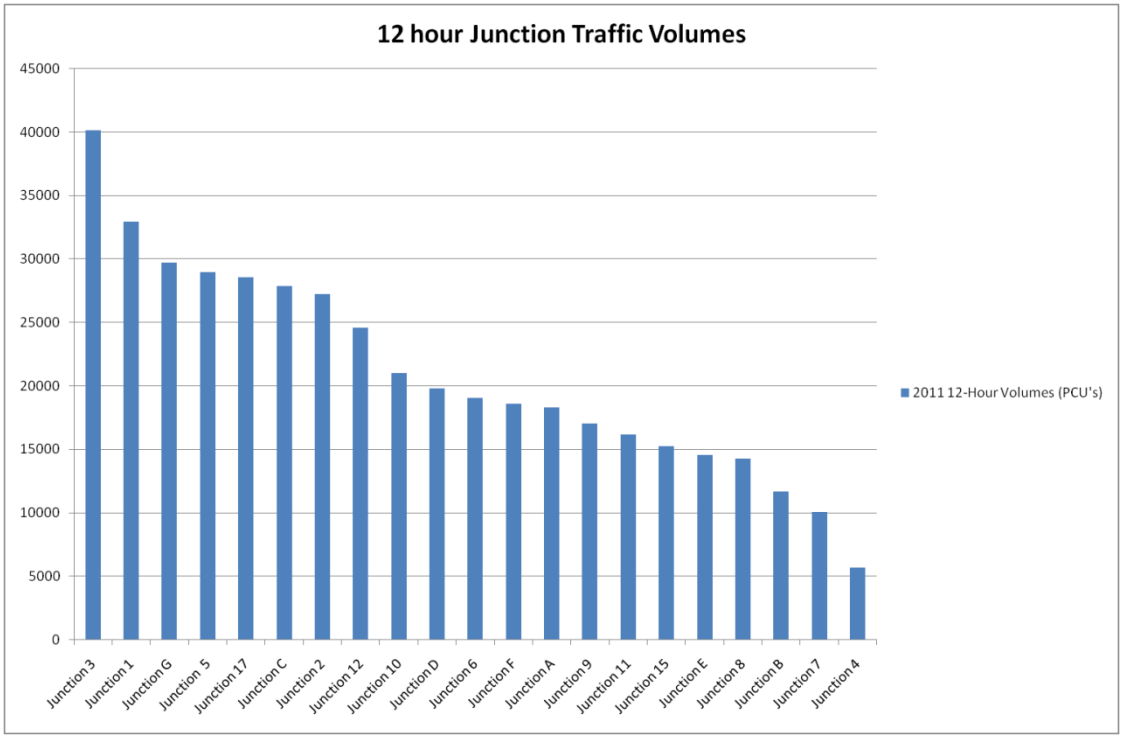


Table 5.3 – 12 hour Junction Flows (PCUs)

Junction Ref	Junction Name	Junction Type	2011 12-Hour Total (PCUs)
Junction 1	M42 Junction 1 (all arms)	Roundabout	32939
Junction 2	A38 Worcester Road/Birmingham Road	Signals	27206
Junction 3	Slideslow A38 Junction	Roundabout	40157
Junction 4	B4184 Finstall	Priority Junction	5690
Junction 5	A38/Charford Road/Stoke Road	Signals	28975
Junction 6	A38/B4091 (All Arms) Hanbury Turn	Signals	19037
Junction 7	New Road/Stoke Road/ New Road/Finstall Road	Roundabout	10066
Junction 8	Rock Hill/Fox Lane	Priority Junction	14238
Junction 9	Worcester Road/Highfield Road/Rock Hill/Charford Road	Roundabout	17043
Junction 10	Kidderminster Road/Hanover Street	Priority Junction	20981
Junction 11	Market Street/Recreation Road	Priority Junction	16152
Junction 12	A4091 Stourbridge Road/Market Street/A448/Birmingham Road	Signals	24608
Junction 15	Perryfields Road/Whitford Road	Priority Crossroads	15271
Junction 17	A38/School Lane	Priority Junction	28541
Junction A	Redditch Road/B4091/A38 Redditch Road	Roundabout	18303
Junction B	Worcester Road/Hanbury Road	Signals	11702
Junction C	A38/New Road	Signals	27843
Junction D	B4184/A448/Market Place	Priority Junction	19775
Junction E	Stourbridge Road/Perryfields Road	Roundabout	14547
Junction F	A38/Buntsford Hill/A38	Roundabout	18578
Junction G	A38 Stoke Road/Austin Road/Sherwood Road	Roundabout	29718

5.5.2 Figure 5.8 illustrates the volume of traffic at each of the modelled junctions during the 12 hour period.

Figure 5.8 – 12 Hour Junction Traffic Volumes



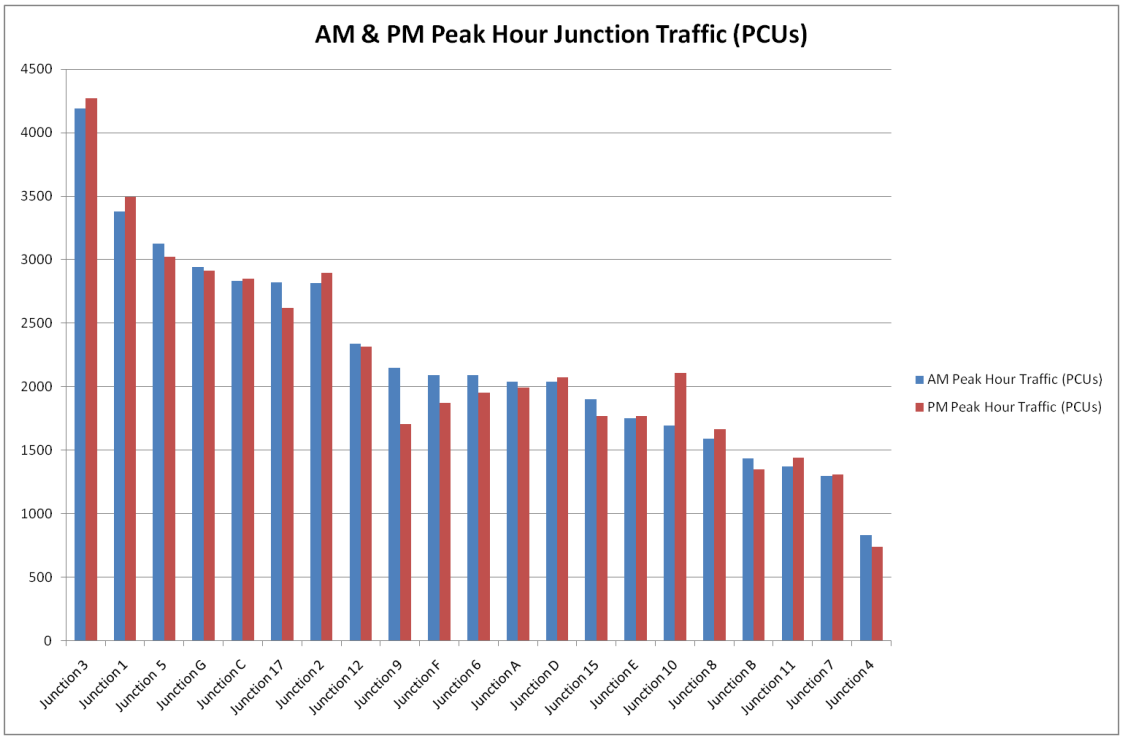
5.5.3 The observed traffic flows at each of the junctions shows:

- ***Junction 3: Slideslow [Roundabout]*** *– (40,157 Observed 12 hour PCU Flow) – This critical junction links the strategic (A38 and A448) with the local highway network in the Bromsgrove Transport Package study area. In recent times, a fifth arm was incorporated into the roundabout to provide access to the Oakalls; a large residential area. This junction is also a multiple accident cluster site on both the Stratford Road and A38 approaches.*
- ***Junction 1: M42, Junction 1 [Signalised Roundabout]*** *– (32,939 Observed 12 hour PCU Flow) – This junction represents the principal access to the Bromsgrove Transport Package highway network from the north. This six arm junction sits at the confluence of the M42, A38 and B4096. It is subject to significant congestion at peak times (as evidenced by the designation of an Air Quality Management Area: See Section 10)*
- ***Junction G: A38 Stoke Road, Austin Road and Sherwood Road [Roundabout]*** *– (29,718 Observed 12 hour PCU Flow) – This junction provides access to the business and retail parks, residential areas and supermarkets from the strategic route network. Given the concentration of trip attractors in this area, it is unsurprising that this junction experiences high traffic volumes.*
- ***Junction 5: A38 Charford Road and Stoke Road Junction [Signalised Junction]*** *– (28,975 Observed 12 hour PCU flow) – This junction provides access from the residential areas of Charford, Aston Fields and Whitford to the A38 and the strategic road network. Additionally there are three large schools located on Charford Road, which together generate significant trip attraction. Stoke Road also provides access to the rail station.*
- ***Junction 17: A38 School Lane [Priority Junction]*** *– (28,541 Observed 12 hour PCU flow) – This junction lies equidistantly between Slideslow Roundabout (Junction 3) and the M42 Junction 1 (Junction 1). The predominant flow of trips across this junction is north-south along the A38, with low traffic flows along School Lane. School Lane provides a rat-run to Barnt Green and on to Birmingham avoiding the heavily congested Junction 1 (M42, Junction 1).*
- ***Junction C: A38 New Road Junction [Signalised Junction]*** *– (27,843 observed 12 hour PCU flow) – This junction is the primary distributor route between Bromsgrove Town Centre and surrounding residential areas with the A38 / strategic route network and the railway station. This junction is an accident cluster site.*
- ***Junction 2: Old Birmingham Road junction with A38 [Signalised Junction]*** *– (27,206 observed 12 hour PCU flow) – This junction links Bromsgrove Town Centre directly with the M42 Junction 1. It is on a major bus route for interurban services and provides access to the strategic route network from a number of residential areas.*
- ***Junction 12: Parkfield Junction [Signalised Junction] –*** *(24,608 observed 12 hour PCU flow) – This junction lies to the north of the town centre, and is the principal north-south-east-west junction in Bromsgrove Town Centre. As such, it performs a strategic function, providing links to all main trip attractors and generators in the town. This junction is an accident cluster site.*
- ***Junction 10: Kidderminster Road and Hanover Street Junction [Roundabout]*** *- (20,981 observed 12 hour PCU flow) – This junction provides access into Bromsgrove Town Centre from the south (Droitwich) and west (Kidderminster). The predominant flow through this junction is south-north into the town centre, although there is also significant demand from the Kidderminster Road arm.*
- ***Junction D: Market Place [Priority Junction]*** *– (19,775 observed 12 hour PCU flow) – This junction provides access from Bromsgrove Town Centre to New Road, the A38 and the railway station. This junction is an accident cluster site at present.*

- ***Junction 6: A38/B4091 Hanbury Turn [Signalised Junction]*** *– (19,037 observed 12 hour PCU flow) – This junction links Bromsgrove with Stoke Works Industrial Estate and also a rat run to the M5 (Junction 5). As such, this junction experiences high peak period demand on all arms.*
- ***Junction F: A38 Buntsford Hill Junction [Roundabout]*** *– (18,578 observed 12 hour PCU flow) – This junction links the Bromsgrove Technology Park and Avoncroft Museum. The predominant flow through this junction is experienced on the A38.*
- ***Junction A: Redditch Road B4094 with A38 [Roundabout] –*** *(18,303 observed 12 hour PCU flow) – This junction provides the principal access into the Bromsgrove Transport Package area from the south. It links the A38 strategic corridor with the B4094 local distributor route into Bromsgrove. Again, the predominant traffic flows across this junction are experienced on the A38.*
- ***Junction 9: Worcester Road, Rock Hill, Charford Road and Highfield Road [Mini Roundabout] –*** *(17,043 observed 12 hour PCU flow) – This junction provides access from Whitford and surrounding residential areas to the A38 and major educational establishments located on Charford Road.*
- ***Junction 11 : Market Street and Recreation Road Junction [Priority Junction]*** *– (16,152 observed 12 hour PCU flow) – This junction is located in Bromsgrove Town Centre, and provides access to a major supermarket car park and employment areas from Market Street. As such, it is unsurprising that this junction experiences high demand.*
- ***Junction 15 : Whitford Road, Perryfield Road and Kidderminster Road Junction [Priority Junction]*** *– (15,271 observed 12 hour PCU flow) – The predominant flow through this junction is along the A448 Kidderminster Road, however, flows suggest that Perryfields Road and Whitford Road provide a western orbital rat run to avoid Bromsgrove Town Centre. This junction is an accident cluster site.*
- ***Junction E : Stourbridge Road and Perryfields Road [Priority Junction]*** *– (14,547 observed 12 hour PCU flow) – The predominant flow through this junction is along Stourbridge Road. The residential areas of Catshill and Sidemoor are located along this route and will generate significant trips. The flows at this junction suggest that some traffic is using Perryfields Road as a rat run to avoid Bromsgrove Town Centre.*
- ***Junction 8: Rock Hill with Fox Lane [Priority Junction] –*** *(14,238 observed 12 hour PCU flow) – The predominant traffic flow through this junction is along the Worcester Road. However, analysis shows that Fox Lane which links to Whitford Road, Kidderminster Road (A448) and Perryfields Road is being used as a rat run to avoid the Town Centre.*
- ***Junction B: Worcester Road (B4094) and Hanbury Road (B4091) [Priority Junction]*** *– (11,702 observed 12 hour PCU flow) – This junction provides a direct route between Bromsgrove Town Centre and Stoke Works Industrial Estate, via the Hanbury Turn Junction.*
- ***Junction 7: Station Approach Junction (New Road, Stoke Road and Finstall Road) [Mini Roundabout]*** *– (10,066 observed 12 hour PCU flow) – This junction provides access to Bromsgrove Railway Station.*
- ***Junction 4: Finstall Road with Alcester Road [Priority Junction]*** *– (5,690 observed 12 hour PCU flow) – This junction provides non-strategic access to the Bromsgrove Transport Package area from Redditch and rural areas to the east. This route provides an attractive alternative for trips to Redditch avoiding the congested Slideslow Roundabout (Junction 3).*

5.5.4 Figure 5.9 illustrates AM and PM Peak Hour Junction traffic volumes, for the purposes of comparison.

Figure 5.9 – AM and PM Peak Hour Junction Traffic Volumes (PCUs)



5.5.5 The analysis shows;

- *There are significant differences between AM Peak hour volumes and PM peak hour volumes at the following junctions, All of which are on strategic routes*
    - *Junction 3: A38 Slideslow Roundabout*
    - *Junction 1: M42 Junction 1*
    - *Junction 5: Charford Road/A38 Junction*
    - *Junction 2: Birmingham Road/A38 Junction*
    - *Junction 10: Kidderminster Road/Hanover Street/St John's Street*

5.5.6 The analysis suggests that these differences are being observed as a result of peak spreading, where return journeys are being made outside of peak periods. Conversely, PM peak hour volumes are less than the AM peak hour equivalents; this could be due to school traffic. Examples of this are observed at junctions 9, 6 and F, which are all located close to major educational establishments. In the case of Junction 10, PM peak hour traffic flow is considerably higher than the AM peak, which is thought to be caused by traffic avoiding congestion on the motorway network, instead passing through Bromsgrove with destinations in the Wyre Forest.

5.6 Global Network Performance Statistics – Queues

5.6.1 Table 5.4 illustrates the results of the analysis into the maximum length of queues at each of the modelled junctions.

Table 5.4 – Queue Length Analysis (in PCUs) Results

Junction Ref	Junction Name	Junction Type	Arm A			Arm B		Arm C			Arm D		Arm E		Arm F	
			Lane 1	Lane 2	Lane 3	Lane 1	Lane 2	Lane 1	Lane 2	Lane 3	Lane 1	Lane 2	Lane 1	Lane 2	Lane 1	Lane 2
A	Redditch Road(Arm B)/B4091(Arm A)/A38 Redditch Road(Arm C)	Roundabout	1	11		3	2	12	1							
B	Rock Hill(Arm A)/Worcester Road(Arm B)/Hanbury Road(Arm C)	Signals	28			28		24								
C	New Road West (Arm A)A38 South (Arm B)/New Road East (Arm C)/A38 North (Arm D)	Signals	25	15		30	23	29	9		29	13				
D	Market Street (Arm A)/St John Street (Arm B)/Market Place (Arm C)	Priority Junction	5	20		16	4	26								
E	Stourbridge Road North (Arm A)/Perryfields Road (Arm B)/Stourbridge Road (Arm C)	Roundabout	5	0		4	1	6								
F	A38 North (Arm A)/Buntsford Hill(Arm C)/A38 South (Arm B)	Roundabout	16	14		7	5	15	4							
G	A38 Stoke Road South (Arm B)/Austin Road (Arm A)/Sherwood Road (Arm C)/Stoke Road (Arm D)	Roundabout	9	3		21	4	9	13		31	4				
1	M42 Junction 1: Birmingham Road N (Arm A)/Birmingham Road S (Arm B)/ Alcester Road (Arm C)/Motorway (Arm D)/Old Birmingham Road (Arm E)	Roundabout	15	21		40	15	46	28		6	3	19	24		
2	A38 N (Arm A)/Birmingham Road (Arm B)/ A38 S (Arm C)	Signals	25	21		35		24	28							
3	Slideslow A38 Junction: A38 N (Arm A)/Stratford Road (Arm B)/A38 S (Arm C)/Regents Park Road (Arm D)/ A448 Bromsgrove Highway (Arm E)/ Golf Course (Arm F)	Roundabout	23	17		38	12	34	18		12	11	32	2	2	
5	A38 N(Arm A)/Charford Road (Arm B)/A38 S (Arm C) /Stoke Road (Arm D)	Signals	25	13	14	20		33	15	18	37	16				
6	Hanbury Road N (Arm A)/ A38 South (Arm B)/Hanbury Road S (Arm C)/ Redditch Road (Arm D)	Signals	25			27	38	35			35	2				
7	New Road N (Arm A)/Stoke Road W(Arm B)/ New Road S (Arm C)/Finstall Road (Arm D)	Roundabout	20			30		11			9					
8	Rock Hill N(Arm A)/Fox Lane (Arm B)/ Rock Hill S (Arm C)	Priority Junction	10			31		25								
9	Worcester Road (Arm A)/Highfield Road (Arm B)/Rock Hill (Arm C)/Charford Road (Arm D)	Roundabout	15			10		21	4		4	9				
10	Hannover Street (Arm A)/St John Street (Arm B)/Kidderminster Road (Arm C)	Priority Junction	16			14		16								
11	Market Street N (Arm A)/ Recreation Road (Arm B)/ Market Street (Arm C)/Market Street (Arm D)	Priority Junction	30	5		28	12	25	3							
12	A4091 Stourbridge Road (Arm A)/Market Street (Arm B)/A448 The Strand (Arm C) /Birmingham Road (Arm D)	Signals	34			27	25	33			19	29				
15	Perryfields Road (Arm A)/Kidderminster Road (Arm B)/Whitford Road (Arm C)/A448 Kidderminster Road (Arm D)	Priority Junction	17	2		25		25	2		7					
17	A38 N(Arm A)/School Lane (Arm C)/A38 S (Arm B)	Priority Junction	1			18		23								

5.6.2 This analysis shows;

- *All junctions assessed across the Bromsgrove Transport Package area exhibit traffic queuing, particularly at peak times.*
- *M42 Junction 1 has significant queuing in excess of 40 vehicles on the northbound A38 Birmingham Road arm and the Southbound Alcester Road arm. This junction has been designated an Air Quality Management Area (AQMA) and as such queuing vehicles are considered to be a major contributor to deteriorating air quality.*
- *A38 Slideslow Roundabout has significant queuing on all arms with maximum queues in excess of 30 vehicles on the Stratford Road, A38 and A448 Bromsgrove Highway arms. As a result of this, northbound traffic queues extend down to the A38 New Road junction which considerably limits the effectiveness of the signals at New Road when the northbound arm is blocked back from Slideslow.*
- *Birmingham Road/A38 signalised junction has significant queues on all arms. This junction has a banned right turn movement from into the Birmingham Road onto the southbound arm of the A38 which was instigated to increase the capacity of the junction on the other arms.*
- *There are significant queues on **all** arms of the A38 Hanbury Turn signalised crossroads. This junction is located within one of the identified Air Quality Management Areas and as such queuing is considered to be a major contributor to deteriorating air quality.*
- *The A38/New Road Signalised Junction exhibits high levels of queuing with an average of 30 vehicles on each of the four arms during the AM Peak Period. This is caused because the A38 principal flow is so high that opportunities to join this flow from distributor routes is significantly reduced at peak times, resulting in queues at all distributors along the route.*
- *In the town centre, Market Street/Recreation Road and Stourbridge Road/Market Street Junctions have queuing in excess of 30 vehicles during the peak periods. This is caused by significant flows on all distributor routes in the town centre, which causes delay at junctions. A mitigation scheme has been proposed for the Market Street/Recreation Road signalised junction as part of the development mitigation measures agreed with Sainsbury's who have a planning consent for the development of a new store in the vicinity of the junction.*

5.6.3 Table 5.5 illustrates the maximum length of queues in metres at each of the modelled junctions which assumes that each vehicle is equal to 6 metres in length (as set out in the Design Manual for Roads and Bridges). Queues and queue lengths are discussed further in paragraph 6.14.

Table 5.5 – Linear Queue Length Analysis in Metres

Junction Ref	Junction Name	Junction Type	Arm A			Arm B		Arm C			Arm D		Arm E		Arm F	
			Lane 1	Lane 2	Lane 3	Lane 1	Lane 2	Lane 1	Lane 2	Lane 3	Lane 1	Lane 2	Lane 1	Lane 2	Lane 1	Lane 2
A	Redditch Road(Arm B)/B4091(Arm A)/A38 Redditch Road(Arm C)	Roundabout	6	66		18	12	72	6							
B	Rock Hill(Arm A)/Worcester Road(Arm B)/Hanbury Road(Arm C)	Signals	168			168		144								
C	New Road West (Arm A)A38 South (Arm B)/New Road East (Arm C)/A38 North (Arm D)	Signals	150	90		180	138	174	54		174	78				
D	Market Street (Arm A)/St John Street (Arm B)/Market Place (Arm C)	Priority Junction	30	120		96	24	156								
E	Stourbridge Road North (Arm A)/Perryfields Road (Arm B)/Stourbridge Road (Arm C)	Roundabout	30	0		24	6	36								
F	A38 North (Arm A)/Buntsford Hill(Arm C)/A38 South (Arm B)	Roundabout	96	84		42	30	90	24							
G	A38 Stoke Road South (Arm B)/Austin Road (Arm A)/Sherwood Road (Arm C)/Stoke Road (Arm D)	Roundabout	54	18		126	24	54	78		186	24				
1	M42 Junction 1: Birmingham Road N (Arm A)/Birmingham Road S (Arm B)/ Alcester Road (Arm C)/Motorway (Arm D)/Old Birmingham Road (Arm E)	Roundabout	90	126		240	90	276	168		36	18	114	144		
2	A38 N (Arm A)/Birmingham Road (Arm B)/ A38 S (Arm C)	Signals	150	126		210		144	168							
3	Slideslow A38 Junction: A38 N (Arm A)/Stratford Road (Arm B)/A38 S (Arm C)/Regents Park Road (Arm D)/ A448 Bromsgrove Highway (Arm E)/ Golf Course (Arm F)	Roundabout	138	102		228	72	204	108		72	66	192	12	12	
5	A38 N(Arm A)/Charford Road (Arm B)/A38 S (Arm C) /Stoke Road (Arm D)	Signals	150	78	14	120		198	90	108	222	96				
6	Hanbury Road N (Arm A)/ A38 South (Arm B)/Hanbury Road S (Arm C)/ Redditch Road (Arm D)	Signals	150			162	228	210			210	12				
7	New Road N (Arm A)/Stoke Road W(Arm B)/ New Road S (Arm C)/Finstall Road (Arm D)	Roundabout	120			180		66			54					
8	Rock Hill N(Arm A)/Fox Lane (Arm B)/ Rock Hill S (Arm C)	Priority Junction	60			186		150								
9	Worcester Road (Arm A)/Highfield Road (Arm B)/Rock Hill (Arm C)/Charford Road (Arm D)	Roundabout	90			60		126	24		24	54				
10	Hannover Street (Arm A)/St John Street (Arm B)/Kidderminster Road (Arm C)	Priority Junction	96			84		96								
11	Market Street N (Arm A)/ Recreation Road (Arm B)/ Market Street (Arm C)/Market Street (Arm D)	Priority Junction	180	30		168	72	150	18							
12	A4091 Stourbridge Road (Arm A)/Market Street (Arm B)/A448 The Strand (Arm C) /Birmingham Road (Arm D)	Signals	204			162	150	198			114	174				
15	Perryfields Road (Arm A)/Kidderminster Road (Arm B)/Whitford Road (Arm C)/A448 Kidderminster Road (Arm D)	Priority Junction	102	12		150		150	12		42					
17	A38 N(Arm A)/School Lane (Arm C)/A38 S (Arm B)	Priority Junction	6			108		138								

5.7 Global Network Performance Statistics Conclusions

5.7.1 The Global data analysed shows that;

- *Wider Network:*
  - *In an average 12-hour period, the Bromsgrove Town Package area accommodates approximately 441,360 vehicle trips.*
  - *Flows into and out of Bromsgrove over a 12-hour period are split 45% (inbound) and 55% (outbound) respectively.*
  - *All junctions along the A38 (between Stoke Heath and M42 Junction 1) exhibit very high levels of demand compared to other junctions in the study area. Unsurprisingly, the A38 is a key strategic corridor for trips into and out of Bromsgrove. This is exhibited through the high traffic volumes observed at all junctions along its length.*
  - *The A448 Bromsgrove Highway is a key corridor for trips out of Bromsgrove. This is evidenced by the high traffic flows observed on the cordon analysis.*
  - *Junction 3 (A38/A448 Slideslow) is the busiest junction across the 12 hour period in Bromsgrove. The A448 Bromsgrove Highway is the principal destination arm across all time periods, followed by A38 northbound (towards the M42, Junction 1). Queuing on Slideslow Roundabout arms can extend to approximately 220 metres on the Stratford Road arm.*
  - *At the M42 Junction 1, the A38 Birmingham Road (southbound) has the highest flow of all the approaches. There is also significant demand for trips continuing on the A38 northbound towards the M5, Junction 4 and the A38 (Birmingham South) of around 700 vehicles across the 12-hour period.*
- *Queuing Traffic*
  - *M42 Junction 1 and A38 Hanbury Road junctions have significant queuing. Both of these junctions lie within designated Air Quality Management Areas (AQMA) and as such queuing vehicles are considered to be a major contributor to deteriorating air quality.*
  - *A38/New Road Junction has queuing as far back as the High Street on the eastbound arm, some 800 metres long.*
  - *Slideslow Roundabout (Junction 3) experiences queuing on all arms. On Stratford Road, traffic queues back as far as the High Street (800 metres away) at peak times.*
  - *The Parkfield Junction (Junction 12) experiences significant queuing on all arms.*
- *Local Network*
  - *The A38 Redditch Road junction with Sherwood Road experiences high levels of demand. The predominant movement is on the mainline A38 route, however there is significant demand generated for the Morrison's and Aldi food retail outlets and the business parks.*
  - *The major educational establishments on Charford Road are a significant contributor to network demand in the vicinity of this area in the AM peak. The levels of demand generated on this section of the network in the AM peak are not replicated in the PM peak.*
- *Rat Running - Due to congestion on the principal corridors, (A38 and Worcester Road/Old Birmingham Road), rat running is observed at a number of locations across the network.*

- *There is evidence to suggest that Finstall Road is used as a Rat-Run for journeys to/from Redditch, avoiding the Slideslow Roundabout and A448 Bromsgrove Highway.*
- *The Hanbury Road provides an attractive alternative route for trips to M5 Junction 5 for trips onto the strategic highway network by avoiding the A38. This is evidenced by unusually high vehicular flows on Hanbury Road.*
- *The data suggests that both Perryfields Road and Whitford Road are used as a western bypass for Bromsgrove Town Centre, as evidenced by traffic flows across key junctions along this route.*
- *Bromsgrove is a through route for trips from the Kidderminster area to the Strategic Highway Network (specifically the M42). This is observed through the cordon analysis and junction specific analysis along this route.*

5.8 Accident Cluster Sites

5.8.1 Worcestershire County Council maintains a database of accident cluster sites, which uses data provided by West Mercia Constabulary. As a general rule of thumb, as traffic volumes (by all modes) increase, so does the incidence of accidents. In the case of Bromsgrove with its congested highway network, it is unsurprising that identified accident cluster sites within the Bromsgrove Transport Package Area are numerous.

5.8.2 Figure 5.10 identifies the location of accident cluster sites in the Bromsgrove Transport Package Area. On the Worcestershire County Council controlled highway network, these locations are:

- ***A448 Junction with Perryfields Road and Whitford Road***

  This site was treated in 2011/2012 using funding secured from Section 106 contributions. The A448 at this location was resurfaced to increase the skidding resistance capabilities of the road, which is expected to result in a reduction of shunt type accidents, which are the predominant accident type observed at this junction.

  Enhanced signing and lining works were installed to raise the profile of this junction, giving a visual narrowing effect to reduce vehicular speeds. Additional works planned for this junction involve extension of the 30mph limit to reduce approach speeds and a decluttering exercise to reduce driver distraction by superfluous road signage.

  If major development occurs in the local area in future, there is likely to be an increased need to consider redesign of this junction to improve efficiency, safety and overall capacity, to the benefit of users.

- ***A38 Junction with Stoke Road and Charford Road***

  Although this site remains a designated accident cluster site, there have been no personal injury accidents observed at this location since 2009. This site is continuously monitored, and a recent speed limit review has concluded that a 50mph speed limit may be imposed. This proposal is currently subject to technical consideration and consultation.

  Further investment in this junction will be required to bring this junction up to current safety standards.

- ***A38 Junction with B4184 New Road***

  Similar to the previous junction, this is a designated accident cluster site, which is subject to continuous monitoring. There is a proposal to include this junction in the 50mph speed limit review identified above.

  Further investment in this junction will be required to bring this junction up to current safety standards.

- ***A38/A448 Slideslow Roundabout***

  Significant investment has already taken place at this junction to reduce accidents. A carriageway lane designation marking scheme was implemented in 2009 to encourage better lane discipline on the approaches to and through the roundabout. Although there has been a recent reduction in personal injury accidents over the last year, the site remains an accident cluster site and so will be subject to continuous monitoring.

  As a five-arm roundabout, this junction contravenes best practice and Department for Transport guidance which dictates that four-arm roundabouts should be the maximum to ensure safety. Under Design Manual for Roads and Bridges guidance, the roundabout is too small to accommodate the significant traffic volumes that it currently accommodates. This causes some drivers to take additional risks and make poor judgments on the approaches to and through the roundabout.

It is essential that further monitoring and analysis is undertaken to identify a suitable remediation scheme at this location to increase capacity and junction efficiency, whilst improving safety for all users. However, it is likely that suitable schemes could cost in excess of £1,000,000 to deliver.

- ***A38 Junction with Burcot Lane***

  As a designated accident cluster site, this junction is subject to continuous monitoring.

  High impact junction warning signs have been erected in recent years. Observed accidents indicate predominantly shunt type incidents involving right turning vehicles. Therefore, a potential long term intervention may include the provision of a designated right turn facility. Remedial measures of this scale are high cost and this is expected to require the acquisition of third party land to accommodate highway widening.

- ***A448 Junction with B4091 and Birmingham Road "Parkfield Junction"***

  The potential for infrastructure and safety improvements at this junction have been explored recently as a result of proposed town centre developments. This junction is currently operating at full capacity during peak periods, which inevitably raises the likelihood of accidents occurring.

  A major investment is required at this junction to enhance overall capacity and improve the safety of this junction for all users, regardless of mode of transport.

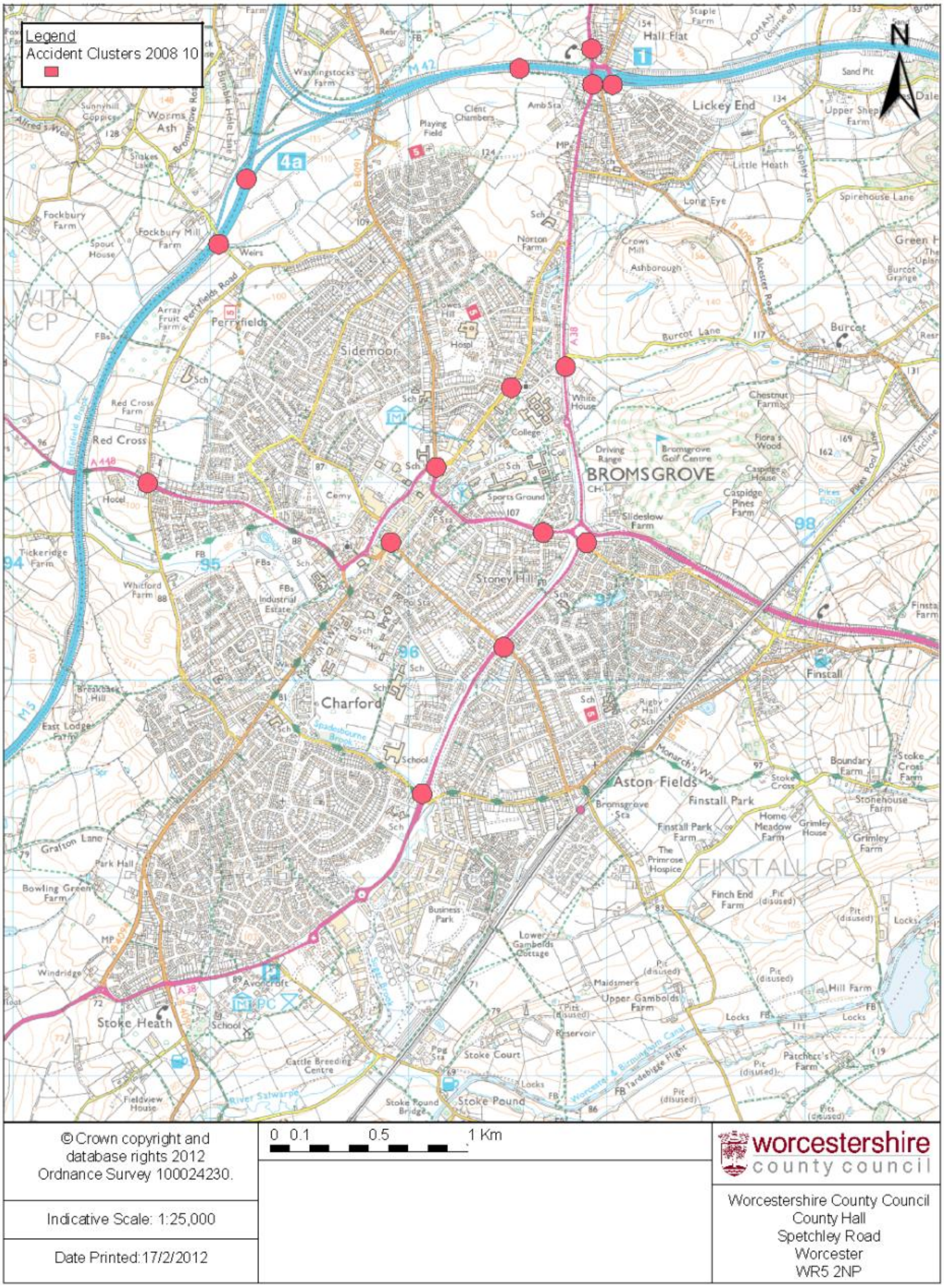
- ***High Street Junction with B4184 New Road***

  There is evidence of excess speed combined with pedestrian movements as contributory factors in personal injury accidents at this location.

  Solutions may include physical traffic calming measures to reduce speeds, however, it is strongly recommended that more detailed monitoring and analysis is undertaken to identify a suitable remediation and enhancement scheme which improves conditions in this area for all users.

5.8.3 It will be essential that any future investment in Bromsgrove's transport infrastructure and services takes full account of any accident cluster sites and seeks to invest in redesigning these locations to promote enhanced user safety for all modes, respecting the modal hierarchies for each area as set out in the LTP3 Traffic and Parking Management Policy.

Figure 5.10 – Accident Cluster Sites in the Bromsgrove Transport Package Area



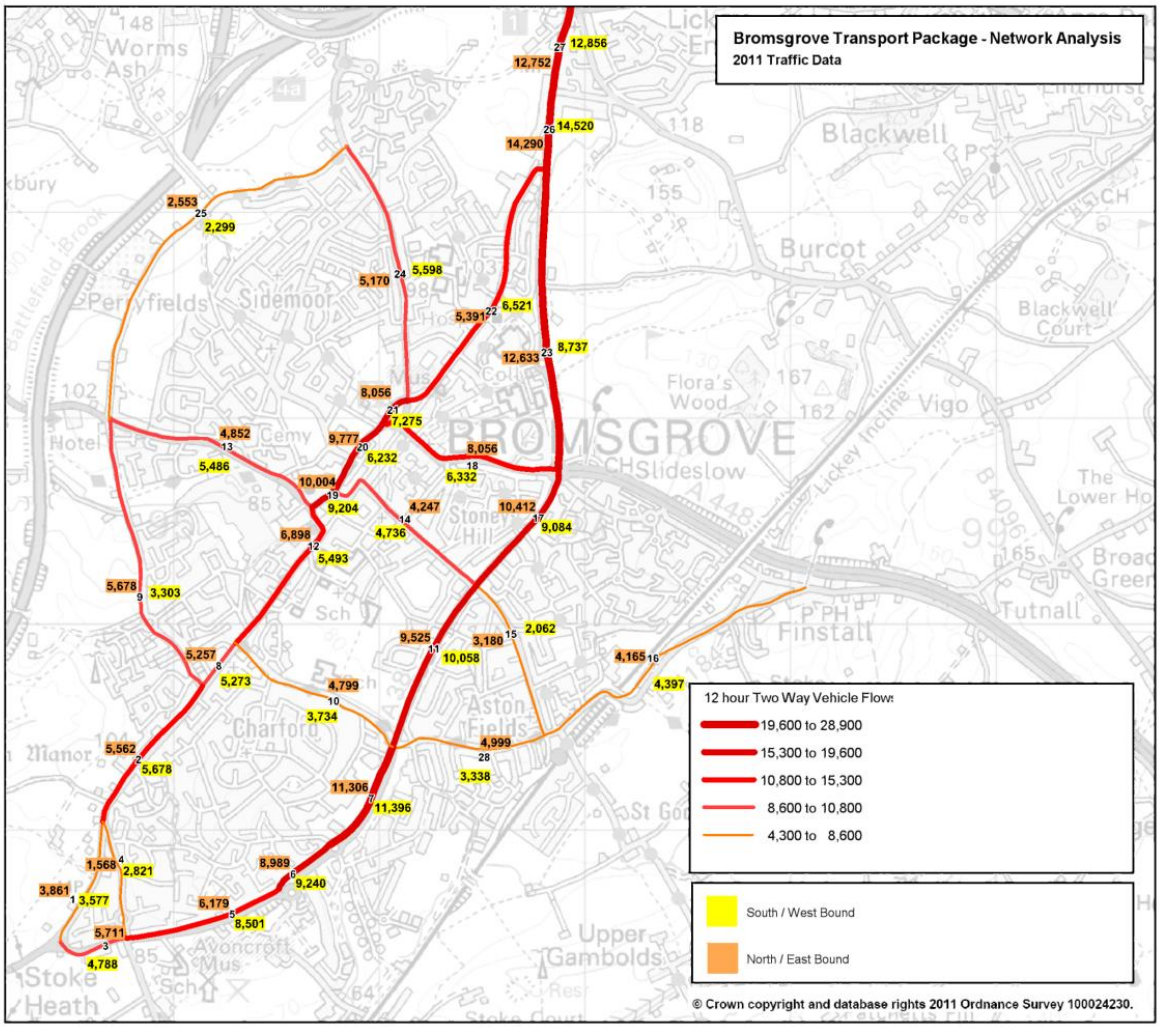
5.9 Link Network Performance Statistics

5.9.1 Table 5.6 and Figure 5.11 summarise the link demand across the Bromsgrove Study Area in all directions for the AM Peak Hour, PM Peak Hour and over a 12-hour period.

Table 5.6 – Link Demand in PCUs

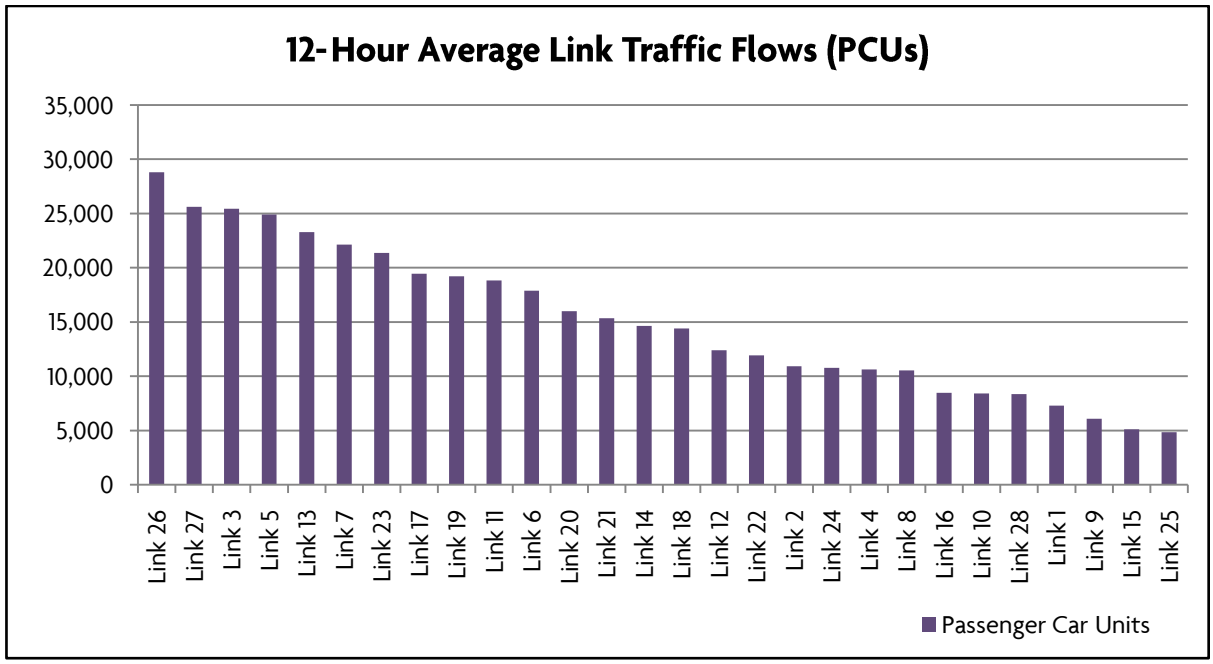
Link	Link Locations	Northbound/Eastbound Flow			Southbound/Westbound Flow		
		AM Peak	PM Peak	12 Hour	AM Peak	PM Peak	12 Hour
1	Worcester Road (B4094)	384	541	3861	471	326	3577
2	Rock Hilll (B4091)	619	727	5562	709	613	5678
3	Redditch Road A38 (Hanbury Turn)	713	545	5711	487	596	4788
4	Hanbury Road North (B4091)	179	202	1568	390	331	2821
5	Redditch Road A38 (Buntsford)	609	667	6179	814	904	8501
6	A38 Bromsgrove Eastern Bypass	978	986	8989	1013	865	9240
7	A38 Stoke Road	1123	1287	11306	1168	1013	11396
8	Rock Hill North (B4091)	609	391	5257	650	584	5273
9	Whitford Road/Fox Lane	709	613	5678	272	662	3303
10	Charford Road	628	471	4799	460	479	3734
11	Bromsgrove Eastern Bypass (Charford)	953	1066	9525	1064	862	10058
12	Worcester Road (B4091)	865	635	6898	656	736	5493
13	A448 Kidderminster Road	737	446	4852	340	493	5486
14	B4184 New Road	625	429	4247	579	629	4736
15	B4184 New Road (Aston Fields)	294	407	3180	256	251	2062
16	Stoke Road/Finstall Road	526	598	4165	658	607	4397
17	A38 Oakalls	1028	1069	10412	742	887	9084
18	A448 Stratford Road	763	735	8056	745	676	6332
19	St John's Street	696	881	10004	849	1079	9204
20	A448 Market Street	995	933	9777	544	592	6232
21	A448 Market Street North	763	735	8056	666	641	7275
22	Birmingham Road	441	494	5391	621	563	6521
23	Bromsgrove Eastern Bypass A38 (Slideslow)	1192	1325	12633	832	974	8737
24	B4091 Stourbridge Road	529	588	5170	789	606	5598
25	Perryfields Road	338	336	2553	261	284	2299
26	A38 Birmingham Road	1361	1357	14290	1441	1442	14520
27	A38 Birmingham Road (North)	1251	1119	12752	1233	1344	12856
28	Stoke Road (South)	680	618	4999	498	430	3338

Figure 5.11– 12 hour Link Flow Analysis in PCUs



5.9.2 Figure 5.12 shows 12-hour average link traffic flows in PCUs across the Bromsgrove Transport Package Area network.

Figure 5.12 – 12-Hour Average Link Traffic Flows



5.9.3 The data presented in Figure 5.12 shows;

- ***Link 1 [Junction A to Junction B]*** *– This link is known as Worcester Road (B4094). Traffic flows on this link are generally low, with vehicular flows in all directions totalling 7,288 PCUs in a 12-hour period.*
- ***Link 2 [Junction B to Junction 8] –*** *This link is known as Rock Hill (B4091). Traffic flows on this link are moderate, with vehicular flows in all directions totalling 10,921 PCUs in a 12-hour period.*
- ***Link 3 [Junction A to Junction 6] –*** *This link is known as Redditch Road (A38) (Hanbury Turn). Traffic flows on this link are high, with vehicular flows in all directions totalling 25,449 PCUs in a 12-hour period.*
- ***Link 4 [Junction B to Junction 6] –*** *This link is known as Hanbury Road North (B4091). Traffic flows on this link are moderate, with vehicular flows in all directions totalling 10,633 PCUs in a 12-hour period.*
- ***Link 5 [Junction 6 to Junction F] –*** *This link is known as Redditch Road (A38) (Buntsford). Traffic flows on this link are high, with vehicular flows in all directions totalling 24,916 PCUs in a 12-hour period.*
- ***Link 6 [Junction F to Junction G] –*** *This link is known as Bromsgrove Eastern Bypass (A38). Traffic flows on this link are moderate, with vehicular flows in all directions totalling 17,886 PCUs in a 12-hour period.*
- ***Link 7 [Junction G to Junction 5] -*** *This link is known as Stoke Road (A38). Traffic flows on this link are high, with vehicular flows in all directions totalling 22,125 PCUs in a 12-hour period.*
- ***Link 8 [Junction 8 to Junction 9] -*** *This link is known as Rock Hill (B4091) (north). Traffic flows on this link are moderate, with vehicular flows in all directions totalling 10,530 PCUs in a 12-hour period.*
- ***Link 9 [Junction 8 to Junction 15] -*** *This link is known as Whitford Road and Fox Lane. Traffic flows on this link are low, with vehicular flows in all directions totalling 6,066 PCUs in a 12-hour period.*
- ***Link 10 [Junction 9 to Junction 5] -*** *This link is known as Charford Road. Traffic flows on this link are low, with vehicular flows in all directions totalling 8,413 PCUs in a 12-hour period.*
- ***Link 11 [Junction 5 to Junction C] -*** *This link is known as Bromsgrove Eastern Bypass (A38) (Charford). Traffic flows on this link are moderate, with vehicular flows in all directions totalling 18,823 PCUs in a 12-hour period.*
- ***Link 12 [Junction 9 to Junction 10] -*** *This link is known as Worcester Road (B4091). Traffic flows on this link are moderate, with vehicular flows in all directions totalling 12,391 PCUs in a 12-hour period.*
- ***Link 13 [Junction 10 to Junction 15] -*** *This link is known as Kidderminster Road (A448). Traffic flows on this link are high, with vehicular flows in all directions totalling 23,276 PCUs in a 12-hour period.*
- ***Link 14 [Junction D to Junction C] -*** *This link is New Road (B4184). Traffic flows on this link are moderate, with vehicular flows in all directions totalling 14,637 PCUs in a 12-hour period.*
- ***Link 15 [Junction C to Junction 7] -*** *This link is New Road (B4184) Aston Fields. Traffic flows on this link are low, with vehicular flows in all directions totalling 5,097 PCUs in a 12-hour period.*
- ***Link 16 [Junction 7 to Junction 4] -*** *This link is known as Stoke Road (B4184). Traffic flows on this link are low, with vehicular flows in all directions totalling 8,483 PCUs in a 12-hour period.*

- ***Link 17 [Junction C to Junction 3] -*** *This link is known as Bromsgrove Eastern Bypass (A38) Oakalls. Traffic flows on this link are moderate, with vehicular flows in all directions totalling 19,446 PCUs in a 12-hour period.*
- ***Link 18 [Junction 11 to Junction 3] -*** *This link is known as Stratford Road (A448). Traffic flows on this link are moderate, with vehicular flows in all directions totalling 14,388 PCUs in a 12-hour period.*
- ***Link 19 [Junction 10 to Junction D] -*** *This link is known as St John's Street (A448). Traffic flows on this link are moderate, with vehicular flows in all directions totalling 19,208 PCUs in a 12-hour period.*
- ***Link 20 [Junction D to Junction 11] -*** *This link is known as Market Street (A448). Traffic flows on this link are moderate, with vehicular flows in all directions totalling 16,009 PCUs in a 12-hour period.*
- ***Link 21 [Junction 11 to Junction 12] -*** *This link is known as Market Street North (A448). Traffic flows on this link are moderate, with vehicular flows in all directions totalling 15,331 PCUs in a 12-hour period.*
- ***Link 22 [Junction 12 to Junction 2] -*** *This link is known as Old Birmingham Road. Traffic flows on this link are moderate, with vehicular flows in all directions totalling 11,912 PCUs in a 12-hour period.*
- ***Link 23 [Junction 2 to Junction 3] -*** *This link is known as Bromsgrove Eastern Bypass (A38) Slideslow. Traffic flows on this link are high, with vehicular flows in all directions totalling 21,370 PCUs in a 12-hour period.*
- ***Link 24 [Junction 12 to Junction E] -*** *This link is known as Stourbridge Road (B4091). Traffic flows on this link are moderate, with vehicular flows in all directions totalling 10,768 PCUs in a 12-hour period.*
- ***Link 25 [Junction 15 to Junction E] -*** *This link is known as Perryfields Road. Traffic flows on this link are low, with vehicular flows in all directions totalling 4,852 PCUs in a 12-hour period.*
- ***Link 26 [Junction 2 to Junction 17] -*** *This link is known as Birmingham Road (A38). Traffic flows on this link are high, with vehicular flows in all directions totalling 28,810 PCUs in a 12-hour period.*
- ***Link 27 [Junction 17 to Junction 1] -*** *This link is known as Birmingham Road (A38) north. Traffic flows on this link are high, with vehicular flows in all directions totalling 25,608 PCUs in a 12-hour period.*
- ***Link 28 [Junction 5 to Junction 7] -*** *This link is known as Stoke Road. Traffic flows on this link are low, with vehicular flows in all directions totalling 8,337 PCUs in a 12-hour period.*

5.9.4 Links 3, 5, 6, 7, 11, 17, 23, 26 and 27 together make up the A38 corridor. These links exhibit the highest traffic flows, of which Link 26 exhibits the highest two-way 12-hour vehicular flows in the Bromsgrove Transport Package area. Figures 5.13 and 5.14 show the AM peak hour and PM peak hour traffic flows along each of the links in both directions.

Figure 5.13 – AM Peak Link Flow Analysis in PCUs

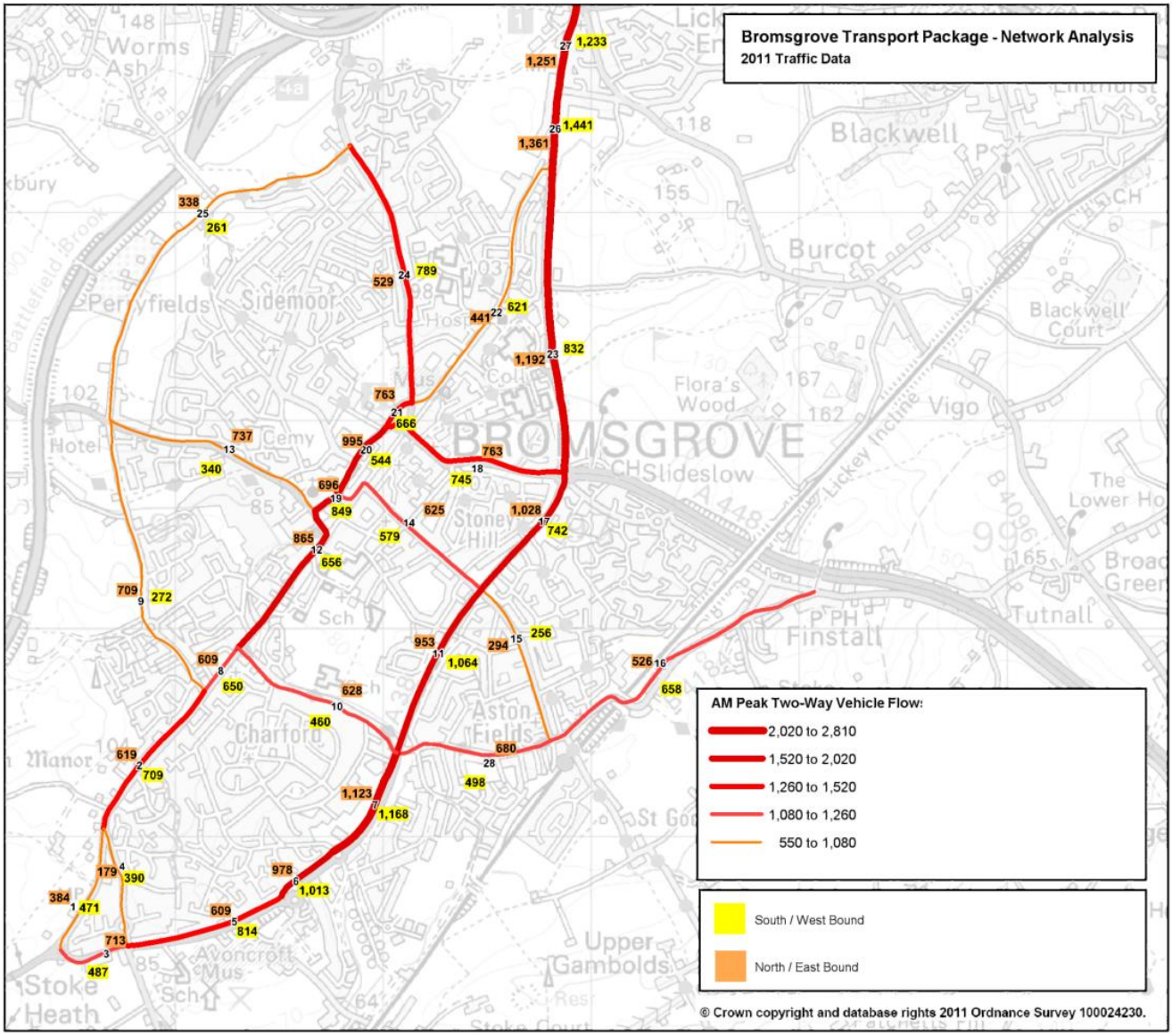
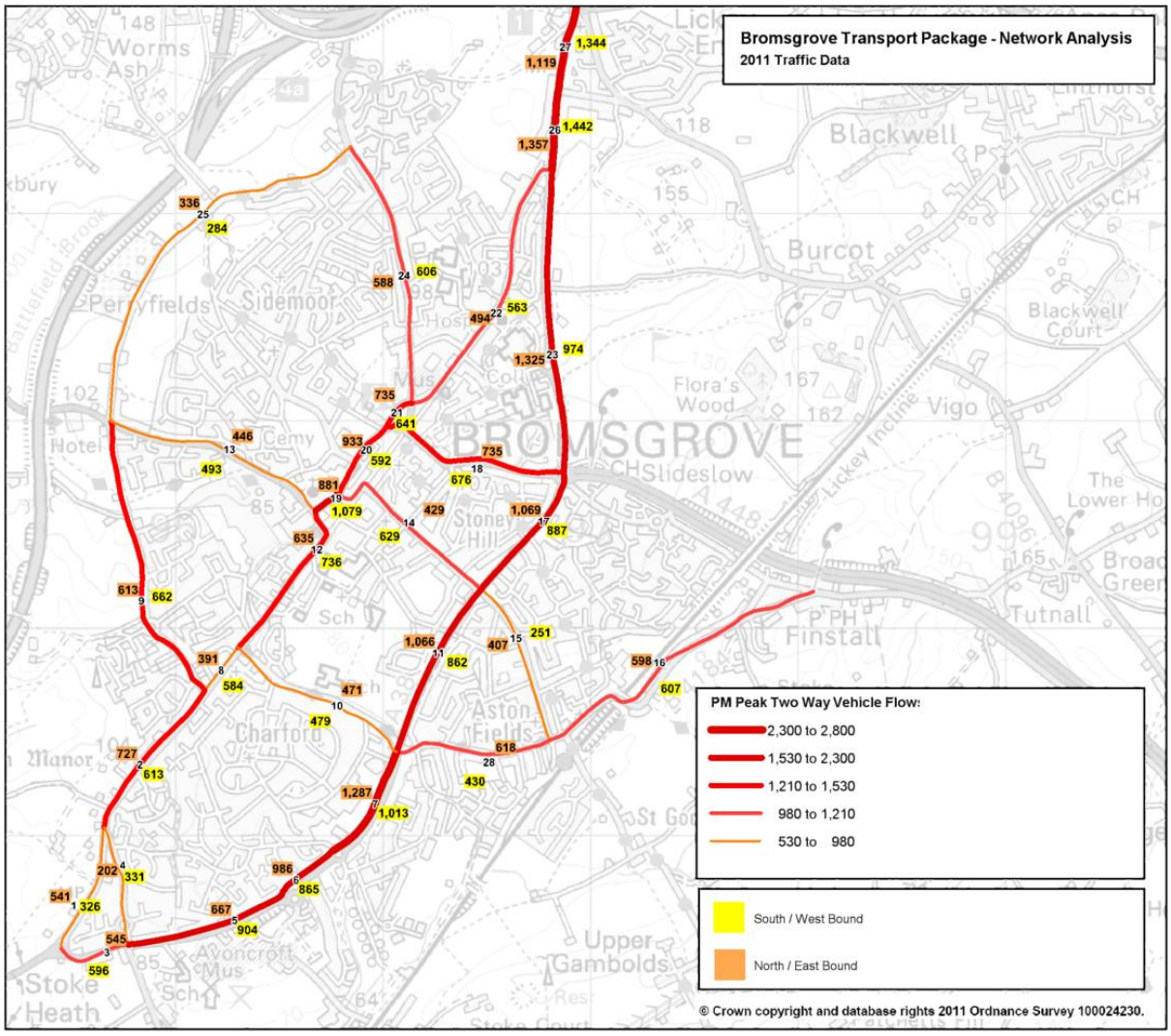


Figure 5.14 – PM Peak Link Flow Analysis in PCUs

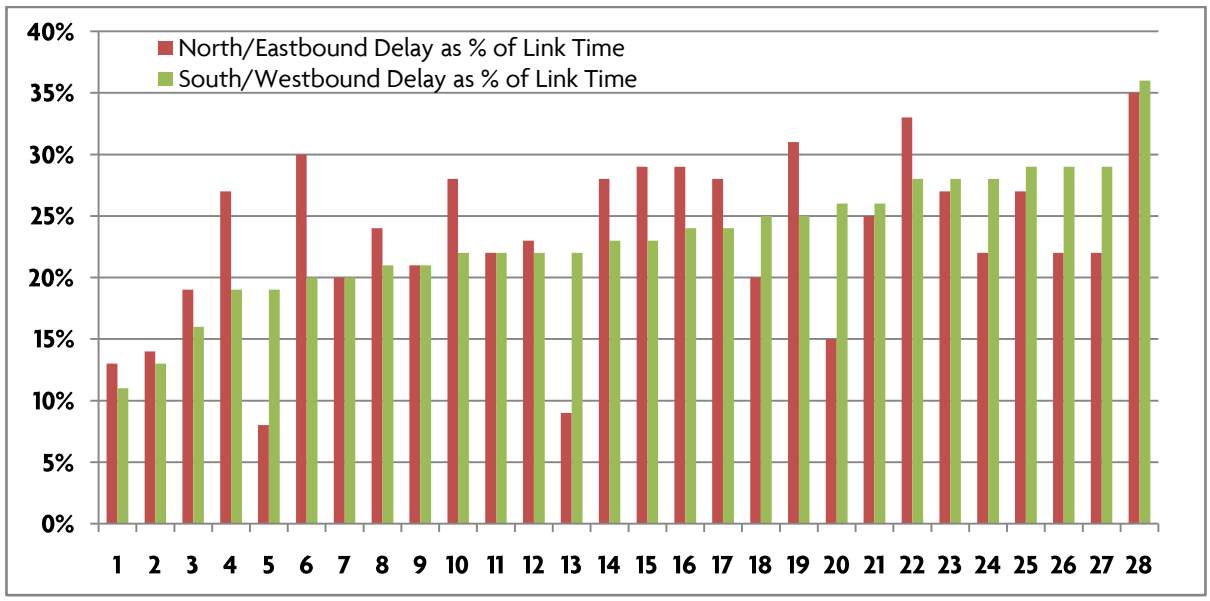


5.9.5 Table 5.7 and Figure 5.15 sets out journey times, journey distances, speeds and delays on a link by link basis.

Table 5.7 (and Associated Plot) – Link Journey Time and Delay (Seconds) over a 12-hour Period, drawn from Strat-E-GIS Congestion Data

Link	North/East Bound				South/West Bound			
	Journey Time (Seconds)	Delay (Seconds)	Total JT (Seconds)	Delay as % of Link Time	Journey Time (Seconds)	Delay (Seconds)	Total JT (Seconds)	Delay as % of Link Time
1	44.08	6.63	50.71	13%	44.59	5.75	50.34	11%
2	72.68	17.58	90.26	19%	65.45	12.04	77.49	16%
3	45.73	18.14	63.87	28%	36.28	10.34	46.62	22%
4	67.09	21.24	88.33	24%	65.51	17.45	82.96	21%
5	52.07	19.27	71.34	27%	63.69	26.58	90.27	29%
6	92.81	26.71	119.52	22%	98.11	27.41	125.52	22%
7	113.89	33.27	147.16	23%	119.19	33.97	153.16	22%
8	38.56	16.87	55.43	30%	29.75	7.54	37.29	20%
9	124.89	19.59	144.48	14%	140.43	21.79	162.22	13%
10	101.89	18.32	120.21	15%	116.27	40.47	156.74	26%
11	57.84	19.65	77.49	25%	74.96	26.72	101.68	26%
12	117.65	48.5	166.15	29%	93.24	30.11	123.35	24%
13	94.35	34.92	129.27	27%	77.27	18.04	95.31	19%
14	117.38	29.64	147.02	20%	119.53	38.8	158.33	25%
15	101.87	8.26	110.13	8%	78.9	17.95	96.85	19%
16	132.17	35.26	167.43	21%	132.17	35.26	167.43	21%
17	85.6	45.27	130.87	35%	82.6	47.27	129.87	36%
18	141.23	63.36	204.59	31%	114.02	38.38	152.4	25%
19	21.13	8.32	29.45	28%	19.83	6.1	25.93	24%
20	68.38	34.05	102.43	33%	54.87	21.54	76.41	28%
21	23.75	9.22	32.97	28%	21.82	6.59	28.41	23%
22	162.77	59.64	222.41	27%	170.52	67	237.52	28%
23	141.76	34.34	176.1	20%	120.51	29.58	150.09	20%
24	136.01	39.23	175.24	22%	164.85	64.35	229.2	28%
25	141.89	13.75	155.64	9%	158.62	43.93	202.55	22%
26	46.21	18.69	64.9	29%	33.92	9.93	43.85	23%
27	56.56	16.1	72.66	22%	64.14	26.38	90.52	29%
28	99.62	30.72	130.34	22%	93.26	40.47	133.73	29%

Figure 5.15 – Delay Observed on Links as a Percentage of Journey Time

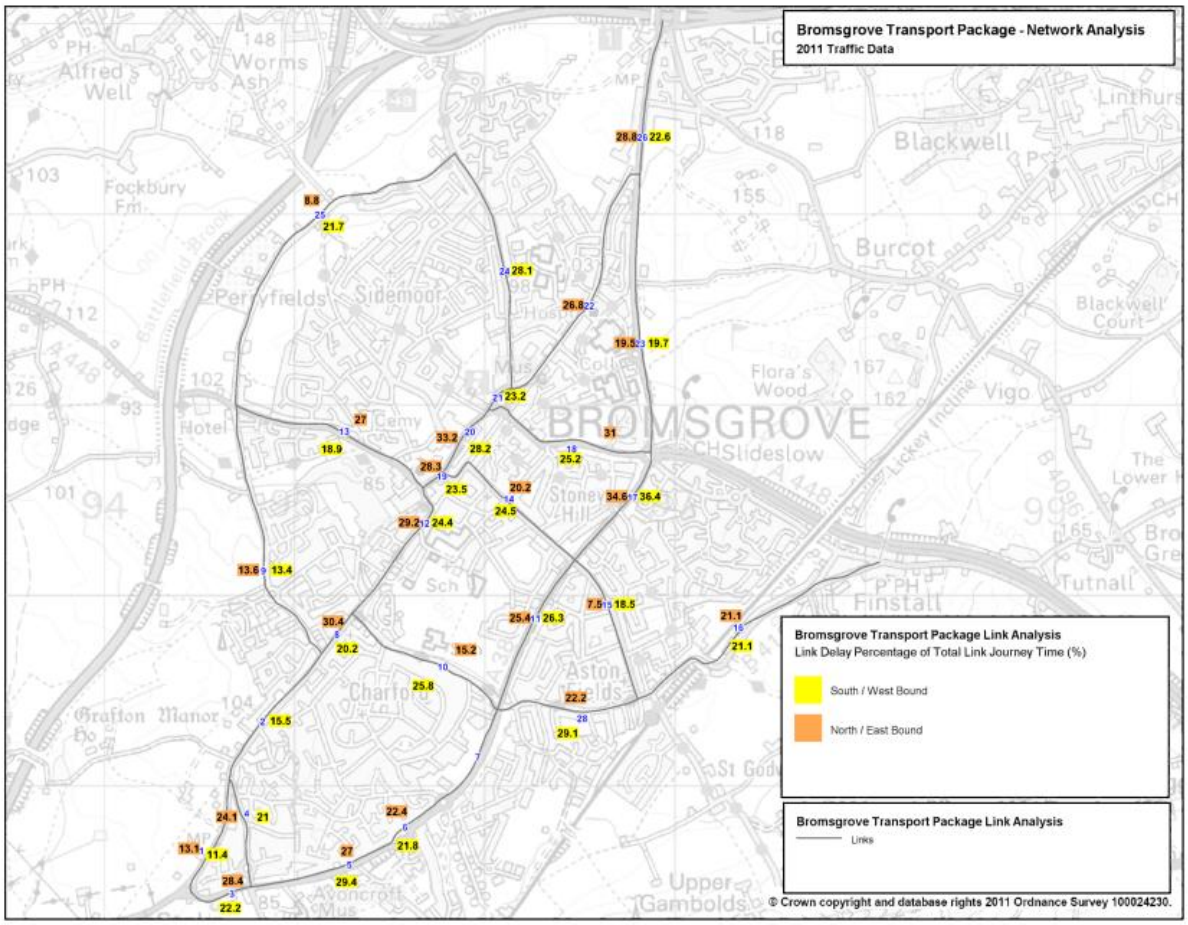


5.9.6 The data shown above identifies:

- *The average % of total journey time across the network identified as delay is ~23%*
- *Northbound delay and southbound delays across the network are largely equal although more links are identified as having high percentages of delay as part of total journey time for northbound flows.*
- *The links which exhibit the highest levels of delay are the north and southbound approaches to the A38 Slideslow roundabout at 35% and 36% respectively.*
- *A448 Stratford Road link between the town centre and Slideslow roundabout exhibits high levels of delay (31% and 25%) accounting for around a third of total journey time.*
- *Within the town centre, network delay accounts for an average of 30% northbound and 25% southbound of total journey time.*

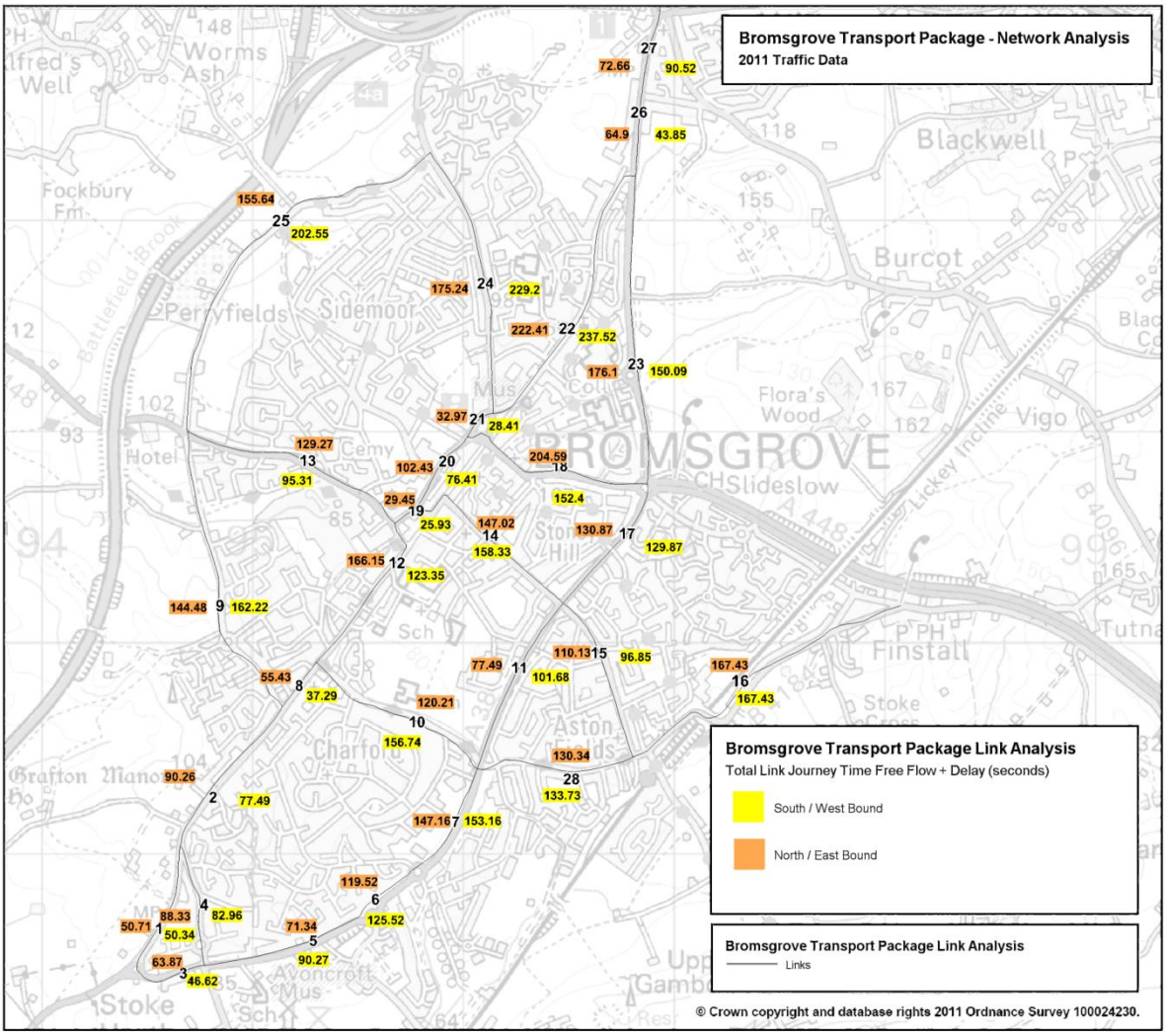
5.9.7 Figures 5.16 illustrates the delays as percentages of total journey time across the Bromsgrove Transport Package area network. This uses DfT Strat-e-GIS data to show the percentage of journey time which can be attributed to delay on a link-by-link basis.

Figure 5.16 – Delay as a Percentage of Total Journey Time over a 12-hour Period (Strat-e-GIS)



5.9.8 Figures 5.17 illustrates total journey time in seconds across the Bromsgrove Transport Package area network. This uses DfT Strat-e-GIS data to show this on a link-by-link basis.

Figure 5.17 – Total Link Journey Times (seconds)



5.9.9 The analysis shows:

- *There are significant differences in the levels of delay observed across the network between North/Eastbound and South/Westbound total journey times across all time periods (12-hour).*
- *Some links exhibit particularly high levels of delay in certain directions. These are discussed below:*
  - ***Stourbridge Road** - 53 seconds slower in the southbound direction than vice versa towards Market Street and the town centre. Evidence suggests that this is caused by congestion at Parkfield Junction, which results in delay in this direction.*
  - ***Stratford Road** – 52 seconds slower in the eastbound direction than vice versa towards Slideslow Roundabout. Evidence identifies that the Slideslow junction is a significant generator of network delay.*
  - ***Perryfields Road** – 46 seconds slower towards junction with Kidderminster Road. The design of the junction of Perryfields Road with Kidderminster Road is substandard, with poor visibility. This causes significant delay as vehicles are forced to queue to wait to cross the junction. This is evidenced by this junction being designated as an accident cluster site.*
  - ***Charford Road** – 36 seconds slower towards junction with Worcester Road. The junction of Charford Road with Worcester Road is currently provided as a substandard mini roundabout. This infrastructure was installed as an accident remediation scheme; however, this now causes network delay, as traffic speeds have been reduced at this location.*
  - ***Kidderminster Road** – 33 seconds slower on the approach to the Worcester Road Junction. This roundabout has poor visibility on the Kidderminster Road approach, which limits opportunities to join the mainline traffic flow.*
  - ***Market Street** – 26 seconds slower in the northbound direction through the town around the junction with Recreation Road. The Parkfield junction is a significant contributor to overall network delay.*
  - ***A38 north of Slideslow Roundabout** – 26 seconds slower on the approach to the junction with Old Birmingham Road. This suggests that the junction with Old Birmingham Road is operating inefficiently.*

5.9.10 Figures 5.18 to 5.21 illustrate some examples of the traffic congestion which is experienced across the Bromsgrove Transport Package area. This is contributing to deteriorating journey times and increased delay across the network.

Figure 5.18 – Traffic Congestion Experienced on Stourbridge Road

5.9.11 Figure 5.18 shows congestion experienced on Stourbridge Road in the direction of the Parkfield Junction. This supports the evidence provided in Table 6.10 which identifies average queues at this location of 210 metres in peak periods.

Figure 5.19 – Traffic Congestion Experienced on Stratford Road

5.9.12 Figure 5.19 shows congestion experienced on Stratford Road in both directions near the junction with the High Street. Observed high pedestrian flows using the crossing at the top of the High Street exacerbate this situation. This supports the evidence provided in Table 5.10 which identifies average queues at this location of 228 metres in peak periods.

Figure 5.20 – Traffic Congestion Experienced on New Road

5.9.13 Figure 5.20 shows congestion experienced on New Road in a eastbound direction near the junction with the A38. This supports the evidence provided in Table 5.10 which identifies average queues at this location of 120 metres in peak periods.

Figure 5.21 – Traffic Congestion Experienced on Bromsgrove Eastern Bypass

5.9.14 Figure 5.21 shows congestion experienced on Bromsgrove Eastern Bypass in both directions near the Slideslow Roundabout. This supports the evidence provided in Table 5.10 which identifies average queues at this location of 204 metres in peak periods.

5.9.15 Table 5.8 illustrates average link speeds across the modelled network using Strat-E-GIS 12-hour data.

Table 5.8 – Average Link Speeds (mph)

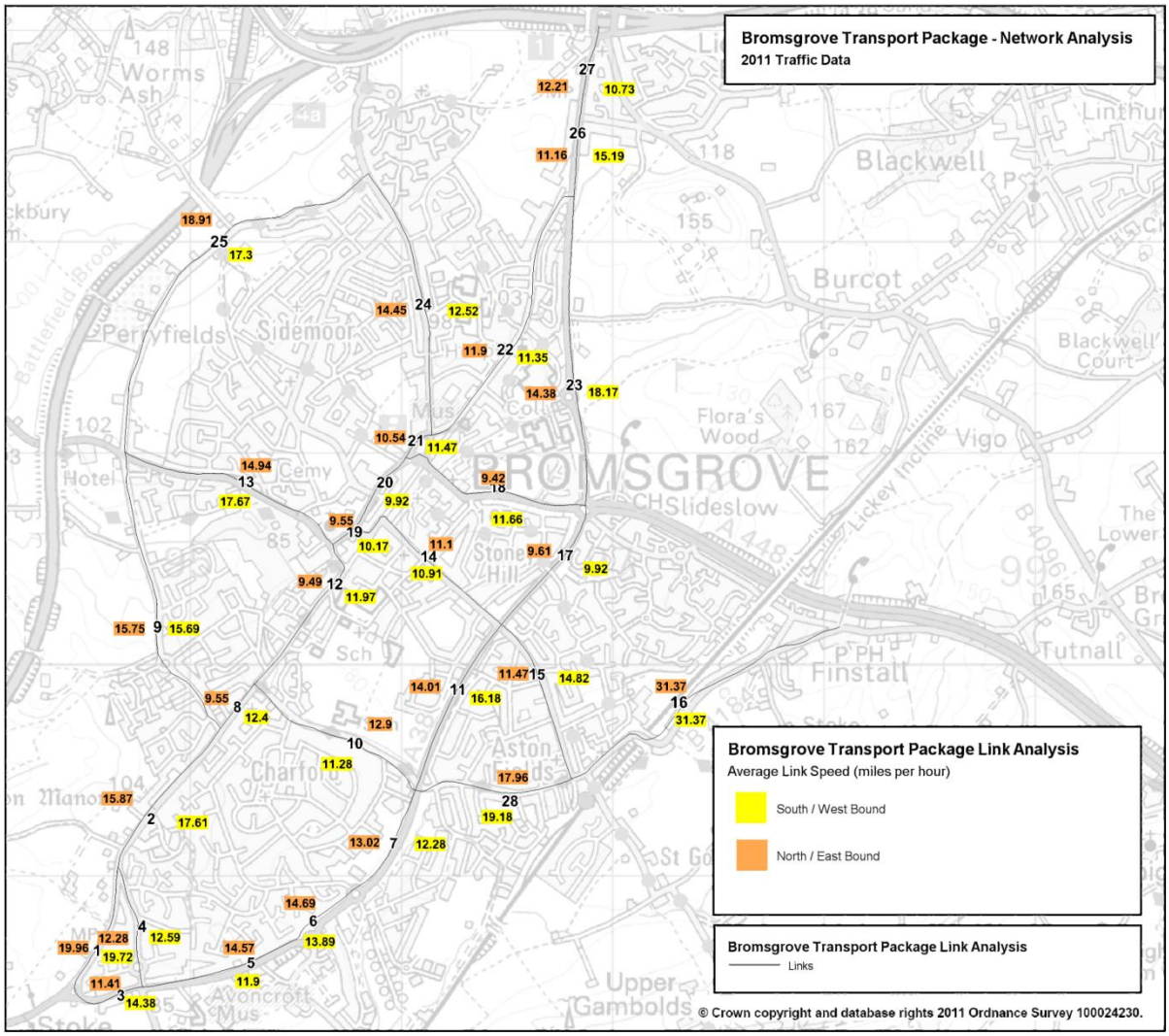
Link	Link Location	North/Eastbound Average Speed (mph)	South/Westbound Average Speed (mph)
1	Worcester Road (B4094)	19.96	19.72
2	Rock Hilll (B4091)	15.87	17.61
3	Redditch Road A38 (Hanbury Turn)	11.41	14.38
4	Hanbury Road North (B4091)	12.28	12.59
5	Redditch Road A38 (Buntsford)	14.57	11.90
6	A38 Bromsgrove Eastern Bypass	14.69	13.89
7	A38 Stoke Road	13.02	12.28
8	Rock Hill North (B4091)	9.55	12.40
9	Whitford Road/Fox Lane	15.75	15.69
10	Charford Road	12.90	11.28
11	Bromsgrove Eastern Bypass (Charford)	14.01	16.18
12	Worcester Road (B4091)	9.49	11.97
13	A448 Kidderminster Road	14.94	17.67
14	B4184 New Road	11.10	10.91
15	B4184 New Road (Aston Fields)	11.47	14.82
16	Stoke Road/Finstall Road	31.37	31.37
17	A38 Oakalls	9.61	9.92
18	A448 Stratford Road	9.42	11.66
19	St John's Street	9.55	10.17
20	A448 Market Street	8.00	9.92
21	A448 Market Street North	10.54	11.47
22	Birmingham Road	11.90	11.35
23	Bromsgrove Eastern Bypass A38 (Slideslow)	14.38	18.17
24	B4091 Stourbridge Road	14.45	12.52
25	Perryfields Road	18.91	17.30
26	A38 Birmingham Road	11.16	15.19
27	A38 Birmingham Road (North)	12.21	10.73
28	Stoke Road (South)	17.96	19.18

5.9.16 The analysis, which uses DfT sourced congestion data, suggests;

- *Across all links in the network the average speeds are approximately 14 mph in all directions.*
- *Average speeds on the links which make up the A38 corridor are low. The speed limit along this corridor is 40mph, whereas observed speeds are on average 14 mph, some 26mph below the designated speed limit.*
- *The link which exhibits the lowest speeds is Market Street in the town centre with speeds of around 8 mph northbound and 9.92 mph southbound.*
- *The link which demonstrates the highest observed speeds is Stoke Road/Finstall Road with average speeds of 31 mph. The speed limit along this section is 30mph, which suggests that this section is prone to speeding.*

5.9.17 Figure 5.22 illustrates link speeds across the Bromsgrove Transport Package area over a 12-hour period. (Again, this evidence is sourced from DfT Congestion Data).

Figure 5.22 – Link Speeds in Miles per Hour



5.10 Link Network Performance Statistics – Conclusions

5.10.1 The Link Network Analysis identifies:

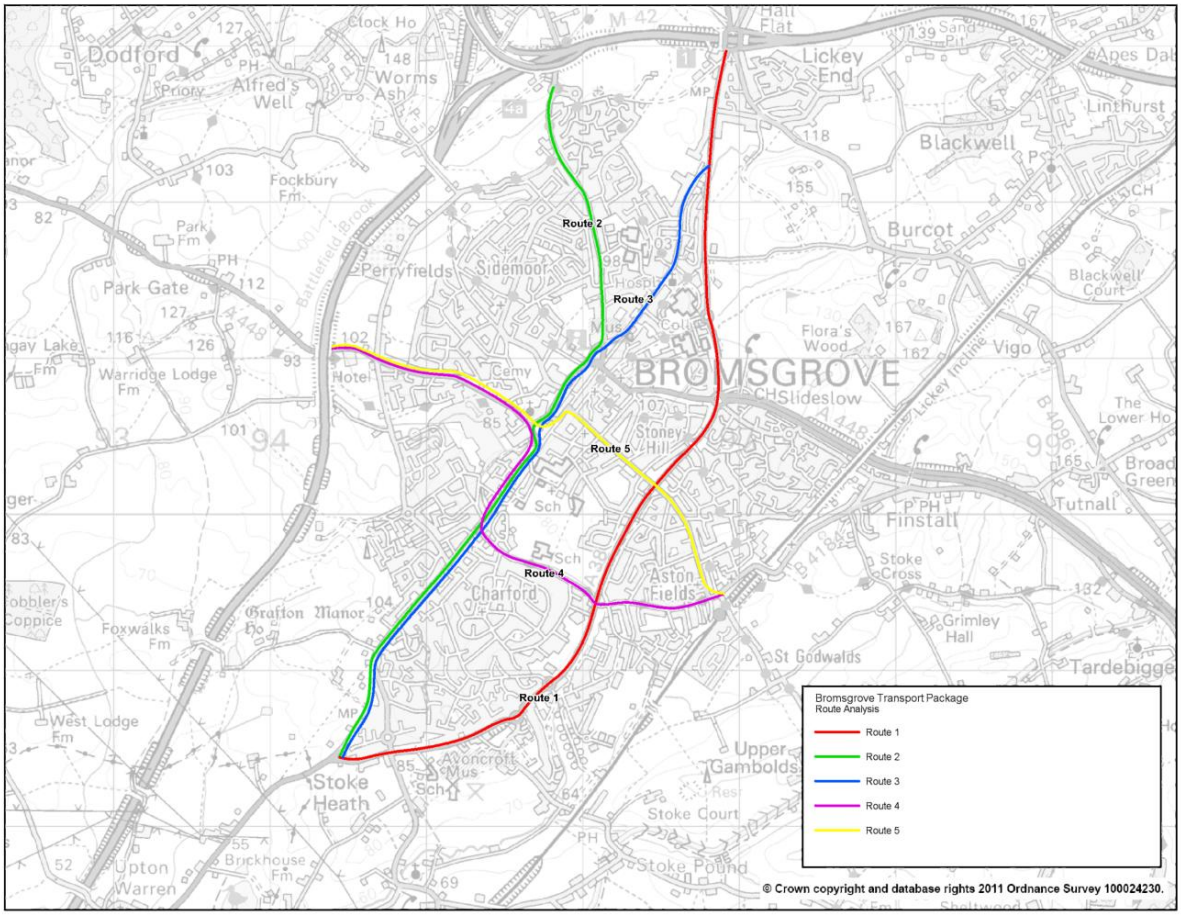
- *The component links of the A38 corridor (links 3, 5, 6, 7, 11, 17, 23, 26 and 27) cumulatively exhibit the highest vehicular flows (over 20,000 PCUs in a 12-hour period).*
- *Elsewhere on the network, other areas where high traffic flow is experienced are Kidderminster Road with a 12-hour, bi-directional PCU flow of 23,276 and St John's Road with a 12-hour, bi-directional PCU flow of 19,208.*
- *Delay accounts for 23% of journey times across the Bromsgrove Transport Package area network on average.*
- *Lowest link speeds are observed on:*
    - *Link 20 (Market Street) with average speeds of 8mph northbound and 10 mph southbound over a 12-hour period*
    - *Link 18 (Stratford Road) with average speeds of 9mph eastbound and 12mph westbound over a 12-hour period*
    - *Link 12 (Worcester Road B4091) with average speeds of 9mph northbound and 12mph southbound over a 12-hour period*
    - *Link 19 (St John's Street) with average speeds of 10mph in both directions over a 12-hour period.*
    - *Link 8 (Rock Hill North) with average speeds of 10mph in both directions over a 12-hour period.*
- *The above suggests that both the Slideslow Roundabout and Parkfield Junction are key drivers of network delay in the Bromsgrove Transport Package area*
- *At all junctions where local traffic seeks to join the A38 from Charford Road, New Road, Stratford Road and Old Birmingham Road, delay is experienced. In the case of Charford Road and Stoke Road, this is also exacerbated by school traffic from major educational establishments and traffic accessing the major retail and industrial trip attractors located in this area.*
- *Highest link speeds are observed on:*
    - *Link 16 (Stoke Road/Finstall Road) with average speeds of 31mph in both directions over a 12-hour period*
    - *Link 1 (Worcester Road B4094) with average speeds of 20mph in both directions over a 12-hour period*
    - *Link 25 (Perryfields Road) with average speeds of 19mph northbound and 17mph southbound over a 12-hour period*
    - *Link 28 (Stoke Road East) with average speeds of 18mph northbound and 19mph southbound over a 12-hour period*
    - *Link 2 (Rock Hill, B4091) with average speeds of 16mph northbound and 18mph southbound over a 12-hour period*

5.10.2 The analysis outlined in this section on links and junctions has been used, together with that collected for the global network to define a series of corridors or routes through the Bromsgrove Transport Package Area. The proceeding section considers the findings of the previous sections in the context of these routes.

5.11 Route Network Performance Statistics

5.11.1 This section considers the Bromsgrove Transport Package area network as a series of linked corridors or routes. The purpose of this approach is to gain an understanding of the efficiency of the network for both local and strategic trips, and also to inform future investment in the network to deliver journey time reliability and cost benefits. Figure 5.23 illustrates the corridors or routes which have been considered as part of this assessment of Route Network Performance.

Figure 5.23 – Bromsgrove Package Study Routes



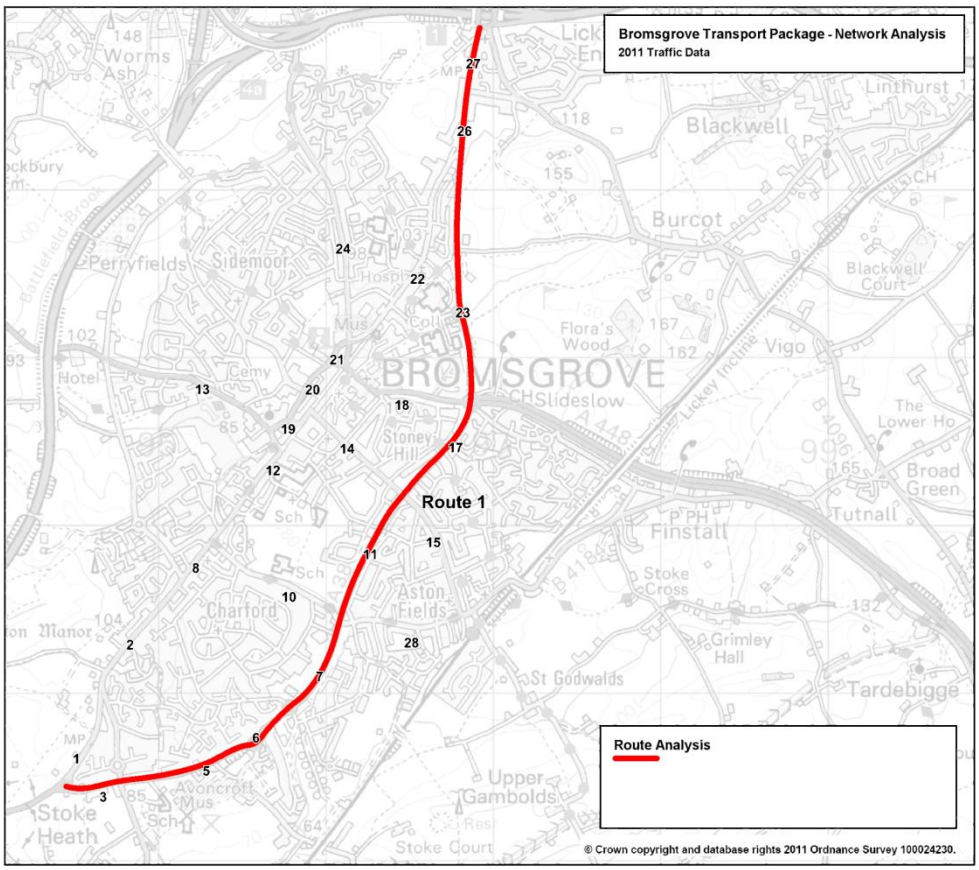
5.11.2 Table 5.9 shows the network performance statistics, which include demand, total journey time, delay and speed data associated with Route 1 (the A38 corridor northbound) on a link basis.

Table 5.9 – Route 1 Statistics (Northbound)

	Link Number									Total
	3	5	6	7	11	17	23	26	27	
Demand	1306	1576	967	1079	836	988	1062	1361	1237	10410
Journey Distance (m)	375	547	983	1145	611	591	1487	370	497	6607
Journey Time (secs)	46	52	93	114	58	86	142	46	57	692
Journey Delay (secs)	18	19	27	33	20	45	34	19	16	231
Total Journey Time (secs)	64	71	120	147	77	131	176	65	73	924
Total Journey Time (mins)	1	1	2	2	1	2	3	1	1	15
Speeds (km/hr)	18	24	24	21	23	15	23	18	20	21

5.11.3 Figure 5.24 illustrates Route 1 (the A38 corridor) through the Bromsgrove Transport Package Area.

Figure 5.24 – Route 1 (the A38 Corridor)



5.11.4 The demand analysis shows;

- *There are 10,410 vehicles on route 1 during the AM peak hour travelling in a northbound direction.*
- *There is a steep drop in demand between links 5 and 6 thought to be due to traffic exiting the network into Morrisons, Aldi and the business parks which are located between the two link points during the AM peak hour. Approximately 600 vehicles exit the route at this point.*
- *There is a steep increase in volumes on the links associated with the Birmingham Road junction where approximately 300 vehicles enter the route in the AM peak hour.*

5.11.5 The journey time, distance and speed analysis shows;

- *The total journey distance along the route is 6.6km (4 miles) and takes approximately 15 minutes to complete.*
- *Delay is equal to 4 minutes or 25% of total journey time*
- *The links either side of the Slideslow roundabout junction and Charford Road junction are the main contributors to delay in journey times.*
- *Average speeds across the route are 21km/hr and average speeds deteriorate significantly on the approach to the Slideslow roundabout with a reduction from 23 km/hr to 15km/hr*

5.11.6 Table 5.10 shows the network performance statistics – demand, total journey time, delay and speed data associated with the A38 corridor Southbound on a link basis.

Table 5.10 – Route 1 Statistics (Southbound)

	Link Number									Total
	27	26	23	17	11	7	6	5	3	
Demand	1233	1429	834	742	1023	1132	999	1016	1447	9854
Journey Distance (m)	497	370	1487	591	611	1145	983	547	375	6607
Journey Time (secs)	64	34	121	83	75	119	98	64	36	693
Journey Delay (secs)	26	10	30	47	27	34	27	27	10	238
Total Journey Time (secs)	91	44	150	130	102	153	126	90	47	932
Total Journey Time (mins)	2	1	3	2	2	3	2	2	1	16
Speeds (km/hr)	17	24	29	16	26	20	22	19	23	22

5.11.7 The demand analysis shows;

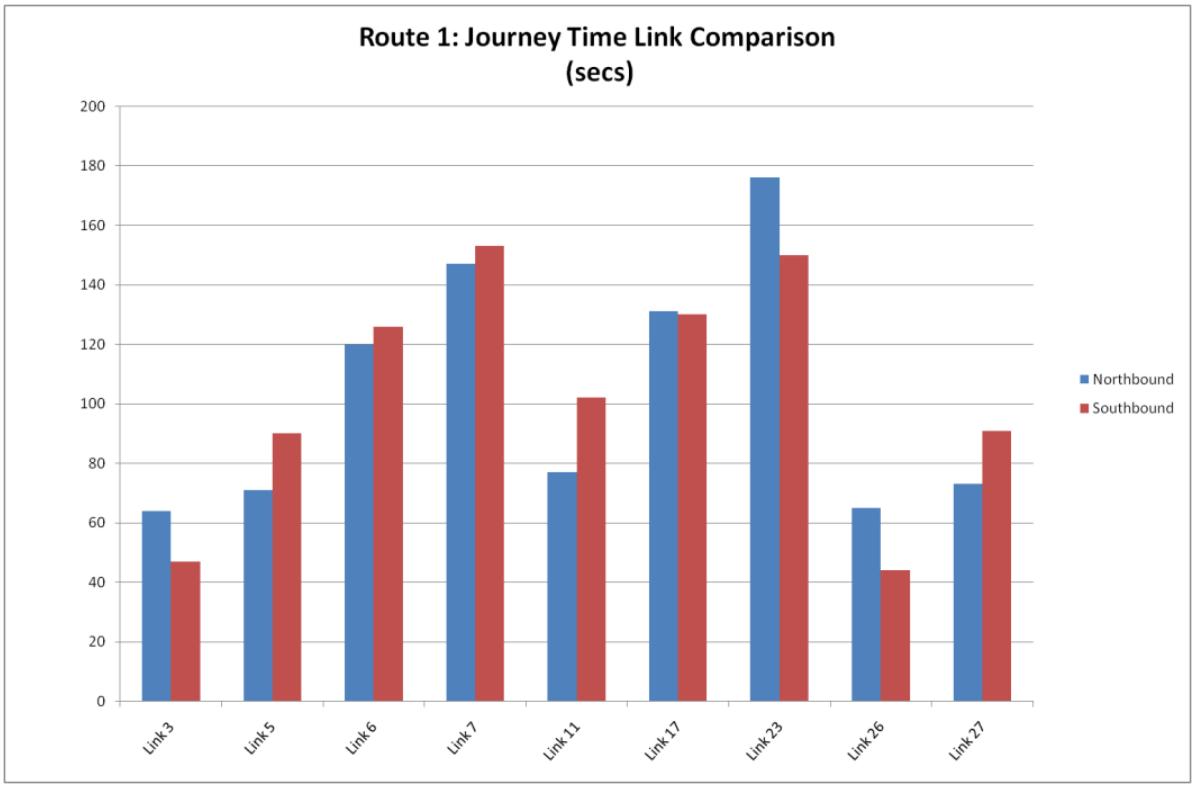
- *There are 9,840 vehicles on route 1 during the AM peak hour travelling in a southbound direction.*
- *There is a steep drop in demand at Birmingham Road Junction with the A38 where approximately 700 vehicles remain on the A38 South corridor.*
- *A38 New Road Junction is shown to be a key feeder road onto the A38 where approximately 300 vehicles join the corridor.*
- *The Hanbury Turn Signalised Crossroads is also shown to be a key feeder road onto the A38 where approximately 400 vehicles join the corridor in the AM Peak.*

5.11.8 The journey time, distance and speed analysis shows;

- *The total journey distance along the route is 6.6km (4 miles) and takes approximately 16 minutes to complete.*
- *Delay is equal to 4 minutes or 25% of total journey time*
- *The links either side of the Slideslow roundabout junction and Charford Road junction are the main contributors to delay in journey times.*
- *Average speeds across the route is 22km/hr and average speeds deteriorate significantly on the approach to the Slideslow roundabout with a reduction from 29km/hr to 16km/hr*
- *There are reductions in speed around the Morrisons, Aldi and Business Park junctions exhibited on the route.*

5.11.9 Figure 5.25 illustrates a journey time comparison between Northbound and Southbound Flows across the A38 corridor.

Figure 5.25 –Route 1 Journey Time Link Comparison

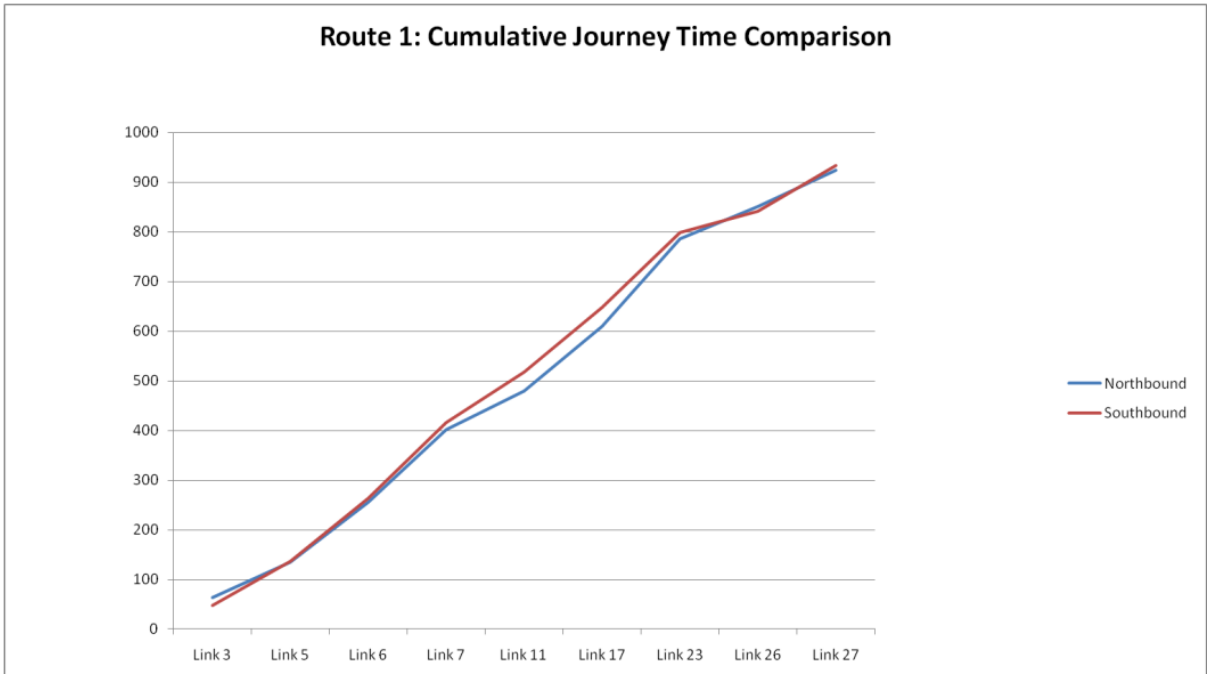


5.11.10 The analysis shows:

- *Northbound flows through the Stoke Heath heading towards the Hanbury Turn Junction takes significantly less time that the southbound flow.*
- *Southbound flows along the link between Charford Road and New Road take considerably longer than the southbound equivalent flows.*

5.11.11 Figure 5.26 shows a cumulative journey time comparison between Northbound and southbound flows along the A38 Corridor.

Figure 5.26 – Route 1 Cumulative Journey Time Comparison



5.11.12 The analysis shows;

- *Although the total journey time for Northbound and Southbound flows are evenly matched there is a section of the route between the approach to the Charford Road signalised junction and the A38/Birmingham Road Junction where northbound flows are take longer to complete the route than southbound equivalents.*
- *The Charford Road Signalised junction, New Road Signalised Junction and the Slideslow roundabout all create delays along this section of route and add significantly to total journey times.*

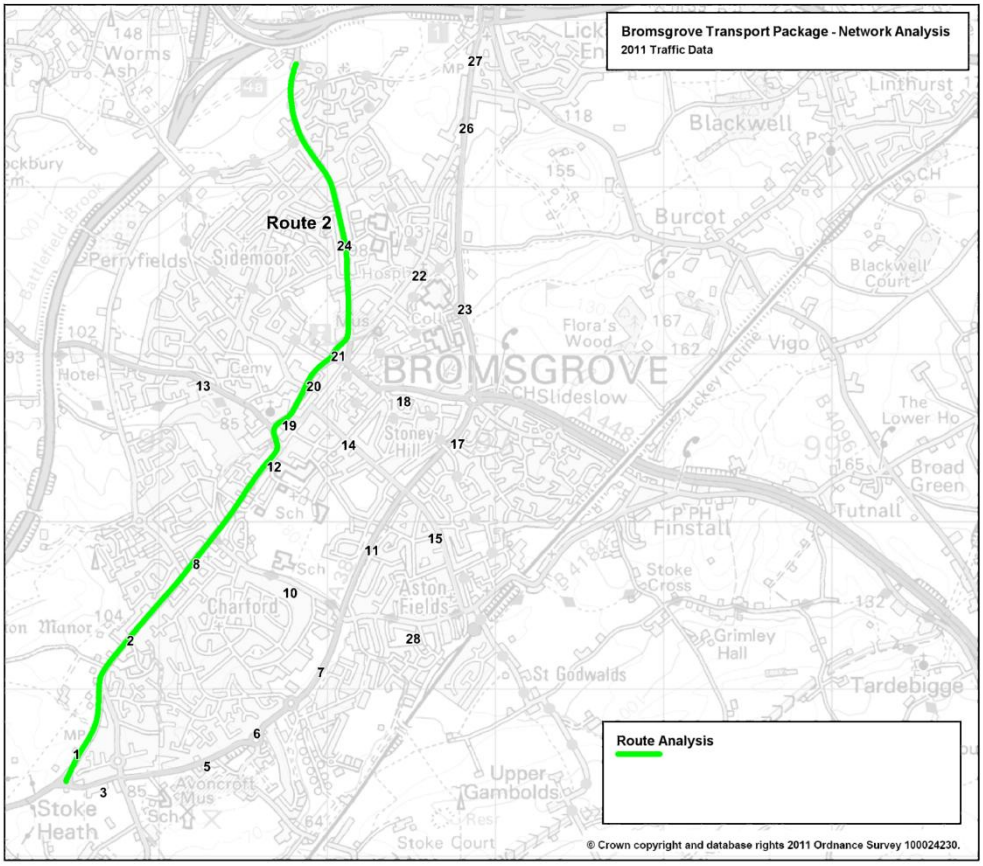
5.11.13 Table 5.11 shows the network performance statistics – demand, total journey time, delay and speed data associated with the Route 2: Worcester Road/Stourbridge Road/Catshill corridor northbound on a link basis.

Table 5.11 - Route 2 Statistics: Northbound

	Link Number								Total
	1	2	8	12	19	20	21	24	
Demand	382	611	609	865	340	657	753	478	4694
Journey Distance (m)	633	831	266	804	145	392	1396	1308	5776
Journey Time (secs)	44	73	39	118	21	68	24	136	522
Journey Delay (secs)	7	18	17	49	8	34	9	39	180
Total Journey Time (secs)	51	90	55	166	29	102	33	175	703
Total Journey Time (mins)	1	2	1	3	0	2	1	3	12
Speeds (km/hr)	32	26	15	15	15	13	17	23	20

5.11.14 Figure 5.27 illustrates Route 2 (the Rock Hill to Catshill Corridor) through the Bromsgrove Transport Package Area.

Figure 5.27 – Route 2



5.11.15 The demand analysis shows:

- *There are 4,694 vehicles on route 2 during the AM peak hour travelling in a northbound direction.*
- *There is a steep increase in demand from the Charford Area of Bromsgrove on the Hanbury Road/Worcester Road Junction of around 300 vehicles in the AM peak hour.*
- *There is a steep increase in volumes on the links associated with the Birmingham Road junction where approximately 300 vehicles enter the route in the AM peak hour.*
- *New road is an important feeder junction for the route at the Market Street junction where approximately 300 vehicles enter the route in the AM peak hour.*
- *There is a sharp drop in demand of approximately 300 vehicles in the AM peak hour between Market Street and the Perryfields Road junction with the Stourbridge Road. The District Council Offices, Princess of Wales Hospital and many businesses are located along this section of the route and are large attractors of travel demand during the AM Peak.*

5.11.16 The journey time, delay and speed analysis shows;

- *The total journey distance along the route is 5.7km (3.5 miles) and takes approximately 12 minutes to complete.*
- *Delay is equal to 3 minutes or 25% of total journey time.*
- *The links of Hannover Street, Market Street and the junction with Recreation Road are the main contributors to delay in journey times.*
- *Average speeds across the route is 20km/hr and average speeds deteriorate significantly around the schools and Charford Road with a reduction from 26km/hr to 15km/hr in the AM Peak*
- *Market Street exhibits the link with lowest speeds of 12km/hr around the Recreation Road Junction and ASDA, Business Parks area.*

5.11.17 Table 5.12 shows the network performance statistics – demand, total journey time, delay and speed data associated with the A38 corridor Southbound on a link basis.

Table 5.12 - Route 2 Statistics: Southbound

	Link Number								Total
	24	**12**	**20**	**19**	**21**	**8**	**2**	**1**	
Demand	748	656	532	772	656	650	743	441	5198
Journey Distance (m)	1308	804	392	145	1396	266	831	633	5776
Journey Time (secs)	165	93	55	20	22	30	65	45	494
Journey Delay (secs)	64	30	22	6	7	8	12	6	154
Total Journey Time (secs)	229	123	76	26	28	37	77	50	648
Total Journey Time (mins)	4	2	1	0	0	1	1	1	11
Speeds (km/hr)	20	19	16	16	18	20	28	32	21

5.11.18 The demand analysis shows;

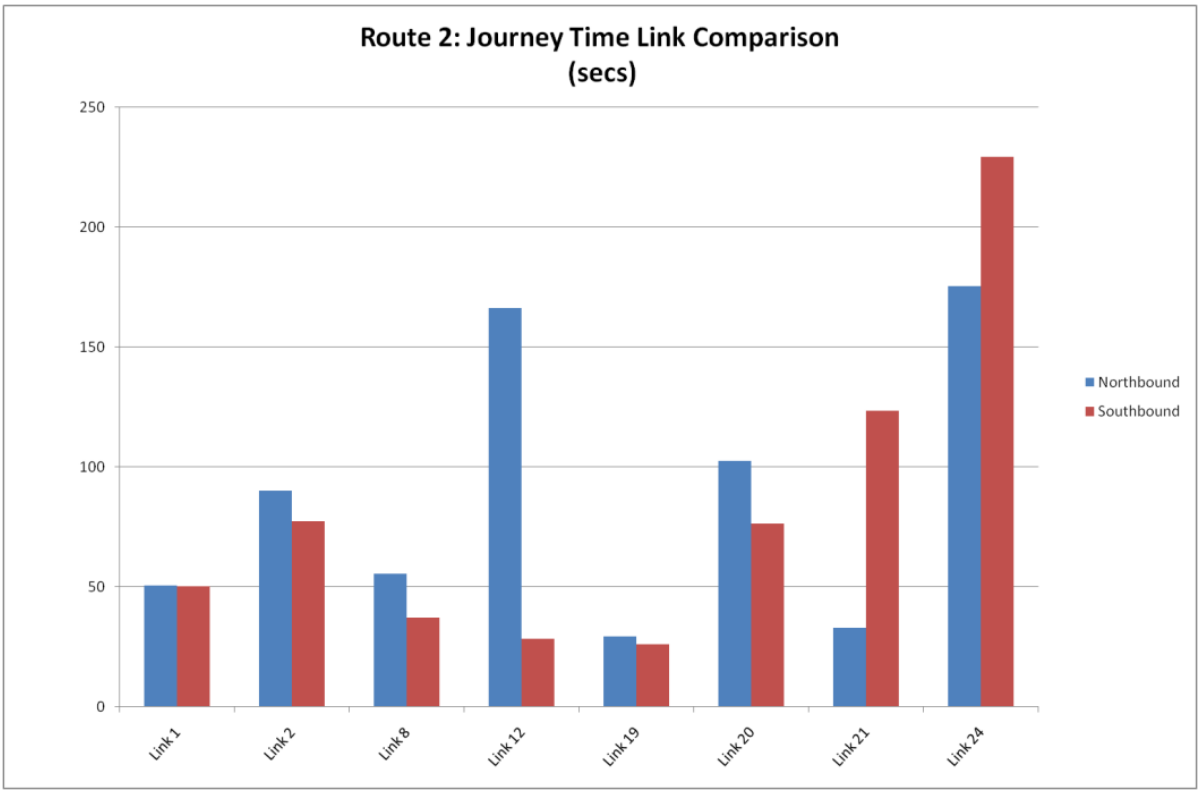
- *There are approximately 5,200 vehicles on route 2 during the AM Peak hour, travelling in a southbound direction.*
- *There is a steady flow of traffic across the route during the AM hour across all composite links. However, approximately 100 hundred vehicles depart the route at Stratford Road and approximately 200 vehicles enter the route between Hannover street and Worcester road in the town centre during the AM peak.*
- *Approximately 300 vehicles depart the route at the junction with Worcester Road and Hanbury Road.*

5.11.19 The journey time, delay and speed analysis shows;

- *The total journey distance along the route is 5.7km (3.5 miles) and takes approximately 11 minutes to complete.*
- *Delay is equal to 2.5 minutes or just under 25% of total journey time.*
- *The links on the approach into Bromsgrove Town Centre towards Market Street are the main contributors to delay in journey times. Once this section of the route has been negotiated there are minimal delays shown on the remainder of the route.*
- *Average speeds across the route is 21km/hr and average speeds increase significantly after the Charford road junction with a increase from 20km/hr to 28km/hr in the AM Peak*
- *Market Street and Hanover Street exhibits the link with lowest speeds of 16km/hr around the Recreation Road Junction and ASDA, and the Business Parks area.*

5.11.20 Figure 5.28 illustrates a journey time comparison between Northbound and Southbound Flows across Worcester Road/Stourbridge Road/Catshill Corridor.

Figure 5.28 - Route 2 Journey Time Link Comparison

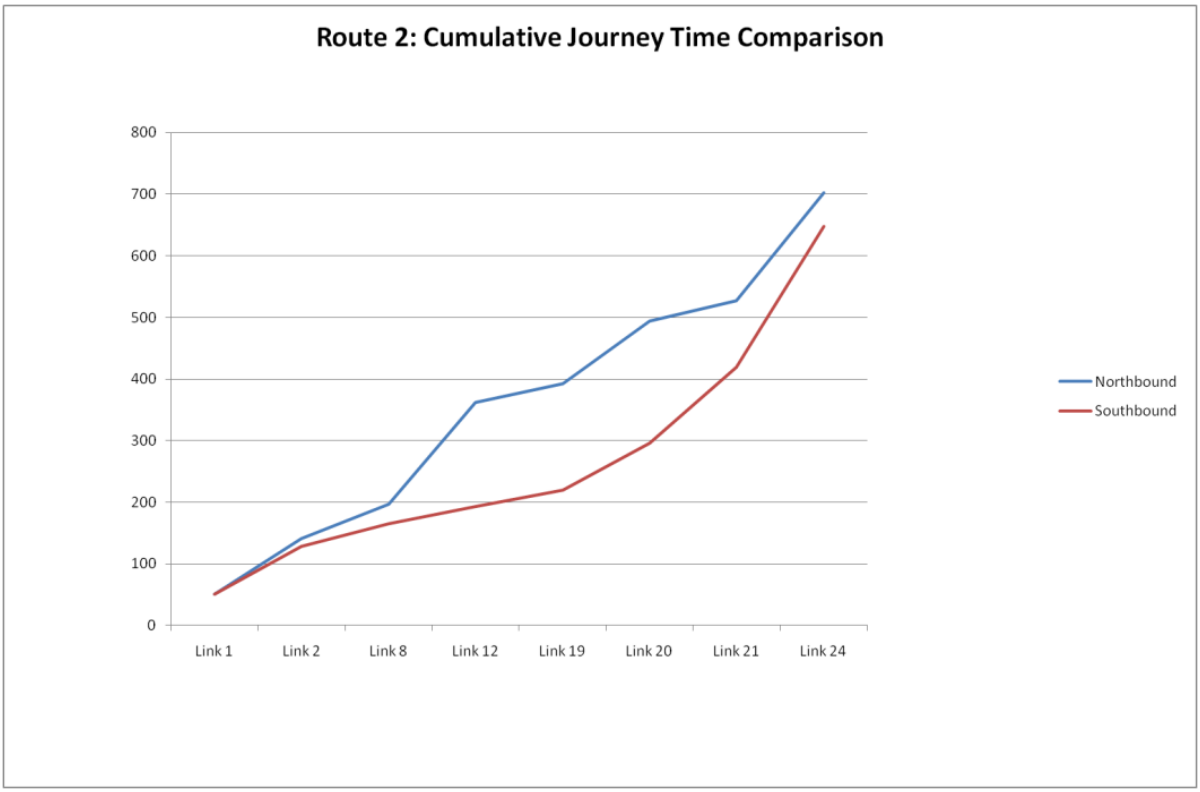


5.11.21 The analysis shows;

- *Journey times along the Worcester Road, north of Charford Road Junction and Hanover Street take considerably longer in the northbound direction than southbound.*
- *Journey times around the Market Street junction with the Strand are longer in the southbound direction than the northbound direction. This is also true of the Stourbridge Road Link.*

5.11.22 Figure 5.29 shows a cumulative journey time comparison between Northbound and southbound flows along the Worcester Road/Stourbridge Road/Catshill Corridor

Figure 5.29 – Route 2: Cumulative Journey Time Comparison



5.11.23 The analysis shows;

- *Journey times for northbound and southbound flows differ by approximately one minute with southbound flows exhibiting shorter journey time.*
- *There is significant disparity between northbound and southbound link journey times across Worcester Road Junction with Charford Road and Market Street Junction with Stourbridge Road.*

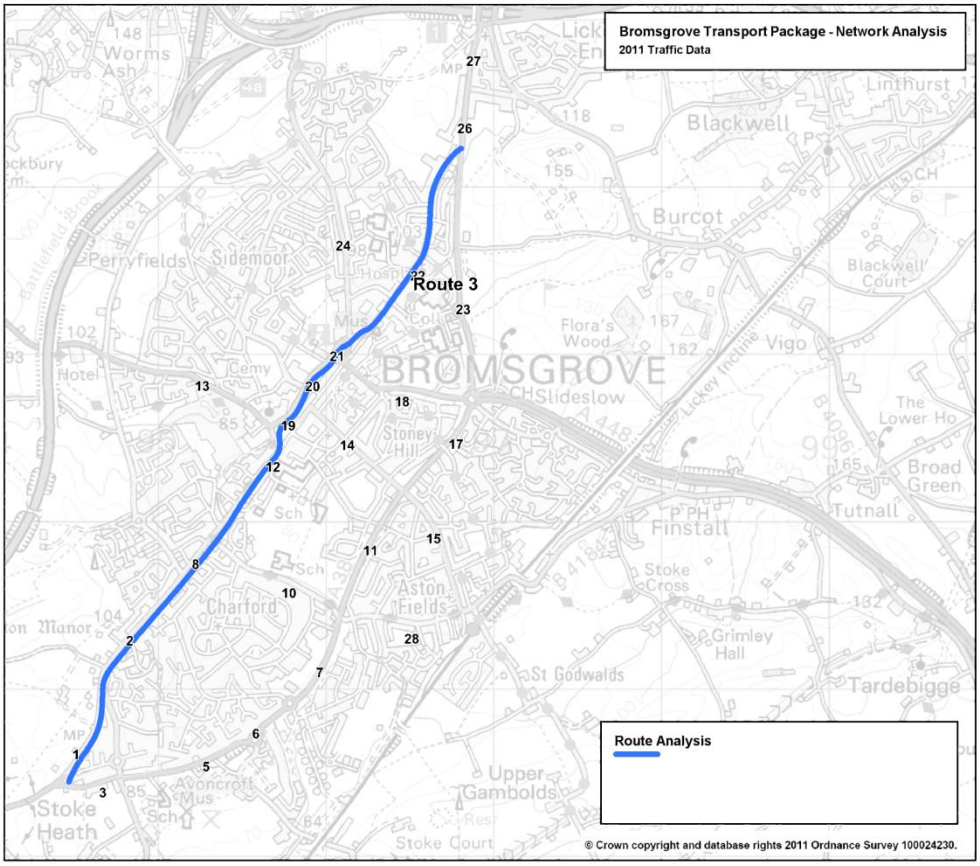
5.11.24 Table 5.13 shows the network performance statistics – demand, total journey time, delay and speed data associated with the Route 3: Worcester Road – M42 Junction 1 Corridor northbound on a link basis.

Table 5.13 – Route 3 Statistics: Northbound

	Link Number										Total
	1	2	8	12	19	20	21	22	26	27	
Demand	382	611	609	865	340	657	753	427	1361	1237	4643
Journey Distance (m)	633	831	266	804	145	392	1396	1396	370	497	5863
Journey Time (secs)	44	73	39	118	21	68	24	163	46	57	549
Journey Delay (secs)	7	18	17	49	8	34	9	60	19	16	201
Total Journey Time (secs)	51	90	55	166	29	102	33	222	65	73	887
Total Journey Time (mins)	1	2	1	3	0	2	1	4	1	1	15
Speeds (km/hr)	32	26	15	15	15	13	17	19	18	20	19

5.11.25 Figure 5.30 illustrates Route 3 (the Worcester Road / Old Birmingham Road Corridor) through the Bromsgrove Transport Package Area.

Figure 5.30 – Route 3



5.11.26 The demand analysis shows;

- *There are approximately 4,600 vehicles on route 3 during the AM Peak hour, travelling in a northbound direction.*
- *There are sharp increases in demand at the following points along the route*
  - *Worcester Road junction with Hanbury Road*
  - *Charford Road Junction with Worcester Road.*
  - *New Road Junction with Market Street*
  - *Birmingham Road Junction with A38*
- *There are steep decreases in demand at the following points along the route*
  - *Market Street for town centre destinations*
  - *Composite links of the Birmingham Road where Bromsgrove District Council Offices, Princess Royal Hospital and Businesses.*

5.11.27 The journey time, delay and speed analysis show;

- *The total journey time distance along the route is 5.8km (3.6 miles) and takes approximately 15 minutes to complete.*
- *Delay is equal to 3.3 minutes which is 20% of total journey time*
- *Average speed along the route is 19 kilometres an hour and average speeds decrease significantly from 26km/hr to 15km/hr south of Hanbury Road Junction and do not remain under 20km/hr until the end of the route.*
- *The lowest speeds of 13km/hr are observed on Market Street.*

5.11.28 Table 5.14 shows the network performance statistics, including demand, total journey time, delay and speed data associated with the Worcester Road – M42 Junction 1 Corridor Southbound on a link basis.

Table 5.14 – Route 3 Statistics: Southbound

	Link Number										Total
	27	**26**	**22**	**21**	**20**	**19**	**12**	**8**	**2**	**1**	
Demand	1233	1429	621	659	532	772	656	650	743	441	6552
Journey Distance (m)	497	370	1396	1396	392	145	804	266	831	633	5266
Journey Time (secs)	64	34	171	22	55	20	93	30	65	45	488
Journey Delay (secs)	26	10	67	7	22	6	30	8	12	6	175
Total Journey Time (secs)	91	44	238	28	76	26	123	37	77	50	791
Total Journey Time (mins)	2	1	4	0	1	0	2	1	1	1	13
Speeds (km/hr)	17	24	18	18	16	16	19	20	28	32	19

5.11.29 The demand analysis shows;

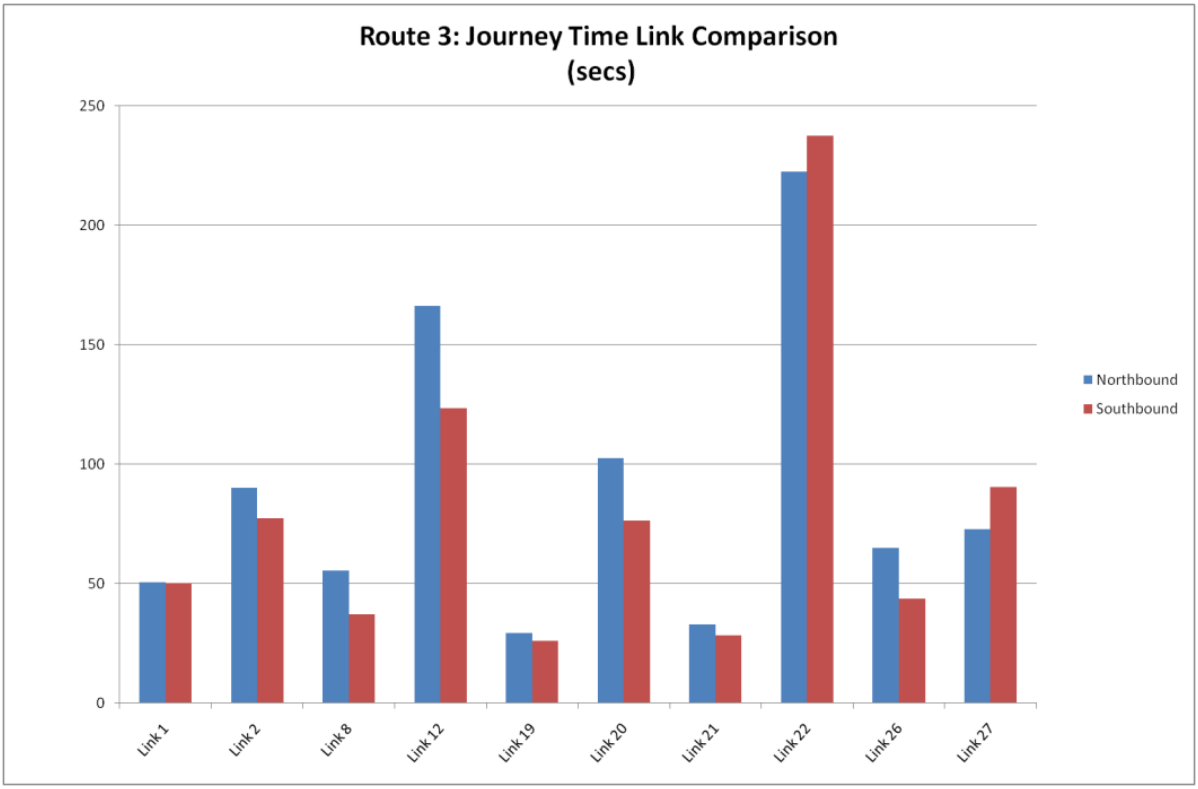
- *There are approximately 6,552 vehicles on route 3 during the AM Peak hour, travelling in a southbound direction*
- *There are sharp decreases in demand of approximately 800 vehicles that remain on the A38 Corridor. Approximately 621 remain on the Birmingham Road route. South of Birmingham road the route exhibits steady flows of between 600-700 vehicles.*
- *Three hundred vehicles also exit the route at the Hanbury road junction with the Worcester road.*
- *Approximately 200 vehicles enter the route around the Market Street and Recreation Road Junction.*

5.11.30 The journey time, delay and speed analysis shows;

- *The total journey distance along the route is 5.8 Kilometres (3.5 miles) and takes approximately 13 minutes to complete.*
- *Delay is equals to around 3 minutes or approximately 23% of total journey time.*
- *Average speed across the route is 19 kilometres an hour. Average speeds decrease considerably once on the Birmingham road and remain under 20 km/hr until south of the Charford Road Junction with Worcester Road.*
- *Lowest speeds are observed around the Market Street, Hannover Street Links and associated junctions.*

5.11.31 Figure 5.31 illustrates a journey time comparison between Northbound and Southbound Flows across Worcester Road – M42 Junction 1 Corridor

Figure 5.31 - Route 3 Journey Time Link Comparison

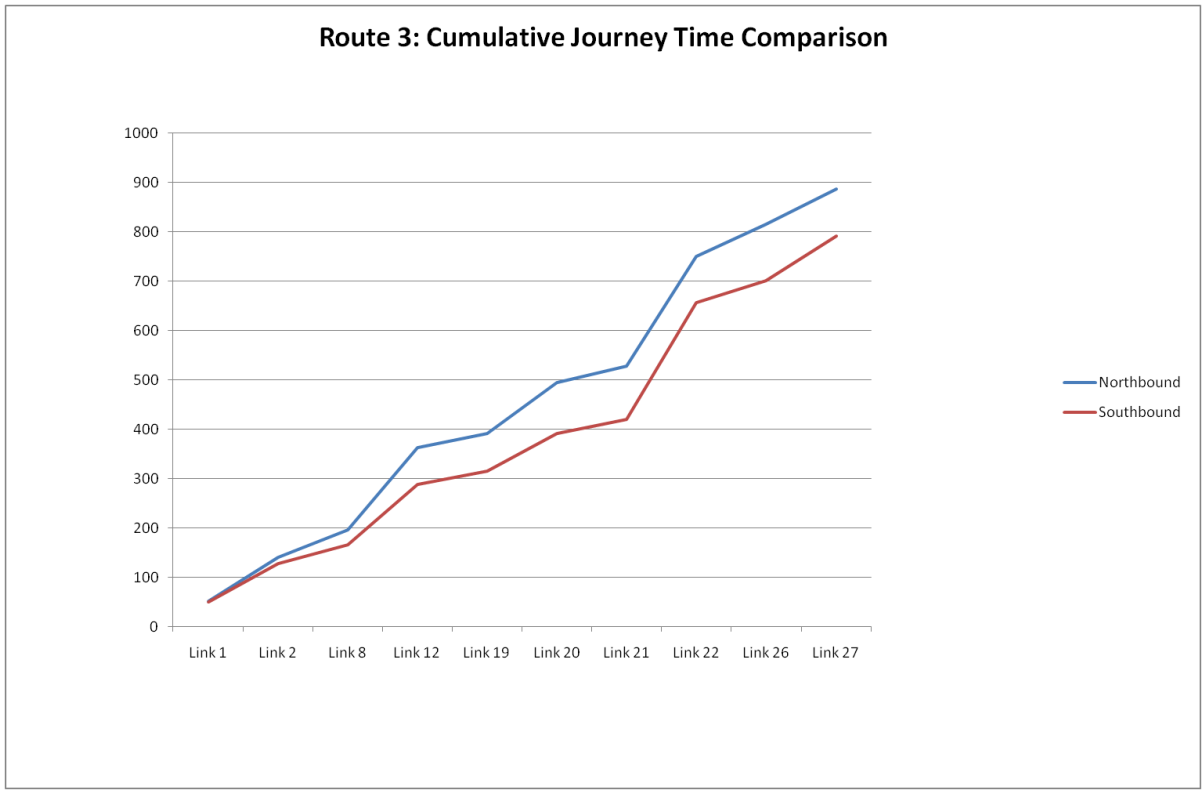


5.11.32 The analysis shows:

- *Northbound flows take a full two minutes longer to complete the route than southbound equivalent flows.*
- *Northbound flows through the Market Street/Hannover Street/Recreation Road area and associated junctions exhibit poorly performing journey times against southbound flows.*
- *Southbound flows have higher journey times on the Birmingham road and on the A38 approach to M42 Junction 1 where there have been lengthy queues observed of between 30-40 vehicles.*

5.11.33 Figure 5.32 shows a cumulative journey time comparison between Northbound and southbound flows along the Worcester Road – M42 Junction 1 Corridor

Figure 5.32 – Route 3: Cumulative Journey Time Comparison



5.11.34 The analysis shows;

- *Northbound flows take significantly longer to complete the section of the route north of Charford Road Junction with Worcester road to the end of the route at M42 Junction 1.*
- *Birmingham Road northbound flows take considerably longer to complete than the southbound equivalent. This is due to the queuing at the A38 Signalised junction where there is a 60 second delay exhibited.*

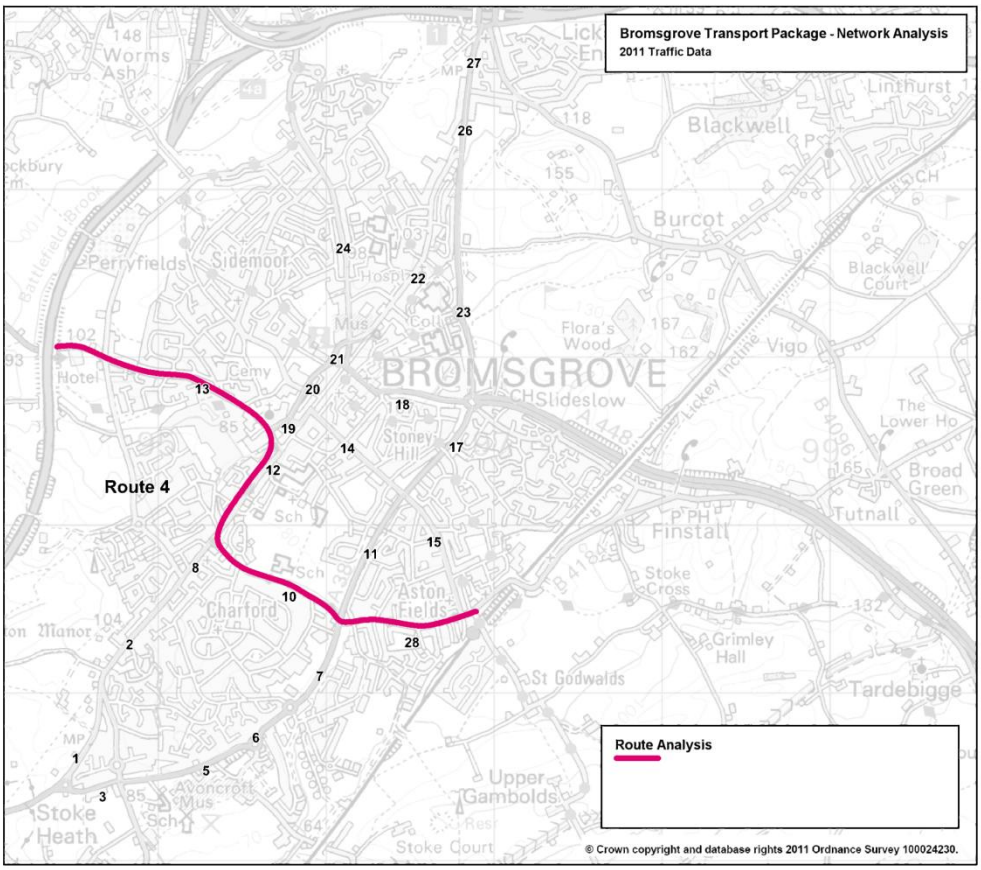
5.11.35 Table 5.15 shows the network performance statistics – demand, total journey time, delay and speed data associated with the Route 4: Kidderminster Road – Charford Road – Rail Station Corridor eastbound on a link basis.

Table 5.15– Route 4 Statistics: Eastbound

	Link Number				Total
	13	12	10	28	
Demand	714	865	628	633	2840
Journey Distance (m)	996	804	944	801	3545
Journey Time (secs)	94	118	102	100	414
Journey Delay (secs)	35	49	18	31	132
Total Journey Time (secs)	129	166	120	130	546
Total Journey Time (mins)	2	3	2	2	9
Speeds (km/hr)	29	15	21	29	23

5.11.36 Figure 5.33 illustrates Route 4 (the Kidderminster Road /Charford Road / Railway Station Corridor) through the Bromsgrove Transport Package Area.

Figure 5.33 – Route 4



5.11.37 The analysis shows;

- *There are approximately 2,840 vehicles on route 4 during the AM Peak hour, travelling in a eastbound direction.*
- *There is a steep increase and then decrease in demand around the Charford Road area during the AM Peak and this is thought to be due to Charford First School and South Bromsgrove High School being located on this link.*

5.11.38 The journey time, delay and speed analysis shows;

- *The total journey distance along the route is 3.5km (2.1 miles) and takes approximately 9 minutes to complete.*
- *Delay is equal to 2.2 minutes, 25% of total journey time.*
- *The links either side of both the Kidderminster Road/Worcester Road Junction and the approach to Charford Road/A38 Junction are the main contributors to delay across the route.*
- *Average speeds across the route are 23km/hr. There is a steep decrease on the approach to the Charford Road/ Worcester Road Junction from 29km/hr to 15 km/hr.*
- *There is a significant increase in speeds east of the Charford Road/A38 Signalised Junction.*

5.11.39 Table 5.16 shows the network performance statistics – demand, total journey time, delay and speed data associated with the Route 4: Kidderminster Road – Charford Road – Rail Station Corridor westbound on a link basis.

Table 5.16– Route 4 Statistics: Westbound

	Link Number				Total
	28	10	12	13	
Demand	477	455	656	1696	3284
Journey Distance (m)	801	944	804	996	3545
Journey Time (secs)	93	116	93	77	380
Journey Delay (secs)	40	40	30	18	129
Total Journey Time (secs)	134	157	123	95	509
Total Journey Time (mins)	2	3	2	2	8
Speeds (km/hr)	31	18	19	28	24

5.11.40 The demand analysis shows;

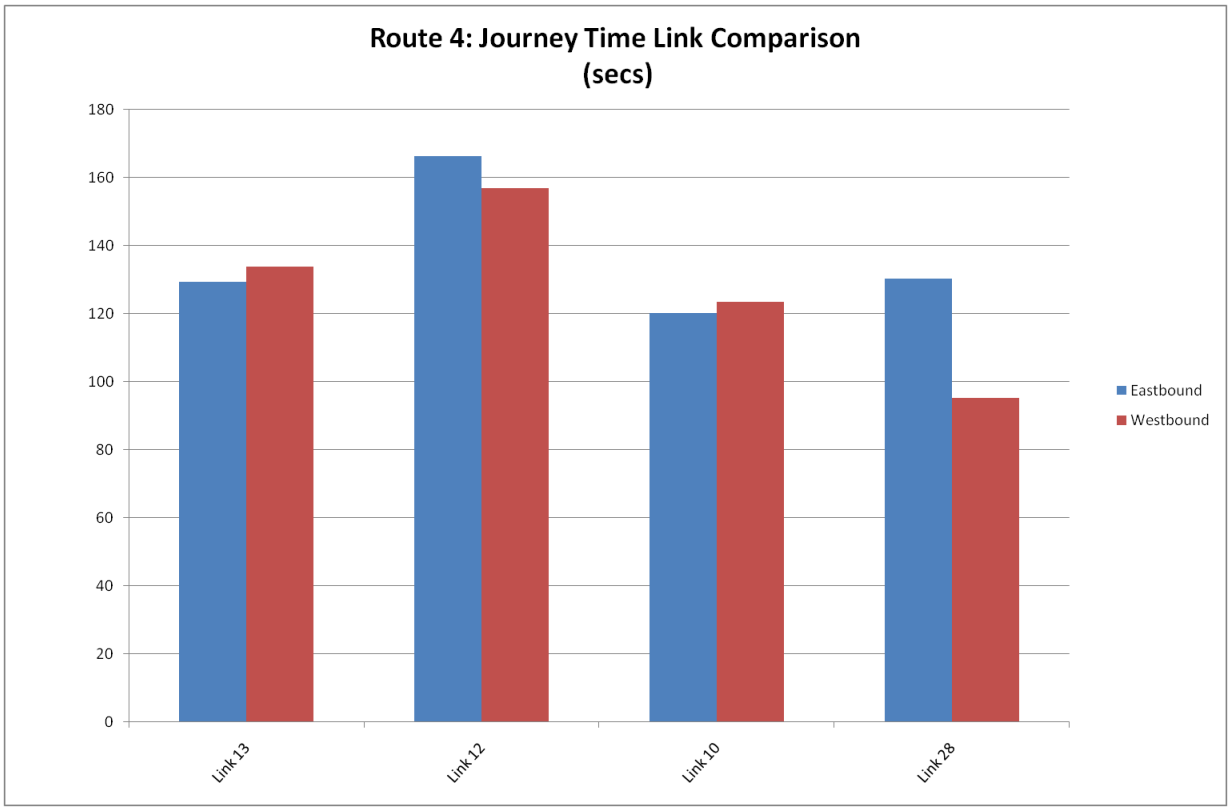
- *There are approximately 1,928 vehicles on route 4 during the AM Peak hour, travelling in a westbound direction – 900 vehicles less than the eastbound flow.*
- *There is a steep increase in demand from the Charford Road residential area and A38 of around 200 vehicles during the AM peak hour, however these continue on the Worcester Road north towards the town centre.*
- *There is a steep decrease in demand for trips onto the Kidderminster road of around 300 vehicles.*

5.11.41 The journey time, delay and speed analysis shows;

- *The total journey distance along the route is 3.5km (2.1 miles) and takes approximately 8 minutes to complete.*
- *Delay is equal to 2.1 minutes, 25% of total journey time. This is equally matched to the east bound flows along the route.*
- *The links either side of the A38/Charford Road Junction and Worcester Road/Charford Road Junction are the main contributors to delay along the route. The junction with Kidderminster road is not subject to significant delay.*
- *Average speeds across the route are 24km/hr. There is a steep decrease on the approach to the Stoke Road/ Junction from 31km/hr to 18 km/hr.*
- *There is a significant increases in speeds once west of the Kidderminster road junction from 19km/hr to 28km/hr.*

5.11.42 Figure 5.34 illustrates a journey time comparison between Eastbound and Westbound Flows across Kidderminster Road – Charford Road – Rail Station Corridor.

Figure 5.34 - Route 4 Journey Time Link Comparison

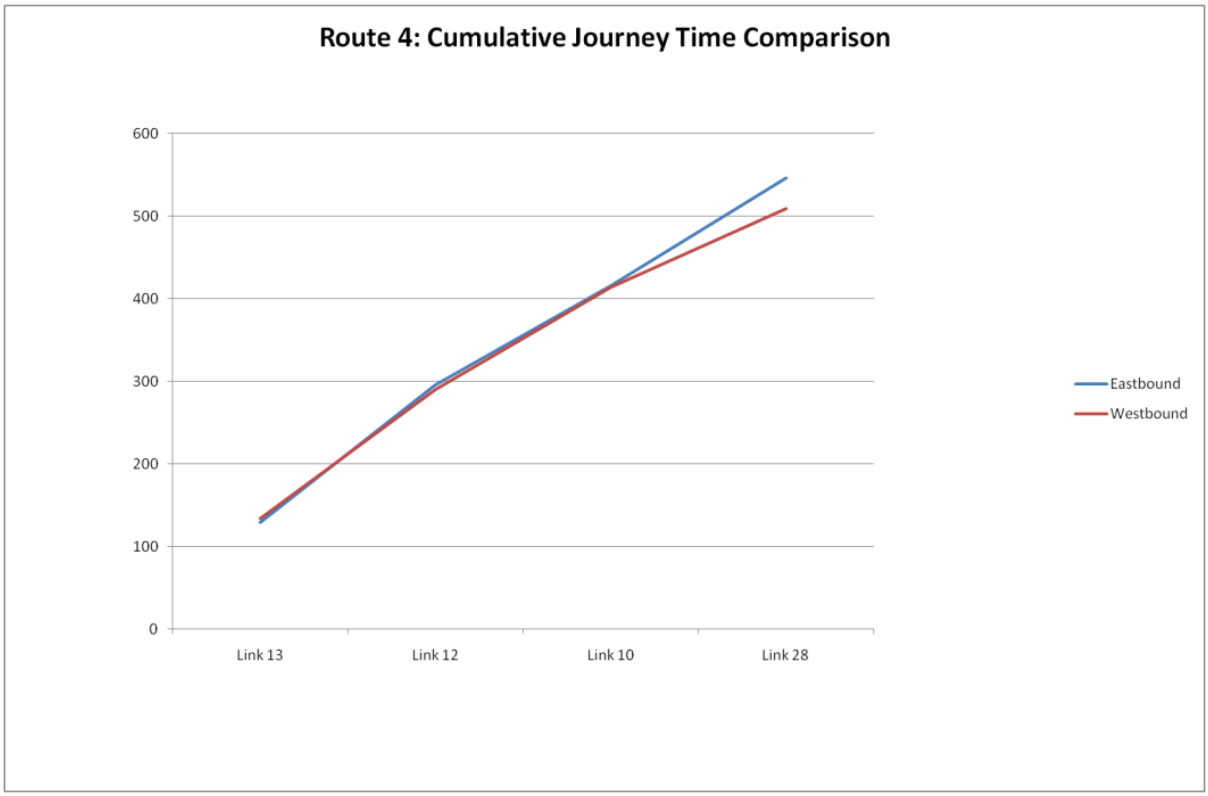


5.11.43 The analysis shows;

- *There are significant differences between eastbound and westbound journey times on the link approaching the Stoke Road junction with the A38.*
- *Slight differences are observed between the journey times around the Kidderminster Road Junction and Charford Road Junction.*
- *Westbound flows are marginally quicker along the Charford Road than Eastbound flows although this is considered to be due to the lower demand numbers on the westbound route.*

5.11.44 Figure 5.35 shows a cumulative journey time comparison between Eastbound and Westbound flows along the Kidderminster Road – Charford Road – Rail Station Corridor

Figure 5.35 - Route 4 Cumulative Journey Time Link Comparison



5.11.45 The analysis shows;

- *Cumulative journey times for both eastbound and westbound are very similar with the exception of the area east and west of the Charford Road/A38/Stoke Road Junction.*
- *The delay at this junction is more significant for westbound flows; however the eastbound flows total journey time is impacted more here over all.*

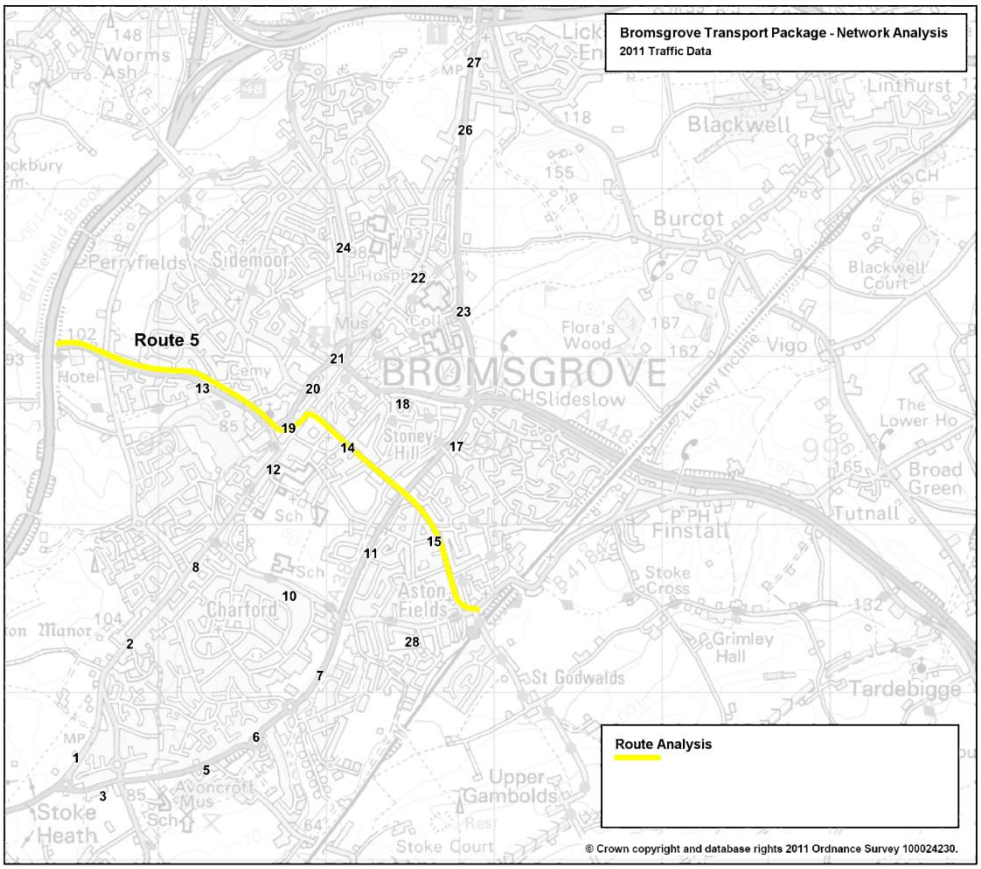
5.11.46 Table 5.17 shows the network performance statistics – demand, total journey time, delay and speed data associated with the Route 5: Kidderminster Road – New Road – Rail Station Corridor eastbound on a link basis.

Table 5.17– Route 5 Statistics: Eastbound

	Link Number				Total
	13	19	14	15	
Demand	714	340	951	289	2294
Journey Distance (m)	996	145	938	842	2921
Journey Time (secs)	94	21	117	102	335
Journey Delay (secs)	35	8	30	8	81
Total Journey Time (secs)	129	29	147	110	416
Total Journey Time (mins)	2	0	2	2	7
Speeds (km/hr)	24	15	18	19	19

5.11.47 Figure 5.35 illustrates Route 5 (the Kidderminster Road /New Road / Railway Station Corridor) through the Bromsgrove Transport Package Area.

Figure 5.35 – Route 5



5.11.48 The eastbound demand analysis shows;

- *There are approximately 2,294 vehicles on route 5 during the AM peak hour, travelling in a eastbound direction*
- *There is a steep decrease in demand around the Market Street, Town centre area of approximately 350 vehicles.*
- *Significant increased in demand are observed of 600 vehicles from the Stoney Hill area onto the New road junction and this route is an important feeder road for the A38 corridor as all vehicles enter this corridor rather than the continuing eastbound on New Road.*

5.11.49 The journey time, delay and speed analysis shows;

- *The total journey distance along the route is 2.9km (1.8 miles) and takes approximately 7 minutes to complete.*
- *Delay is equal to 1.3 minutes - 20% of total journey time*
- *Delays occur at the Kidderminster Road/Worcester Road Junction and the New Road/A38 Junction.*
- *Average speeds across the route is 19km/hr. There is a significant deterioration of speeds a along the High Street from 24 km/hr to 15 km/hr and speeds remain low for the remainder of the route. There is considerable queuing observed on the New Road approach to the A38 of 30 vehicles.*

5.11.50 Table 5.18 shows the network performance statistics which include demand, total journey time, delay and speed data associated with the Route 5: Kidderminster Road – New Road – Rail Station Corridor westbound on a link basis.

Table 5.18 – Route 5 Statistics: Westbound

	Link Number				Total
	15	14	19	13	
Demand	236	584	772	1696	3287
Journey Distance (m)	842	938	145	804	2729
Journey Time (secs)	77	120	20	77	294
Journey Delay (secs)	18	39	6	18	81
Total Journey Time (secs)	95	158	26	95	375
Total Journey Time (mins)	2	3	0	2	6
Speeds (km/hr)	24	18	16	28	22

5.11.51 The westbound demand analysis shows;

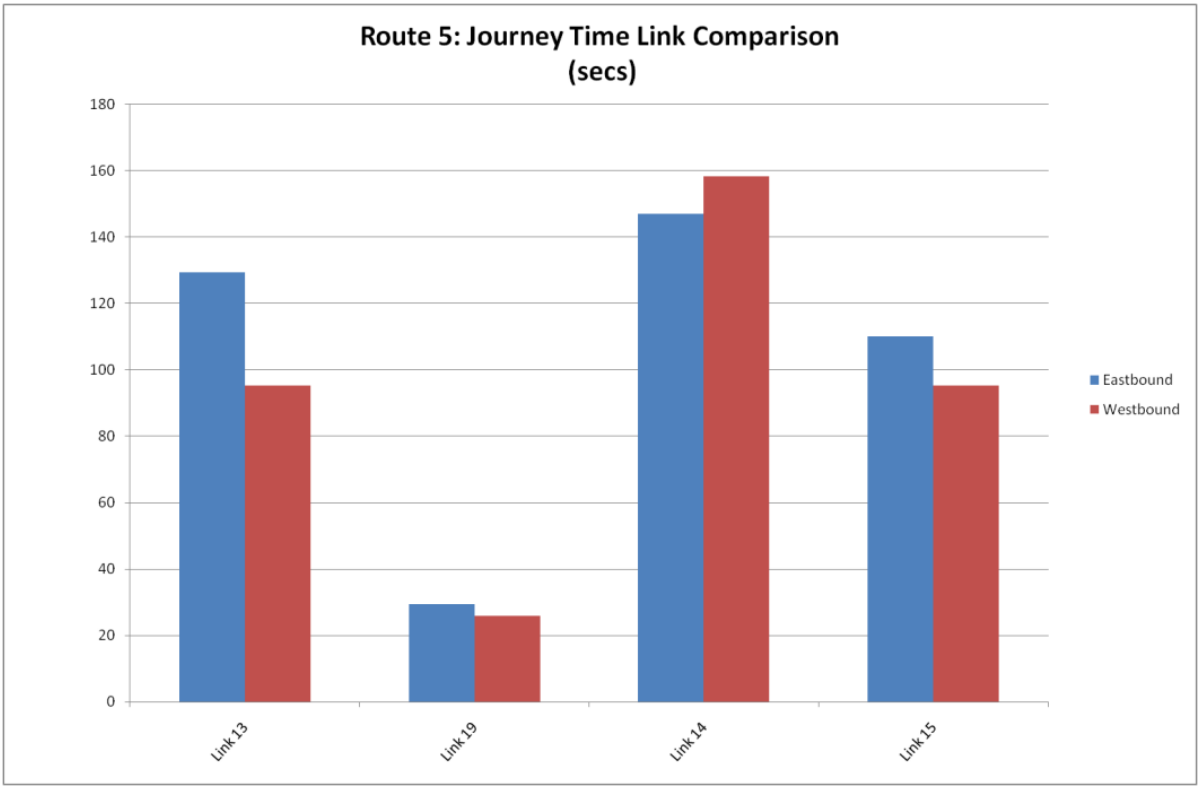
- *There are approximately 3,287 vehicles on route 5 in the AM peak hour travelling in a westbound direction – 1000 vehicles more than the eastbound flow.*
- *There are steep increases in demand from the residential areas of Aston Fields and Stoney Hill of around 200 vehicles on each composite link.*
- *There is a steep decrease in demand of around 350 vehicles in the town centre and Worcester Road Junction.*

5.11.52 The journey time, delay and speed analysis shows;

- *The total journey distance along the route is 2.9km (1.8 miles) and takes approximately 5 minutes to complete.*
- *Delay is equal to 1.3 minutes – 25% of total journey time.*
- *Delays occur at the Kidderminster Road/Worcester Road Junction and the New Road/A38 Junction.*
- *Average speeds are 22 km/hr and speeds deteriorate significantly between the New Road Junction with the A38 and the area around the high street and associated junctions.*

5.11.53 Figure 5.37 illustrates a journey time comparison between Eastbound and Westbound Flows across Kidderminster Road – New Road – Rail Station Corridor

Figure 5.37 - Route 5 Journey Time Link Comparison

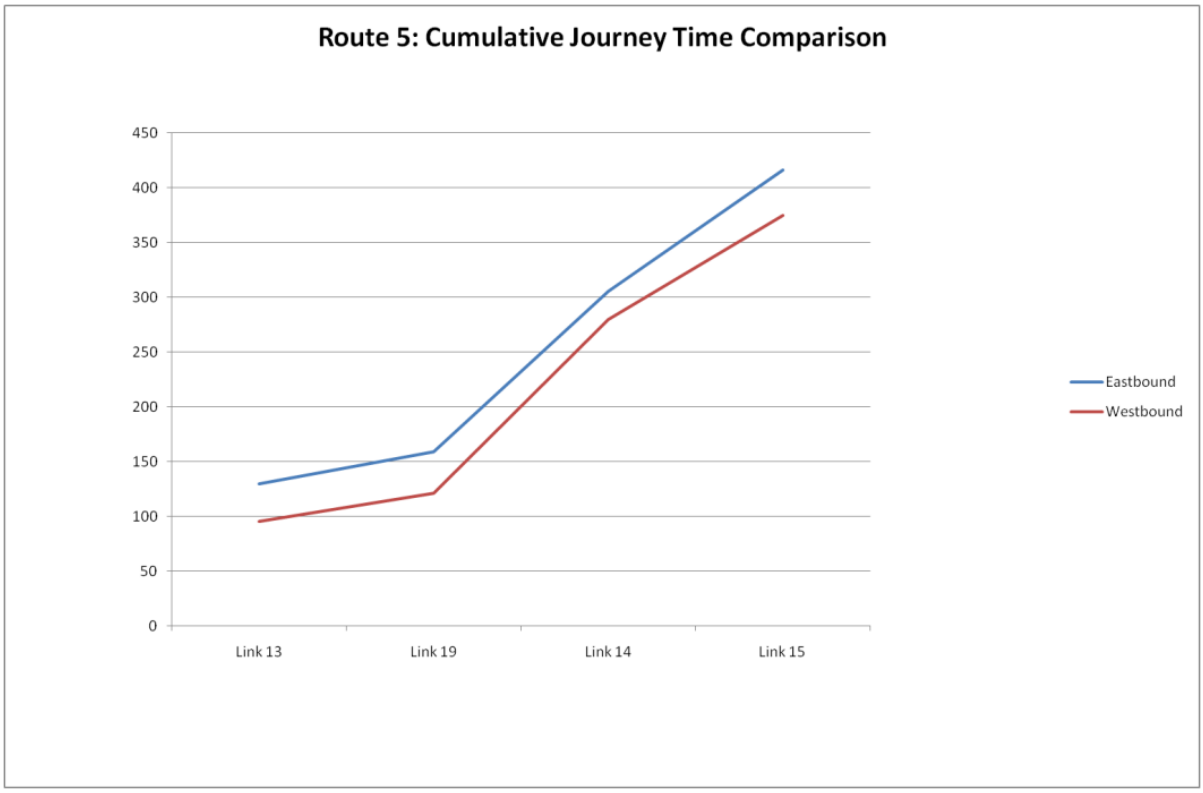


5.11.54 The analysis shows;

- *Nearly all eastbound flows, with the exception of New Road link take considerably longer than Westbound flows.*
- *The Kidderminster Road link shows significant differences in journey times with the eastbound flow taking longer to complete the link than the westbound equivalent.*

5.11.55 Figure 5.38 shows a cumulative journey time comparison between Eastbound and Westbound flows along the Kidderminster Road – New Road – Rail Station Corridor

Figure 5.38 - Route 5 Journey Time Link Comparison



5.11.56 The analysis shows;

- *Eastbound flows take considerably longer than the westbound equivalent.*
- *The delay in journey times are similar for each of the link points*

5.12 Route Performance Statistics Conclusions

5.12.1 The route performance statistics show;

- *It is marginally quicker to access the M42 Junction 1 from South Bromsgrove using the Worcester Road (route 3) than it is to use the strategic A38 (Route 1) Corridor. Around 4,600 use Route 3 compared to the 10,000 vehicles which use Route 1.*
- *Delays are lower on route 3 which goes through Market Street and the town centre than they are on the strategic A38 route. Speeds are however lower on Route 3.*

5.13 The Bromsgrove Core Strategy – Planned Development Growth for Bromsgrove

5.13.1 The Bromsgrove Draft Core Strategy 2 is the most recent document produced by the District Council for consultation. Once finalised and approved, it will form the central document in the Bromsgrove Local Development Framework. Its purpose is to present the spatial vision and objectives for the future growth and development of the District until 2026. In particular, the document includes a number of core policies focused on achieving Bromsgrove District Councils' vision.

5.13.2 Significant levels of development are proposed in Bromsgrove between now and 2026. Within the Bromsgrove Transport Package area, the following quantum of development is proposed:

- *2,410 dwellings*
- *11.1 hectares of employment/retail land*

5.13.3 A breakdown of the proposed development for the Bromsgrove town package area is provided in Table 5.19.

Table 5.19 - Proposed Development Growth in Bromsgrove (Bromsgrove DRAFT Core Strategy 2)

Site Name and Location	Level of Residential Dwellings Proposed	Level of Employment Proposed (Hectares)	Likelihood of Delivery	Notes
BROM 1 - Norton Farm, Birmingham Road, Bromsgrove	**318**		More than likely/ Reasonably foreseeable	Unknown what transport infrastructure required to 'open up' west of Bromsgrove
BROM 2 - Perryfields Road, Bromsgrove	**1300**	**5** including a Local Centre	More than likely / Reasonably foreseeable	Unknown what transport infrastructure required to 'open up' west of Bromsgrove
BROM 3 - Whitford Road, Bromsgrove	**500**		More than likely / Reasonably foreseeable	Unknown what transport infrastructure required to 'open up' west of Bromsgrove
Wagon Works - St Godwald's Road, Bromsgrove	**212**		More than likely	Public Inquiry underway to determine highways issues
Catshill - Church Lane	**80**		More than likely	Planning Application Submitted
Bromsgrove - Technology Park		**6.1**	Near Certain	Outline Planning Application Granted

5.13.4 The development proposed for the Bromsgrove Transport Package area is most concentrated on an arc of land which currently separates Bromsgrove town's urban area from the M5 and M42 (which skirts around Bromsgrove to the west and north. There is also significant commercial development proposed to the south of Aston Fields (where the station is situated). A plot identifying the rough location of development is provided in Figure 5.1.

5.14 Forecast Highway Demand

5.14.1 Proposed growth in Bromsgrove is forecast to generate uplift in traffic volumes of approximately 20% by 2026. The growth factors used to calculate this are illustrated in Table 5.20, and the AM, PM and 12-hour effects of the growth in a future scenario (2026) are provided in Table 5.21.

5.14.2 To understand the future implications of travel demand on the highway network a series of tools were used to forecast traffic demand in the future year of 2026;

- *Bromsgrove District Council Draft Core Strategy – Development assumptions for Bromsgrove between 2008 and 2026*
- *Tempro V6.2 AF09 NTM*
- *Bromsgrove Development Model*

Table 5.20 –Growth Factors Used to Forecast Travel Demand

Junction Reference	Junction Name	Growth Factors		
		AM Peak	PM Peak	12 Hour
A	Redditch Road/B4091/A38 Redditch Road	1.159617	1.167446	1.17144
B	Worcester Road/Hanbury Road	1.17	1.148	1.17144
C	A38/New Road	1.159617	1.167446	1.17144
D	B4184/A448/Market Place	1.248	1.192	1.2
E	Stourbridge Road/Perryfields Road	1.409	1.401	1.4
F	A38/Buntsford Hill/A38	1.159617	1.167446	1.17144
G	A38 Stoke Road/Austin Road/Sherwood Road	1.159617	1.167446	1.17144
1	M42 Junction 1	1.159617	1.167446	1.17144
2	A38 Worcester Road/Birmingham Road	1.159617	1.167446	1.17144
3	Slideslow A38 Junction	1.159617	1.167446	1.17144
4	B4184 Finstall	1.159617	1.167446	1.17144
5	A38/Charford Road/Stoke Road	1.159617	1.167446	1.17144
6	Hanbury Turn	1.159617	1.167446	1.17144
7	New Road/Stoke Road/ New Road/Finstall Road	1.168	1.18	1.19
8	Rock Hill/Fox Lane	1.17	1.148	1.18
9	Worcester Road/Highfield Road/Rock Hill/Charford Road	1.159617	1.167446	1.17144
10	Kidderminster Road/Hanover Street	1.248	1.192	1.25
11	Market Street/Recreation Road	1.159617	1.167446	1.17144
12	A4091 Stourbridge Road/Market Street/A448/Birmingham Road	1.159617	1.167446	1.17144
15	Perryfields Road/Whitford Road	1.409	1.241	1.41
17	A38/School Lane	1.159617	1.167446	1.17144

Table 5.21 – Effects of Growth on Bromsgrove Transport Package Area Identified Junctions in the Current (2011) and Future Year (2026) Scenarios

Junction Ref	Junction Name	2011 AM Peak Hour (PCUs)	2011 PM Peak Hour (PCUs)	2011 12-Hour (PCUs)	2026 AM Peak Hour (PCUs)	2026 PM Peak Hour (PCUs)	2026 12-Hour (PCUs)	2026 -vs- 2012 AM Peak Hour (PCUs)	2026 -vs- 2012 PM Peak Hour (PCUs)	2026 -vs- 2012 12-Hour (PCUs)
Junction A	Redditch Road/B4091/A38 Redditch Road	2039	1991	18303	2364	2324	21440	116%	117%	117%
Junction B	Worcester Road/Hanbury Road	1436	1349	11702	1680	1548	13708	117%	115%	117%
Junction C	A38/New Road	2832	2850	27843	3283	3327	32616	116%	117%	117%
Junction D	B4184/A448/Market Place	2039	2074	19775	2544	2472	23729	125%	119%	120%
Junction E	Stourbridge Road/Perryfields Road	1754	1769	14547	2471	2478	20365	141%	140%	140%
Junction F	A38/Buntsford Hill/A38	2091	1875	18578	2425	2188	21762	116%	117%	117%
Junction G	A38 Stoke Road/Austin Road/Sherwood Road	2941	2917	29718	3410	3405	34813	116%	117%	117%
Junction 1	M42 Junction 1	3377	3497	32939	3916	4083	38586	116%	117%	117%
Junction 2	A38 Worcester Road/Birmingham Road	2814	2894	27206	3263	3379	31871	116%	117%	117%
Junction 3	Slideslow A38 Junction	4192	4270	40157	4862	4985	47042	116%	117%	117%
Junction 4	B4184 Finstall	829	738	5690	961	862	6665	116%	117%	117%
Junction 5	A38/Charford Road/Stoke Road	3128	3026	28975	3627	3532	33942	116%	117%	117%
Junction 6	Hanbury Turn	2089	1954	19037	2422	2282	22300	116%	117%	117%
Junction 7	New Road/Stoke Road/ New Road/Finstall Road	1298	1310	10066	1515	1545	11978	117%	118%	119%
Junction 8	Rock Hill/Fox Lane	1590	1666	14238	1860	1913	16801	117%	115%	118%
Junction 9	Worcester Road/Highfield Road/Rock Hill/Charford Road	2147	1705	17043	2490	1991	19965	116%	117%	117%
Junction 10	Kidderminster Road/Hanover Street	1692	2110	20981	2112	2515	26226	125%	119%	125%
Junction 11	Market Street/Recreation Road	1373	1441	16152	1592	1682	18921	116%	117%	117%
Junction 12	A4091 Stourbridge Road/Market Street/A448/Birmingham Road	2337	2313	24608	2709	2700	28827	116%	117%	117%
Junction 15	Perryfields Road/Whitford Road	1901	1766	15271	2678	2192	21531	141%	124%	141%
Junction 17	A38/School Lane	2821	2623	28541	3271	3062	33433	116%	117%	117%

5.14.3 The results of the analysis identify a minimum 20% global uplift in traffic volumes at junctions in the Bromsgrove Transport Package Area in 2026. However, due to the proximity of some junctions to new development sites, uplifts in traffic volumes in excess of this are forecast at the following junctions:

- ***Junction D*** *(B4184/A448 Market Place Junction) – 25% uplift in traffic volumes in AM peak, 19% in the PM peak and 20% in the future year (2026) 12-hour scenario.*
- ***Junction E*** *(Stourbridge Road/Perryfields Road) – 41% uplift in traffic volumes in the AM peak, 40% in the PM peak and 40% in the 12-hour future year (2026) scenario.*
- ***Junction 10*** *(Kidderminster Road/Hanover Street) – 25% uplift in traffic volumes in the AM peak, 19% in the PM peak and 25% in the 12-hour future year (2026) scenario.*
- ***Junction 15*** *(Perryfields Road/Whitford Road) – 41% uplift in traffic volumes in the AM peak, 24% in the PM peak and 41% in the 12-hour future year (2026) scenario.*

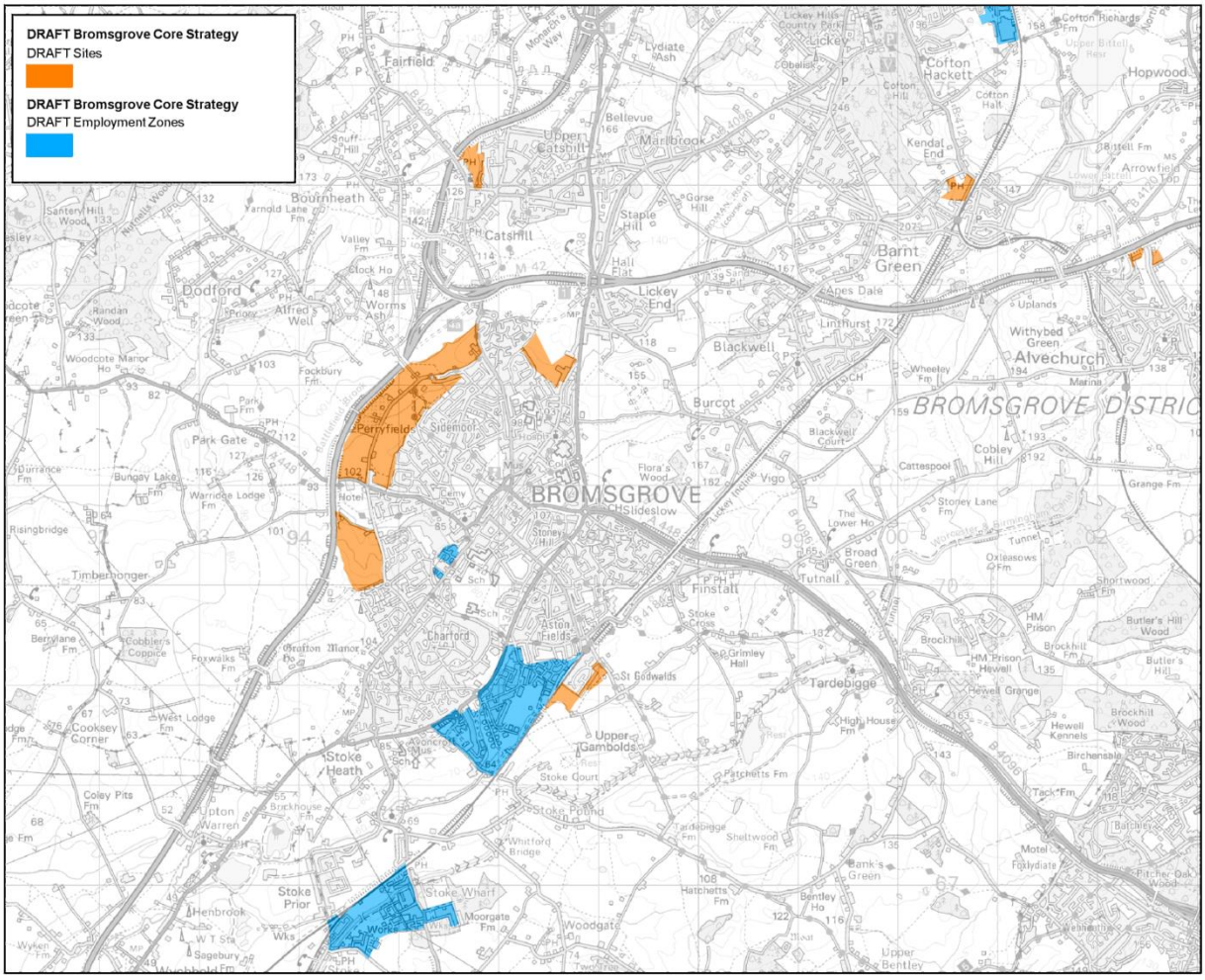
5.14.4 The development of an Infrastructure Development Plan (IDP) to underpin the nascent Bromsgrove Core Strategy would provide additional information as to the likely impacts of this growth in demand and provide a planned approach to investing in Bromsgrove's transport network to facilitate this growth.

5.14.5 To ensure that Bromsgrove's transport infrastructure and services are capable of supporting development growth, it will be essential that all developers are required to contribute towards appropriate enhancements to local transport infrastructure and services to ensure that new developments do not detract from (and ideally improve) local quality of life. Following the adoption of the Worcestershire LTP3 Compendium in February 2011, Worcestershire County Council has developed a comprehensive approach towards any proposed developments/redevelopments across the County. These policies can be read in detail at: www.worcestershire.gov.uk/LTP3. In each case, Worcestershire County Council will expect developers to:

- *Explore all feasible methods of encouraging increasing walking, cycling and passenger transport use*
- *Reduce the need to travel to access key services and facilities*
- *Reduce the length of trips, in particular for single occupancy car trips*
- *Promote multi-purpose or linked trips through reducing physical separation of key land uses*
- *Actively address the environmental impact of travel by improving sustainable transport choices*
- *Maximise accessibility to, from and across new developments for pedestrians, cyclists and passenger transport users.*
- *Develop and deliver proactive and funded Travel Plans*
- *Make the best/optimum use of existing transport infrastructure*
- *Manage access to highway network (including for passenger transport)*
- *Mitigate the residual effects on the highway network of traffic generated by the new development*
- *Demonstrate effective connections to the Principal Road Network (PRN) and by passenger transport to key locations*
- *Assess the forecast traffic impacts during proposed construction phases and provide proposals for mitigation*

5.14.6 Specifically, it will be essential that developers invest in Smarter Choices measures (as outlined in the Worcestershire LTP3 Smarter Choices Policy) to promote sustainable travel choice to ensure that future demand to travel from new developments is appropriately managed to avoid congestion. Figure 5.39 identifies the locations where development is proposed in the Bromsgrove Transport Package Area.

Figure 5.39 - Locations of Development in Bromsgrove Transport Package Area



6. Passenger Transport Network Performance

KEY FACTS – Passenger Transport Network Performance

- ***Bromsgrove has the potential to make better use of its strategic bus and rail services to provide enhanced access to a wide range of employment, social and training opportunities.***
- ***Currently, the quality of existing urban passenger transport connections (bus and rail) are poor.*** *This is as a result of severe reliability issues, poor quality infrastructure and inadequate linkages between residential areas and key trip attractors, including Bromsgrove Town Centre and the Railway Station.*
- ***Congestion is having a significantly detrimental impact on the efficiency of the local bus network.*** *Bus service journey times are particularly poor at peak times, where the main transport corridors through the town experience significant delays.*

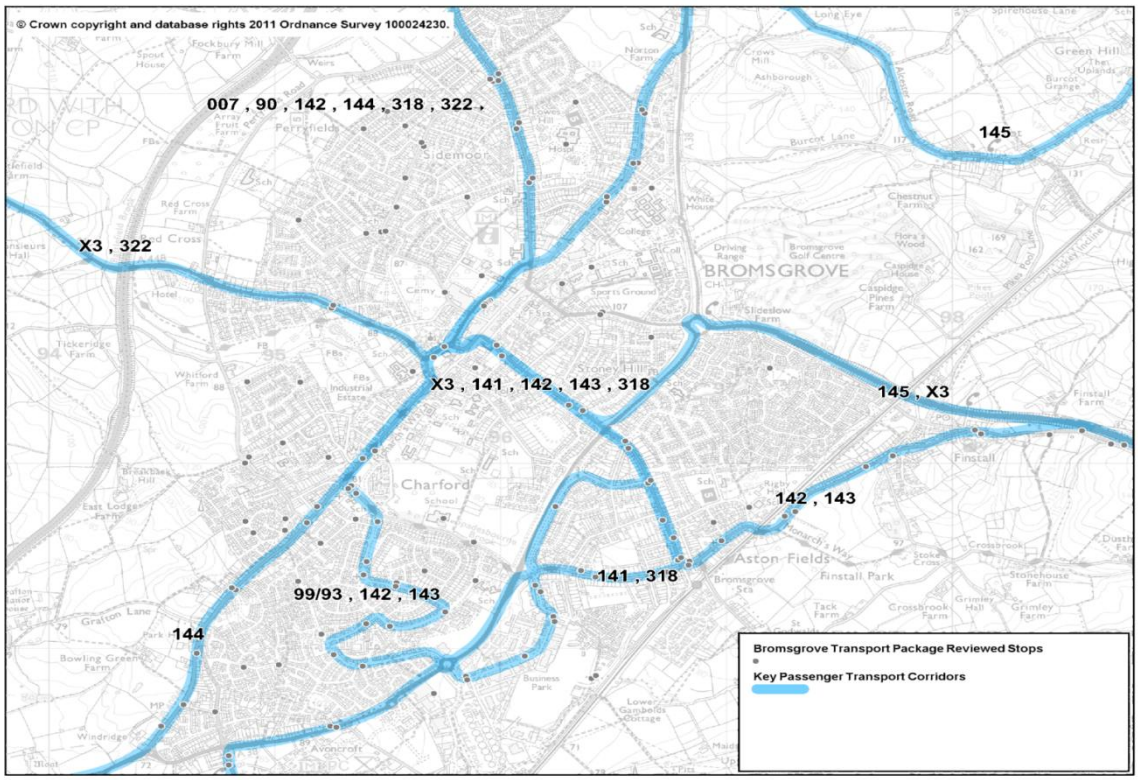
6.1 Introduction

6.2 The performance of the passenger transport network in Bromsgrove is important for maximising the efficiency of the transport network and ensuring a wide range of opportunities, services and facilities within the town, county and region are accessible for residents and businesses. The passenger transport network, illustrated in Figure 6.1 below, has been analysed and reviewed to determine the following aspects of passenger transport performance and operation:

- *Passenger Transport (Walk, Bus and/or Rail) Accessibility*
- *Passenger Transport Reliability – Local and Inter-Urban Bus Services*
- *Passenger Transport Demand – Local and Inter-Urban Bus Services*
- *Passenger Transport Infrastructure – Local and Inter-Urban Bus Services*

6.2.1 The following sections represent key data from the analysis of these aspects of the passenger transport network; the full reports including methodologies are contained in Appendix B.

Figure 6.1 – Bromsgrove Bus Network – Key Services



6.3 Access to Local and Strategic Employment

Access to Employment Opportunities

6.3.1 This chapter summarises the journey time and opportunity analysis for access to local and regional employment opportunities by passenger transport (bus and/or rail) from the Bromsgrove Package area.

6.3.2 Access to local and strategic employment destinations and opportunities by passenger transport (bus and/or rail) from the BTP area is important for residents and businesses in terms of:

- *Access to a wide range of employment opportunities across all business sectors;*
- *Access to a wider labour pool, skills sets, and access to markets and customers;*

6.3.3 Areas with high accessibility by passenger transport (bus and rail) benefit from more efficient operation of the transport network, reduced costs for businesses and residents and the movement of goods and people.

Access to Local, County and Regional Employment Opportunities (Opportunity analysis)

6.3.4 The numbers of employment opportunities (weighted by journey time) which can be accessed from across the BTP area in the AM peak are illustrated in Figure 6.2, the PM peak results are illustrated in Figure 6.3.

6.3.5 The data illustrates the importance of the railway station, and the key inter-urban passenger transport services for providing access to employment opportunities from the Bromsgrove area.

Figure 6.2 - Local, County and Strategic Employment Opportunities Accessible from the Bromsgrove Transport Package area – PT (bus and/or rail) AM Peak (0700-0900)

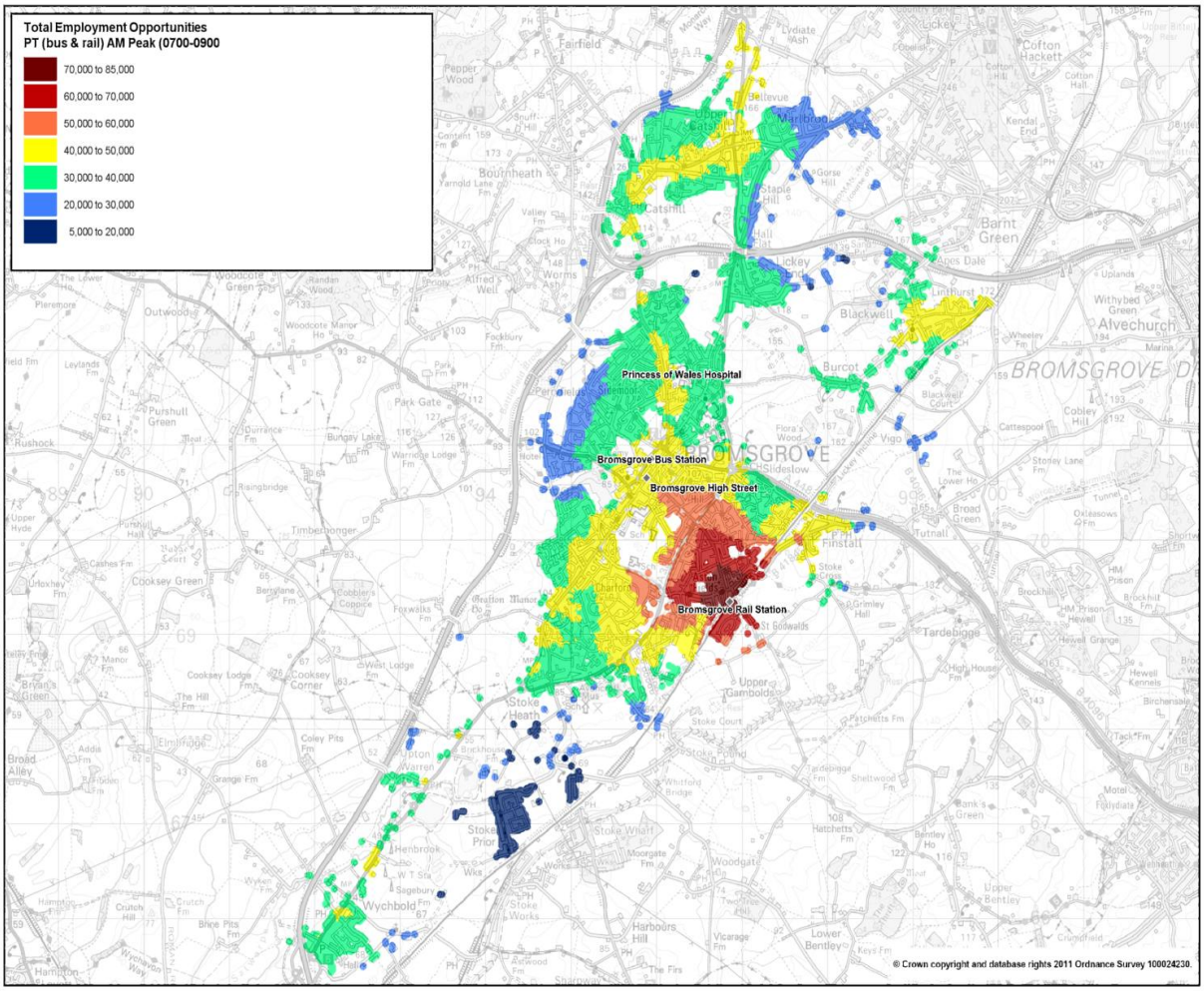


Table 6.1 – Analysis of Results

Journey to Work	Issue	Discussion
AM Peak **Local, County and Strategic Employment Opportunities 4**	Access to a significant number of employment opportunities (40-50,000) from areas in close proximity to the railway station and key inter-urban passenger transport services.	Lower walk, wait and interchange times due to relatively high levels of services on corridors (144, 143, 142 and X3 services) and from the railway station.
	Areas which are not in close proximity to the key passenger transport network.	Due to higher walk, wait and interchange time, this makes access to employment opportunities less attractive by passenger transport.

Figure 6.3 - Local, County and Strategic Employment Opportunities Accessible from the Bromsgrove Transport Package Area – PT (bus and/or rail) PM Peak (1630-1830)

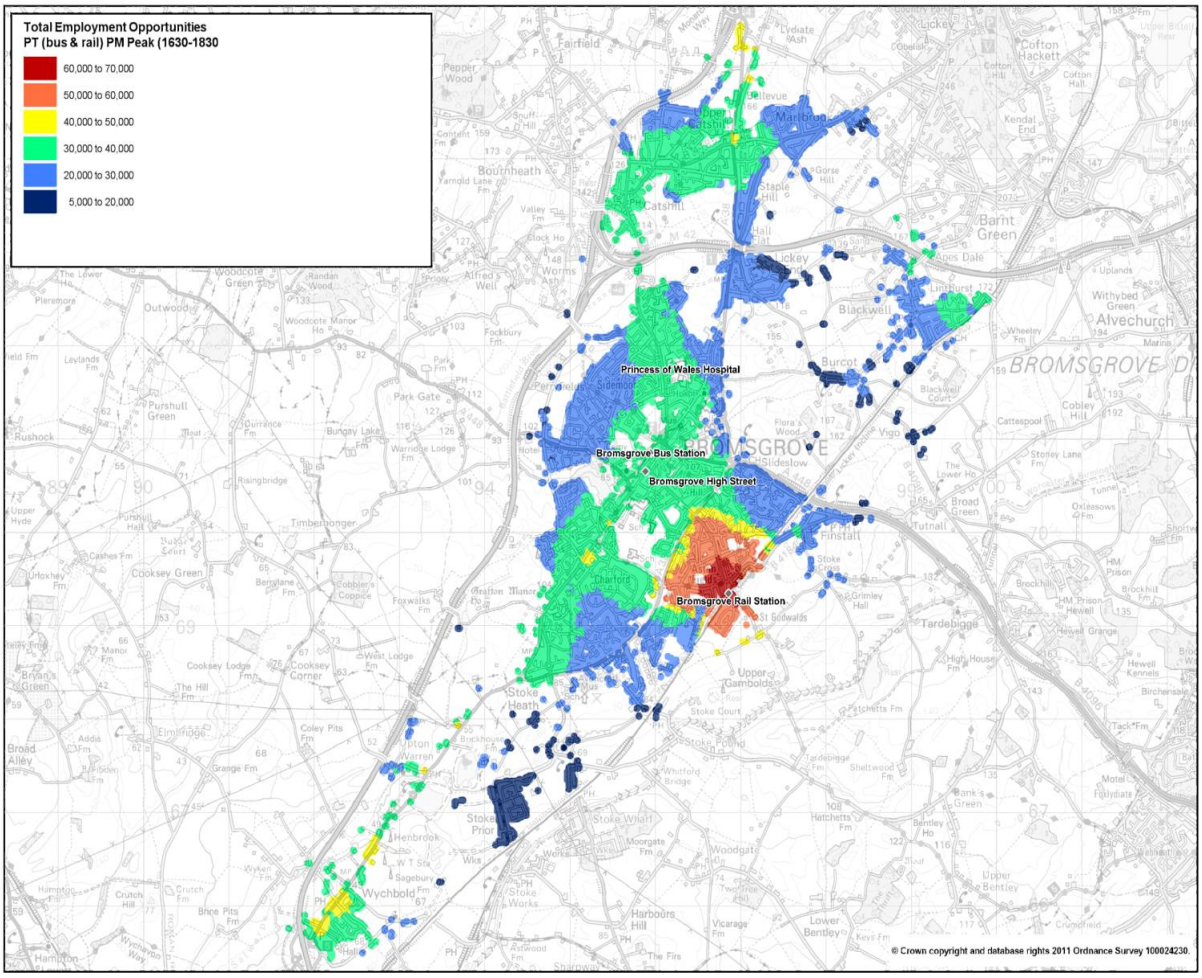


Table 6.2 – Analysis of Results

Journey to Work	Issue	Discussion
PM Peak Local, County and Strategic Employment Opportunities	Significantly less employment opportunities which could be accessed within this time-period.	This is a result of increased journey times on the passenger transport network in the PM peak. This is due to the lower service frequencies and the associated increase in wait and interchange time.
	Access to employment opportunities is higher for areas within close walk distance of the railway station and along the key passenger transport corridors which have a higher level of service.	The key influence on the attractiveness of these modes from these areas is the lower walk, wait and interchange time required to access employment opportunities.

Access to Bromsgrove Railway Station and Birmingham City Centre by Passenger Transport (bus and/or rail) AM and PM Peak

6.3.6 Journey times by passenger transport to Bromsgrove Railway Station and Birmingham City Centre in the AM peak are illustrated in Figures 6.4 and 6.5 respectively, the PM peak journey times are illustrated in Figures 6.6 and 6.7.

6.3.7 Access to Bromsgrove Railway Station by walking and passenger transport (bus and/or rail) is better from:

- *Areas along the key passenger transport corridors due to lower walk, wait and interchange times for passenger transport journeys*
- *Aston Fields, Slideslow and eastern areas of Charford for walking journeys*

6.3.8 Birmingham city centre by walking and passenger transport (bus and/or rail) is most accessible from:

- *Areas within walking distance of the railway station and along PT corridors with direct services to the railway station*
- *The Catshill area within walk distance of the 144 and 143 corridor*
- *Access to Barnt Green railway station is more attractive from the Linthurst/Blackwell area*

Figure 6.4 – AM Peak (0700-0900) Journey Time by Walk and/or Passenger Transport (bus and/or rail) to Bromsgrove Railway Station from the Bromsgrove Transport Package area

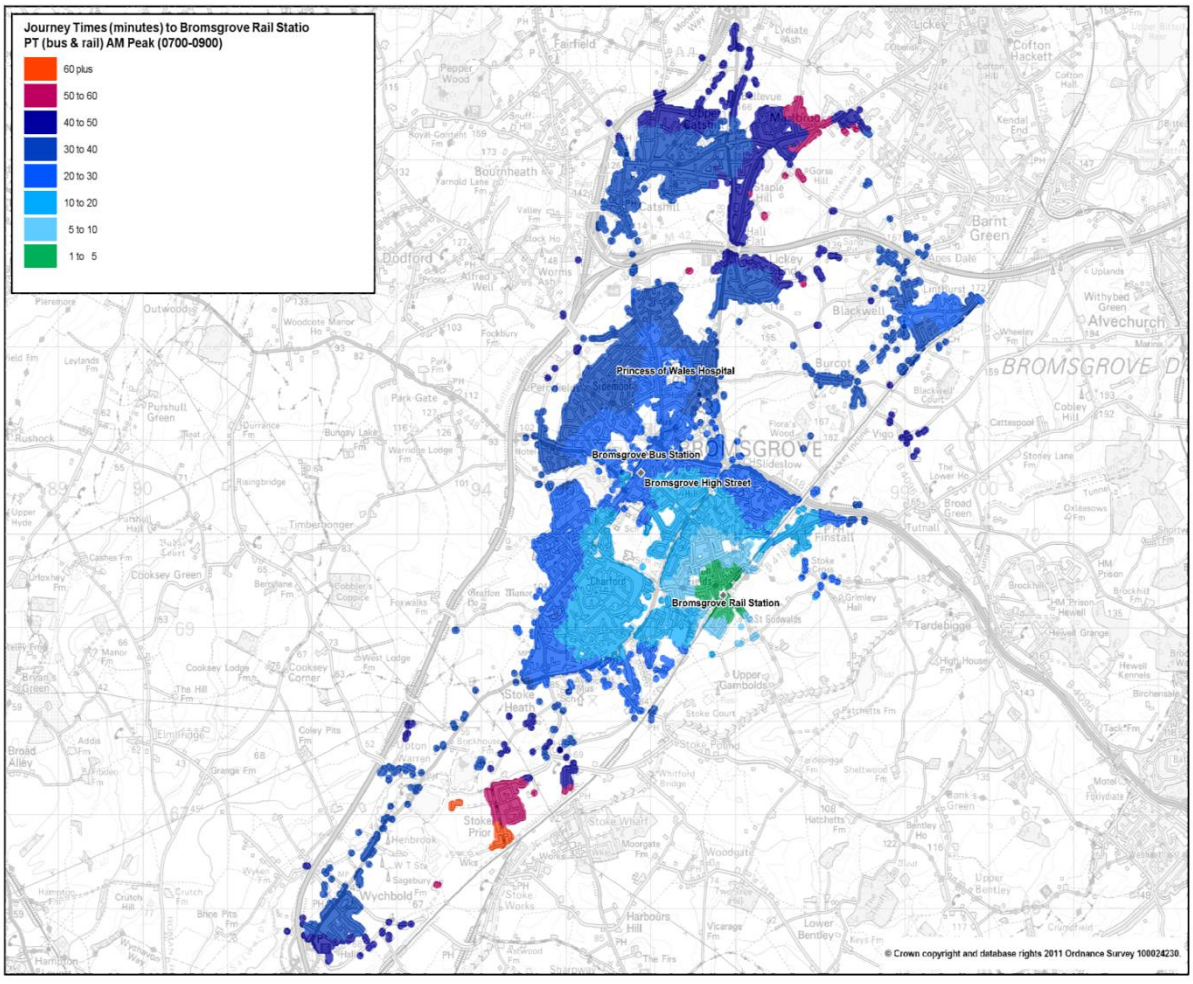


Table 6.3 – Analysis of Results

Journey to Work	Issue	Discussion
Bromsgrove Railway Station AM Peak	Poor access to the rail station from Stoke Prior and Marlbrook.	Low bus service frequency and further distance from passenger transport network results in high walk, wait, and interchange time
	High journey times in from Whitford, Sidemoor, Blackwell, Catshill, Stoke Heath.	These areas are not served by a direct service to the railway station and results in extended walk, wait and interchange times. For example, passengers from Whitford would have to catch the 98 service to the town centre and change for the 141/142/143/318 service, or walk to the Worcester Road to access the 142/143 service to the station.
	Access to the railway station by passenger transport would be unattractive for the areas with a journey time greater than 30 minutes.	Extended walk, wait and interchange times required to access onward rail services. In some cases this results in journey times in excess of 50 minutes to access Birmingham City Centre by passenger (bus and/or rail) - this is demonstrated in Figure 6.4.
	Poor access to the Bromsgrove Station from the Blackwell/Linthurst area.	Lengthy journey times to access Bromsgrove Railway Station as a result of higher walk, wait and interchange times.

Figure 6.5 - AM Peak (0700-0900) Journey Time by Walk and/or Passenger Transport (bus and/or rail) to Birmingham City Centre from the Bromsgrove Transport Package Area

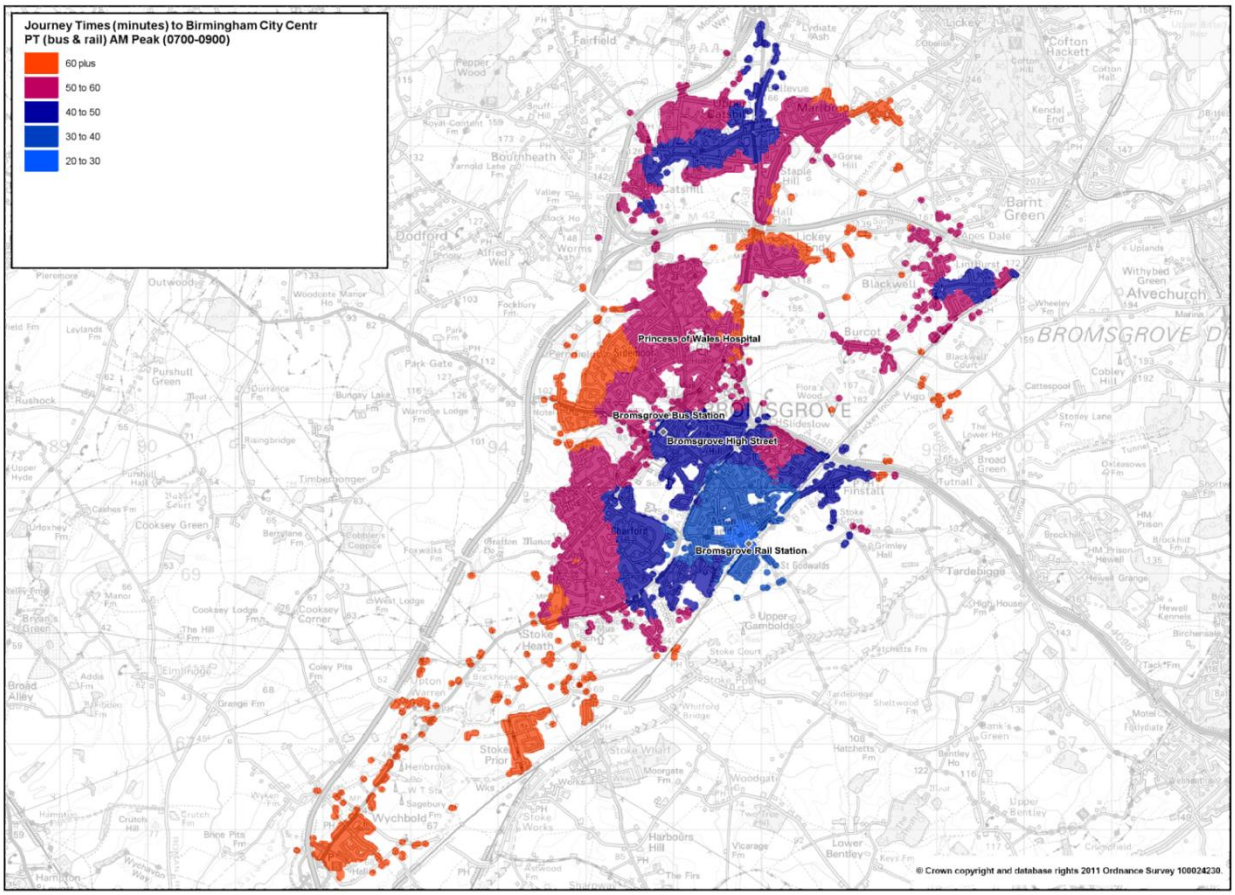


Table 6.4 – Analysis of Results

Journey to Work	Issue	Discussion
Birmingham City Centre AM Peak	Access by bus to Birmingham from the Catshill area is more attractive than a bus and rail journey.	Catshill is on the key 144 and 143 corridor, which operate at a 15 minute frequency in the AM Peak.
	The southern, northern and north western parts of the BTP area have journey times greater than 50 minutes to access Birmingham City Centre.	These areas are not immediately served by a direct service to the railway station and as a result walk, wait times are higher and interchange times for onward journeys by rail increase.

Figure 6.6 - PM Peak (1630-1830) Journey Time by Walk and/or Passenger Transport (bus and/or rail) to Bromsgrove Railway Station from the Bromsgrove Transport Package Area

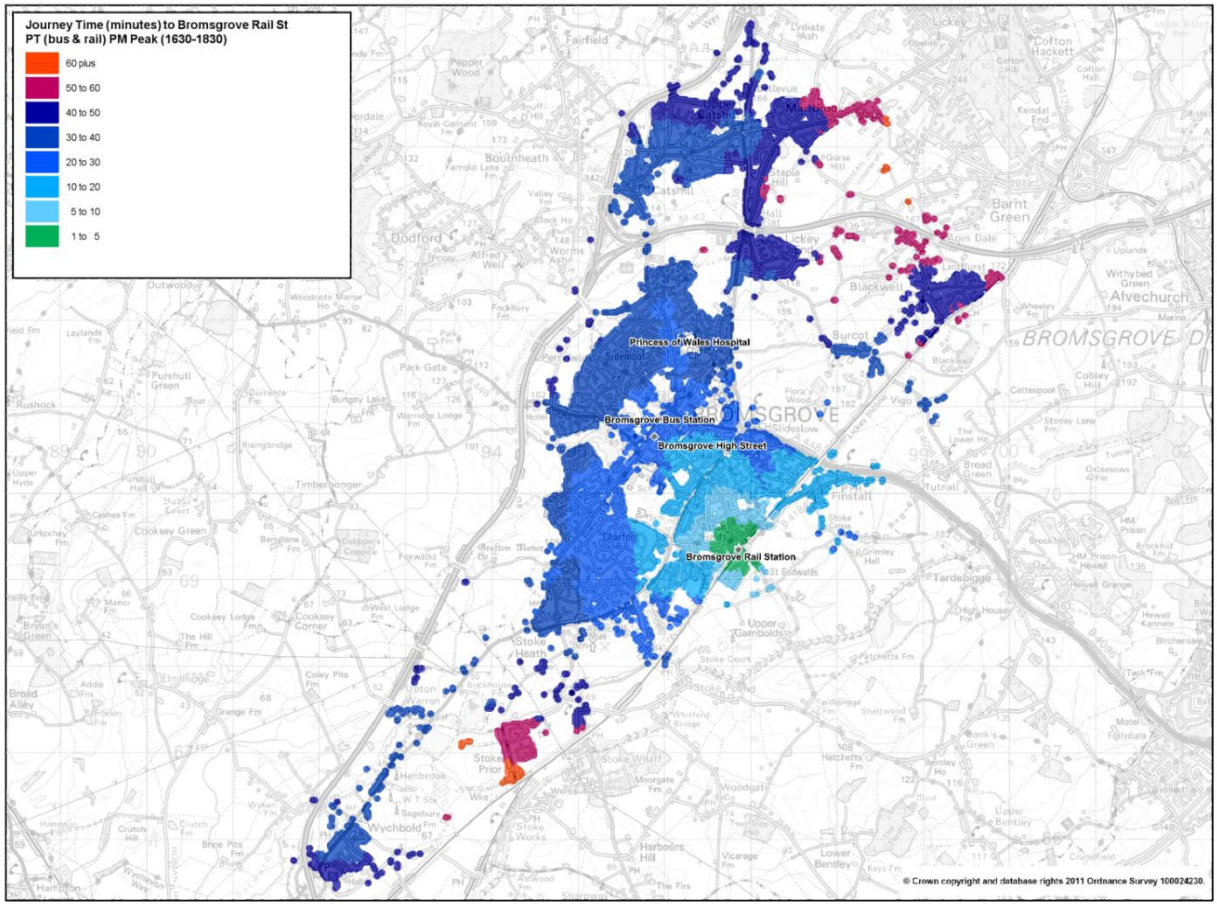


Table 6.5 – Analysis of Results

Journey to Work	Issue	Discussion
Bromsgrove Railway Station PM Peak	Journey times from the BTP area to the railway station are higher for the Charford, Whitford and Sidemoor areas than in the AM peak.	Lower frequency of bus services operating in the BTP area within these time-periods; this includes direct and indirect services to the railway station. This results in higher wait and interchange times from these areas.
	Higher journey times in the PM peak have been calculated in the Marlbrook and Blackwell areas.	Lower frequency of bus services operating within these areas results in higher wait and interchange time elements of the journey.

Figure 6.7 - PM Peak (1630-1830) Journey Time by Walk and/or Passenger Transport (bus and/or rail) to Birmingham City Centre from the Bromsgrove Transport Package Area

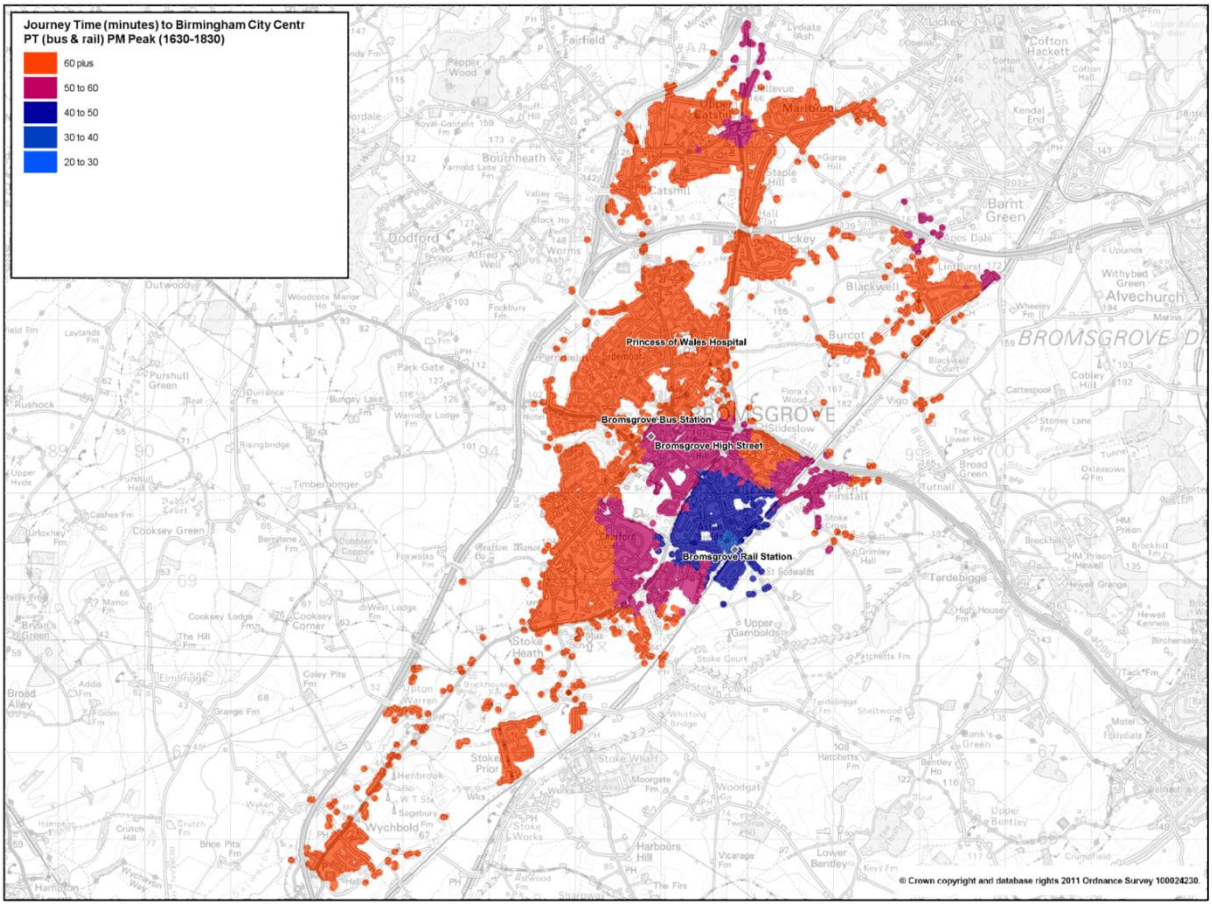


Table 6.6 – Analysis of Results

Journey to Work	Issue	Discussion
Birmingham City Centre PM Peak	Access to Birmingham City Centre in the PM Peak (1630-1830) is poorer than in the AM Peak, it is evident that journey times increase across the greater proportion of the BTP area	Lower frequency of direct and indirect bus services to the railway station, and a lower frequency of rail services to Birmingham from Bromsgrove. In the PM peak there are 2 Bromsgrove-Birmingham services (4 in the AM peak), however there are 5 Birmingham-Bromsgrove services in the PM peak

Journey Time Summary AM and PM Peak - Access to Employment Destinations by Walk and/or Passenger Transport (bus and/or rail) from the Bromsgrove Transport Package area

6.3.9 A summary of journey times to access key employment destinations by passenger transport (bus and/or rail) from all origins within the BTP area is provided in Table 6.6.

Table 6.7 –Journey Time Summary Table (Min, Max, Min/Max Difference, Standard Deviation) Access to Employment AM and PM Peak from All Origins in the BTP area

Employment Destinations	Bromsgrove Rail Stn	Worcester Foregate St Stn	School Drive (Offices)	Bromsgrove Town Centre	Aston Fields Industrial Estate	Lowes Hill (Hospital)	Birmingham City Centre	Bromsgrove Bus Stn
AM Peak								
Minimum Journey Time (minutes)	5.02	28.26	5.02	5.01	5.01	5.01	27.26	5.01
Maximum Journey Time (minutes)	63.72	86.35	53.91	50.69	63.55	57.28	89.61	47.15
% Difference between Min and Max	20%	4%	20%	20%	20%	20%	4%	20%
Average Journey Time (minutes)	28.53	51.88	21.86	18.61	30.98	22.37	52.47	16.82
Standard Deviation (of journey times to destinations)	11.12	10.10	7.91	7.92	11.43	9.09	9.27	7.16
PM Peak								
Minimum Journey Time (minutes)	5.02	30.26	5.02	5.01	5.01	5.01	38.26	5.01
Maximum Journey Time (minutes)	68.17	99.88	50.91	50.68	73.17	51.91	100.61	45.91
% Difference between Min and Max	20%	3%	20%	20%	20%	20%	3%	20%
Average Journey Time (minutes)	31.05	51.39	21.44	19.75	34.47	20.21	64.46	14.85
Standard Deviation (of journey times to destinations)	11.60	11.66	7.32	7.33	13.17	7.72	9.83	6.22

Table 6.8 – Analysis of Results

Journey to Work	Issue	Discussion
Local Employment Destinations (Bromsgrove)	The variation in journey times to destinations in central Bromsgrove is lower than key strategic destinations. The exception is Aston Fields Industrial Estate, which has a high variation in journey times from the BTP area.	The variation in journey times is higher for destinations which are not located in central Bromsgrove and are further in distance from the key passenger transport network such as the 144, 145, 143, 93 and 99 services.
	Variation in journey times is greatest in the PM peak.	Due to increased wait and interchange times associated with lower service frequencies, in particular the 144 and 93/99 services.
Railway Stations – Bromsgrove and Worcester Foregate. Railway Station	The variation in journey times is high for access to Bromsgrove and Worcester Foregate Street station, and Birmingham City Centre from the BTP area.	In terms of Bromsgrove railway station, this is due to its location in the south east of Bromsgrove and the lower levels of bus services in this area. These variations will have an additional impact on journey times for onward destinations (Worcester and Birmingham)
Birmingham City Centre	Increase in the minimum, maximum, average and variation in journey times between the AM and PM peak	Changes in frequency of rail services from Bromsgrove railway station which results in increased wait and interchange time for walk and PT journeys. **Bromsgrove – Birmingham** 0700-0900 4 trains 1600-1800 2 trains **Birmingham – Bromsgrove** 0700-0900 3 trains 1600-1800 5 trains This is evident in the increase in journey times (minimum, maximum and average) to Birmingham City centre in the PM peak

Summary – Access to Local and Strategic Employment Opportunities

6.3.10 The analysis highlights:

- *The importance of the railway station for ensuring residents and businesses have access to the regional labour market, however access to the station is constrained from parts of the BTP area due to limited provision of direct services to the railway station;*
- *The importance of inter-urban bus services (144, 143, 145) for ensuring local and regional employment opportunities can be accessed from the BTP area;*
- *The limited provision of frequent and direct bus services in some parts of the BTP area which are critical for ensuring access to wider employment opportunities is possible.*

6.3.11 This means that existing and future rail and inter-urban bus services need to be maintained and protected, whilst the frequency and routing of some local services needs to be examined in order to ensure that the movement of goods and people to and from the BTP area is efficient and that maximum use is made of the existing transport network.

6.4 Access to Healthcare

Access to Healthcare Facilities

6.4.1 Access to local and regional healthcare facilities form the BTP area is important for maintaining quality of life for residents in Bromsgrove it is a key factor for:

- *Supporting the delivery of health services;*
- *Maximising access to healthcare services and facilities and the distribution of service delivery;*
- *Efficient and cost-effective delivery of health services.*

6.4.2 Access to healthcare services and facilities by passenger transport enables people to independently access health services, maintaining their quality of life and ensuring the efficient delivery of services.

Journey Times to Princess of Wales Hospital (Bromsgrove) AM Peak and Inter-Peak by Walk and Passenger Transport (bus and/or rail)

6.4.3 Access to the Princess of Wales Hospital by walk and passenger transport is best from:

- *Sidemoor and St Johns areas within walking distance of the hospital;*
- *The Catshill area and other areas in close proximity to key inter-urban bus services which either directly serve or stop in close proximity to the hospital.*

Figure 6.8 – AM Peak (0700-0900) Journey Times to Princess of Wales Hospitals from the Bromsgrove Transport Package area by Passenger Transport (bus and/or rail)

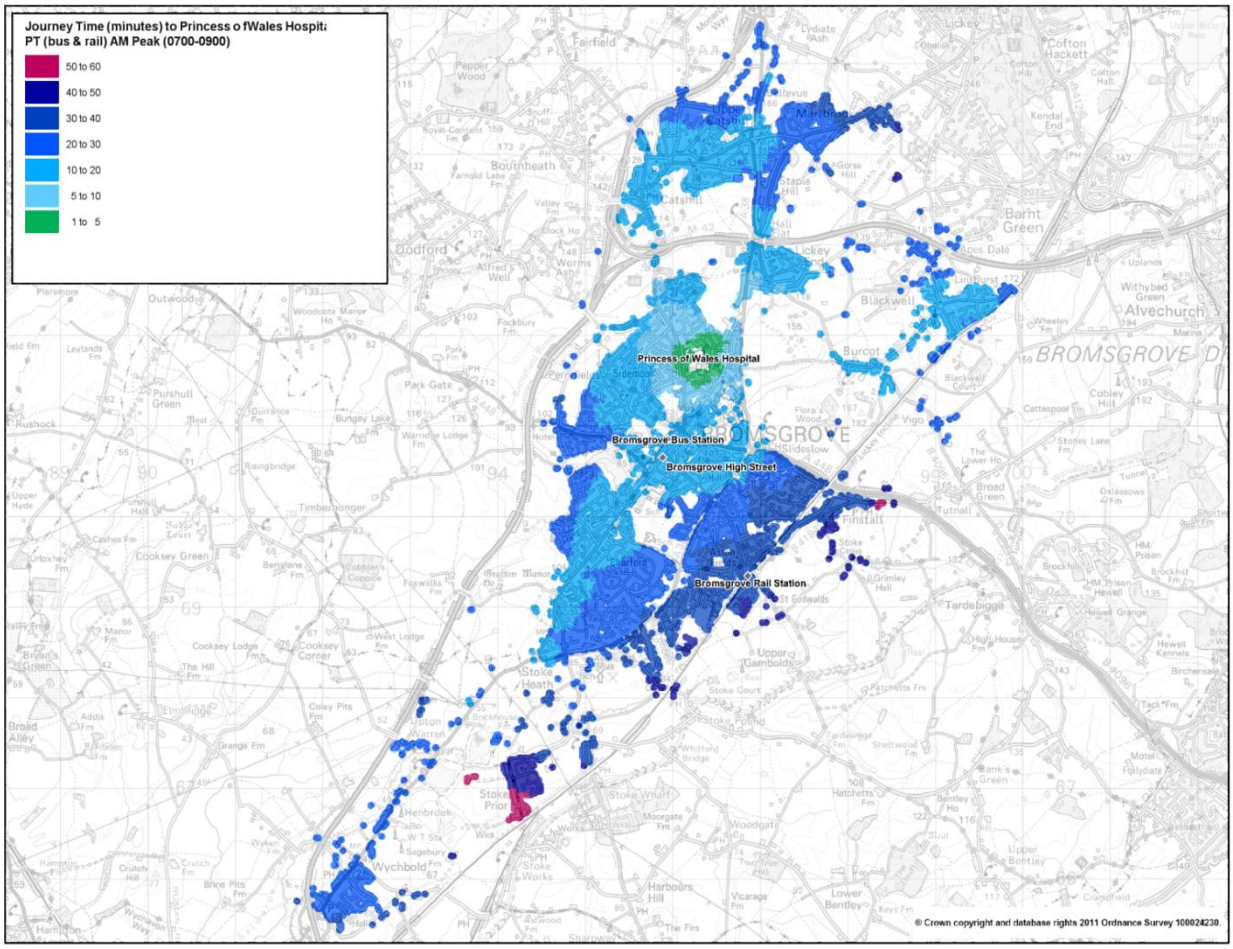


Table 6.9 – Analysis of Results

Journey Purpose	Issue	Discussion
AM Peak Princess of Wales Hospital	Good access from the eastern area of Sidemoor and northern area of St Johns.	These areas are within an attractive walk-distance of the hospital.
	Lower journey times along the Worcester Rd, Stourbridge Rd and Birmingham Rd corridors (144, 142/143, 145 services)	The corridors are served by relatively frequent services (some of which are direct), therefore walk, wait and interchange (if required) times are lower.
	Poor access from south eastern areas of the town, and Stoke Prior.	These areas are either not served by frequent services, and/or direct services to the hospital, and in the case of Stoke Prior is a significant walk distance from the passenger transport network.

Figure 6.9 – Inter-Peak (1000-1200) Journey Times to Princess of Wales Hospitals from the Bromsgrove Transport Package area by Passenger Transport (bus and/or rail)

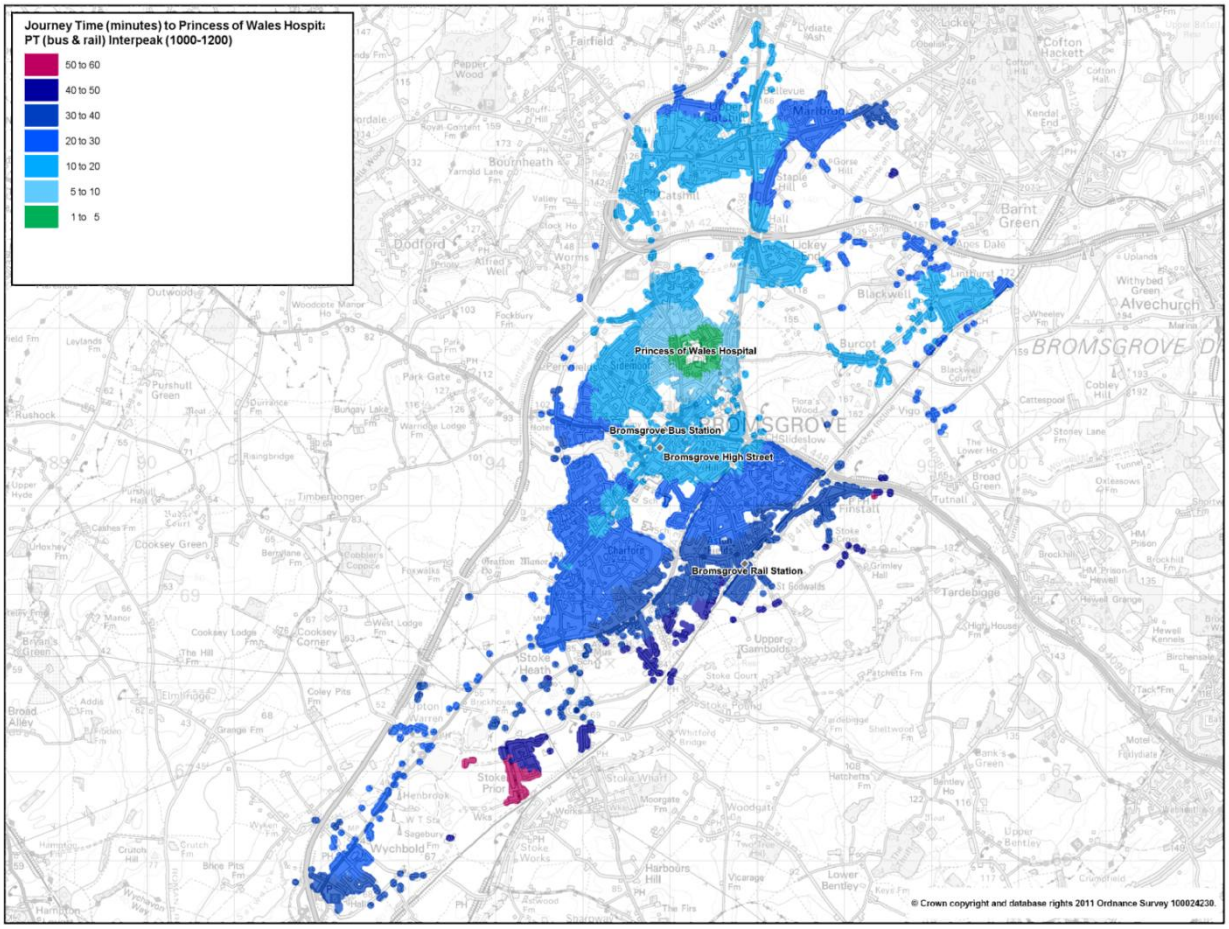


Table 6.10 – Analysis of Results

Journey Purpose	Issue	Discussion
Inter-Peak Princess of Wales Hospital	Overall higher journey times than the AM peak from south western and south eastern parts of the town.	Lower frequency of services in the inter-peak results in higher wait and interchange times, particularly because these areas are not served by a direct service to the hospital.
	Poor access, in terms of journey times, from south eastern areas of the town, and Stoke Prior.	These areas are either not served by frequent services, and/or direct services to the hospital, and in the case of Stoke Prior is a significant walk distance from the passenger transport network.

Journey Time Summary AM Peak and Inter-Peak - Access to Healthcare Facilities by Passenger Transport (bus and/or rail) from the Bromsgrove Transport Package area

6.4.4 The summary of journey times to access healthcare facilities by passenger transport (bus and/or rail) from the BTP area in the AM peak and Inter-Peak is provided in Table 6.11. The results are discussed after the table below.

Table 6.11 – Journey Time Summary Table (Min, Max, Min/Max Difference, Standard Deviation) Access to Healthcare AM Peak (0700-0900) and Inter-Peak (1000-1200)

Health Destinations	Princess of Wales Hospital	Davenal House Surgery	Catshill Village Surgery	Parkside Health Centre	New Rd Surgery	Worcestershire Royal Hospital	Alexandra Hospital	Kidderminster General Hospital	Queen Elizabeth Hospital Birmingham	Pershore Cottage Hospital	Malvern Community Hospital
AM Peak											
Minimum Journey Time (minutes)	5.01	5.01	5.01	5.01	5.01	52.26	55.33	58.26	27.26	88.26	38.26
Maximum Journey Time (minutes)	54.91	53.91	67.28	53.91	53.91	119.38	119.96	109.63	89.61	110.00	97.34
% Difference between Min and Max	20%	20%	20%	20%	20%	2%	2%	2%	4%	1%	3%
Average Journey Time (minutes)	21.70	19.86	26.33	19.10	20.92	82.17	78.06	82.09	50.84	103.48	68.58
Standard Deviation (of all journey times to destinations)	8.98	7.96	11.21	7.87	7.59	13.22	12.82	10.22	8.92	5.48	12.96
Inter-Peak											
Minimum Journey Time (minutes)	5.01	5.01	5.01	5.01	5.01	69.26	62.80	50.26	28.26	85.39	49.26
Maximum Journey Time (minutes)	56.91	51.91	62.08	47.04	51.91	120.00	106.91	115.97	106.91	110.00	115.97
% Difference between Min and Max	20%	20%	20%	20%	20%	1%	2%	2%	4%	1%	2%
Average Journey Time (minutes)	22.18	19.55	26.05	18.68	21.80	96.79	77.85	81.12	55.79	102.18	80.68
Standard Deviation (of all journey times to destinations)	9.16	7.63	10.22	7.48	7.56	12.41	7.48	14.06	11.35	5.71	14.50

Table 6.12 – Analysis of Results

Journey Purpose	Issue	Discussion
Surgeries and Health Centre	Lower variation in journey times for Davenal House, Parkside and New Road.	These destinations are centrally located, and in close proximity to high frequency passenger transport services.
	Minimal difference between the AM and Inter peak.	
Princess of Wales Hospital	Increases in maximum, average and variation in journey times between AM & Inter peak.	Due to reductions in services frequency which results in increased interchange time in the Inter-peak.
Acute Hospitals (Worcester, Redditch and Kidderminster)	Highest variation in journey times to Worcestershire Royal Hospital (WRH) in the AM peak	For some locations in Bromsgrove journey times by bus would be shorter, for others rail and bus journeys would be quicker – this variation is due to the interchange time required for all journeys as there are no direct services between Bromsgrove and WRH.
	Highest Inter-peak variation in journey times to access Kidderminster General Hospital	This is because of lower service frequency in this time-period which results in increased wait and interchange times.
Community Hospitals	Journey times (and variation) to Pershore hospital are consistent between AM and Inter peak	Bus and rail would be the most attractive option to access Pershore; the timetabling of rail services to Pershore is consistent throughout the day (interchange at Worcester would be required).
	Highest journey times (and variation) to Malvern hospital in the Inter peak	The frequency of rail services (the quickest way to access Malvern from the BTP area) is lower in the Inter-peak time-period.
Queen Elizabeth (QE), Birmingham	Lower journey times to access QE than Acute hospitals in Worcestershire (better average, minimum and maximum) in both AM and Inter peak	This hospital is located within a short walk distance of the University Railway Station in Birmingham which is directly serviced by rail services from Bromsgrove station.
	Inter-Peak journey times and variations are higher	The frequency of rail services to Birmingham is lower in the Inter-peak, therefore wait and interchange times would be higher in some areas.

Conclusion - Access to Healthcare Facilities

6.4.5 The analysis of journey times to healthcare services and facilities highlights:

- *The importance of rail and inter-urban bus services for accessing strategic healthcare facilities;*
- *Acute hospitals in Worcestershire are not directly accessible from most parts of the BTP area, interchange between bus and/or rails services is required;*
- *Local healthcare facilities are directly accessible from parts of the BTP area, however in some cases walk is the quickest mode of travel;*
- *The Queen Elizabeth Hospital in Birmingham is the most accessible strategic healthcare facility for the majority of the BTP area.*

6.4.6 Maintaining and enhancing rail services is essential to ensure access to healthcare facilities by passenger transport is a viable option. Key walk links to local healthcare facilities should be maintained and enhanced to enable journeys on foot. The provision of direct and frequent services to the three acute hospitals should be examined in order to reduce journey times by bus to these services.

6.4.7 Access to healthcare services by reliable and direct passenger transport services is critical in order for the efficient delivery and distribution of healthcare services and to reduce costs incurred by additional transport requirements, car parking maintenance and missed appointments.

6.5 Access to Retail and Leisure

Introduction

6.5.1 Access to retail and leisure by passenger transport is important for the following reasons:

- *Enhanced access to retail and leisure opportunities can results in increased footfalls on high streets and key retail areas;*
- *The benefits of enjoying leisure time without the car, and associated challenges;*
- *Encouraging tourism and visitors and resulting in limited impact of local and strategic transport network.*

6.5.2 The vitality, viability and sustainability of retail and leisure areas can be improved if they are highly accessible by passenger transport (bus and/or rail).

Access to Retail and Leisure AM Peak (0700-0900), Inter-Peak (1000-1200) and Saturday (1000-1200)

6.5.3 Access to key retail and leisure destinations by walk and passenger transport (bus and/or rail) has been assessed in the AM Peak, Inter-Peak and Saturday time periods. A summary of the journey times to the retail and leisure destinations assessed is provided in Table 6.14.

Access to Bromsgrove High Street

6.5.4 Journey times to Bromsgrove High Street by walk and passenger transport (bus) from the BTP area are illustrated in Figures 6.10 to 6.12, a discussion of journey times is provided after Figure 6.12.

Figure 6.10 – AM Peak (0700-0900) Journey Times (minutes) by Walk, Passenger Transport (bus and/or rail) to Bromsgrove High Street from the BTP Area

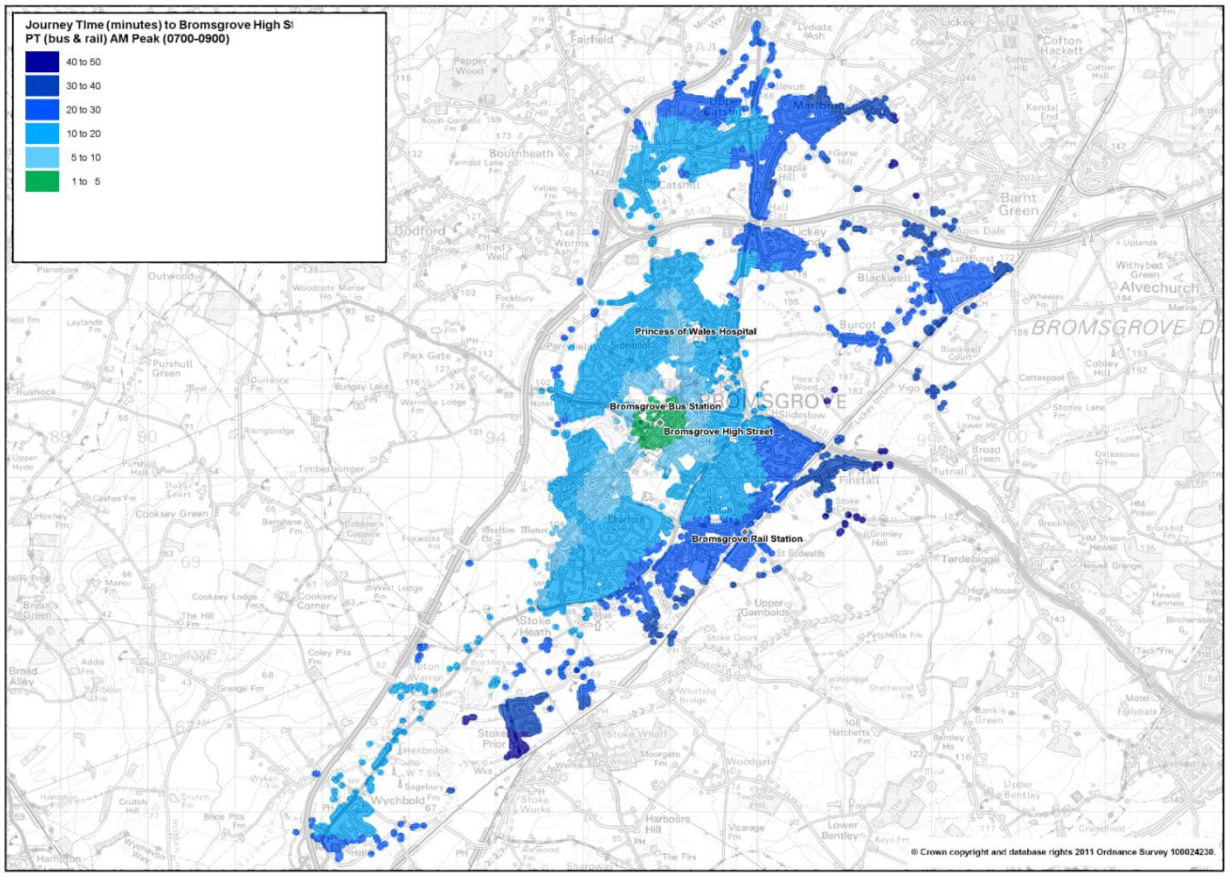


Figure 6.11 – Inter-Peak (1000-1200) Journey Times (minutes) by Walk, Passenger Transport (bus and/or rail) to Bromsgrove High Street from the BTP Area

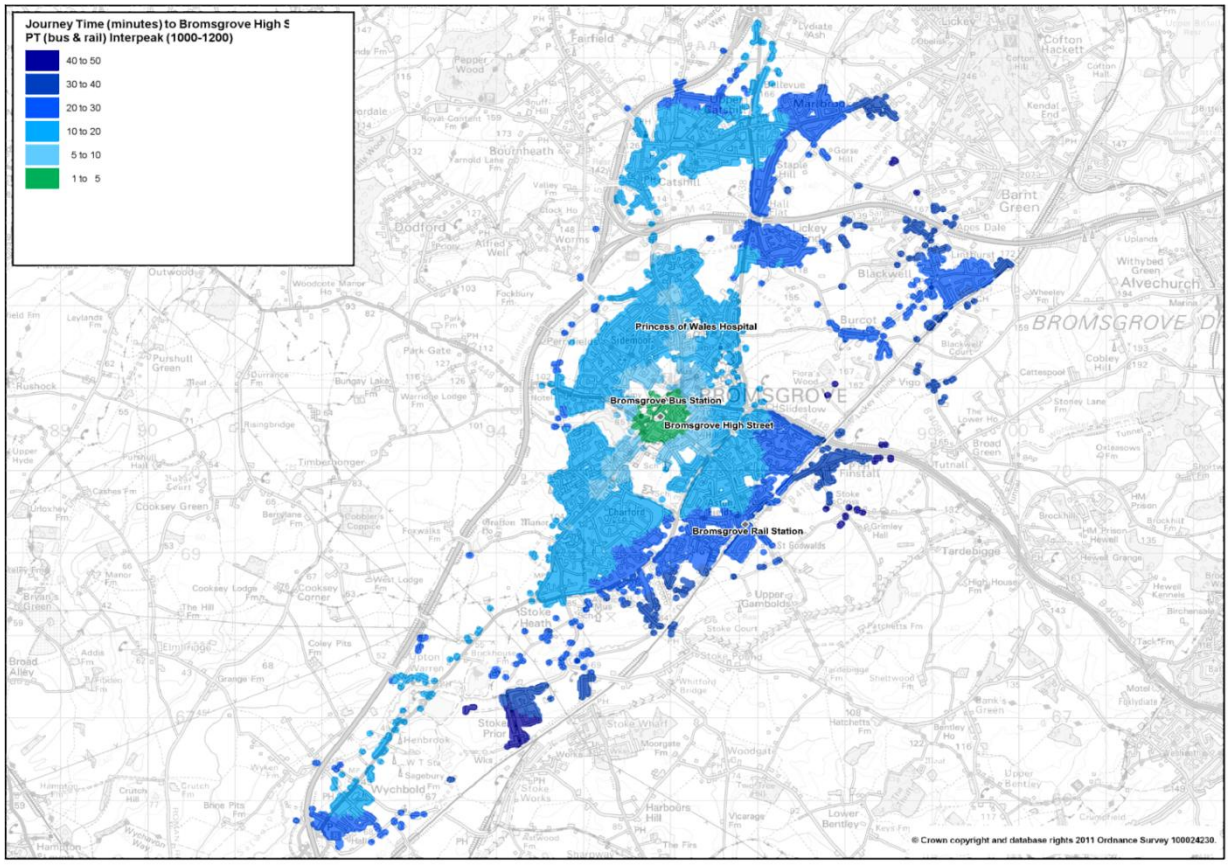


Figure 6.12 – Saturday (1000-1200) Journey Times (minutes) by Walk, Passenger Transport (bus and/or rail) to Bromsgrove High Street from the BTP Area

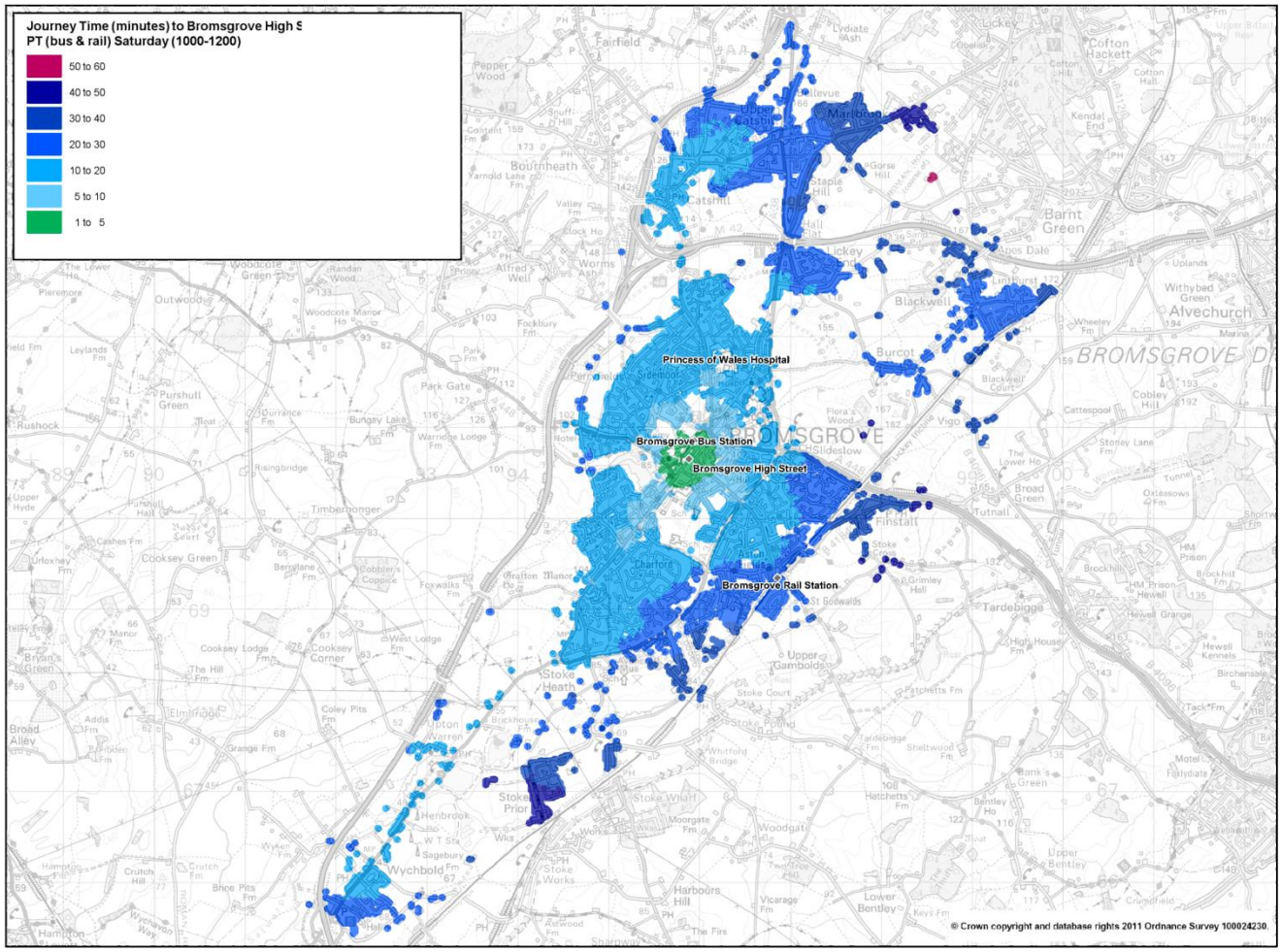


Table 6.13 – Analysis of Results

Journey Purpose	Issue	Discussion
Bromsgrove High Street	Lower journey times to the High Street along the Catshill, Worcester Road and Stourbridge Road passenger transport corridors.	Proximity to higher frequency and direct bus services to central Bromsgrove.
	Inter-peak and Saturday journey times are similar.	Frequencies and operations of services are similar for Saturday and inter-peak time-periods, resulting in higher wait times.
	Greater areas of the BTP area are no longer within 5-10 minutes journey time of the High Street in the Inter-peak and Saturday time-period.	Frequencies in the Inter-peak and Saturday are lower, therefore wait time is higher.
	In all the time-periods assessed access to the High Street by passenger transport is poor from the Stoke Prior, Blackwell, Lickey End and Finstall areas.	This is due to proximity to the key passenger transport network and excessive walk distances to access passenger transport services.

Journey Time Summary AM Peak, Inter-Peak and Saturday - Access to Retail and Leisure by Walk, Passenger Transport (bus and/or rail) from the Bromsgrove Transport Package Area

6.5.5 A summary of the journey times to access key retail and leisure destinations form the BTP area is provided in Table 6.14 below. A discussion of this summary is provided below.

Table 6.14 - Journey Time Summary Table (Min, Max, Min/Max Difference, Standard Deviation) Access to Retail & Leisure AM Peak (0700-0900), Inter-Peak (1000-1200) and Saturday (1000-1200)

	Bromsgrove High Street	Redditch Kingfisher Centre/ Town Centre	Worcester High Street	Kidderminster Swan Centre/ Town Centre	Birmingham Great Park	Merry Hill
AM Peak						
Minimum Journey Time (minutes)	5.01	25.33	28.26	48.26	23.59	88.26
Maximum Journey Time (minutes)	48.75	119.96	86.35	99.63	84.91	119.99
% Difference between Min and Max	20%	4%	4%	2%	4%	1%
Average Journey Time (minutes)	18.19	49.32	56.27	72.09	45.09	104.98
Standard Deviation (of all journey times to destinations)	7.36	15.87	12.04	10.22	10.37	6.93
Inter-Peak						
Minimum Journey Time (minutes)	5.01	32.80	29.26	39.26	22.59	79.26
Maximum Journey Time (minutes)	48.75	76.91	95.97	105.97	84.28	119.99
% Difference between Min and Max	20%	3%	3%	3%	4%	1%
Average Journey Time (minutes)	18.25	47.85	59.13	71.04	44.65	108.10
Standard Deviation (of all journey times to destinations)	7.22	7.48	13.92	14.20	10.45	10.45
Saturday						
Minimum Journey Time (minutes)	5.01	32.80	29.26	39.26	22.59	79.26
Maximum Journey Time (minutes)	50.68	76.91	95.97	105.97	84.28	120.00
% Difference between Min and Max	20%	3%	3%	3%	4%	1%
Average Journey Time (minutes)	19.47	47.85	58.77	70.46	47.29	108.31
Standard Deviation (of all journey times to destinations)	7.67	7.48	13.96	14.27	11.82	10.45

Table 6.15 – Analysis of Results

Journey Purpose	Issue	Discussion
Local (Bromsgrove High Street)	The variation in journeys times across the BTP area is relatively low.	This reflects the central location of the High Street and is consistent with the other local destinations assessed.
	There is a difference between minimum and maximum journey times.	This is because the High Street is within an attractive walk-distance for the central areas of Bromsgrove town.
	Journey times are higher in the Saturday time-period.	This is due to a higher wait-time to access passenger transport services in some parts of the BTP area.
County (Redditch, Worcester and Kidderminster)	Higher variation in journey times to access Worcester and Kidderminster in all time-periods.	Parts of the BTP area are located along inter-urban service corridors which serve these locations, however journey times are higher in areas which are not along these corridors.
	High variation in journey times to access Redditch in the AM Peak.	High wait and interchange times in some areas to access onward services to Redditch.
	The most attractive destinations in terms of journey times are Worcester and Redditch.	These locations are served by direct inter-urban services from parts of the BTP area.
West Midlands (Great Park and Merry Hill)	AM peak variation in journey time to Merry Hill is higher than the other time-periods.	This is because the minimum and maximum journey times are high.
	In terms of journey times, it would be more attractive to access Great Park by passenger transport with average journey times being less than 60 minutes.	The average journey time to Merry Hill by passenger transport is almost two hours – this is due to high wait, in-vehicle and interchange times.

Conclusion - Access to Retail and Leisure

6.5.6 The analysis highlights:

- *The importance of rail and inter-urban bus services for accessing Worcester High Street and Birmingham Great Park;*
- *Parts of Bromsgrove are within walk distance of the High Street, however some parts of the BTP area are not served by frequency and direct services to the High Street;*
- *Frequency and directness of services is also an issue for accessing Merry Hill and Kidderminster High Street.*

6.5.7 The viability and sustainability of these retail and leisure areas will be undermined if existing quality rail and inter-urban services are not maintained, and appropriate amendments are made to the frequency and routing of services to destinations such as Merry Hill, Kidderminster and Bromsgrove High Street.

6.6 Passenger Transport Services Reliability – Local and Inter-Urban Bus Punctuality

Introduction

6.7 This report analyses the punctuality survey data undertaken by Worcestershire County Council in September 2011 at Bromsgrove Bus Station. The surveys are undertaken annually in order to report Bus Punctuality (NI178) to the Department for Transport. The data is a snapshot from 27th and 28th September 2011.

6.8 The punctuality surveys record the actual departure time of bus services, and provide an approximate number of passenger on services, the data is analysed using scheduled/timetabled departure times to determine the punctuality of services.

6.8.1 Punctuality of bus services is critical because poor reliability of services affects passenger confidence, demand, mode choice and operating costs and consequently fares and financial sustainability of the network. For example, increases in fares required to offset increased operating costs will in turn adversely impact on passenger demand and revenue and hence service viability. Decreased use of passenger transport will also adversely impact traffic congestion.

6.8.2 Poor reliability and punctuality of bus services (local and inter-urban) results in:

- *Reduced passenger demand*
- *Reduced passenger satisfaction, confidence and long term modal choice*
- *Risk to maintaining existing passenger base*
- *Increases the wait time*
- *Increases the interchange time (for onward services)*
- *Reduces the attractiveness of bus services as a viable and convenient alternative to the car*
- *Acts as a barrier to releasing latent demand*
- *Increases in operating costs resulting in fare increases*

6.8.3 The punctuality and reliability of inter-urban and local bus services is influenced by the following:

- ***Bus Stop Infrastructure**: parking restrictions, bus boarders and lay-bys; the absence of these features causes high stop dwell and traffic re-join times;*
- ***Highway Network Performance**: delays and congestion at key points on the highway network affect the punctuality of services;*
- ***Operational issues**: passenger boarding (ticketing) and alighting which can cause higher stop dwell times. Driver training and scheduling can cause services to depart early.*

6.8.4 Table 6.16 provides a global summary of the punctuality for all services for each of the surveyed time-periods, whilst Table 6.17 provides a summary of punctuality of specific services across all time-periods. Table 6.18 presents the results for specific services for each of the time-periods surveyed, whilst Figure 6.19 illustrates the average lateness for each service and time-period. The results are discussed in terms of variance which refers to the difference between recorded and scheduled departure time.

Punctuality Data – Global Results

Table 6.16 - Service Punctuality Data - All Services All Time-Periods (Bromsgrove Bus Station timing point)

Variance (minutes)	AM Peak	Inter Peak	PM Peak
Average	+4.10	+4.25	+4.38
Maximum	+27.00	+10.00	+24.00
Minimum	-8.00	-3.00	-4.00
Standard Deviation	5.13	2.96	5.17

6.8.5 The global results presented in Table 6.16 demonstrate that in terms of punctuality:

- *The highest average variance have been recorded in the PM peak*
- *The greatest maximum variance was recorded in the AM peak, however significant poor punctuality was also recorded in the PM peak*
- *The minimum variation in punctuality is greatest in the AM peak, however some early running was recorded across all time-periods*
- *The greatest variation (standard deviation) in the punctuality of services was in the AM and PM peak; consistent with these periods being the poorest in terms of service reliability*

Table 6.17 – Global Punctuality Data – Average Weekday and Annualised Service Punctuality (Bromsgrove Bus Station timing point) Service Specific

Service Number	Average Total Weekday Punctuality (minutes early/late)	Average Total Annualised Punctuality (minutes early/late)	Average Total Annualised Punctuality (hours early/late)
144	76.5	19,890	331.5
X3	28.5	7,410	123.5
143	26.5	6,890	114.8
93	14.5	3,770	62.8
7	9.5	2,470	41.2
145	9.5	2,470	41.2
202	6	1,560	26.0
141	4.5	1,170	19.5
99	1.5	390	6.5
90	1	260	4.3
322	1	260	4.3
142	0	-	-
98	0	-	-
97	0	-	-
318	-2	- 520	- 8.7

VERY LATE
ON-TIME
EARLY

6.8.6 The global service specific weekday and annualised punctuality data provided in Table 6.17 indicates that:

- *The majority of the services operating within the Bromsgrove Package area have issues with punctuality;*
- *Services on the Worcester-Birmingham and Redditch-Kidderminster inter-urban corridors have the greatest issue with punctuality;*
- *The local service with the greatest issue with punctuality is the 93;*
- *The services with few punctuality issues are predominantly local services the 98 and 97;*
- *Services which do not operate on the key strategic highway network within the Bromsgrove Package area have few issues with punctuality; however there is an issue with the 318 to Stourbridge with recorded early average departure times.*

Punctuality Data – AM Peak Results

Table 6.18 – Punctuality Data AM Peak (0700-1000) Service and Destination Specific

Destination	Service Number	Variance (minutes)		
		Average	Min	Max
Redditch (St Augustine's School, Alexandra Hospital)	143	14	1	27
Bromsgrove (Charford, South Bromsgrove High School)	145	4	3	5
Droitwich Spa	141	4	0	12
Redditch Bus Station (Kingfisher Centre)	X3	4	-2	17
Worcester Crowngate	144	3	-3	19
Catshill	144	3	0	7
Bromsgrove (The Oakalls)	7	3	2	3
Longbridge Station (Great Park)	145	3	1	4
Halesowen Bus Station	202	2	-2	5
Birmingham (City Centre)	144	2	0	10
Kidderminster Centre (Swan Centre, Railway Station)	X3	2	1	2
Birmingham (City Centre)	143	1	0	2
Fairfield (Catshill, Bromsgrove Town Centre)	322	1	1	1
Stourport (Kidderminster – Swan Centre, Railway Station)	X3	1	0	2
Bromsgrove (Charford, Austin Road Shops, Town Centre)	99	1	0	1
Bromsgrove (Aston Fields, Bromsgrove Rail Station)	318	0	0	0
Catshill	90	0	0	0
Bromsgrove (Deansway ,Town Centre)	98	0	0	0
Bromsgrove (Sidemoor, Town Centre)	97	0	0	0
Stourbridge Bus Station	318	0	-1	0
Charford Austin Road Shops	93	0	-8	2

VERY LATE
ON-TIME
EARLY

6.8.7 The service specific AM peak results are presented in Table 6.18 the results indicate that:

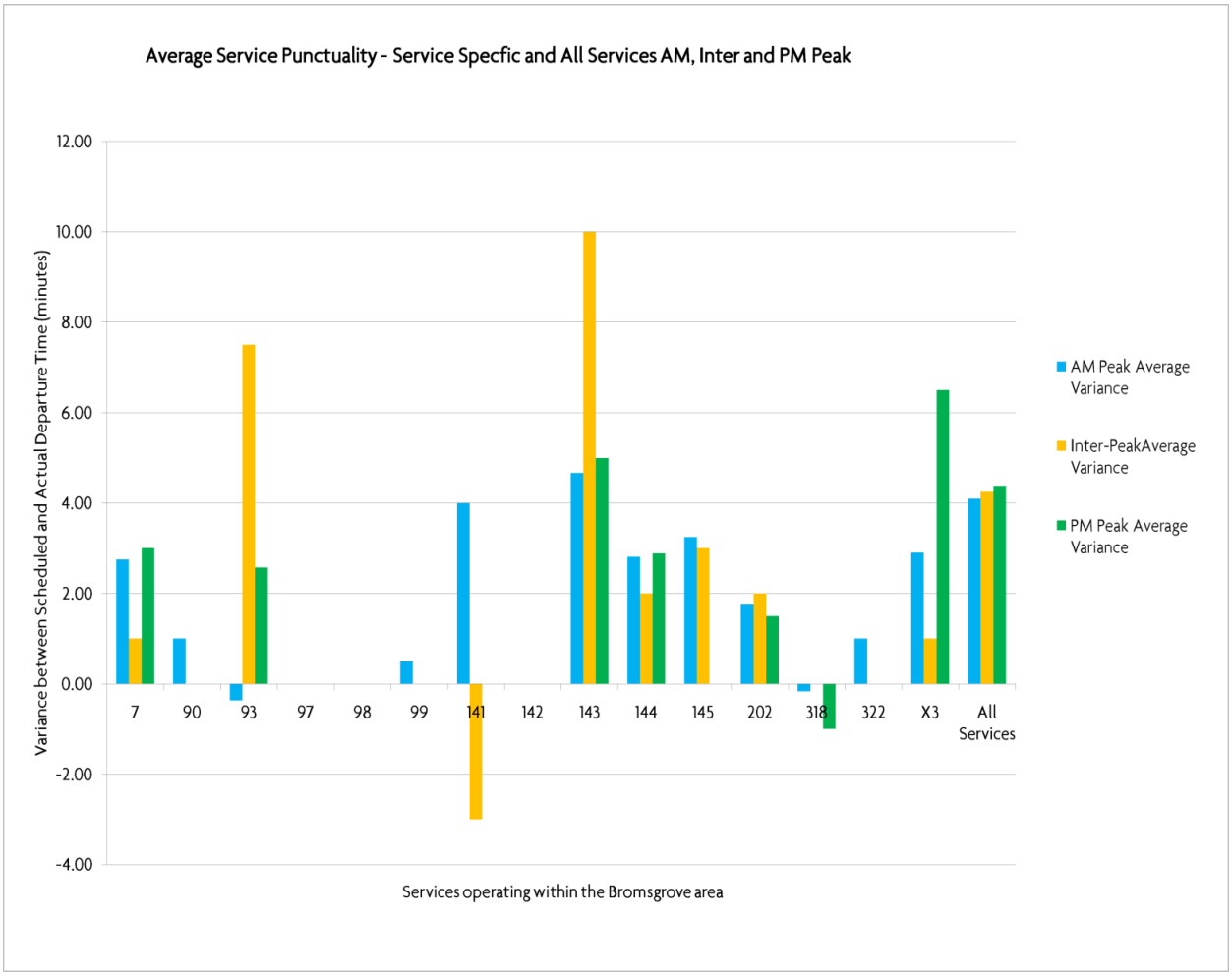
- *The highest maximum variance has been recorded for the 144, X3, 143, 141 and 202 services;*
- *No variance in times was recorded for the 90, 97, 98 and 318 services in the AM peak;*
- *Early departure times for the 93, 144, 202, X3 and 318 services;*
- *The highest average variance has been recorded for the 143 service;*
- *The greatest variance on services has been recorded for services from the north, west and south.*

Punctuality Data – AM, Inter and PM Peak Results

6.8.8 Figure 6.19 below illustrates the average variance in departure times for specific services in the AM, Inter and PM peaks. The results demonstrate that:

- *Across all the surveyed time-periods the inter-urban services have the greatest average variance (143, 144, 202 and X3);*
- *The greatest number of services have a variance in departure times within the AM peak;*
- *The greatest average variance occurs in the Inter-peak and PM peak;*
- *No variance was recorded in all time-periods for the 97, 98 and 142 services.*

Figure 6.19 – Average Variance between Actual and Scheduled Departure Time – Each Service – AM peak, Inter-Peak and PM peak



Conclusions

6.8.9 The reliability data provided above illustrates that:

- *The maximum variance was on the inter-urban services which operate via Bromsgrove (X3, 143, 144, and 145). These are services which predominantly operate on the strategic highway network (A38, A448) and other major local roads, including B4096, B4091 and B4094);*
- *The variance are on services operate between Bromsgrove bus station and Birmingham, Droitwich/Worcester and Kidderminster with delays recorded both on inbound and outbound services in the area;*
- *The most reliable services are those which do not operate on the strategic highway network (A38, A448, B4096, B4091, B4094);*
- *The greater numbers of services are delayed in the AM peak, and the highest average variance has been recorded in the Inter-peak and PM peak.*

6.8.10 It is evident from the data that Bromsgrove is an inter-change point for key inter-urban bus services in Worcestershire. The data indicates that the reliability of these services is poor; this is due to delays on the highway network in Bromsgrove and across Worcestershire:

- *A38 links and junctions*
- *M5 junctions – Junction 5*
- *M42 – Junction 1*
- *A448 links and junctions*
- *Wyre Forest – Kidderminster Ring Road, Stourport*
- *Redditch – Ran Tan roundabout and Hospital*
- *Worcester – City Centre and Tything*

6.8.11 The data provides a clear indication of the reliability of services in the BTP area, however due to the nature of the surveys the data is insufficient to provide full details on the causes of late or early running services. On bus journey time surveys are the most appropriate survey method for collecting data on link delays, speeds, stop dwell times, rejoin traffic times which provide a detailed profile of the performance of specific services.

6.8.12 Poor reliability of local and inter-urban bus services undermines the performance, operation, financial viability and sustainability of bus services and as a result reduces the attractiveness of passenger transport as alternative to travelling by car.

6.9 Demand for Passenger Transport Services – Local and Inter-Urban Bus Services

Introduction

6.9.1 Passenger demand on the passenger transport network is critical in terms of the financial viability and sustainability of bus services within the Bromsgrove Package area.

6.9.2 Passenger demand on services is influenced by:

- *Service frequency*
- *Service destination*
- *Service routing (direct/indirect)*
- *Infrastructure and information provision*
- *Service reliability and punctuality*

6.9.3 The global passenger data is presented in Table 6.20, whilst the AM, Inter and PM peak passenger data is provided in Tables 6.21, 6.22 and 6.23 respectively. A profile of the average passenger flows per hour for each service and time-period is presented in Figure 6.22.

Passenger Data – Global Results

Table 6.20 – Global Passenger Data (Bromsgrove Bus Station timing point) Service and Destination Specific

Destination	Service No	Frequency (bph)	Passenger Numbers				
			Average	Minimum	Maximum	Total	Avg. Flows
Birmingham (City Centre)	144	4	17	0	56	276	69
Worcester Crowngate	144	4	10	0	26	309	40
Bromsgrove (Charford, South Bromsgrove High School)	145	1	36	35	36	71	36
Redditch (St Augustine's School, Alexandra Hospital)	143	1	23	15	30	45	23
Bromsgrove (Charford, Austin Road, Town Centre)	93	4	5	0	18	109	22
Catshill	144	2	11	0	27	108	22
Longbridge Station	145	1	21	3	51	62	21
Stourport (Kidderminster – Swan Centre, Railway Station)	X3	1	13	2	20	90	13
Bromsgrove (Charford, Austin Road, Town Centre)	99	4	3	1	7	22	13
Barnt Green (Barnt Green Railway Station)	145	1	10	10	10	10	10
Birmingham (City Centre)	143	1	10	3	13	39	10
Redditch Bus Station (Kingfisher Centre)	X3	1	7	0	15	88	7
Halesowen Bus Station	202	1	7	0	37	78	7
Droitwich Spa	141	1	6	0	18	32	6
Birmingham City Centre	142	1	5	5	5	5	5
Bromsgrove (The Oakalls)	7	1	4	2	7	11	4
Stourbridge Bus Station	318	1	3	0	13	17	3

Kidderminster Centre (Swan Centre, Railway Station)	X3	1	3	2	3	5	3
Bromsgrove (Sidemoor, Town Centre)	97	1	2	0	3	3	2
Bromsgrove (Deansway ,Town Centre)	98	1	1	0	1	1	1
Bromsgrove (Aston Fields, Bromsgrove Rail Station)	318	1	0	0	1	1	0
Catshill	90	1	0	0	0	0	0
Fairfield (Catshill, Bromsgrove Town Centre)	322	1	0	0	0	0	0

6.9.4 The global results presented in Table 6.21 indicate that:

- *The greatest flow of passengers is on the 144 and 145 services;*
- *The highest flows of passengers is north (toward Birmingham) and south (toward Worcester) from Bromsgrove;*
- *The services with the highest average number of passengers are the 144, 145, 143 and X3;*
- *The local service with the highest level of demand is the 93;*
- *The services with the lowest passenger numbers are those which operate within Bromsgrove and are of a lower frequency.*

Passenger Data – Time-Period Results

Table 6.21 - Passenger Data AM Peak (0700-1000) Service and Destination Specific

Destination	Service No	Frequency (bph)	Passenger Numbers				
			Average	Minimum	Maximum	Total	Average Flows / Hour
Birmingham (City Centre)	144	4	11	0	20	97	43
Worcester Crowngate	144	4	10	0	25	193	39
Bromsgrove (Charford, South Bromsgrove High School)	145	1	36	35	36	71	36
Redditch (St Augustine's School, Alexandra Hospital)	143	1	23	15	30	45	23
Stourport (Kidderminster – Swan Centre, Railway Station)	X3	1	14	2	20	57	14
Bromsgrove (Charford, Austin Road Shops, Town Centre)	99	4	3	1	7	19	13
Birmingham (City Centre)	143	1	12	11	12	23	12
Catshill	144	2	4	0	10	12	8
Redditch Bus Station (Kingfisher Centre)	X3	1	7	0	15	44	7
Bromsgrove (Charford, Austin Road, Town Centre)	93	4	1	0	4	16	6
Longbridge Station	145	1	6	3	8	11	6
Kidderminster Centre (Swan Centre, Railway Station)	X3	1	3	2	3	5	3
Bromsgrove (The Oakalls)	7	1	2	2	2	4	2
Bromsgrove (Sidemoor, Town Centre)	97	1	2	0	3	3	2
Droitwich Spa	141	1	1	0	2	3	1

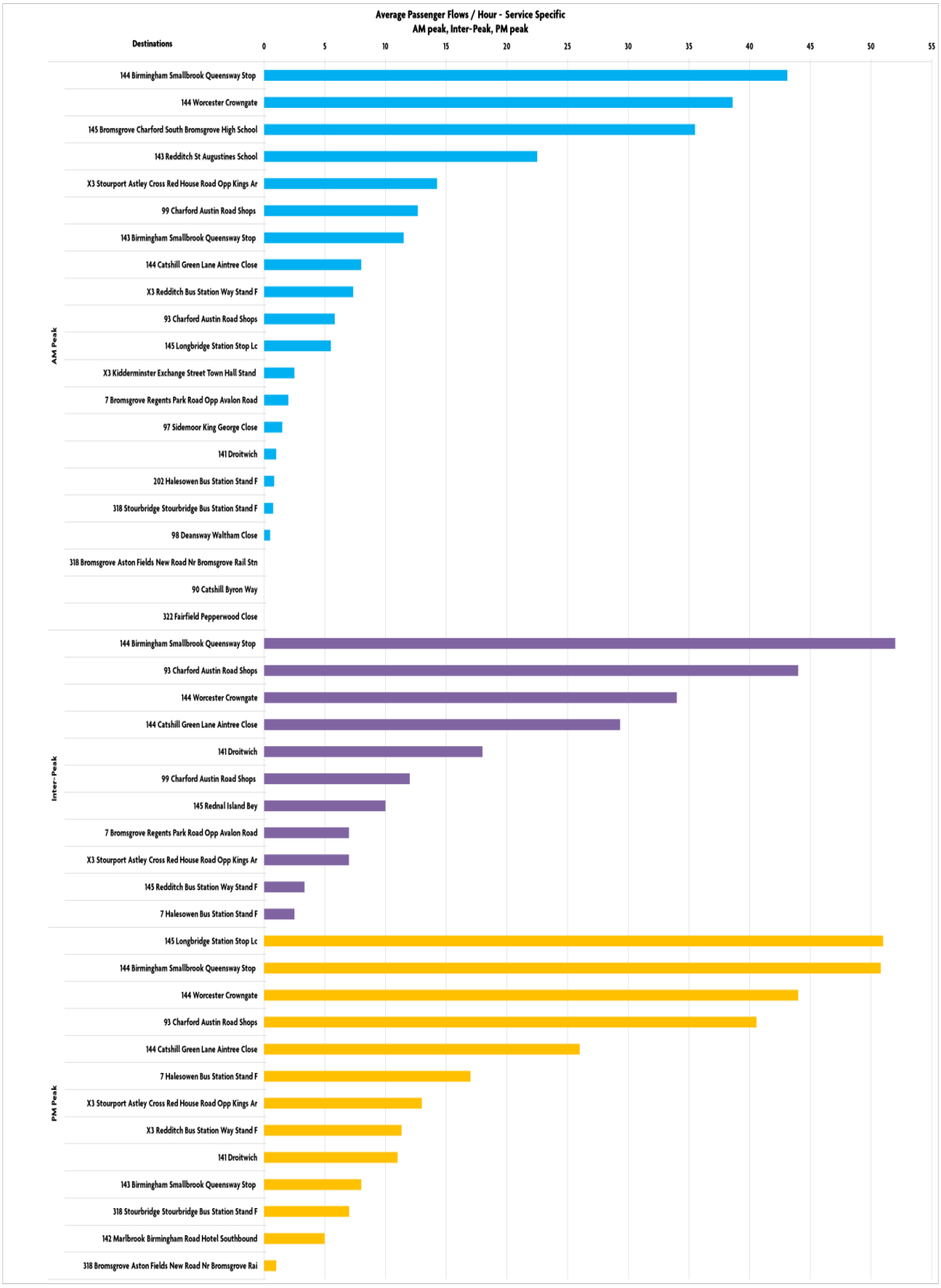
Halesowen Bus Station	202	1	1	0	1	5	1
Stourbridge Bus Station	318	1	1	0	2	3	1
Bromsgrove (Deansway ,Town Centre)	98	1	1	0	1	1	1
Bromsgrove (Aston Fields, Bromsgrove Rail Station)	318	1	0	0	0	0	0
Catshill	90	1	0	0	0	0	0
Fairfield (Catshill, Bromsgrove Town Centre)	322	1	0	0	0	0	0

6.9.5 The AM peak passenger data provided in Table 6.22 indicates that:

- *The highest average passenger flows / hour have been recorded for the 144 services, north and southbound;*
- *The lowest average flows have been recorded for those services which operate within Bromsgrove and at a lower frequency;*
- *The 93 and 99 services have the highest passenger flows for services which only operate within Bromsgrove. These services operate at a higher frequency;*
- *The highest total number of passengers within the survey time-periods has been recorded for the 144 service.*

6.9.6 The average passenger flows per hour for each recorded time-period are presented in Figure 6.22 below.

Figure 6.22 – Average Passenger Flows per Hour – Each Service – AM Peak, Inter-Peak and PM Peak



6.9.7 Figure 6.22 illustrates that:

- *AM Peak: higher average passenger flows are recorded on inter-urban services;*
- *Inter-Peak: average flows increase for local services, and remain high for inter-urban services;*
- *PM Peak: passenger flows for inter-urban and local services remain consistent with the Inter-Peak flows, and are higher than in the AM Peak;*
- *The highest total average passenger flows have been recorded in the PM peak;*
- *The 144 service (north and southbound) has the highest flows across all time-periods;*
- *Local services have higher passenger flows in the Inter-Peak and PM peak time-periods.*

Conclusions

6.9.8 The passenger data provided above indicates the following:

- *The highest passenger flows in each time-period are on the inter-urban services, in particular the 144 north and southbound;*
- *The Bromsgrove town local services have higher passenger flows in the Inter-Peak and PM peak;*
- *Lower passenger numbers were recorded for local Bromsgrove services in the AM peak;*
- *The services which have higher passenger flows are those which operate at a greater frequency.*

6.9.9 The viability and financial sustainability of local and inter-urban bus services, and the current levels of demand on services, could be undermined by the poor performance of the passenger transport network which would be caused by a range of transport network issues, including the highway network.

6.10 Passenger Transport Infrastructure – Local and Inter-Urban Bus Stop Infrastructure Review

6.11 The current provision of passenger transport infrastructure within the Local Transport Plan 3 Bromsgrove Transport Package (BTP) area has been reviewed to provide a detailed profile of the extent, type and quality of bus stop infrastructure provision within the town.

6.12 The quality of bus stop infrastructure is critical because it has an influence on:

- *Passenger demand and confidence*
- *Passenger access(boarding/alighting)*
- *Passenger, Driver and Highway Safety*
- *The attractiveness of bus services to passengers*
- *The attractiveness of bus routes/corridors to operators*
- *Bus service operations (stop dwell and rejoin traffic time)*
- *Operating Costs*
- *Passenger Fares*

6.13 It is important, therefore, that high quality bus stop infrastructure is provided to increase the attractiveness and viability of bus services in the BTP area.

6.13.1 The provision of high quality features, information, pedestrian and bus access to/from bus stops is critical in terms of ensuring the efficient operation of bus services and maintaining current patronage and encouraging new passengers onto the local and inter-urban bus network.

6.13.2 This assessment has analysed all 143 bus stops within the Bromsgrove Transport Package (BTP) area, these are illustrated in Figure 6.13.

Stop Assessment

6.13.3 The infrastructure has been reviewed by assessing the following bus stop features:

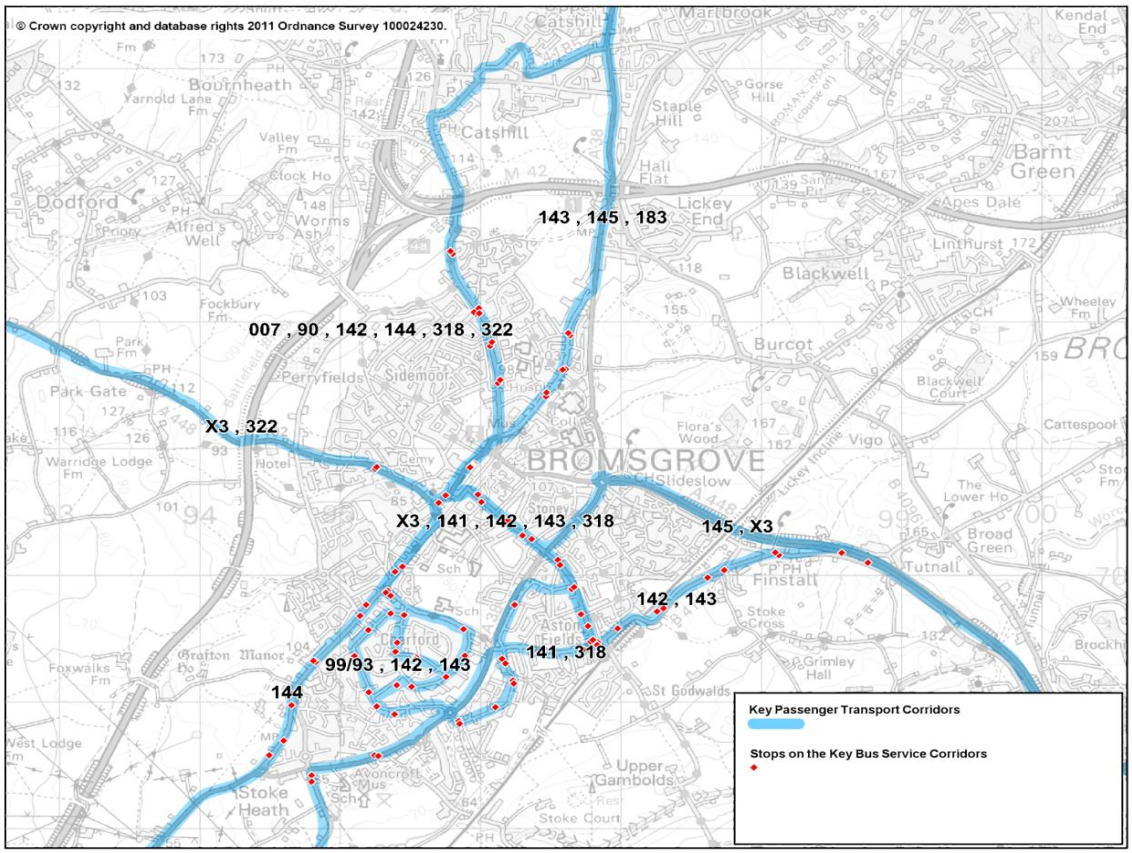
- *Stops*
    - Marked stops
    - *Unmarked stops (Hail & Ride)*
- *Bus Shelters*
    - Shelters
    - Shelters in poor condition
    - Marked Stops without shelters
- *Stop Information*
    - Stops with/without timetable information
    - Stops with/without bus stop flag
- *Bus Access to/from the Stop*
    - Parking restrictions
    - Bus cage (carriageway markings)
    - Lay-by
- *Passenger Access to/from the Stop*
    - Hard-standing
    - Raised kerbing
    - Standard kerbing (=<125mm)
    - Sub-standard low kerbing
    - Poor access to bus stop boarding/alighting point

Assessment of Key Bus Service Corridors

6.13.4 A further review has been undertaken of stops along the key bus service corridors within the BTP area, these corridors are illustrated in Figure 6.14.

Figure 6.13 – All Bus Stops within the Bromsgrove Transport Package area (143 stops reviewed)

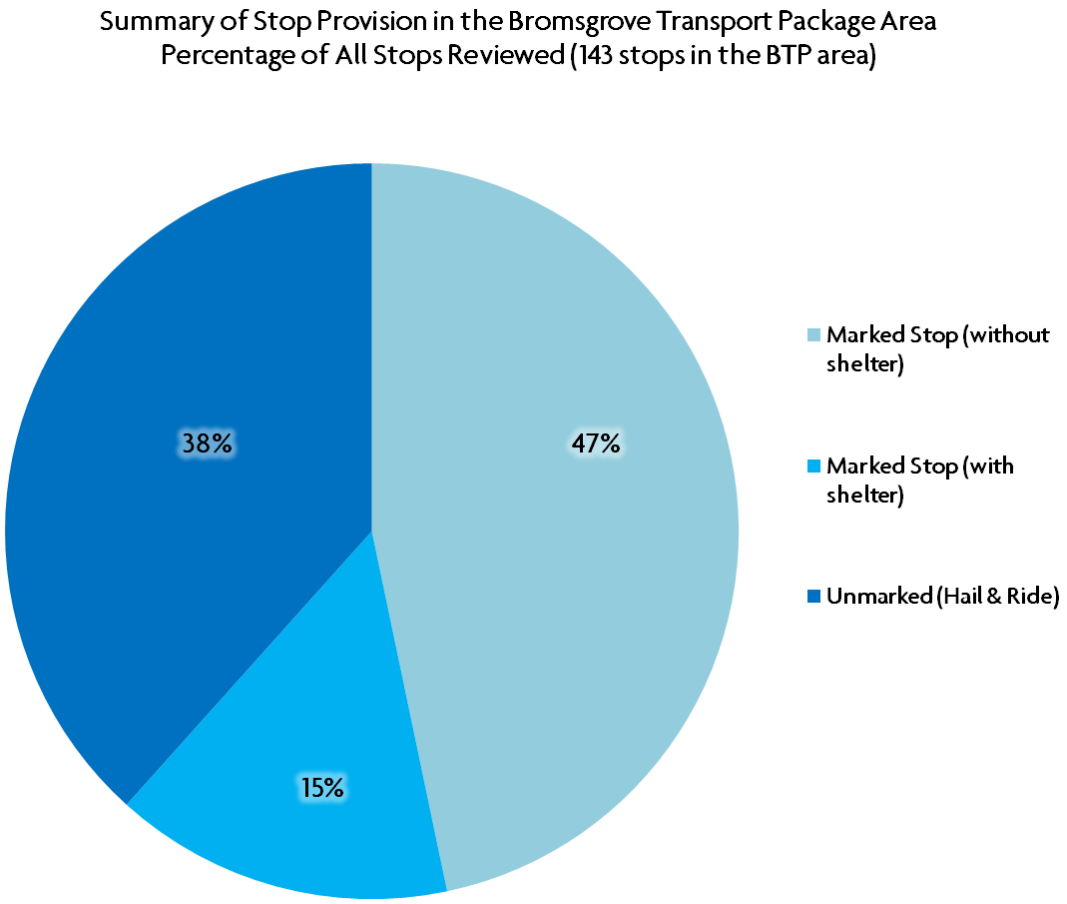
Figure 6.14 –Stops on the Key Bus Service Corridors in the Bromsgrove Transport Package Area



6.14 Bromsgrove Bus Stop Infrastructure Review

6.14.1 The findings from the review of BTP bus stop provision is summarised below.

Figure 6.15 – Stop Provision Summary - % of All Stops Reviewed (143 in the Bromsgrove Transport Package Area)



6.14.2 Figure 6.15 illustrates that half of the stops are marked but do not have a shelter, 15% of all the stops reviewed have a bus shelter (of varying quality) whilst 38% are unmarked (no sign/flag or pole) and are used primarily for Hail & Ride services. Table 6.23 shows that there are 143 stops in the Bromsgrove town area, 94 of these are on corridors served by key bus services in Bromsgrove.

Table 6.23 – Stop Summary – Worcestershire, Bromsgrove Town area and Key Services Corridors

Bus Stop Infrastructure	No of Stops	% of Total
Bus stops in Worcestershire (marked/unmarked)	3234	100%
Bus stops in Bromsgrove Town Area	143	4% (of Worcestershire)
Bus stops on Key Services Corridor (in Bromsgrove town area)	94	66% (of Bromsgrove town stops)

6.14.3 Table 6.23 is a profile of stop features at all stops in the BTP area and those along key bus service corridors. Figure 6.14 illustrates the locations of marked stops with/without a shelter and unmarked (hail and ride) stops. A discussion of the findings of the review, a discussion of the findings is provided below.

Table 6.24 – Bromsgrove Transport Package Area Bus Stop Review Summary

Bus Stop Infrastructure	No of Stops In Bromsgrove town are	% of Total Stops in Bromsgrove town area	No of stops on Key Service Corridors	% of Total Stops in Bromsgrove town area
Bus stops in Worcestershire (marked/unmarked)	3234	100%	3234	100%
Bus stops in Bromsgrove Town Area	143	4%	143	4%
Bus stops on Key Services Corridor	94	66%	94	66%
Stops				
Marked stops	88	62%	81	92%
Unmarked stops (Hail & Ride)	55	38%	13	24%
Bus Shelters				
Stops with shelters	21	15%	19	90%
Shelters in poor condition	6	4%	4	67%
Marked Stops without shelters	67	47%	62	93%
Stop Information				
Stops with timetable information	27	19%	16	59%
Stops without timetable information	116	81%	78	67%
Stops with bus stop flag	88	62%	81	92%
Stops without bus stop flag	55	38%	13	24%
Bus Access to/from the Stop				
Stops with no parking restrictions	78	55%	72	92%
Stops with bus cage (carriageway markings)	13	9%	7	54%
Stops with no bus cage	130	91%	74	57%
Stops with lay-by	11	8%	11	100%
Passenger Access to/from the Stop				
Stops with no hard-standing	7	5%	6	86%
Stops with raised kerbing	0	0%	0	0%
Stops with standard kerbing (=<125mm)	133	93%	87	65%
Stops with sub-standard low kerbing	10	7%	7	70%
Poor access to bus stop boarding/alighting point	28	20%	18	64%

Stops

6.14.4 62% of the stops in the BTP area are marked and 92% of these are on the key bus service corridors. 38% of all stops are Hail and Ride (unmarked), 24% of which are on the key bus service corridors.

Bus Shelters

6.14.5 15% of all stops in the stops in the BTP area have shelters, 90% of these are on the key bus service corridors, of which 67% of shelters are in poor condition are on these corridors.

Bus Access to/from the Stop

6.14.6 The provision of parking restrictions and facilities which improve the operation of bus services is limited within the BTP area; 55% of all stops have no parking restrictions whilst 91% of all stops have no bus cage.

6.14.7 The stops with parking restrictions and bus access facilities are predominantly located along the key service corridors; 100% of stops with lay-bys and 54% of stops with a bus cage are along these corridors.

6.14.8 None of the bus stops in the BTP area have bus boarder facilities.

Pedestrian Access to/from the Stop

6.14.9 No bus stops within the BTP area have the provision of raised kerbing, whilst a significant number of the stops (28 across the BTP area) have poor access to the boarding/alighting point at stops.

6.14.10 The majority of stops without hard-standing (86%) and stops with poor and sub-standard kerbing are located along the key bus service corridors.

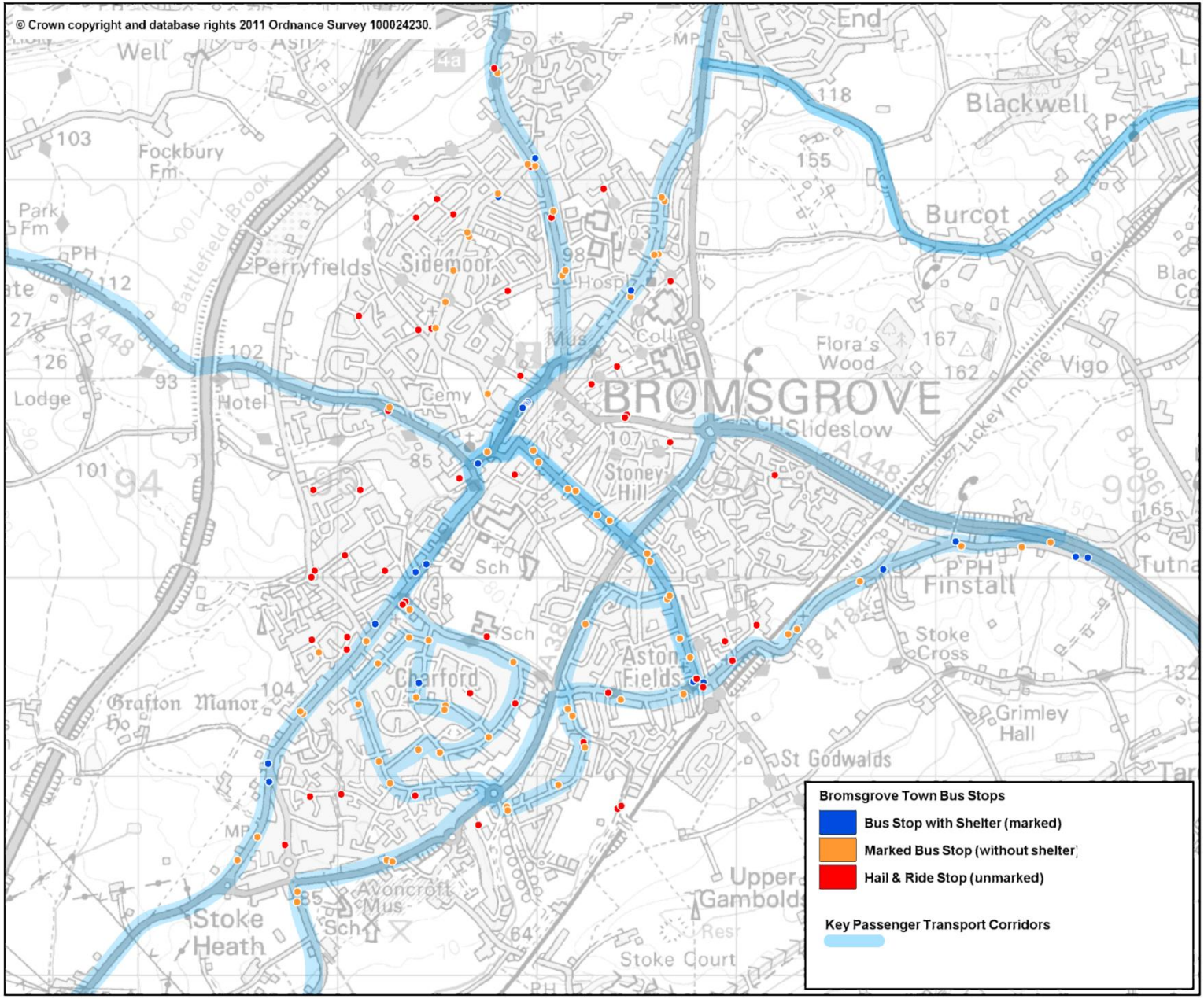
Location of Bus Shelters, Marked and Unmarked (Hail & Ride) Stops

6.14.11 Figure 6.16 illustrates that the majority of the marked stops (with or without a shelter) are located along the key bus service corridors (blue and green on the plot); they are also in residential areas with the highest levels of bus usage for journeys to work in the BTP area (see Figure A1, Appendix A).

6.14.12 The bus stops with shelters (blue) are located on the key bus routes (144, 142/3. 145, X3, 93 and 99 services).

6.14.13 Hail & Ride stops in the BTP area are located in residential areas which are not along the key service corridors; they are not served by high frequency or inter-urban services.

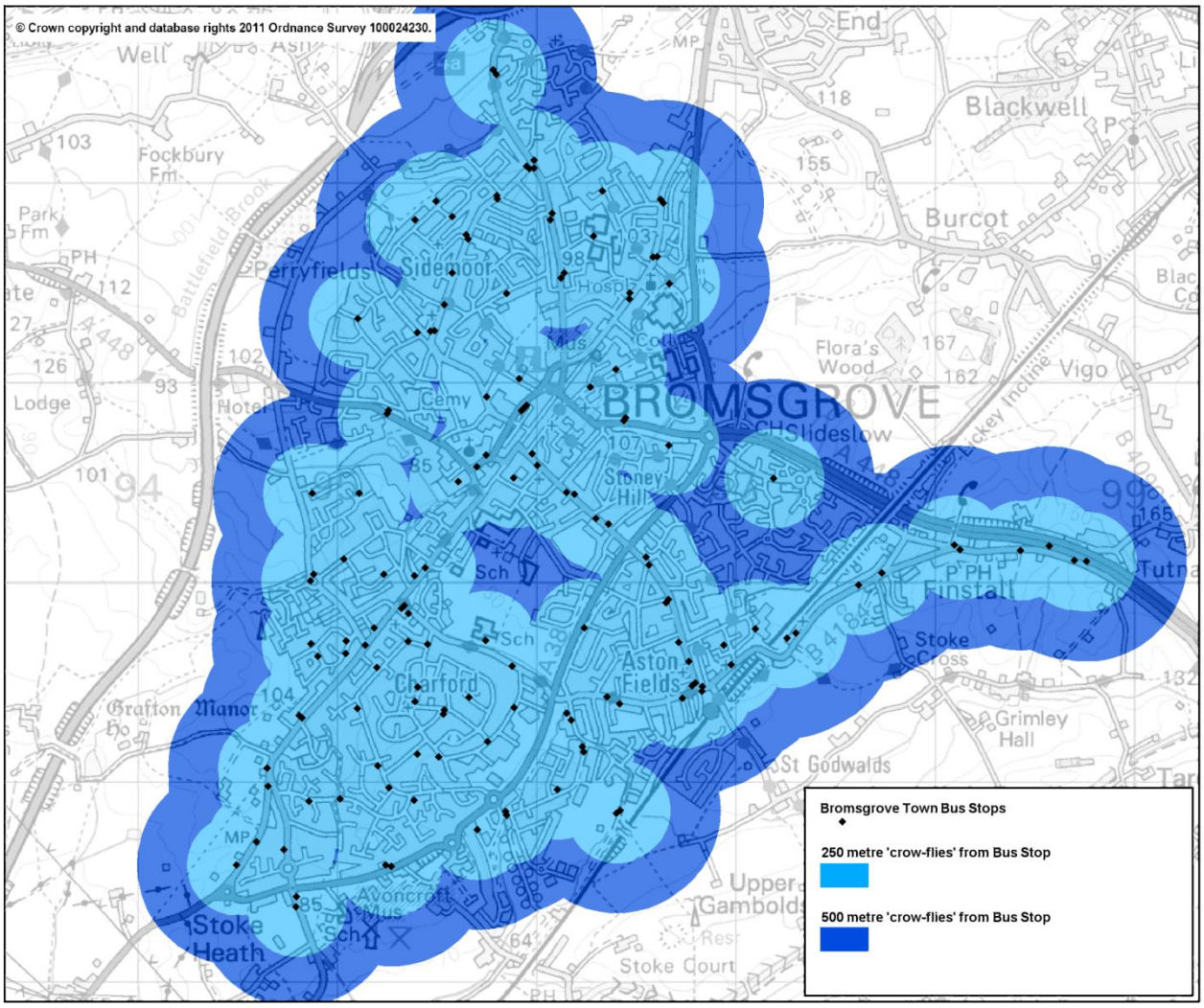
Figure 6.16 – Stops with Shelters, without Shelters and Unmarked (Hail and Ride) in the Bromsgrove Transport Package Area



6.15 Bromsgrove Catchment Analysis

6.15.1 The 250 and 500 metre 'crow-flies' walk distance from stops are illustrated in Figure 6.17, the demographic data for population within these walk distances is provided in Table 6.25.

Figure 6.17 – 'Crow-Flies' Walk-Distance from Bromsgrove Town Stops



6.15.2 Figure 6.17 illustrates that the majority of the Bromsgrove Town area is within 500 metres; crow-flies' walk distance of a bus stop, and that a significant proportion of the town is within 250 metres of a bus stop in the town. The population data presented in Table 6.25 highlights that a significant proportion of the Bromsgrove population is within 500 metres walk-distance of a stop (marked and unmarked):

- *69% of population and 70% of households are within 500 metres of a scheduled bus stop*
- *High percentages of economically active, employee, and unemployed population (70% plus) are located within 500 metres of a scheduled bus stop*
- *77% of economically active residents use the train as the main mode of travel to work*
- *64% of economically active residents use the bus as the main mode for travel to work*
- *A high number of people who walk and cycle to work*
- *Higher percentage of households with low car ownership (no car/one car per household) are within the bus stop catchment*

Table 6.25 – Population with 250 and 500 metres of a Bus Stop in Bromsgrove – Comparison (percentage and actual) against Bromsgrove Transport Package Area Demographic Data

Demographic Category	People within Walk-Distance	BTP Area (People)	Percentage of Bromsgrove Transport Package Area Total
	0-500 metres		0-500 metres
Population	34,004	49,191	69%
Households	14,151	20,343	70%
Age			
Total Aged 0-15	6,546	9,417	70%
Total Aged 16-19	1,888	2,678	71%
Total Aged 20-24	1,649	2,298	72%
Total Aged 25-44	9,347	13,017	72%
Total Aged 45-64	8,458	12,712	67%
Total Aged 65	6,116	9,069	67%
Economic Activity			
Economically Active	18,512	26,488	70%
Employee	15,982	22,733	70%
Self Employed	1,201	1,939	62%
Unemployed	739	978	76%
Full Time Student	590	838	70%
Economically Inactive	5,814	8,824	66%
Retired	2,700	4,317	63%
Other Inactive	3,114	4,507	69%
Main Mode of Travel to Work			
Work mainly at or from home	1,401	2,129	66%
Train	580	752	77%
Bus, minibus or coach	279	433	64%
Taxi or minicab	72	94	77%
Driving a car or van	12,104	17,718	68%
Passenger in a car or van	1,247	1,784	70%
Car (driver and/or passenger)	13,351	19,502	68%
Motorcycle, scooter or moped	206	267	77%
Bicycle	343	451	76%
On foot	1,477	1,790	83%
Car Ownership			
No car or van in household	1,980	2,526	78%
1 car/van in household	5,401	7,528	72%
2 cars/vans in household	5,577	8,295	67%
3 cars/vans in household	931	1,532	61%
4 or more cars/vans in household	266	469	57%

Source: Worcestershire County Council ACORN Database, 2011

6.15.3 The data indicates that the majority of the population is served by a bus stop (marked/unmarked), however it is understood that the key influence on access to stops is the provision of services. For example, 36% of people who use the bus as main mode of travel to work are not within 500 metres of a stop, so they are likely to walk further to access a service of a higher frequency or which is more direct.

6.16 Conclusions on the Performance of the Bromsgrove Passenger Transport Network

6.16.1 The evidence presented in the preceding sections demonstrates that the passenger transport network (bus and rail) performs a critical function in providing access to economic opportunities for residents and businesses of the Bromsgrove Package area whilst benefiting the environment.

6.16.2 The evidence also highlights that the performance of the passenger transport network is currently being undermined due to a range of issues on the transport network in and around Bromsgrove. It is expected that the passenger transport network will be further undermined in the future if the issues are not addressed. The network issues highlighted in the analysis are:

- *High walk, wait and interchange times from some areas of Bromsgrove due to operating frequency and routing of services*
- *Punctuality issues on important inter-urban and local services*
- *Delays to passenger transport services due to congestion on the local and strategic highway network*
- *Delays on services due to limited infrastructure provision for passengers and bus operation*
- *Poor service information provision across the Bromsgrove area*

6.16.3 These issues need to be addressed in order to prevent further deterioration in the performance of the passenger transport network which would result in:

- *Reduced passenger demand and risk to existing passenger base*
- *Reduced passenger satisfaction, confidence and long term modal choice*
- *Increased operating costs resulting in fare increases*
- *Reduced access for residents and businesses to key regional economic opportunities*
- *Negative impact on the environment*

6.16.4 It is expected that the not addressing these issues will result in increased traffic flows and the inefficient operation of the transport network in Bromsgrove, which will undermine economic and environmental objectives for the area.

Improving the Performance of the Bromsgrove Passenger Transport Network

6.16.5 In order to address the issues highlighted above it is suggested that a range of measures are considered to enhance the performance of the passenger transport network in Bromsgrove and maximise the efficiency of the transport network (including the local and strategic highway network).

6.16.6 The following measures would improve the performance of the passenger transport network for existing and future bus and rail services within the Bromsgrove Package area:

- *Provision of passenger transport infrastructure:*
    - Proposals to provide a new railway station with multimodal interchange facilities in Bromsgrove, with associated infrastructure and service enhancements
    - Provision of high quality bus stop infrastructure on key corridors, with the inclusion of Real Time Information and high quality facilities which reduce perceived and actual wait time
    - Provision of high quality bus stop infrastructure which improves pedestrian access for boarding and alighting services and improves bus access to/from stops in order to maintain reliability of services by reducing stop dwell and traffic re-join times
- *Operation of passenger transport services:*
    - Direct and frequent services linking key parts of the BTP area to Bromsgrove town centre (bus station) and the railway (current and proposed) in order to reduce interchange time.
    - The provision of high quality walk and cycle links to key passenger transport corridors within the BTP area, and the provision of high quality access to stops for pedestrians (includes boarding/alighting facilities) in order to reduce perceived and actual walk time to access services
    - Development of integrated ticketing which reduces boarding and stop-dwell and interchanges times improving the reliability and attractiveness of passenger transport services in the BTP area

6.16.7 It is considered that this range of measures will ensure that access to key local and strategic destinations by passenger transport (bus and/or rail) is an attractive mode of travel for people within the BTP area and maximise the efficiency of the transport network in the package area, and across Worcestershire.

7. Walking and Cycling Network Performance

KEY FACTS – Walking and Cycling Network Performance

- ***The main transport corridors in Bromsgrove cause significant severance, which adversely affects the attractiveness of walking and cycling*** *– Ageing and poor quality infrastructure along the main routes limits crossing and access opportunities, which causes journey time delay.*
- ***High traffic flows on the key urban corridors (particularly in the Town Centre) make the local environment unattractive for walking and cycling in Bromsgrove –*** *high traffic volumes result in increased traffic noise and deteriorated air quality along Bromsgrove's main transport corridors.*
- ***The quality of walking and cycling infrastructure is poor –*** *in particular, walking and cycling networks are fragmented, poorly defined and do not effectively link key trip attractors to key trip generators, such as the town centre and the railway station.*

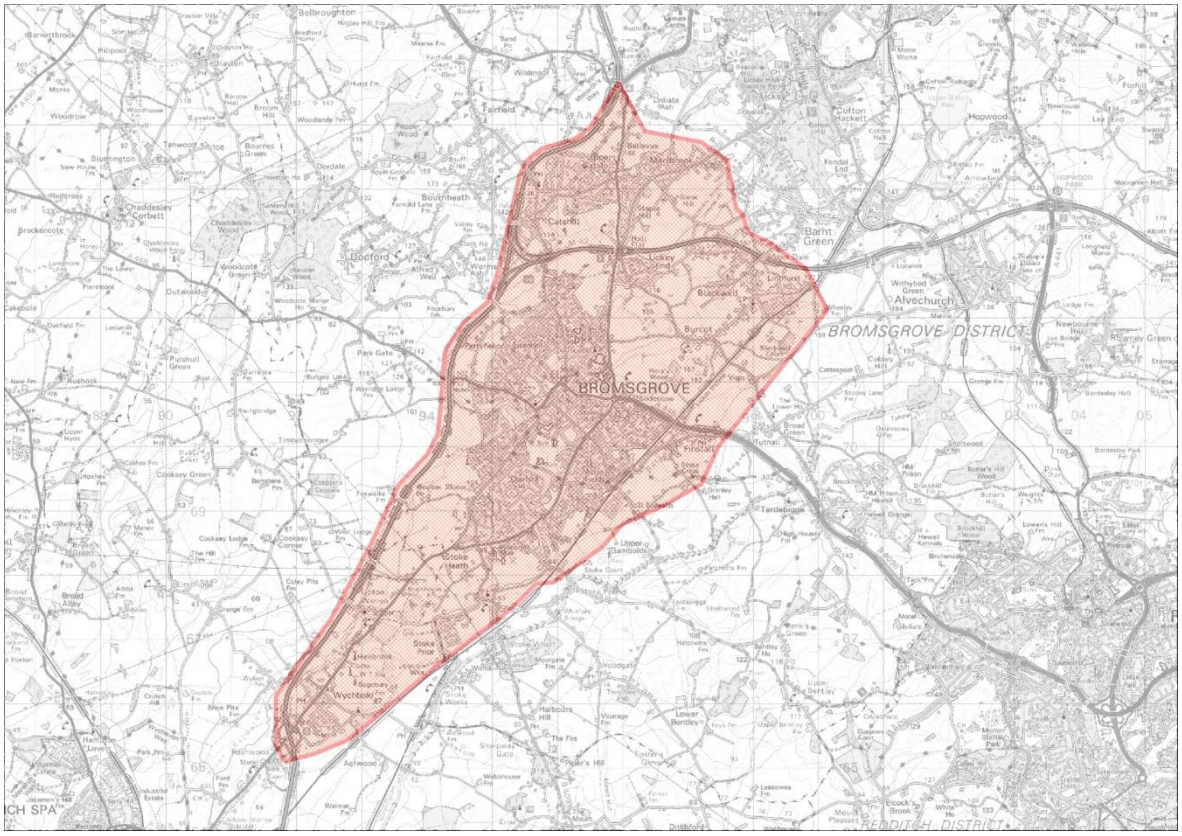
7.1 Introduction

7.2 This report discusses the outputs of the accessibility analysis of the Bromsgrove Transport Package (BTP) area illustrated in Figure 7.1 below. The report analyses access to key services and facilities by walking and cycling.

7.3 This report will form part of the evidence base for developing the Local Transport Plan 3 Bromsgrove Package. The evidence presented within this report identifies the accessibility problems and issues which adversely impact on Bromsgrove residents and businesses.

7.4 Measures developed in the subsequent phases of package development will be tested in terms of accessibility to determine their impact on the accessibility issues highlighted in this report.

Figure 7.1 – The Bromsgrove Transport Package (BTP) Area



7.5 Current accessibility within the Bromsgrove Transport Package area has been assessed in order to determine:

- *Walk and cycle links to access to key services and facilities;*
- *The potential for walking and cycling journeys to access key services and facilities.*

7.6 The analysis of accessibility by walk and cycle has been undertaken using the Worcestershire Accession model, Geographical Information Systems (GIS) and Excel.

7.7 An assessment of accessibility of future growth points (Bromsgrove Draft Core Strategy) has previously been undertaken and is discussed within the Bromsgrove Transport Package Evidence Base Report. The full analysis is provided as an appendix to that report.

7.8 Methodology

7.8.1 This assessment was undertaken using the Worcestershire Accession model, which is maintained within the Transport Policy and Strategy Team. Further analysis of the model outputs has been completed using GIS and Excel.

7.8.2 The model measures journey times by walk and cycle between specified origins within the BTP area and destinations within Bromsgrove. The model also takes account of local conditions on the walk and cycle network, such as the surface quality and severance.

7.8.3 Walk and cycle Journey times are calculated on the following basis:

- *Using the walk, cycle and road network, speeds are calculated using DfT specified speeds. Walk: 4.8 kph, Cycle: 16 kph.*

7.8.4 Local conditions such as:

- ***Walk and Cycle Link condition**: poor quality surfacing, lighting, crossing facilities, safety (perceived and actual)*
- ***Severance (A38, A448):** traffic flows, noise, air quality, safety (perceived and actual) and limited crossing facilities*

7.8.5 A Pavement Audit was conducted by the Bromsgrove Town Centre Regeneration Team, this data has been used to identify the condition of walk and cycle links, these links are illustrated in Figure 7.2. Air quality, noise and traffic flow data has been used to identify links where severance is an issue; this data is illustrated in Figure 7.3.

7.8.6 These factors act as barriers (perceived and actual) to walking and cycling in the BTP area and therefore limit the potential for people to walk and cycle for short distance trips.

Figure 7.2 – Walk and Cycle Links with Issues of Severance and Quality in the BTP Area (Source: Pavement Audits, WCC Bromsgrove Town Centre Regeneration Team)

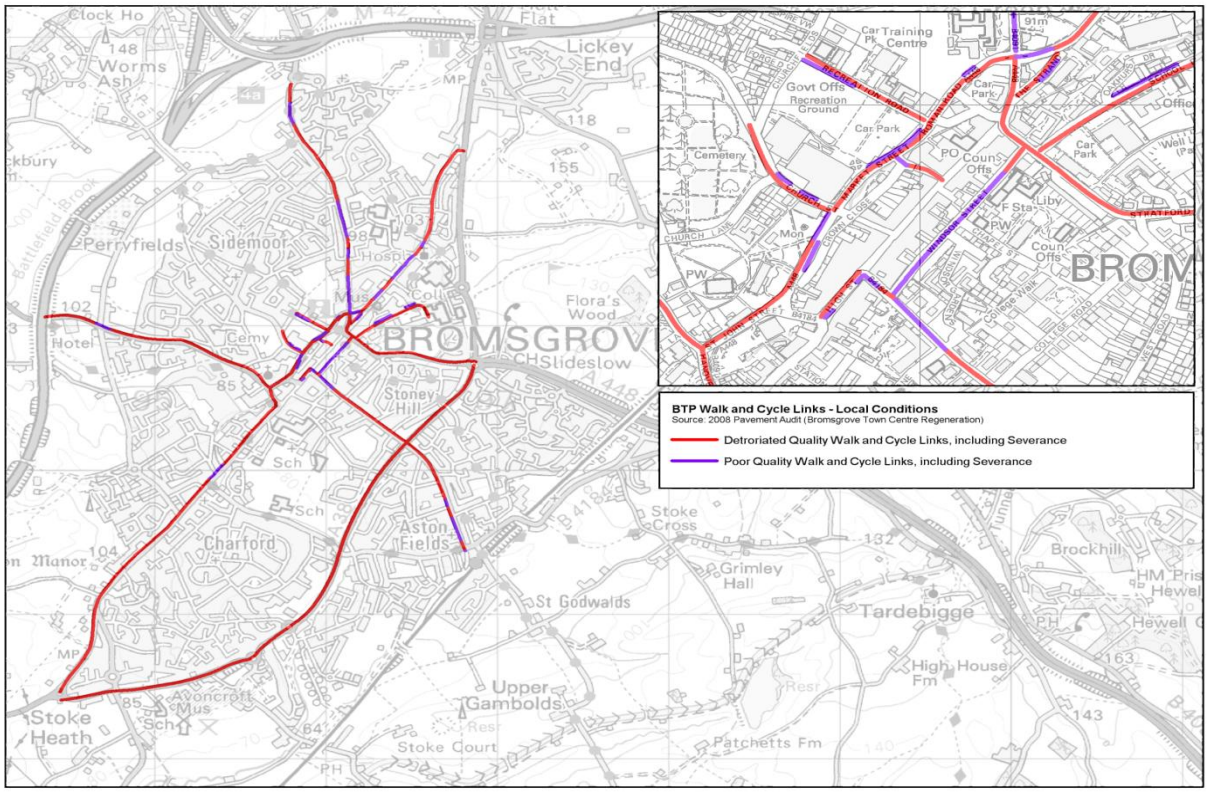
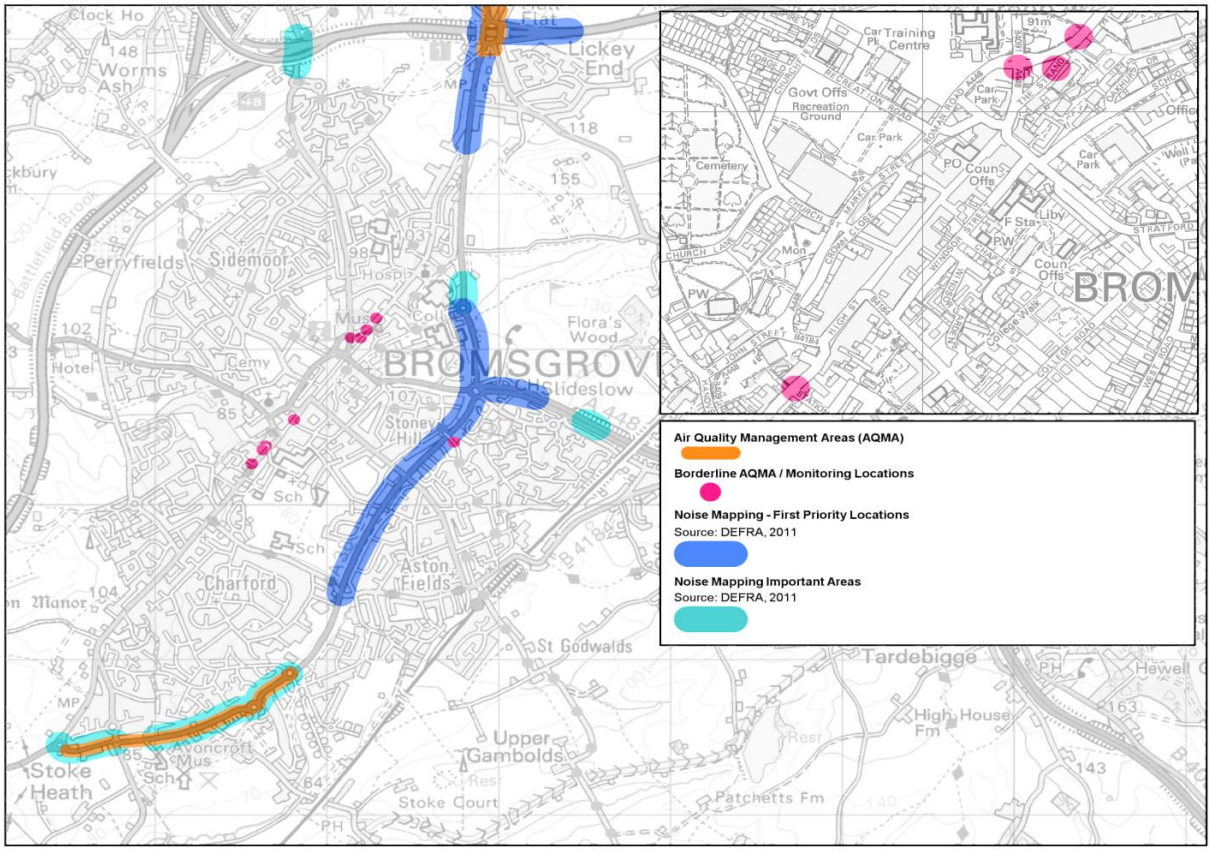


Figure 7.3 – Factors which effect Walking and Cycling: Air Quality Management Areas (AQMA) and Noise Mapping



7.9 Data Inputs and Calculation Settings for Worcestershire Accession Model

7.9.1 The Worcestershire Accession model calculates walk and cycle journey times between origin points in the BTP area and key trips attractors in the package area. The data and settings are provided in Table 7.1 below.

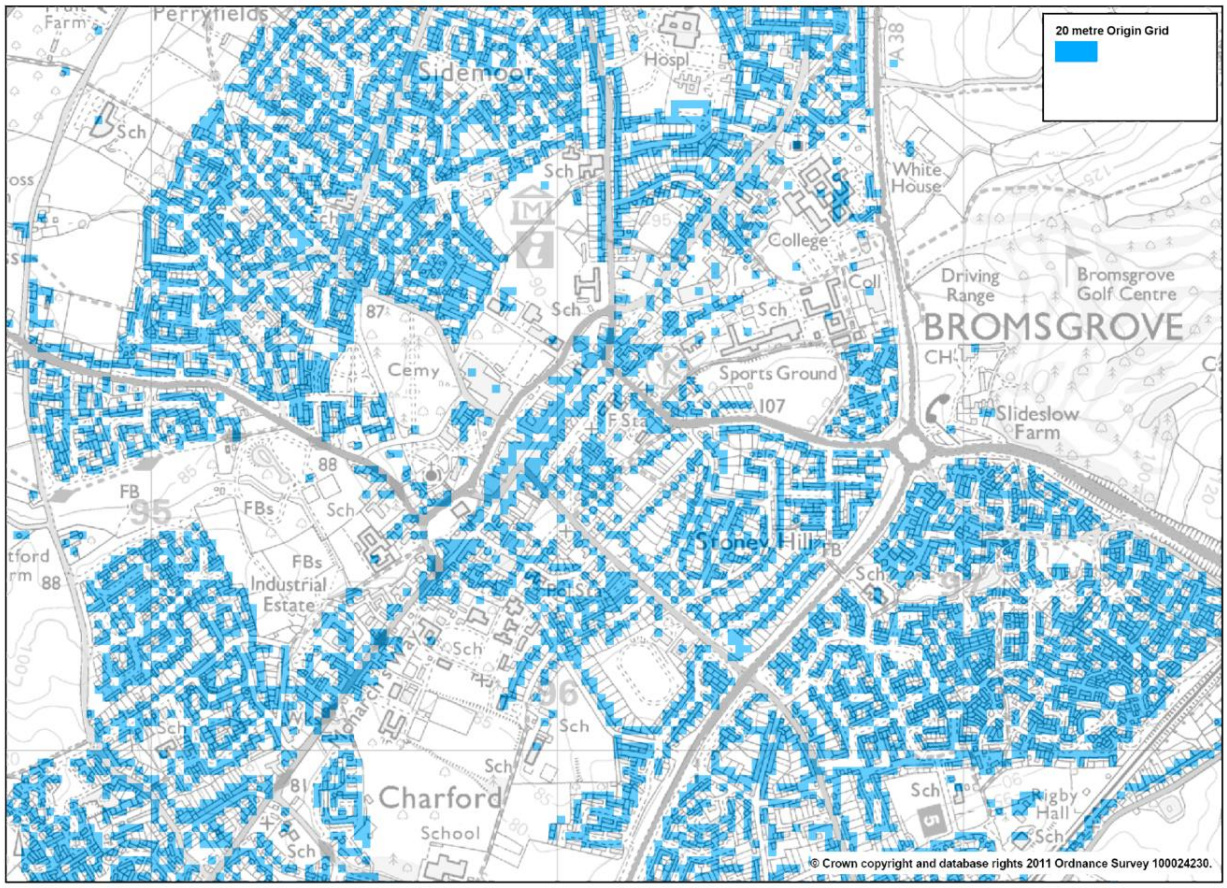
Table 7.1 – Walk and Cycle Calculation Parameters

Parameter	Setting
Road Network	Worcestershire ITN, Bromsgrove Walk and Cycle
Origin set	Bromsgrove 20 metre origin grid (see Figure 7.4)
Destination set	Local
Journey Modes	Walk, Cycle.
Average walk speed	4.8 kilometres per hour
Average cycle speed	16 kilometres per hour

7.10 Origins

7.10.1 Journey times have been calculated from a 20 metre origin grid which is representative of Addresspoint data in Worcestershire; this is illustrated in Figure 7.4 below.

Figure 7.4 – Origin Grid – Sample of the 20 metre Origin Grid for the Bromsgrove Transport Package Area



7.11 Destinations

7.11.1 Access to the following key local destinations and trip attractors in Bromsgrove has been assessed:

- *Bromsgrove Town Centre*
- *Bromsgrove Rail Station*

7.11.2 The analysis of access to these destinations by walking and cycling are presented and discussed in chapters 3, 4.

7.12 Analysis

7.12.1 The outputs from the Worcestershire Accession model have been analysed to identify walk and cycle accessibility in terms of:

- ***Journey Time*** *- Minimum, maximum, average and variance in journey times to each destination from origins in the BTP area*

7.13 Access to Bromsgrove Town Centre and High Street

7.13.1 A range of employment, leisure and retail opportunities are available in the town centre area, access to these by walking and cycling is important for residents and businesses for the following reasons:

- *Residents benefit from low-cost, convenient and active modes of travel to access important employment, retail and leisure opportunities*
- *Retail businesses benefit from improved footfall and frequency of trips whilst employers benefit from an active and wider spectrum of workforce and an improved business environment*

7.13.2 Walking and cycling play an important role for short distance journeys within Bromsgrove therefore providing high quality walk and cycle access to the town centre and High Street area is important for maximising the efficiency of the existing transport network and enhancing the town centre environment.

7.13.3 Walk and cycle times to access Bromsgrove Town Centre and High Street from origins in the Bromsgrove town area are presented and discussed in the following figures and tables.

Walk Access

Figure 7.5 – Walk Journey Time (minutes) to Bromsgrove Town Centre and High Street from the BTP Area

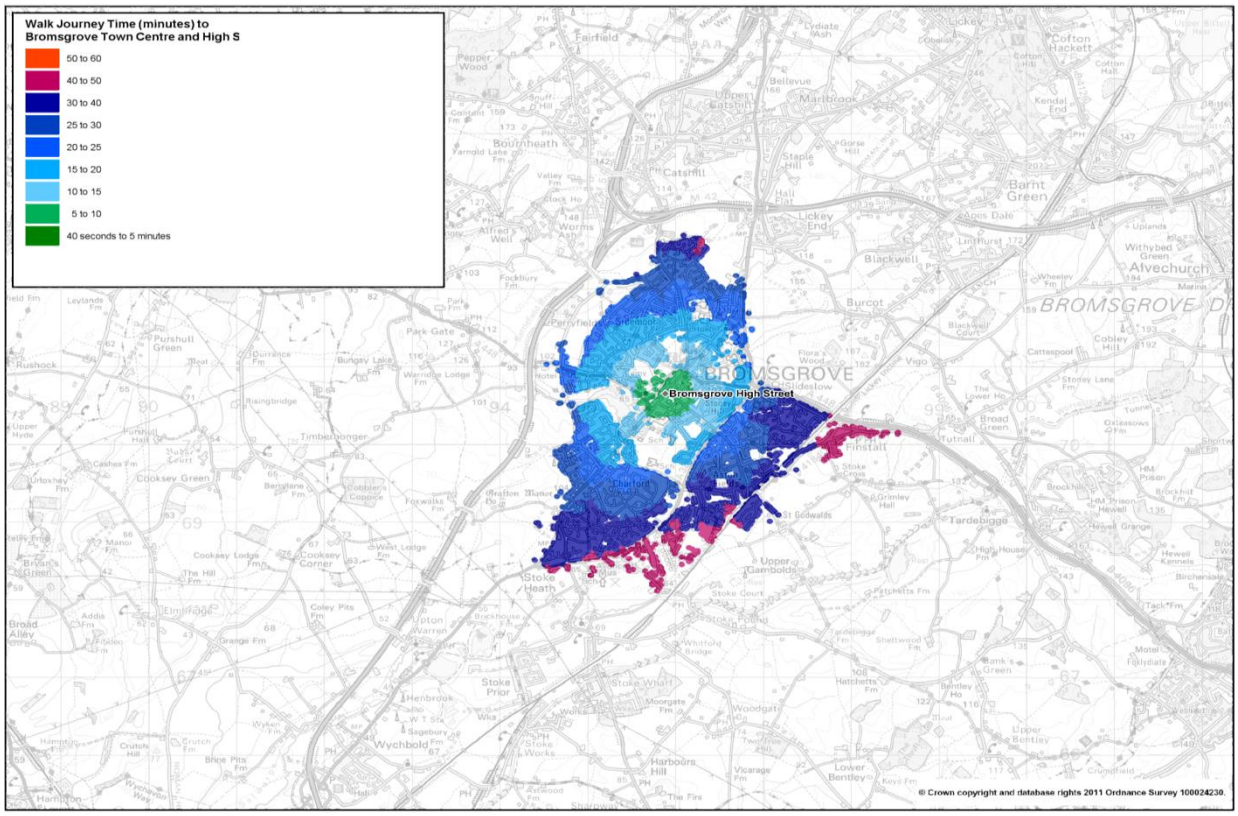


Table 7.2 – Analysis of Figure 7.5

	Issue	Discussion
Walk to Bromsgrove Town Centre and High Street	High walk journey times from The Oakalls and Aston Fields areas.	Severance effects of the A38 and limited walk links increase walk time.
	High walk times from Stoke Heath, southern Charford and Sidemoor/Perryfields areas.	Distance, severance and poor quality walk links result in higher walk times.
	Central areas of the town are within 10-15 minute walk time of the town centre and High Street.	These areas have fewer barriers (in terms of severance) to access the town centre; however poor quality walk links result in higher walk time.

Cycle Access

Figure 7.6 – Cycle Journey Time (minutes) to Bromsgrove Town Centre and High Street from the BTP Area

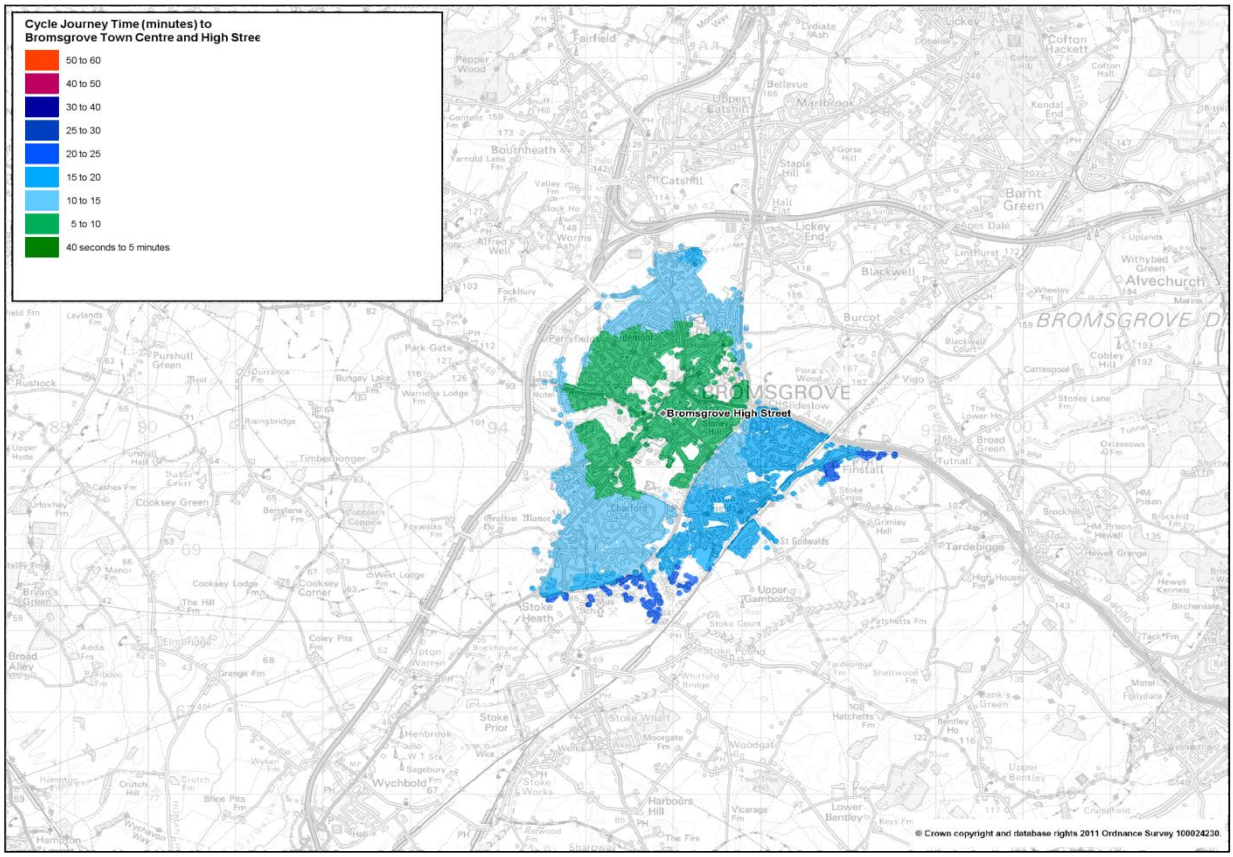


Table 7.3 – Analysis of Figure 7.5

	Issue	Discussion
Cycle to Bromsgrove Town Centre and High Street	High cycle journey times from The Oakalls, Aston Fields and Stoke Heath areas.	Severance effects of the A38 and limited cycle links increase cycle time.
	Charford, Sidemoor, Whitford and Perryfields areas are beyond 10 minutes cycle time of the town centre.	Distance, severance and poor quality cycle links result in higher cycle times.

7.13.4 The analysis highlights that there is potential for all residents of Bromsgrove to access the Town Centre and High Street by walking and cycling within 30 minutes travel time. However there are barriers to walking and cycling to the town centre:

- *Indirect routes and limited range of links to the centre from all parts of Bromsgrove;*
- *Surface quality, lighting, safety issues (perceived and actual)*
- *Severance on key highway links (A38, A448) as a result of noise, air quality and traffic flows*

7.13.5 It is important to address these issues in order to develop the attractiveness of the town centre and High Street, make it more accessible to a wider spectrum of the population and improve the town centre environment. This will make the town centre more attractive to residents and businesses in Bromsgrove.

7.14 Access to Bromsgrove Railway Station

7.14.1 A range of employment, health education, leisure and retail opportunities are accessible from Bromsgrove Railway Station, access to the station by walking and cycling is important for residents and businesses for the following reasons:

- *Residents benefit from low-cost, convenient and active modes of travel to and from the railway station and access to onward opportunities (employment, health, education, leisure and retail)*
- *Businesses benefit from low-cost, congestion free access to and from the station and for access to county, regional and national markets and opportunities (labour and business)*

7.14.2 The railway station is a key trip attractor in Bromsgrove and provides access to a range of key destinations by rail, therefore it is important to ensure it is highly accessible by all modes of transport, including walking and cycling, to provide benefits to the environment and the economy.

7.14.3 Walk and cycle times to access Bromsgrove Railway Station from origins in the Bromsgrove town area are presented and discussed in the proceeding section.

Walk Access

Figure 7.7 – Walk Journey Time (minutes) to Bromsgrove Railway Station from the BTP Area

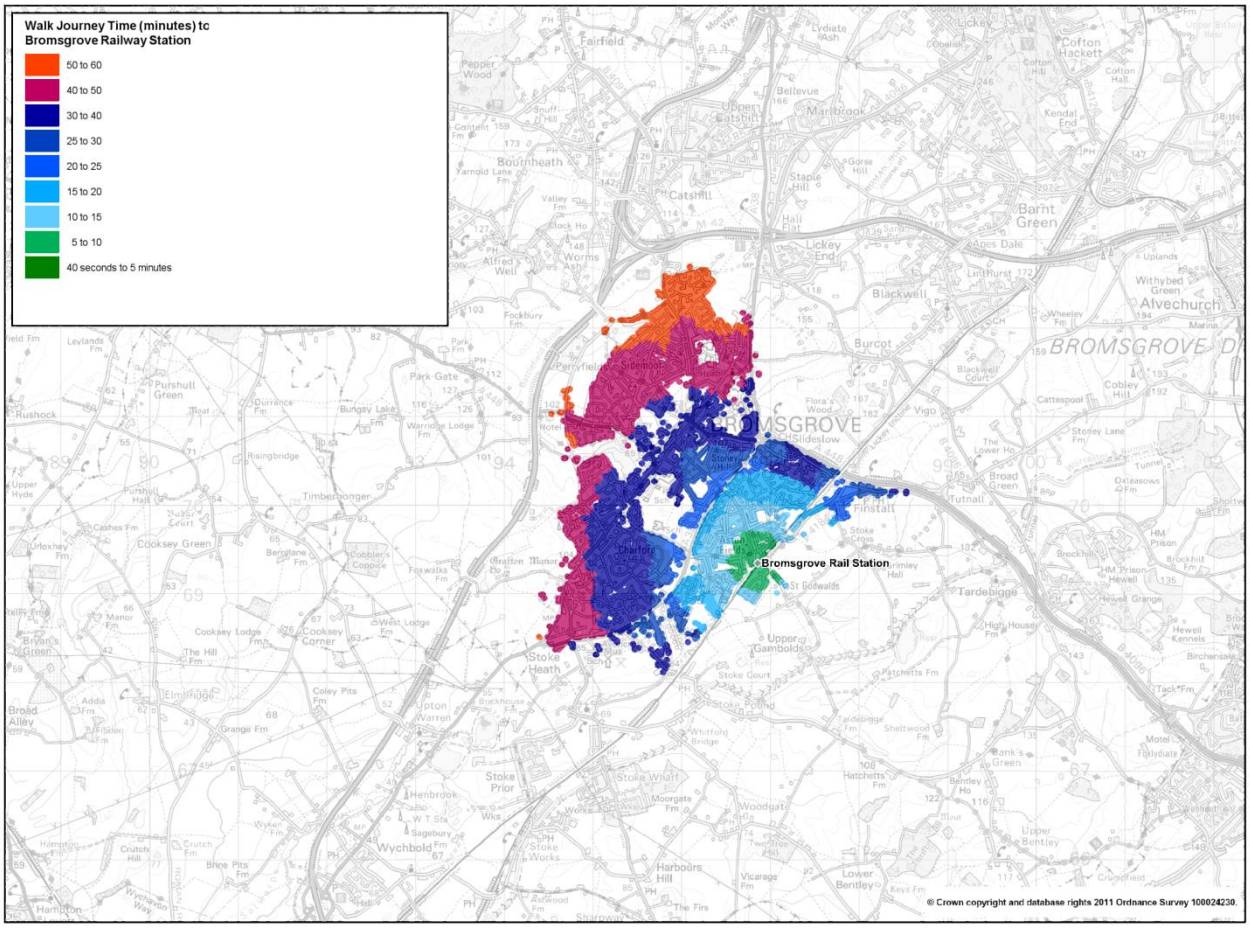


Table 7.3 – Analysis of Figure 7.7

	Issue	Discussion
Walk to Bromsgrove Railway Station	Low journey times from the Aston Fields area, higher journey times from areas to the north of the A38.	The A38 is a barrier to walk journeys from northern areas of the town to the railway station, whilst areas to the south of the A38 benefit from lower walk times.
	High journey times from parts of The Oakalls area considering its proximity to the station.	Poor provision of walk links from this residential area to the station means that pedestrians cannot take direct routes to the station.
	High journey times from Whitford, Sidemoor and Stoke Heath areas.	

Cycle Access

Figure 7.8 – Cycle Journey Time (minutes) to Bromsgrove Railway Station from the BTP Area

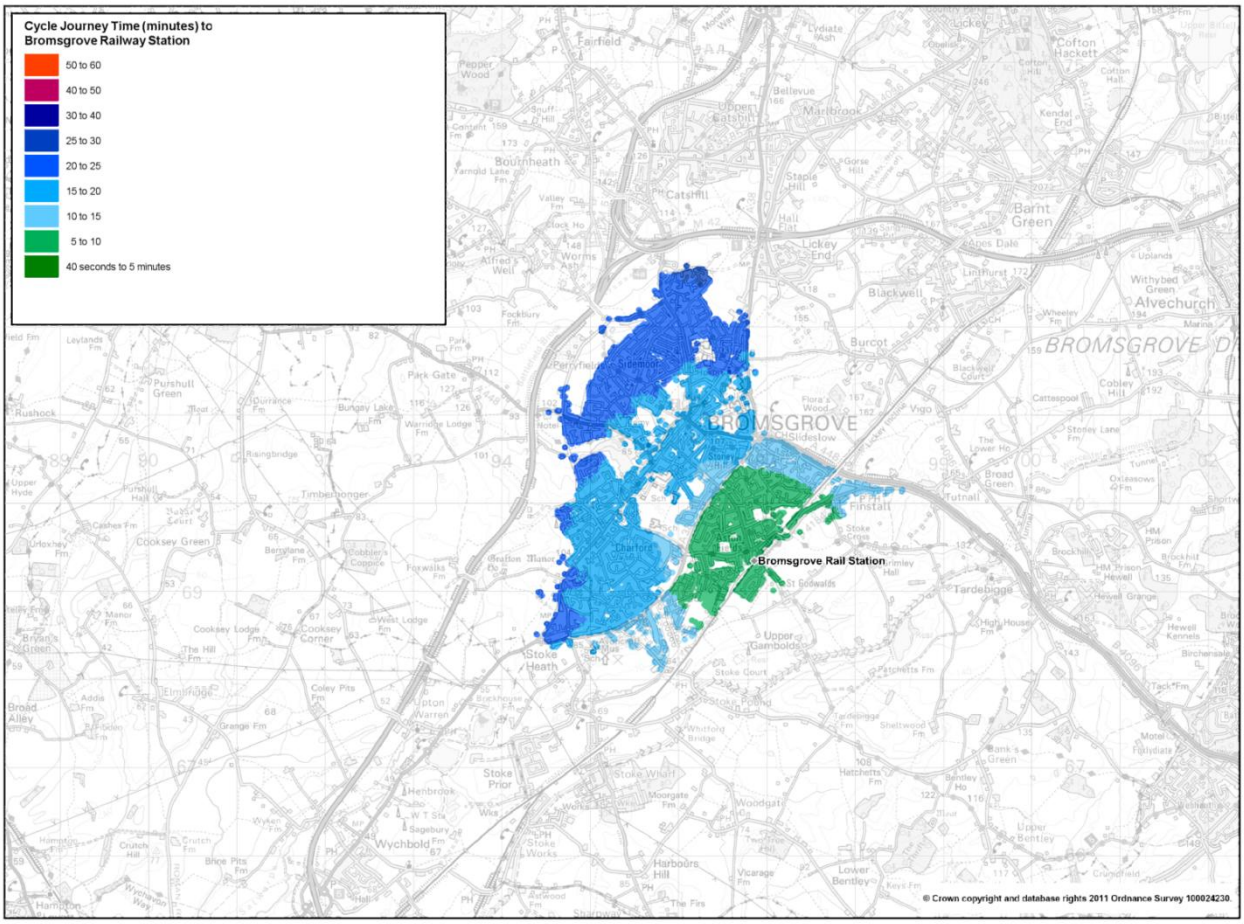


Table 7.3 – Analysis of Figure 7.8

	Issue	Discussion
Cycle to Bromsgrove Railway Station	High cycle journey times from The Oakalls considering it's proximity to the station.	Poor provision of direct cycle links between this area and the station means that cycle journey times are higher.
	Areas to the north of the A38 have higher cycle journey times.	The severance effect of the A38 due to traffic flows, noise, air quality, poor crossing facilities, and perceived and actual safety issues result in higher cycle journey times from these areas to the station.
	15-20 minute cycle journey time between the town centre and the railway station.	The A38 and the poor quality of cycle links are barriers to accessing the station from the town centre, resulting in higher cycle times than would be expected.

7.14.4 The analysis of access to Bromsgrove Railway Station indicates that there are barriers to accessing the station by walking and cycling from significant parts of Bromsgrove. These barriers are:

- *Limited provision of walk and cycle links between residential areas and the railway station*
- *The A38 is a significant barrier to walking and cycling from the town centre to the railway station due to traffic flows, noise, air quality and safety (actual and perceived) issues*
- *Poor quality walk and cycle links, crossing facilities and issues of safety (perceived and actual)*

7.14.5 Addressing these issues is important to ensure that walk and cycle access to the railway station is maximised so that residents and businesses fully benefit from the railway station and a wide range of onward employment, health, education, retail and leisure opportunities whilst making it attractive for people visiting the town.

7.15 Conclusions on Walking and Cycling in Bromsgrove

7.15.1 Walking and cycling are key modes of transport for short distance journeys as such they play a key role in maximising the efficiency of the transport network within Bromsgrove. The size of the town means that walking and cycling is a realistic mode of travel for key trip attractors in the town. There are however a number of barriers to walking and cycling within Bromsgrove which have been identified in this report, these barriers are:

- *Severance effects of the A38 and A448 due to traffic flows, noise, air quality and safety issues (actual and perceived)*
- *Poor integration of walk and cycle links, including the permeability of residential areas (for example, The Oakalls)*
- *Limited provision of safe and attractive crossing facilities*
- *Indirect walk and cycle links to key trips attractors*
- *Link quality: surfacing, lighting and safety issues*

7.15.2 These barriers limit the potential to maximise the use of walking and cycling for short-distance journey within the town.

7.15.3 It should be noted that some parts of the Bromsgrove pavement network have been recently enhanced, and further links are expected to be enhanced as part of the Footways Enhancement Programme. This programme is funded through a £3 million capital investment from Worcestershire County Council's Integrated Transport Block allocation. This funding is being used to improve the sections of footway across the county in the poorest condition. The aim of the programme is to improve the overall quality of the wider transport asset.

7.15.4 In the 2011/2012 financial year, the following sections of footways were treated within the Bromsgrove Transport Package Area:

- *York Road, Sidemoor*
- *Melbourne Road, Sidemoor*
- *Pennine Road, Sidemoor*
- *New Road, (Outside Bromsgrove Youth Centre)*

- *Finstall Road, Finstall*
- *Austin Road, Charford*

7.15.5 A similar programme of investment is likely to be commissioned in 2012/2013. The outcomes of this analysis will be used to influence which footways are prioritised for investment.

8. Parking Supply and Demand

KEY FACTS – Parking Supply and Demand

- ***Bromsgrove currently offers very good value off-street parking.*** *As of 2010, all day parking was the cheapest in the area at only £3, and an all year permit was £300, some £200 cheaper than the nearest priced competitor.*
- ***Off-street parking capacity is currently underused.*** *There are 1,300 car parking spaces in Bromsgrove Town Centre. Collectively these car parks typically operate at only 60% capacity.*
- ***On-street parking management is set to be improved in mid 2013 with the introduction of Civil Parking Enforcement.*** *There is an appetite locally to expand the area around the town centre where on-street car parking is controlled.*
- ***Off-street car parks are in need of rationalisation,*** *to improve the business case for investment in pay-on-foot technologies, which promote longer shopping trips/enhanced local visitor economy (including evenings and weekends)*

8.1 Introduction

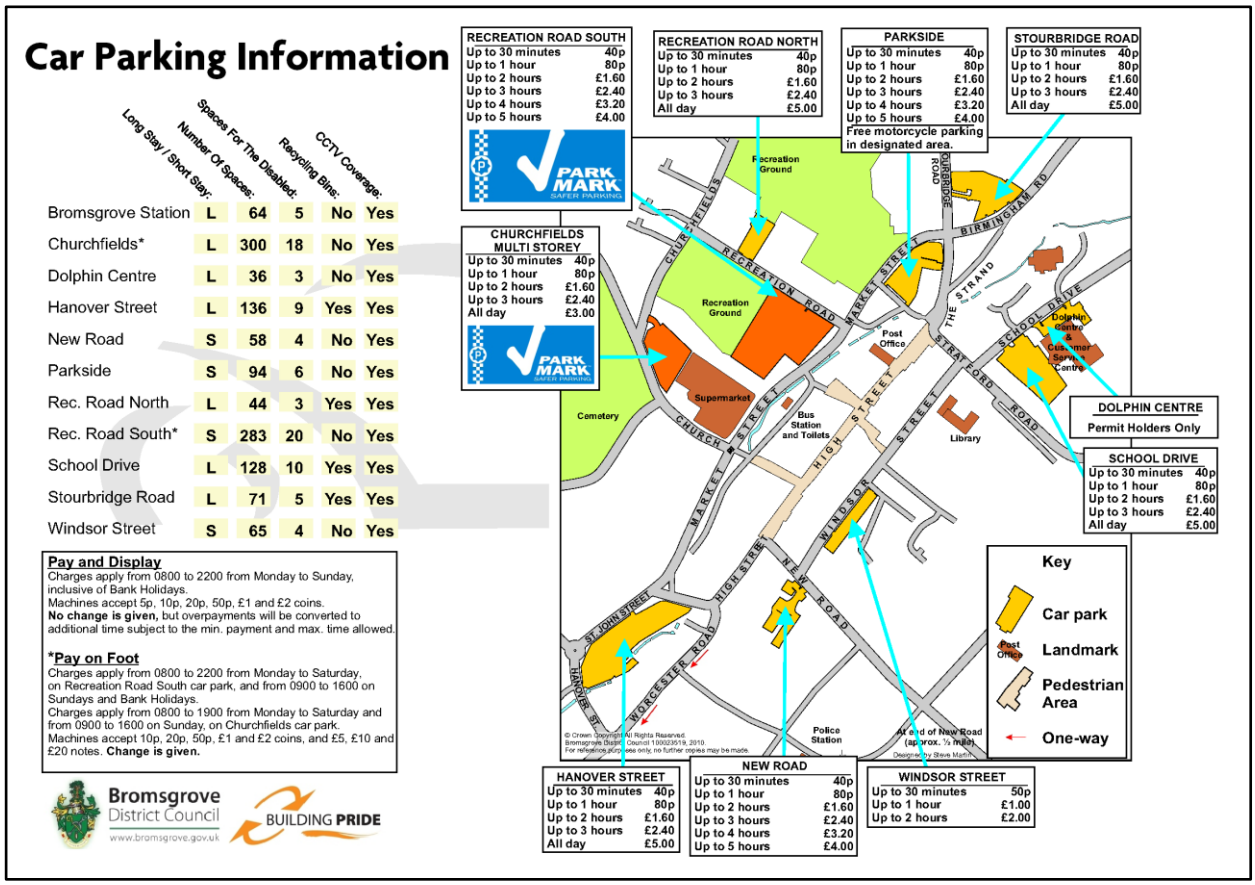
8.1.1 In July 2010, Bromsgrove District Council undertook a comprehensive Car Parking Review to review all off-street parking in the study area (with the exception of the car park at Bromsgrove Station – this will be covered separately). There are approximately 1,300 car parking spaces in Bromsgrove Town Centre, spread discordantly across 10 car parks. A plan showing the location, capacity and facilities offered at car parks in Bromsgrove Town Centre is provided below in Figure 7.1.

8.1.2 Parking fees in Bromsgrove are generally good value, with neighbouring districts often charging higher rates. See Table 8.1 below.

Table 8.1 - Bromsgrove and Neighbouring Districts - Comparison Car Parking Charges in 2010 (Cheapest rates shown in Bold)

Time Period	Bromsgrove District Council	Worcester City Council	Redditch (Kingfisher Shopping Centre)	Wychavon District Council	Wyre Forest District Council
30 minutes	**£0.40**	£0.90	£1.20	£0.70	**£0.70 / Free**
1 hour	**£0.70**	£0.90	£1.20	**£0.70**	**£0.70**
2 hours	£1.40	£1.80	£1.20	£1.40	**£1.00**
3 hours	£2.10	£2.70	£2.50	£2.10	**£1.80**
4 hours	£2.80	£3.60	**£2.50**	£2.80	£3.50
5 hours	£3.50	£5.00	**£2.50**	£4.00	£3.50
All day	**£3.00**	£6.00	£10.00	£4.00	£3.50
Permit	**£300**	£720	£600	£720	£500

Figure 8.1 - Off Street Car Parking Information (Bromsgrove District Council)



8.1.3 The best used of the car parks is Recreation Road (adjacent the ASDA supermarket) which accounts for 42% of ticket sales. Evidence suggests that Bromsgrove town centre car parks typically operate at approximately 60% capacity at peak times, suggesting that there is significant levels of underused parking capacity.

8.1.4 Bromsgrove District Council's Car Parking Review of 2011 includes a suggested future parking scenario, where New Road, Windsor Street (Existing), Parkside, Stourbridge Road and Recreation Road North **car parks are sold for redevelopment**, **with lost capacity replaced** with a sizeable new car park in Windsor Street offering both short and long-stay parking, as well as enhanced parking provision at School Drive and Hanover Street. This proposal would see the number of car parks reduced by 50%; however, this would result in a net increase in car parking capacity in Bromsgrove Town Centre.

8.2 Civil Parking Enforcement

8.2.1 An agreement between the two councils resulted in the transfer of resources from Bromsgrove District Council to Wychavon District Council in January 2012. This agreement includes provision for the implementation of Civil Parking Enforcement, which is currently programmed for implementation in mid-2013.

8.3 On-Street Parking

8.3.1 The majority of the town centre streets are regulated with traffic management orders to control parking in this area. Bromsgrove District Council's Car Parking Review of 2011 suggests the potential expansion of controlled parking to an approximate 500 metre radius of the town centre. It is expected that this will be pursued as part of the implementation of Civil Parking Enforcement in mid-2013. Under these proposals, Bromsgrove District Council have expressed a desire that any charging mechanism implemented for on-street parking charges is priced such that off-street car parking becomes the more affordable (and therefore more attractive) option. There could well be benefits to traffic management and on-street servicing under this approach, however, these would need to be quantified in a robust business case to justify implementation.

9. Local Environmental Quality

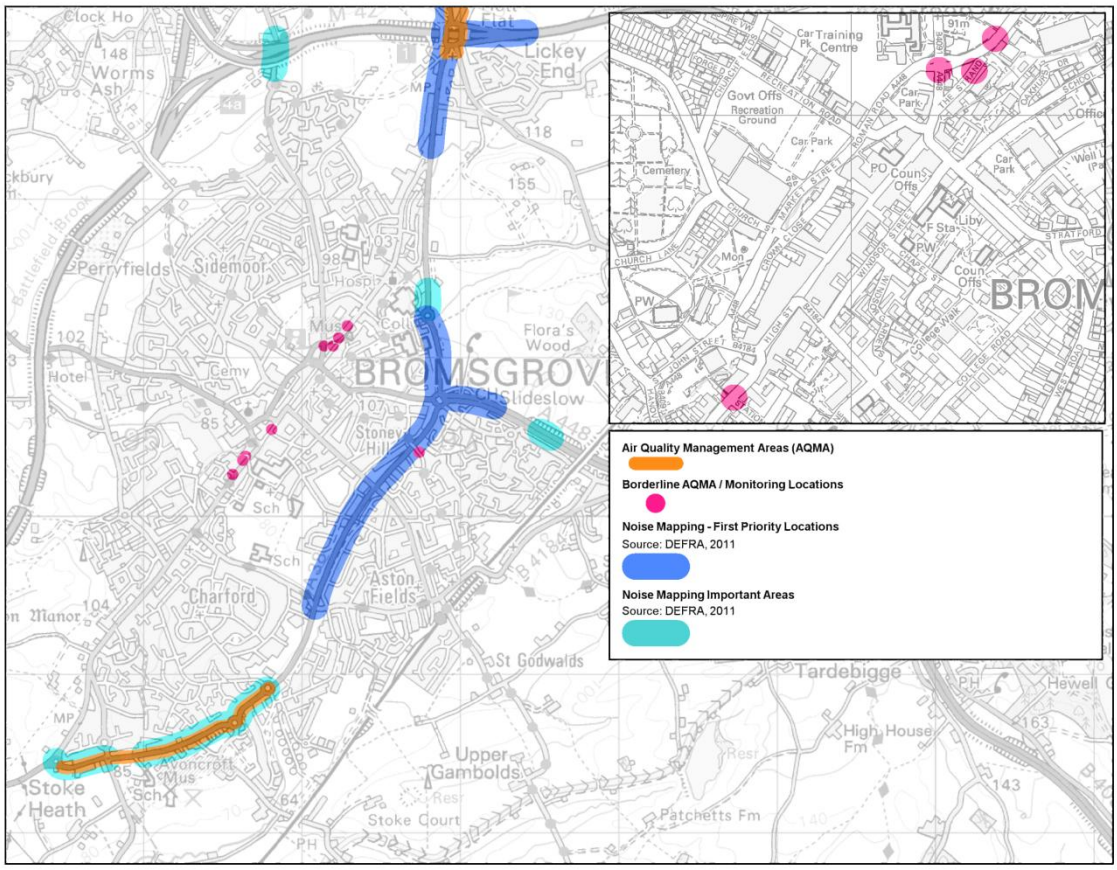
KEY FACTS – Local Environmental Quality

- ***Bromsgrove suffers from high levels of transport-related noise.*** *Noise Mapping by Defra suggests that the A38 and parts of the M42 and M5 generate significant noise as a result of the high volumes of traffic.*
- ***Air Quality in parts of the Bromsgrove Transport Package study area is poor.*** *There are two Air Quality Management Areas in the study area, and air quality in the town centre is deteriorating, all as a result of build up of vehicular emissions.*
- ***Bromsgrove is surrounded by some of the best quality farmland in Worcestershire.*** *It is also protected on all sides by the West Midlands Green Belt, which forces development restraint and limits opportunities for towns to merge.*
- ***There are no Special Areas of Conservation, Areas of Natural Beauty or National Parks within proximity of Bromsgrove.*** *However, there are known colonies of Brown Trout and Water Voles in the Spadesbourne Brook, which runs through the town centre. The habitat for these species must be maintained and enhanced.*
- ***Bromsgrove has approximately 70 listed buildings broadly located in two designated conservation areas in St Johns and the High Street.*** *It will be essential that any proposed interventions enhance the setting of these historic structures and protect them for future generations to enjoy.*

9.1 Noise

9.1.1 Defra are currently in the process of undertaking UK wide noise mapping to enable monitoring of this invisible determinant of environmental quality. Figure 9.1 shows a noise map produced through this process which identifies a couple of areas of 'noise concern'. In particular, there are a number of "First Priority" locations in the Bromsgrove Transport Package study area, principally focussed on the A38 (Bromsgrove Eastern Bypass). It is interesting to note that these areas of noise concern broadly correspond with identified Air Quality Management Areas.

Figure 9.1 - Noise Mapping and AQMA in the Bromsgrove Area



9.1.2 It is strongly suggested that, whilst no specific data currently exists, the negative impacts of noise (particularly resulting from road and rail transport) should be mitigated where possible, to avoid unnecessary deterioration in local environmental quality.

9.2 Air Quality

Introduction

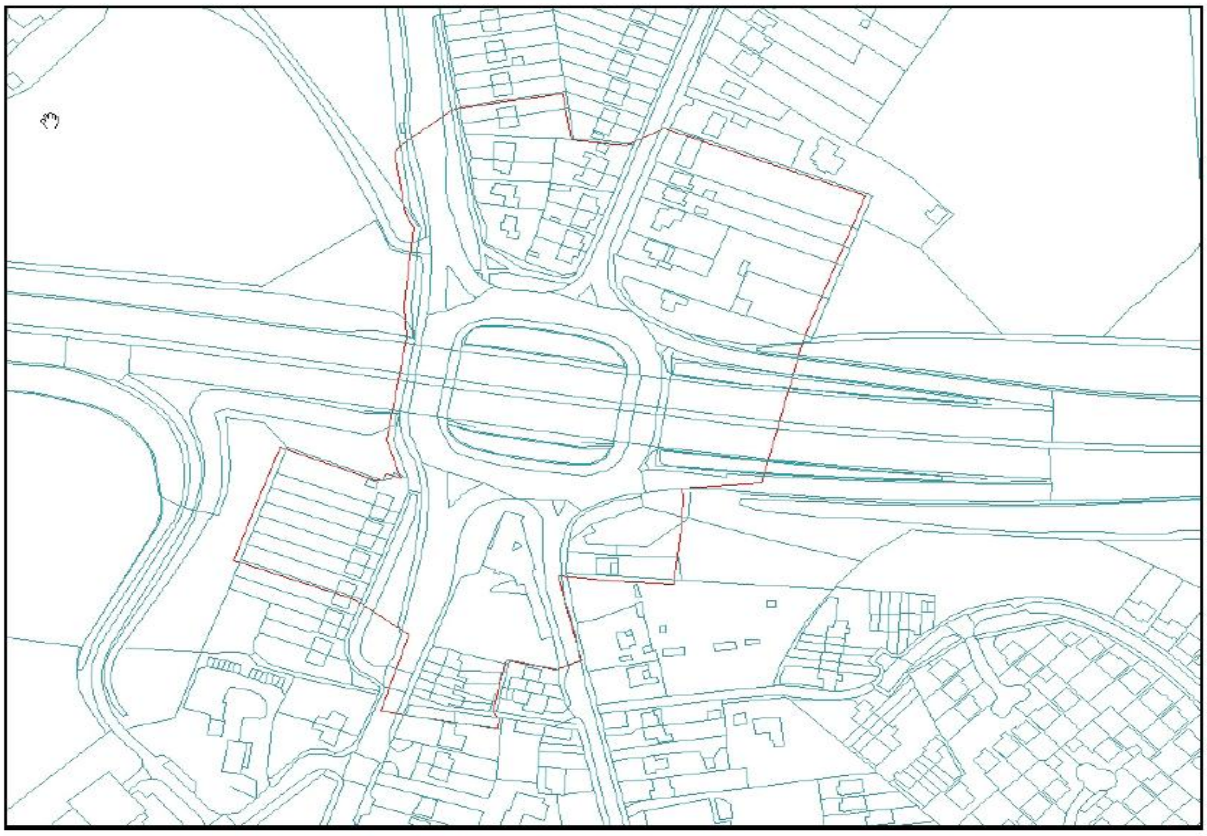
9.2.1 In the study area, responsibility for the monitoring of air quality lies with Bromsgrove District Council, which is administered locally by Worcestershire Regulatory Services. Within the study area, air quality is a specific concern. This section provides details about designated Air Quality Management Areas (AQMAs) within the Bromsgrove Transport Package study area.

9.2.2 Further information relating to the designation of Air Quality Management Areas, and the policy framework which underpins the monitoring of local air quality in Worcestershire can be viewed here: www.worcestershire.gov.uk/cms/pdf/LTP3_TAQP_PUBLIC_FINAL.pdf.

The Lickey End Air Quality Management Area

9.2.3 The **Lickey End Air Quality Management Area** was designated in 2002, and covers the area around Junction 1 of the M42. This busy junction lies at the intersection of the M42 with the A38 and the B4096. A plan of this junction is provided in Figure 9.2.

Figure 9.2 - The Lickey End AQMA



9.2.4 Although the junction only provides partial access to the M42 (access and egress slips on the eastern flanks) the A38 is designated as an alternative route if the motorway has to close, and so can become heavily congested.

9.2.5 The junction was designated as an Air Quality Management Area as a result of continuing exceedences of Nitrogen Dioxide (the mean annual average must be less than 40 $\mu g/m_3$ to avoid declaration as an Air Quality Management Area), emanating from vehicular traffic. As a rule, concentrations of transport-related Nitrogen Dioxide and particulate matter tend to occur where congestion is common, or where dissipation of emissions is reduced (in urban areas, these are known as street canyons, where buildings form a continuous line either side of the street, preventing gas dissipation.) In the case of Lickey End, this is caused by a mix of the two: the M42 runs in a cutting under the junction with masonry walls either side, forming a street canyon, and the junction above and associated slip roads are regularly congested at peak times

The Stoke Heath Air Quality Management Area

9.2.6 The **Stoke Heath Air Quality Management Area** was designated on 17th February 2010, and covers the section of the A38 in Bromsgrove known as Redditch Road. A plan of this junction is provided in Figure 9.3.

9.2.7 Similar to the Lickey End Air Quality Management Area, the A38 at Stoke Heath is designated as an alternative route if the motorway closes, and so can become heavily congested.

9.2.8 The Stoke Heath Air Quality Management Area was designated as a result of continuing exceedences of Nitrogen Dioxide caused by congestion along this route (particularly at peak times). Despite this, development along the route provides a number of significant undeveloped 'gaps' to permit gas dispersal.

Figure 9.3 - The Stoke Heath AQMA

Borderline Air Quality Management Areas in Bromsgrove

9.2.9 In addition to the two designated Air Quality Management Areas, there are two areas which have been identified in previous analysis as being locations where air quality is deteriorating to a point where Air Quality Management Areas in Bromsgrove Town Centre:

- *Borderline AQMA at Worcester Road (south of High Street)*
- *Borderline AQMA at Birmingham Road (from Strand to Davenal House)*

The Worcester Road Area

9.2.10 The Worcester Road Area was identified as having borderline air quality issues in the Progress Report 2010, which was produced for Bromsgrove District Council by Air Quality Consultants Ltd. This report identified that the mean annual average of Nitrogen Dioxide had been exceeded in the Worcester Road Area (defined in Figure 9.4 below as BG5, DL, BA/a/b and BCX.) Detailed Assessment is already underway for this area, and there is a strong possibility that it will be designated as an Air Quality Management Area in the future unless mitigation measures are put in place.

9.2.11 The Worcester Road Area is a classic street canyon, with rows of (often historic) buildings continuously abutting the street on both sides, reducing gas dissipation. Worcester Road provides an alternative through-route to the A38, and also provides access to the A448 (Kidderminster Road) from the A38 and the motorway network.

The Birmingham Road Area

9.2.12 The Birmingham Road Area was identified as having borderline air quality issues in the Progress Report 2010, which was produced for Bromsgrove District Council by Air Quality Consultants Ltd. This report identified that the mean annual average of Nitrogen Dioxide had been exceeded in the Birmingham Road Area (defined on Figure 9.4 below as BG1, BR and 5.) This area will be monitored more closely in response to major redevelopments in the local area (including the proposed Sainsbury's development).

Figure 9.4 – Borderline Air Quality Management Areas in Bromsgrove

9.2.13 Whilst the Air Quality Management Areas are causes for concern, the majority of the readings show that the level of deterioration of air quality is not severe at present. Nonetheless, it will be essential that any changes in land use take full account of the likely impact on local ambient air quality, and seek to either maintain or improve over air quality in the local area.

9.3 The Natural Environment

9.3.1 Worcestershire enjoys a rich and diverse natural environment. The third Worcestershire Local Transport Plan contains a full Strategic Environmental Assessment, which provides significant data on Worcestershire's natural assets. This can be viewed here: (www.worcestershire.gov.uk/LTP3)

9.3.2 Bromsgrove is set amidst some of the best quality farmland in Worcestershire, as well as being fully surrounded by the West Midlands green belt, which currently limits development around the town. There are no Special Areas of Conservation (SACs), National Parks or Areas of Outstanding Natural Beauty within proximity of the Bromsgrove Transport Package study area, although there are colonies of Water Voles and Brown Trout in the Spadesbourne Brook (which runs through Bromsgrove Town Centre), whose environment must be protected and enhanced where possible through investment in the Bromsgrove Transport Package.

9.4 The Built Environment

9.4.1 Within the Bromsgrove Transport package study area, there are two conservation areas: Bromsgrove High Street (www.bromsgrove.gov.uk/cms/pdf/BTCAA%20low%20res%2007-06-11.pdf) and St Johns (www.bromsgrove.gov.uk/cms/pdf/St%20Johns%20CAA%2007-06-11%20low%20res.pdf). These were both designated in 2011 from the former Bromsgrove Town Centre Conservation Area.

9.4.2 Bromsgrove town centre contains approximately 70 listed buildings, including the Grade 1 listed St John's Parish Church. The street pattern in the town centre is largely medieval, and the town boasts a large number of built heritage assets. It will be essential that any proposals developed as part of the Bromsgrove Transport Package fully take into account the presence and setting of built heritage assets.

10. Conclusions and Recommendations

10.1 Analysis and Interpretation of Transport Issues in Bromsgrove

10.1.1 Bromsgrove suffers from the following core transport issues:

- ***Significant congestion across the local transport network*** *(particularly at peak times).*
  - *Congestion is particularly acute along the A38 Bromsgrove Eastern Bypass and approaches to this route (in particular, New Road and Stratford Road) resulting in significant delay for all users, particularly at peak times. Indeed, delay accounts for 23% of total journey time.*
  - *Evidence suggests that highway links in Bromsgrove are not operating over capacity. This suggests that poor junction design is a significant cause of congestion on Bromsgrove's transport network.*
  - *Congestion directly impacts on the punctuality, reliability and overall efficiency of strategic (inter-urban) and local bus services in Bromsgrove, particularly at peak times.*
  - *School traffic is a significant contributor to network congestion at peak times. This is particularly visible in the AM peak, where congestion is experienced around a number of schools.*
  - *Air quality is deteriorating markedly across the network, with two Air Quality Management Areas designated at Stoke Heath (on the Bromsgrove Eastern Bypass) and at the M42, Junction 1. There are also a number of borderline Air Quality Management Areas in Bromsgrove Town Centre on Worcester Road, Market Street and Birmingham Road.*
  - *Transport related noise is an issue of concern. Data sourced from Defra indicates that noise levels harmful to health are experienced close the A38 (Bromsgrove Eastern Bypass) and adjacent the M5 and M42.*
  - *The Bromsgrove District Core Strategy is currently under development. If approved, it is forecast that traffic will increase by approximately 20%. Without any investment in the transport network, this will exacerbate existing conditions, leading to severely deteriorated journey times and potentially, gridlock.*

- ***Poor local accessibility to key trip attractors in Bromsgrove*** *on foot, by bicycle and by passenger transport (including the Town Centre, the Railway Station and the Retail/Business Parks)*
  - *Inadequate junction design, high traffic volumes and limited crossing opportunities cause significant severance, making walking and cycling particularly unattractive for Bromsgrove residents.*
  - *The existing railway station is not suitably designed for current passenger use. Furthermore, it is not currently served by frequent rail services, which directly impact on the attractiveness of rail to access key services and facilities.*
  - *Bus stop infrastructure across Bromsgrove has become deteriorated over time, which reduces the attractiveness of bus services in Bromsgrove.*
  - *The quality of walking and cycling networks in Bromsgrove is particularly poor. Fragmented networks, limited signage and poor information do nothing to make walking or cycling attractive alternatives to car use in the town.*

- *Passenger transport information is poor across Bromsgrove. This reduces the attractiveness of bus and rail to access key services and facilities.*
- *The public realm in Bromsgrove Town Centre has become deteriorated over time. Many of the transport corridors and in particular the town centre are not attractive places to walk or cycle to or through. As such, it is considered that this has a negative impact on encouraging increased walking, cycling and passenger transport as an alternative to car use in Bromsgrove.*

10.1.2 Focussing purely on one mode of transport (for example car) will not deliver sufficient decongestion and accessibility benefits to improve overall quality of life in Bromsgrove. It is strongly recommended that a multimodal investment approach is pursued, which will deliver enhanced transport choice for Bromsgrove's residents and visitors, as well as reducing congestion and improving quality of life.

10.2 Recommendations

10.2.1 It is recommended that the following schemes for the town of Bromsgrove are progressed for consideration in the next phases of the development of the LTP3 Bromsgrove Package.

10.2.2 These will be considered in the development of the transport related Infrastructure Delivery Plan for the District's Draft Core Strategy, however this alone is not sufficient to populate the transport elements of an Infrastructure Delivery Plan to a level compatible with scrutiny at an Evidence in Public.

- ***Corridor Enhancement Scheme for the A38 Bromsgrove Eastern Bypass*** *– This scheme would involve significant investment in junction design and capacity at all junctions along the route from the M42 Junction 1 to Upton Warren. The programme should include enhancements to crossing opportunities and safety (where appropriate) to significantly increase the efficiency of this corridor, enabling the route to perform its strategic function as a bypass for Bromsgrove. This will require traffic modelling of all junctions and links along the route, as well as additional data collection to develop the evidence base to progress this scheme.*
- ***Bromsgrove Town Junctions Enhancement Programme*** *–This scheme would involve the comprehensive modelling of junctions across Bromsgrove urban area to identify a series of infrastructure enhancement schemes which:*
  - *Improve the efficiency of traffic flow, and provide sufficient capacity to cater for planned growth*
  - *Provide systemic measures to enable the efficient operation of bus services throughout Bromsgrove. This will require consideration of junctions as part of a corridor-length approach to deliver significant enhancements to bus service punctuality and reliability.*
  - *Provide enhanced crossing opportunities for pedestrians and cyclists*

- ***Bromsgrove Walking and Cycling Network Development Scheme -*** *This would involve the design and development of a comprehensive network of traffic free and traffic calmed routes, with appropriate crossing points and signage, connecting existing and future trip generators (residential areas) with trip attractors across the town. Additionally, this would also require the installation of secure cycle parking at trip attractors. The programme will be required to be fully compliant with the policies contained in the Worcestershire LTP3 Compendium, and will involve the development of a costed proposal (or series of proposals) for network enhancement which can be progressed for delivery as phases of the wider Bromsgrove Transport Package.*

- ***Bromsgrove Road Based Passenger Transport Infrastructure Enhancement Scheme*** *– This scheme would involve systemic investment in bus stop infrastructure across Bromsgrove, including rationalisation and improvement of bus stops and shelters and improvements to information provision, compliant with the policies identified in the Integrated Passenger Transport Policies listed in the Worcestershire LTP3 compendium.*

- ***Bromsgrove Rail Interchange Scheme*** *– This scheme, currently under development, will significantly enhance the quality and frequency of rail services and facilities in Bromsgrove, as well as increasing the attractiveness of sustainable modes of transport (walking, cycling, bus, taxi and community transport services) to access rail services in the town.*

- ***Bromsgrove Local Bus Service Enhancement Scheme*** *– This scheme would involve the development and delivery of a consolidated and efficient local bus service for Bromsgrove, which would replace existing local bus services, operating via all existing and future trip generators (residential areas) and existing and future trip attractors (including the Town Centre, the hospital, the retail and business parks and the new Rail Interchange). This service would be designed to operate commercially, supported by enhanced infrastructure and bus priority (where appropriate) across the local transport network.*

- ***Bromsgrove Town Centre Public Realm Enhancement Scheme*** *– This scheme would involve the comprehensive redesign of Bromsgrove High Street, to enable it to perform a dual role both as a trip attractor and trip facilitator. The scheme must be designed to the highest affordable standards and will need to promote and encourage access to this location on foot, by bicycle and by public transport, as evidence shows that the most successful town centres (in terms of economic activity and social function) optimise accessibility by all modes.*

- ***Development and Delivery of a Parking Management Strategy for Bromsgrove*** *– This scheme would require a comprehensive review of all on-street and off-street parking capacity in Bromsgrove, including its location, efficiency of use and purpose. The strategy should seek to make recommendations for rationalising on-street and off-street parking to meet the needs of the town, encouraging appropriate enforcement and minimising the call on the public purse to maintain such infrastructure. This Parking Management Strategy should be wholly compliant with the Traffic and Parking Management Policies included in the Worcestershire LTP3 compendium.*

- ***A Smarter Choices Programme for Bromsgrove*** *– This programme should be delivered continuously throughout the delivery of investments in infrastructure and services, and should meet the requirements of the Smarter Choices Policies contained in the Worcestershire LTP3 Compendium. The programme would require the development and delivery of a package of 'softer' measures which should include, as a minimum:*

    - *An Individual Travel Marketing Programme, covering all households in Bromsgrove, to promote the use of sustainable modes of transport (walking, cycling and passenger transport), home working and more responsible car use.*

- *The development and dissemination of enhanced multimodal travel information to residents and visitors to encourage greater travel choice.*
- *Intervention programmes at workplaces and schools to promote the use of sustainable modes of transport, home working and more responsible car use.*
- *A comprehensive marketing campaign, delivered across a range of appropriate media, to promote and reinforce enhanced travel choice across Bromsgrove.*