

Managing Highway Capacity Strategy

**Incorporating
Intelligent Transport Systems Strategy
&
Congestion Strategy**

Contents

Introduction	Page 3
Background	Page 5
National, Regional and Local Policy	Page 7
Challenges	Page 9
Opportunities and Objectives	Page 17
Delivering Change	Page 33

Introduction

Intelligent Transport Systems

The term Intelligent Transport System (ITS) refers to the application of information and communications technology to transport infrastructure, enabling data to be collected and shared in order to maximise the efficiency of the highway network.

ITS encompasses a range of technologies including traffic signals, real-time public transport information, in-vehicle satellite navigation systems and variable message signing to inform drivers of congestion ahead or availability of parking spaces. This can enable people to make more informed travel choices, make journeys more efficient and help to reduce the impact of transport on the environment.

As transport networks become more congested, and the business case for and major new highway construction becomes more difficult, there is a growing need to adopt policies that manage demand and make full use of existing assets.

Advances in information technology are now such that ITS offers real possibilities for authorities to meet the challenge of a busier road network: by monitoring existing network performance, predicting what might happen in the future and providing the means to manage demand proactively and on an area-wide basis.

ITS systems have an important role to play in delivering transport policy objectives and the responsibilities placed on highway authorities under the Traffic Management Act, with substantial benefits for traffic congestion and pollution reduction, as well as improving accessibility, providing integrated transport solutions and making best use of highway infrastructure and car park capacity.

Congestion

The Department for Transport notes that traffic congestion is an inherently difficult concept to define as it has both physical and relative dimensions. At its simplest, it can be explained in physical terms as the way in which vehicles interact to impede each others' progress. These interactions and their influence on individual journeys usually increase as demand for the available road space approaches capacity or when capacity itself is reduced through road works. In addition, incidents such as bad weather or road traffic accidents can also have a significant bearing on congestion.

However, this purely physical definition ignores the fact that congestion can mean very different things to different people. For example, a person living in a rural area might regard an unusually long queue of traffic experienced on their daily commute as severe congestion, while someone living in an urban area might experience much longer hold-ups on a daily basis and regard the same length queue as being almost totally uncongested.

In relative terms, congestion can therefore also be defined in terms of the difference between users' expectations of the road network and how it actually performs.

Effects of increased congestion

Regardless of whether it is defined physically or relatively, the effects of increased congestion are typically characterised by:

- Longer journey times (slower speeds)
- Increased queuing at junctions
- Increased stopping and starting
- Less predictable journey times
- Displacement onto less appropriate routes

As a result of these effects, congestion also has both economic and environmental impacts.

Although increased demand for the road network can often be driven by economic growth, the presence of congestion can also hold back further growth as more time is spent travelling at the expense of other productive activities. In addition, the inability to accurately predict journey times due to congestion can result in wasted time as individuals either arrive late for appointments or arrive early by allowing too much time for their journey.

Environmentally, increased congestion can lead to increased pollution and carbon emissions as vehicles spend more time stationary or at very low speeds where engine efficiency is lower. In addition, greater levels of congestion can result in increased wear and tear to vehicles due to the high frequency of braking and acceleration that often occur in slow moving traffic¹

¹ An Introduction to the Department for Transport's road congestion statistics. May 2016.
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/524035/an-introduction-to-dft-congestion-statistics.pdf

Background

Much of Bracknell Forest, including its road infrastructure, has been constructed during the past 50 years. Bracknell town itself was designated as a 'new town' in 1949, and built in response to post-war housing shortages. The layout of the central road network is generally typical of the time, including many dual carriageways and roundabouts. Smaller villages and satellite towns such as Sandhurst and Crowthorne have more historic centres and road connections, yet also have a significant volume of 'newer' residential and commercial development. Many older roads have been upgraded as the Borough has grown, particularly since the 1980's.

Residential and commercial growth in the Borough has continued through to the present day – with development around Bracknell dating from all decades since the 1950s. Most recently (post 2015) new housing development around Warfield has necessitated a new road link. Major junctions such as Twin Bridges and Coral Reef have also been upgraded to accommodate future traffic growth, incorporating modern Intelligent Transport Systems. A complete regeneration of Bracknell town centre was completed in September 2017 (first phase), which has required further changes to the central road network, in which ITS will also play a key role.

Future network pressures

With the expected growth of Bracknell Forest borough over the next ten years, linked to housing, business, and the regenerated town centre, the council requires a clear approach to managing its highway network. Pressure will not only come from local sources, but also from increased development in the wider Berkshire and South-Eastern area, as authorities remain under pressure to build more houses in order to cope with demand outside London.

Whilst the Council will continue its focus on Sustainable Modes, it would be unrealistic to assume that these can cater for the overall increase in demand on transport and travel within Bracknell Forest and the wider region. Road transport remains a dominant form of travel.

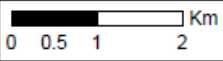
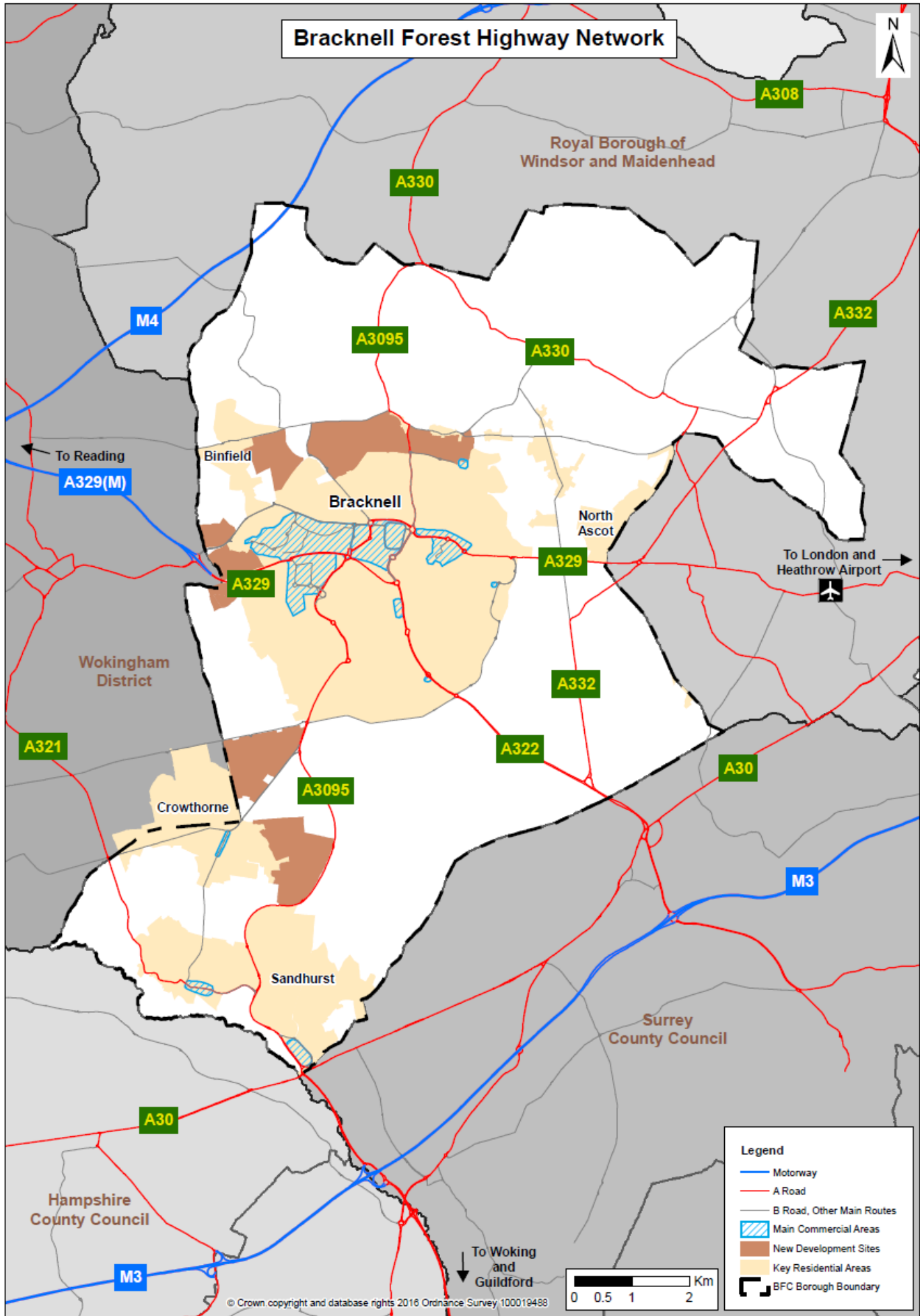
The map on the following page shows the highway network in Bracknell Forest.

The Intelligent Transport Systems toolbox

Many authorities are already employing ITS to assist in the delivery of transport policies or to solve particular problems. Within Bracknell Forest, the key opportunities to exploit ITS technology lie within the following:

- Traffic signal control
- Bus Priority
- Car Park Variable Message Signing (CPVMS)
- Strategic Variable Message Signing (SVMS)
- Real Time Passenger information (RTPI) for buses
- Real Time Travel and Street Works Information (Roadworks.org)
- Air Quality Monitoring (AQM) action plans
- Automatic Number Plate Recognition (ANPR) and Closed Circuit Television CCTV

Bracknell Forest Highway Network



Legend

- Motorway
- A Road
- B Road, Other Main Routes
- Main Commercial Areas
- New Development Sites
- Key Residential Areas
- BFC Borough Boundary

Policy: National, Sub-regional and Bracknell Forest

National Policy

In general, the national interest in ITS comes from the problems caused by traffic congestion and an increasing range of new information technology for real-time control of the road network. Importantly, ITS can facilitate the delivery of a wide range of transport policy objectives, bringing significant benefits to transport users and those who live and work within the Bracknell Forest area.

ITS can deliver noticeable economic benefits through reduced journey times and increased journey time reliability, as well as reductions in pollution. The potential for an increase in the economic viability and vitality of urban areas, through the use of ITS, can make them attractive locations for future inward investment.

As travel patterns increase, it will not always be possible to provide new infrastructure to meet the demand, especially in a congested areas. ITS offers opportunities to manage and smooth traffic flow and can help reduce the need for new infrastructure.

The Government has made it quite clear that it expects Local Authorities to make increasing use of ITS to deliver better transport. Legislation, such as the Traffic Management Act 2004, has placed a major bearing on the performance of local Highway Authorities in relation to network management and Part 2 of the Act places a duty on Local Authorities to understand and examine how their network is performing, manage their network effectively and minimise congestion.

Regional Policy

Bracknell Forest is one of six unitary authorities in the county of Berkshire, adjacent to The Royal Borough of Windsor and Maidenhead and Wokingham, along with Reading, West Berkshire and Slough. Bracknell also borders Hampshire to the South-West, and Surrey to the South-East.

Bracknell Forest is part of the Thames Valley Berkshire Local Enterprise Partnership (TVB LEP), which is a strategic body made up of businesses, local authorities, communities and the education sector, set up to drive the local economy. The region was recently identified as the UK's most productive sub-region.

All of Bracknell's neighbouring authorities face traffic congestion problems, and are using ITS to some extent, which generally depends on the characteristics of the key settlements of each authority, and the type of highway pressures they face.

Bracknell Forest Policy

As development in Bracknell Forest and neighbouring areas continues apace, the network is reaching capacity at peak times, causing journey time delays for those who live or work within the borough, and those travelling through it. This has social, economic and environmental implications at a local, regional and national level.

The council has recognised the benefits that ITS can provide in reducing delays by improving junction efficiency, allowing us to make better use of the existing network. Whilst at present

some junctions only benefit at peak times, traffic and growth projections suggest that ITS will be essential for all strategic or busy junctions throughout the day as we look to the future.

The two policies that this Strategy aims to address form part of the council's third Local Transport Plan, which contains twenty policies in total and covers the period 2011 – 2026. The two, namely Congestion Management and Intelligent Transport Systems, are considered within this one strategy due to the similarities and links between them, i.e. congestion is the problem, whilst ITS is considered as one of the most effective means of dealing with the problem.

Policy TP13 – Congestion Management, states that the Council will seek to reduce the impact of congestion through the following objectives:

Reducing the need to travel for social, domestic and business purposes through planned location of development

Increasing the choice to travel by more sustainable modes of travel

Works and measures to improve the capacity and functionality of junctions and route corridors

Partnership working with major businesses to promote sustainable travel

Policy TP14 – Intelligent Transport Systems, states that the Council will use Intelligent Transport System (ITS) technology to manage traffic flow through transport corridors vulnerable to excess CO2 emissions through the following objectives:

Planning the expansion of ITS in a coordinated manner

Establishing an effective Urban Traffic Management Control (UTMC) system for Bracknell Forest

Promoting partnership working and data exchange with the neighbouring Authorities

Improving monitoring and management of the road network

Using technology to give priority to particular types of vehicles or road user, where appropriate

Provide reliable travel information to road users, so that they can make informed decisions before and during their journey

Exploring new opportunities for ITS technology to improve road safety

These commitments form our priority objectives which we will explore further in the next section of this strategy.

Challenges

Meeting our objectives will require significant challenges to be overcome, and an understanding of the existing situation and trends has highlighted a number of weaknesses and threats which are shown and considered in greater detail in the table and discussion that follows.

Weighing up the situation – SWOT analysis of Managing Highway Capacity in Bracknell Forest

<p>Strengths</p> <ul style="list-style-type: none"> • Relatively modern highway network provides good base for ITS application • Facilitates efficient running of already busy junctions • Town centre redevelopment provides modern base to work with • Cross-boundary working on ITS and associated maintenance contracts provides efficiency • Good network visibility due to CCTV • Good communications network which is revenue neutral 	<p>Weaknesses</p> <ul style="list-style-type: none"> • High resident and commuter car use • Conflicting interests e.g. buses vs cars • Ability to change people's perceptions – a lack of understanding and presumption of low value for money • ITS can be expensive to install and maintain • Reliance on technology and risk of system failure • Aging assets and infrastructure • Budget availability can impact on progress
<p>Opportunities</p> <ul style="list-style-type: none"> • New development / new junctions, town centre redevelopment • Working with other local authorities to find more efficient ways of working and sharing of new technology • Government funding bids which allow implementation of new ideas to resolve existing issues and pre-emptively manage future network pressures. • Refurbishment allows opportunity to modernise ITS units and make more cost effective, with better functionality • Trial new technology and stretch existing ITS systems • Further information sharing with fellow stakeholders on the merits of ITS 	<p>Threats</p> <ul style="list-style-type: none"> • Continued increase in traffic exceeding network capacities • Ability of network to deal with major one-off events or issues elsewhere on the network (e.g. M3 / M4 closure) and the knock-on effects • Pace of the ITS industry – built-in obsolescence in technology and infrastructure. Requirement for niche / specialist services • Procurement – need for long-term business relationships • Developer demands – seeking low cost products but needing to comply with council systems • Availability of future funding to deliver this strategy

By considering this broad range of Strengths, Weaknesses, Opportunities and Threats alongside the LTP Vision for Bracknell Forest, we are able to identify four specific challenges, and a range of corresponding opportunities which will aim to address them.

Challenge 1 – Increasing car ownership and traffic levels

Challenge 2 – Increased dependence on technology and pace of change

Challenge 3 – Relative costs of purchase, maintenance, and procurement

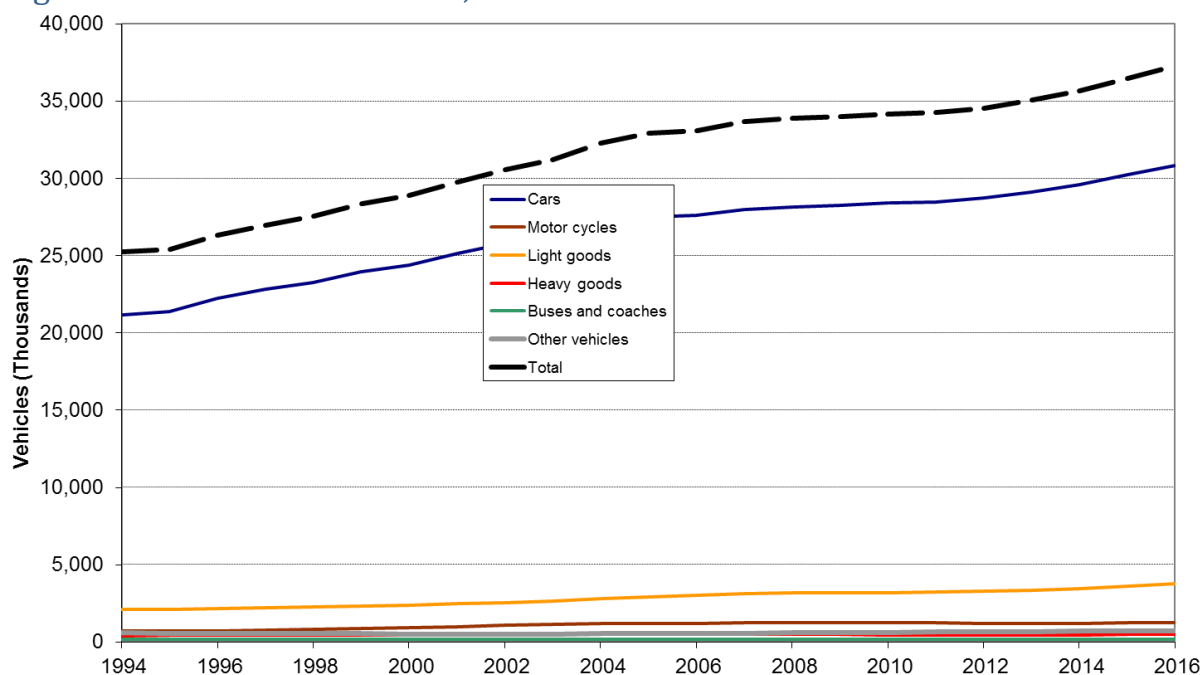
Challenge 4 – Ability to change people’s perceptions and understanding

These challenges and opportunities then inform our eleven main objectives for Managing Highway Capacity in Bracknell Forest, which are set out in the next section of this document.

Challenge 1 – Increasing car ownership and traffic levels

At the end of 2016 there were 37 million vehicles licensed in the UK, of which 30.8 million were cars. The total number of licensed vehicles has increased every year since the end of the Second World War except 1991.

Figure 1: Licensed vehicles: UK, 1994 – 2016



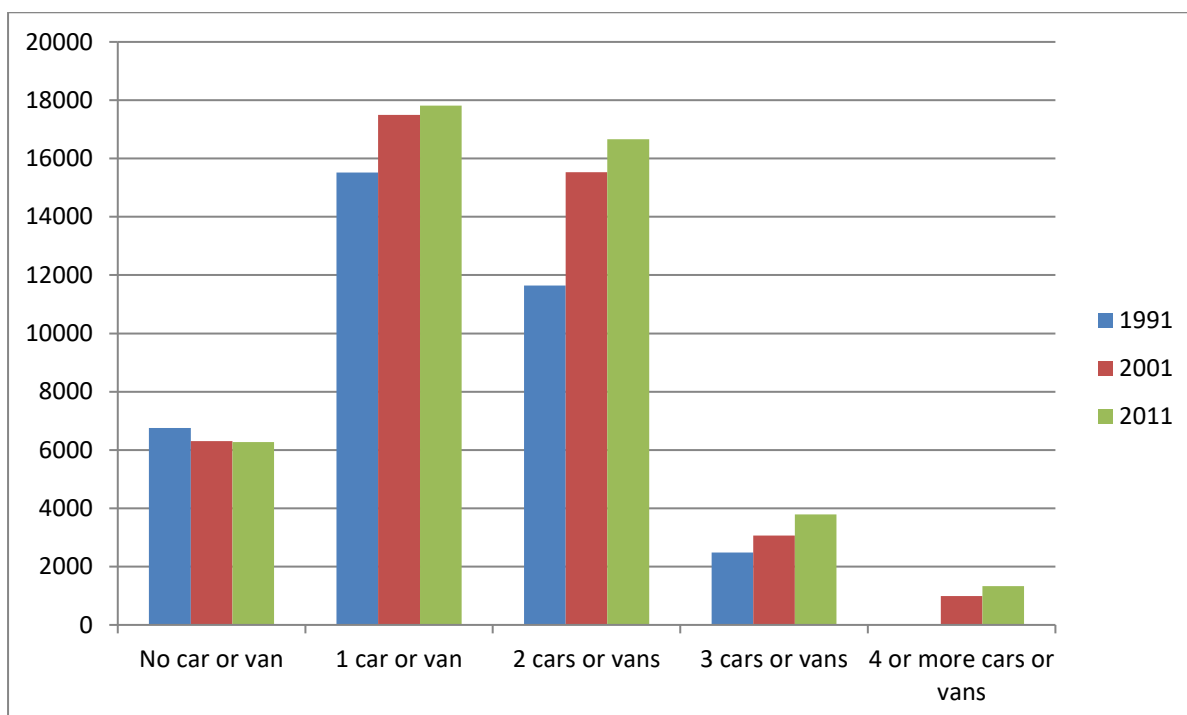
Source: Department for Transport Vehicle Licensing Statistics (2016)

Some of the largest increases in the past ten years have been in vans, light goods vehicles and motorcycles. Nevertheless, cars remain by far the largest licensed vehicle category in the UK. The South-East of England has the most cars regionally, and has also seen some of the greatest recent growth. Bracknell Forest, as a growing and relatively affluent Borough, is no exception to that trend.

Between 1991 and 2011 (based on the most recent Census data), the number of households in Bracknell Forest with 3 cars or vans increased by 52% to 3794. In the 2001 census, a further category was added for '4 or more cars or vans'. Between 2001 and 2011, this figure increased by 34% in itself, to 1335, as **Table 1** shows. The number of households without a car or van also continues to fall.

Table 1: Household car ownership in Bracknell Forest 1991 – 2011

Year	No car or van	1 car or van	2 cars or vans	3 cars or vans	4 or more cars or vans
1991	6761	15523	11638	2489	N/A
2001	6307	17497	15529	3065	994
2011	6275	17818	16656	3794	1335



With vehicle numbers expected to continue to rise over at least the life of the current Bracknell Local Transport Plan (2011 – 2026), Bracknell Forest needs a highway network which is prepared for higher levels of traffic. The need is compounded by the relatively high level of new residential development being constructed, both within and around the Borough, along with the significant new Town Centre regeneration due for completion in 2017.

Challenge 2 – Increased dependence on technology and pace of change

The term 'Intelligent Transport Systems' covers a wide range of areas and applications. One of the earliest forms of ITS were traffic signals which could adapt to traffic conditions using sensors and basic computer control. Nowadays this is better known in the industry as Urban Traffic Control (UTC) and Microprocessor Optimised Vehicle Actuation (MOVA). Such systems started to become commonplace in the 1980s, and were developed given the continuing growth in car ownership and general traffic levels meaning uncontrolled junctions were struggling to cope. The justifications are much the same today, although the technology has advanced significantly to allow more efficient movements and adaptations to traffic.

We have already briefly considered the multitude of ITS applications now available to councils which aim to maintain efficient traffic flow, improve public transport appeal and reliability, and provide information to road users. However, there are challenges and risks involved in such an increased reliance on technology;

Cost

One obvious drawback of implementing ITS is the cost of doing so (capital), and the ongoing cost of maintenance (revenue). Fortunately, given the Government's recognition of the effectiveness of many ITS measures, funding grants are available for many major schemes, particularly those that can show a resulting economic benefit.

Whilst installation and initial infrastructure costs can be relatively high, they are justified (and recognised by Government) as being worthwhile given the overall benefits they can provide through increased highway network efficiency and resulting journey time reliability.

Nevertheless, the Council maintains a detailed asset database of its liabilities, considering age and replacement cost of infrastructure, and uses a competitive tendering process for the equipment alongside maintenance contracts, to ensure the best value for money.

Obsolescence

As with many modern technologies, the pace of change and improvement in ITS systems is relatively rapid, although the basic principles are usually well-established, and the core function of the system in question remains the same. One way around this is to ensure that infrastructure can improve through software updates, rather than full equipment replacement. Nevertheless, we must remain mindful that the older a piece of equipment is, the less reliable it can be, which is a particular risk if much of the equipment is becoming old at the same time.

Challenge 3 – Relative costs of purchase, maintenance, and operation

The purchase of ITS equipment inherently comes at a cost, both in terms of capital (purchase) and revenue (maintenance). The council is required to go through a public procurement process for the purchase of all major goods and services. In theory, this is intended to ensure that works or contracts are awarded fairly and at good value for money, to any interested party who tenders.

When considering bids, it is important to consider ongoing and long-term revenue costs alongside the initial capital costs, something which is often overlooked, particularly as part of capital grant funded work. There are further aspects which can add complexity to procurement when considering ITS, as there may be multiple elements which could be more efficiently delivered by one provider, or potentially the opposite where many providers are required. Whilst value for money is a key consideration, care must be taken to ensure that pressure to get the cheapest equipment / services does not result in a false economy leading to problems down the line.

Pressures to do more for less can result in the Council increasingly reverting to technology where traditional engineering methods may no longer be viable. The challenge here is not only the capital cost but the expectation for it to continue to perform its purpose for a given amount of time which can result in expenses not only in maintaining equipment but also in bringing in specialist expertise to keep equipment running as efficiently as possible.

System fault or failure

Whilst ITS applications are designed to be extremely reliable, faults can still occur, whether as a result of a component of the system itself, or an external factor such as a power cut or a collision with part of the infrastructure. Faults or failures can have a significant impact on the function and safety of the highway network.

If a fault does occur, most of the systems will alert the Highway Network Management team or their contractor so that it can be quickly rectified. Equipment manufacturers offer 24-hour support, or maintenance contracts, generally as part of their contract with the council. This means that the majority of faults are repairable at little or no additional cost, however if a fault is more major in nature, or not covered by warranty, then the council can face urgent repair bills.

Challenge 4 – Ability to change people’s perceptions and understanding

ITS is implemented to make things *better* – whether that means easier, more efficient, safer, or more reliable. ITS could be applied to a bus stop to provide live timetable information, to a junction to improve journey time reliability, or to a car park to provide information on the number of spaces available.

Whilst the benefits of ITS can be significant, it can be difficult to convince transport users and the general public of the benefits of change, particularly when installation of new technology creates short-term inconvenience.

The order of delivery of ITS measures can often be dictated by outside factors which can imply an incoherent approach to managing issues, yet conversely, these incremental changes form an overall plan of improvement. In other words, some schemes benefit from the sum of their parts, but over a period of time. This is particularly apparent in the ‘corridor’ approach that the Council has been applying in recent years

The application of traffic signals to major junctions improves all-round junction efficiency and the reliability of journey times, as controlled flow is more consistent than a ‘free-flowing’ uncontrolled junction or roundabout, particularly where a busy major route crosses a more minor route. The need for such changes are compounded by anticipated traffic growth figures over the next ten years and beyond, as over 10,000 houses are built in Bracknell Forest, and the town centre regeneration works draw in more people from the surrounding boroughs.

For this reason, communication is very important that council officers work closely with their respective councillors and member representatives to ensure that they, and all stakeholders, are well informed.

How will the Objectives address the Challenges?

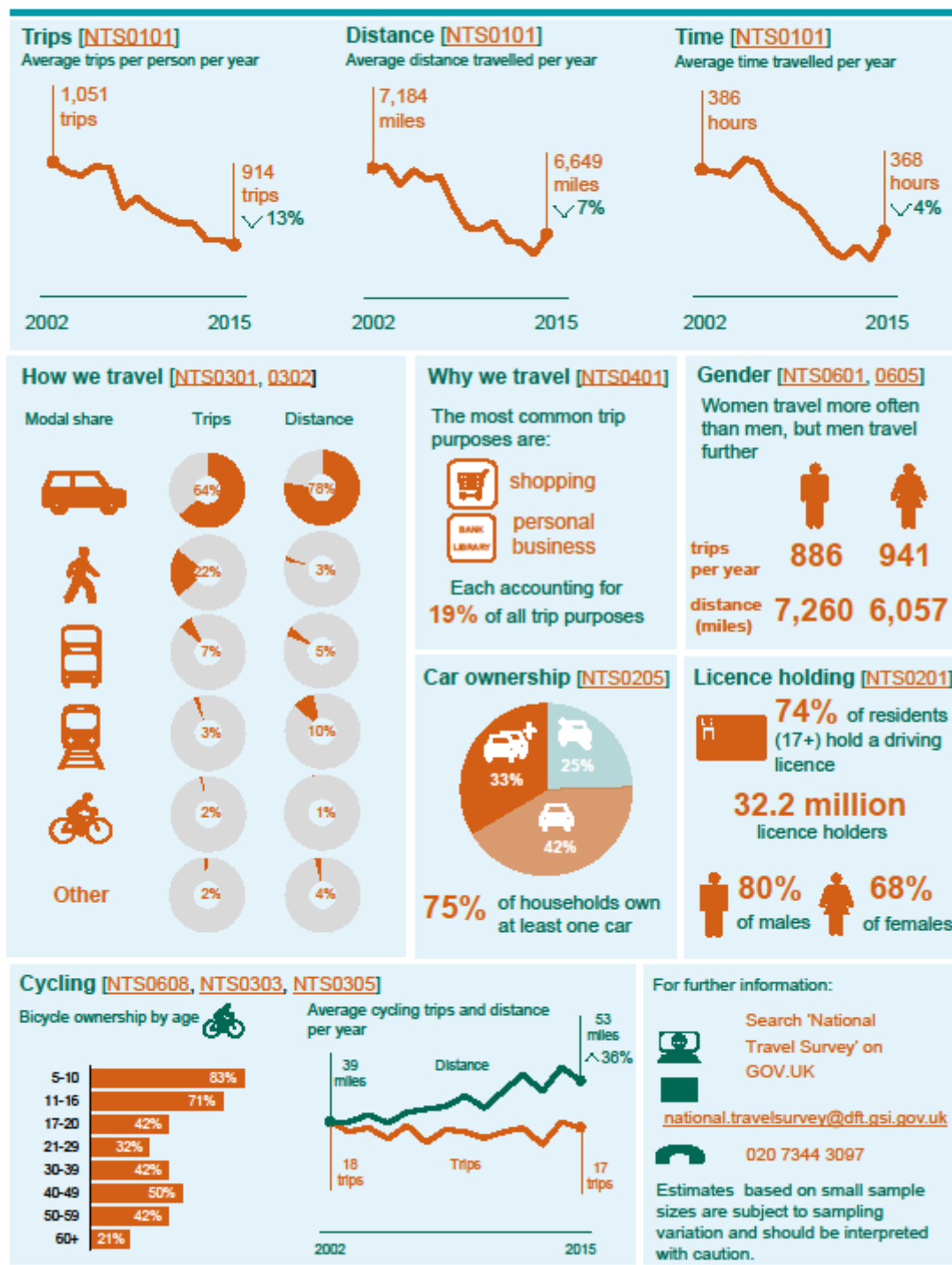
By delivering on the eleven strategy **objectives**, we will address the four key **challenges** identified previously.

		CHALLENGES			
		Increasing car ownership and traffic levels	Increased dependence on technology and pace of change	Relative costs of purchase, maintenance and procurement	Ability to change peoples perceptions and understanding
OBJECTIVES	Reducing the need to travel for social, domestic and business purposes through planned location of development				
	Increasing the choice to travel by more sustainable modes of travel				
	Works and measures to improve the capacity and functionality of junctions and route corridors				
	Partnership working with major businesses to promote sustainable travel				
	Planning the expansion of ITS in a coordinated manner				
	Establishing an effective Urban Traffic Management Control (UTMC) system for Bracknell Forest				
	Promoting partnership working and data exchange with the neighbouring authorities				
	Improving monitoring and management of the road network				
	Using technology to give priority to particular types of vehicles or road user, where appropriate				
	Provide reliable travel information to road users, so that they can make informed decisions before and during their journey				
	Exploring new opportunities for ITS technology to improve road safety				

Opportunities and Objectives

Reducing the need to travel for social, domestic and business purposes through planned location of development

According to the **Department for Transport's National Travel Survey for England 2015**, the number of trips we make has actually declined over the past decade, as has the distance travelled and time taken. The most common trip purposes are shopping and personal business;



Nevertheless, the number of vehicles licenced continues to increase, as too does the population, effectively cancelling out reductions in individual trips. This is particularly acute in the South East and Bracknell Forest, where demand for housing outstrips supply, creating pressure to build more houses. During the timeframe of LTP3, over ten thousand new homes will be constructed in Bracknell Forest at various sites around the Borough.

When considering where to locate new housing developments (over and above the actual practical site options available), it is important to consider access to shops, services and workplaces with a view to reducing the need to travel. This can be difficult on large scale new developments in the outer fringes of a town, as these houses will be inherently further from the town centre. This can to some extent be addressed by locating schools, small shops and services within them, as a requirement of the planning permission for a site. Similarly, developers can be asked to contribute towards transport infrastructure such as cycle paths and bus shelters, or indeed a subsidised bus service for a period of time on completion of a development. These are known as Section 106 or Section 278 agreements;

Planning obligations under Section 106 of the Town and Country Planning Act 1990 are a mechanism which makes a development proposal acceptable in planning terms that would not otherwise be acceptable

A Section 278 of the Highways Act 1980 agreement can be used to licence a developer to carry out improvement works on public highway which are generally necessary where planning permission has been granted for a development. It is Council policy to apply this method of amending of existing highways.

A similar tool is the **Community Infrastructure Levy**, introduced in April 2010. It allows local authorities in England and Wales to raise funds from developers undertaking new building projects in their area. The money can be used to fund a wide range of infrastructure that is needed as a result of development.

Key actions

Support new residential and commercial development that is closer to public transport, services, shops and other local amenities

Work with developers to ensure an effective provision for sustainable travel within or associated with new developments, through S106 / S278 agreements, or Community Infrastructure Levy.

Increasing the choice to travel by more sustainable modes of travel

Alongside investment in the highway network to improve the reliability of journey times, Bracknell Forest Council is committed to facilitating uptake of alternative, more 'sustainable' modes, i.e. walking, cycling and public transport.

Bracknell Forest is fortunate in already having a relatively comprehensive network of traffic-free cycle and foot paths, and its relatively modern highway and built infrastructure could be conducive to facilitating new technologies such as electric vehicles.

In many ways, sustainable modes are complementary to this particular strategy, as their uptake can remove cars from the road. The Walking and Cycling Strategy and Smarter Travel Strategy cover the council's aims, objectives and investment priorities on sustainable modes in detail.

In summary, these cover the ways in which the council will aim to improve provision for walking and cycling, buses, trains and alternatively fuelled vehicles through new built infrastructure, smart technologies, educational and promotional campaigns.

Key actions

Identify gaps in the existing cycle and footpath network, and invest in new walking and cycling infrastructure where opportunities arise

Encourage and facilitate uptake of electric and low emission vehicles

Promote sustainable modes through council media, events and personal travel planning initiatives (where funding allows)

Implement objectives and actions of **Walking & Cycling Strategy** and **Smarter Travel Strategy**

Works and measures to improve the capacity and functionality of junctions and route corridors

Much of Bracknell Forest's primary route network of A and B roads were designed and built following the establishment of Bracknell as a 'new town' in the late 1950's. As such, they were designed with the car in mind – dual carriageways and major roads linked by roundabouts or signalised junctions at key intersections.

This road network has coped fairly well with the increase in traffic and population of the borough over the past fifty years. However, with continued development and demand for more housing, both in the borough and the region, many junctions and corridors have reached, or are reaching capacity at peak times.

In the past various layouts have been developed in an effort to address junction capacity issues which focussed on individual locations. Whilst all delivered some improvement, they required heavy investment for what is now considered little return.

Through the use of strategic transport modelling a different approach was adopted which allowed engineers to design and test solutions that improved the corridor as a whole through infrastructure changes and use of coordinated Urban Traffic Control (UTC).

This approach allows us to achieve improved and reliable journey times along the whole corridor whilst also delivering improvements to junctions at a much reduced cost, providing better value for money.

In addition to major schemes, the council will explore opportunities for improvements to smaller, individual junctions where capacity, efficiency or safety concerns are identified. This could involve simple lining changes, priority changes or the introduction of a mini roundabout.

Key actions

Review effectiveness of corridor junction capacity works and make any necessary adjustments to their operation and responsiveness

Study options for Downshire Way A322, the A3095 corridor and other strategic corridors as further capacity constraints emerge

Continue to explore opportunities for improvements to smaller, individual junctions where capacity, efficiency or safety concerns are identified

Partnership working with major businesses to promote sustainable travel

Bracknell Forest is home to hundreds of businesses, from large head offices such as Waitrose, 3M, Fujitsu, Dell, HP, Panasonic and Honda, right through to small enterprise businesses which locate in the area due to the excellent transport links and proximity to London.

All businesses tend to generate traffic and travel, although the nature of the business depends on the type of traffic generated to some extent. Waitrose for example generates a significant volume of Heavy Goods Vehicle traffic, given its distribution operations, whereas the majority of the other large employers in Bracknell tend to be office (service industry) based, with individual car traffic movements generated by employees and visitors.

The council has a good working relationship with most of the major employers in the Borough, and works in partnership to encourage more sustainable travel methods. This is complimented by project work such as DfT funded initiatives, and supporting materials such as online Travel Plan guidance, and a simple, informal 'Travel Information for Businesses' document which is circulated to all major employers, with quarterly news letters.

Travel Plans

A Travel Plan is a long term management strategy which encourages sustainable travel for new and existing developments. It sets out transport impacts, establishes targets and identifies a package of measures to encourage sustainable travel. Bracknell Forest Council, like most other councils, requires a travel plan for most major commercial and residential developments.

Key actions

Maintain regular contact with major businesses on Bracknell's business areas through the Travel Information for Businesses publication, and Travel Plan process

Ensure Travel Plans are kept up-to-date and commitments are adhered to through regular monitoring

Seek funding through Local Enterprise Partnership (e.g. Growth Deal), DfT or other relevant channels for projects aimed at increasing uptake in sustainable modes by Bracknell Forest's workforce

Encourage businesses to offer incentives for sustainable travel, and provide support for any travel initiatives they run

Planning the expansion of ITS in a coordinated manner

It is important to coordinate any ITS expansion with other functions both inside and outside the council. Whilst ITS plays an instrumental, and indeed increasing role in the modern highway network, it depends on other factors to work effectively, such as the design of the infrastructure it is applied to. From the initial concept stage, through to design, modelling and implementation, council officers work closely with each other, along with consultants and contractors to ensure that each element complements the other to create an effective and efficient solution.

Beyond the Borough boundaries, the council works with other Highway Network teams in Berkshire and neighbouring authorities to ensure that where possible, there is consistency. These consistencies generally apply to the operational policies of the respective councils, and can include the type of ITS technology deployed, the software and programmes used, and the design of road features and junctions and resulting flow of traffic. In some cases, cross-boundary working can be further formalised through joint contracts, or asset and data sharing. Such approaches can provide significant cost benefits, as larger schemes and contracts provide economies of scale, whilst helping to ensure consistency between boroughs. As an example, all Berkshire authorities currently use Siemens as their UTMC supplier, and meet monthly to discuss any issues, new ideas, or opportunities for further joint working and expansion. There is also further scope for integration, modification and expansion of existing works or ITS measures into larger cross-authority / regional schemes. The council will continue to explore opportunities for efficiencies where appropriate.

Expansion within the remainder of the LTP3 period is likely to focus on further CCTV monitoring, UTMC application to new and existing key junctions, increased application of

Variable Message Signs to direct and inform drivers of delays, car parking spaces or provide general information or safety messages.

The further expansion of UTMC technology will increasingly be considered the predominant tool for the reduction of traffic congestion and vehicle emissions. The broader use of UTMC within the Borough will also contribute towards the progression of wider co-ordination and control of ITS infrastructure.

Coral Reef road junction following junction redesign in 2016



Key actions

Continue to work with neighbouring authorities and stakeholders to maximise opportunities for coordinated technology improvements on key cross-boundary corridors

Investigate opportunities for increased UTMC application at busy junctions in the borough where pressures are expected to increase as a result of traffic and population growth

Regularly assess the priorities within the ITS work plan

Establishing an effective Urban Traffic Management Control (UTMC) system for Bracknell Forest

UTC and MOVA

Urban Traffic Control (UTC) is a term used to describe the technique of co-ordinating traffic signals, normally through a centrally located system. Areas where signals are relatively close together, and traffic flows are high, lend themselves to UTC co-ordination as benefits are achieved by progressing platoons of traffic in an organised fashion. UTC systems can refine the operation of traffic signals on key network corridors and allow manual or automatic intervention when problems occur.

Microprocessor Optimised Vehicle Actuation (MOVA) is predominantly a method of controlling individual traffic signal junctions, and is used to maximise capacity and reduce delays through the introduction of localised intelligence within the junction controller.

UTMC – exploiting ITS technology

Urban Traffic Management and Control (UTMC) systems are designed to allow the different applications used within modern ITS to communicate and share information with each other. This allows previously disparate data from multiple sources such as traffic signal installations, real time bus passenger information systems (RTPI), permanent traffic counter sites, car park management systems, street works databases, air quality monitoring stations and wider travel information, to be amalgamated into a central console or database.

The idea behind UTMC is to enable operators to maximise their transport network potential by using an intelligent system to co-ordinate and control its use - either through direct intervention or via higher level strategies/operating plans. In addition, and very importantly, UTMC provides a platform from which travel and transport information can be disseminated to, and accessed by, the general public.

Over the past few years the Council has made significant progress with ITS implementation, many of the major junctions on key networks have been upgraded and fitted with functionality such as MOVA and UTC control. Furthermore an increasing network of CCTV for the purpose of highway monitoring has been implemented. These works, through a combination of physical improvement and technological advances, have ensured we can actively manage the highway network during current and future demands.

Progress on UTMC initiatives within Local Authorities is accelerating, and opportunities already exist to exchange network and local/regional travel information through the linking of UTMC systems. It is expected that the current development of regional multi-modal travel information for the general public, and opportunities to co-ordinate cross-boundary initiatives will place pressure on those Authorities' without a UTMC agenda.

Localised UTMC within Bracknell Forest

The Council's Highway Network Management team has full control over an increasingly comprehensive localised Urban Traffic Management Control network. This means that whilst some systems are hosted (and to an extent monitored) by a third party, cameras and control equipment are based in-house, allowing real-time adjustments to traffic signals to influence traffic flow through a common interface.

The ability to control the network and manage traffic flows is particularly important during periods of heavy congestion, or where incidents have occurred. Recent advances in telecommunications protocols mean that sites can be controlled or monitored across the Borough, either through a wired connection, iMESH or wireless 3G / 4G networks. Significant work has been undertaken to ensure there are no weak links within the system.

In addition, the Council's control interface can be utilised for the centralisation and dissemination of travel and transport information to the public through a variety of channels, such as Variable Message Signs to direct drivers along appropriate routes or to the most suitable car parks.

Key actions

Combine systems data to facilitate greater levels of functionality, control and automation

Ensure that UTMC systems and infrastructure is up to date with emerging technology

Expand the Council's private UTMC communications network (i-MESH) to further reduce revenue expenditure

Promoting partnership working and data exchange with the neighbouring Authorities

As we have already considered in coordinating the expansion of ITS, partnership working and data exchange is vital in ensuring a consistent and cost effective approach to the maintenance of existing, and the roll out of new Intelligent Transport Systems.

The joint traffic signal maintenance contract with West Berkshire, Reading, Wokingham, Windsor & Maidenhead and Slough Councils provides significant cost savings whilst ensuring County-wide consistency. This does not cover all ITS infrastructure, although the option for expansion is currently being explored, as this may provide further cost savings going forward. Broadly speaking, the county-wide maintenance contract improves efficiency in 'attend and repair' times, whilst enabling a broader field of technical expertise due to economy of scales across Berkshire.

Whilst maintenance contract sharing undoubtedly provides benefits, it is important to note that the specific types and applications of various ITS measures may not suit individual authorities the same. Reading, for example, faces different traffic issues to Bracknell Forest in and around its densely developed town centre, which has focussed significantly on bus priority measures over the past decade. This is one of the benefits of retaining individual borough UTMC staff, as they are more familiar with their differing respective areas, whilst still sharing workload on joint initiatives and projects.

Nevertheless, information and data exchange allows invaluable learning from others' experiences, and new technology can be trialled in one area and the results analysed and considered for potential deployment elsewhere.

Key actions

Share resources, infrastructure and contracts, providing efficiency benefits

Expand the Berkshire-wide Traffic Signal Maintenance Contract to cover wider ITS infrastructure and deliver a holistic and cost effective maintenance solution.

Improving monitoring and management of the road network

Traffic flow monitoring

Day-to-day traffic flow monitoring is dealt with using permanent automatic traffic counters at fifty locations across the borough. Many of these sites need the data to be downloaded manually and use induction loops in the carriageway. However as other network elements such as UTMC are upgraded, opportunities to install new, real-time traffic counters connected to the council's data network will be explored. Traffic counters are increasingly using Bluetooth technology (which is fitted in most new cars manufactured today) which allows journey times to be accurately calculated between two sites based on individual vehicle signals. This is useful in determining how smoothly and efficiently the highway network is running.

Automatic Number Plate Recognition (ANPR) and Closed Circuit Television CCTV

Bracknell Forest now has an extensive network of CCTV cameras which can be used to enable traffic management decisions to be made in real-time. They allow UTMC staff to refine the operation of traffic signals on key corridors and assist with manual intervention when problems occur.

By connecting ANPR devices to UTMC systems, it is possible to monitor the travel of individual vehicles, automatically providing sanitised information about the speed and flow of traffic on various routes. Permanent ANPR devices are now being introduced by UK Police Forces on many key traffic routes (for the purpose of crime prevention), including Bracknell Forest, and opportunities exist for shared data.

Staffing

In order to monitor the highway network effectively, it is useful to have staff on hand to deal with any network problems that arise, or indeed before they arise. Staff can monitor the various CCTV covered junctions and roads in the borough from the UTMC control station within the council's Time Square offices. It is also possible for officers to control traffic signals remotely, should priorities require changing due to unusual traffic patterns or significant congestion. A staff rota ensures that networks are monitored, with remote access also possible using a laptop from anywhere with an internet connection, and a staff member 'on-call' should any serious issues arise. This is backed up by 24-hour technical support on all UTMC systems.

Long-term monitoring and modelling

Using data collected from ITS equipment or site surveys, we can understand how the road network functions at certain times of day, month and throughout the year. We can then use this data to plan where to increase capacity, change priorities or change traffic signal timings. These are constantly reviewed, as changes such as new developments can affect traffic patterns, whilst data can be used to model and predict future flows, some of which is carried

out by the council's in-house modelling team. The same model can be used to test designs before they are committed to.

Air Quality Monitoring (AQM) action plans

Local authorities have a duty under Part IV of the Environment Act to review air quality in their area and assess whether the specified standards are met. Where they are not met the Local Authority is required to designate an Air Quality Management Area and develop an Action Plan to achieve improvements.

Congestion management can be used to control vehicle emissions by optimising capacity of the highway network or, in extreme cases, constraining traffic flow into vulnerable areas. The further application of UTC and MOVA within Bracknell Forest will provide an opportunity for selected areas to be given priority protection by distributing vehicles flows, and therefore emissions, more equitably or to where they are less harmful. AQM plans can be adopted to hold traffic queues outside an area when congestion or pollution exceeds a pre-set threshold.

Key actions

Using modern open source applications to provide additional data and information on network performance

Ensure a flexible and effective system for monitoring and managing the highway network outside of Council core business hours

Using technology to give priority to particular types of vehicles or road user, where appropriate

Technology exists to allow priority at signalised junctions to particular types of vehicle, using inductive road loops, automatic number plate recognition, radar-based systems and GPS. The technology is generally used for emergency services vehicles and buses, although it can have wider applications to general traffic.

Bus Priority

Bus priority is a name for the various techniques used to speed up the movement of buses through junctions controlled by traffic signals. Priority can be given to buses to ensure that they stick to the timetable and to encourage more people to use public transport instead of the private car.

Buses normally signal their impending arrival (for example via GPS or radio systems) and on their arrival at the junction receive a green light. These measures can be combined with designated bus lanes. The junction will either extend the current green or change to the relevant stage to give the bus progression through the junction. This works in a similar way to hurry calls and cannot violate any minimum green or intergreen timings.

Bus priority measures have existed within Bracknell Forest for some years, although recent advances in technology have meant that some modernisation of the original infrastructure has been necessary. Increasingly, the technology behind bus priority systems will stem from that used for Real Time Passenger Information and will therefore be GPS based. A number of recent highway improvements within the Borough have incorporated the ability to operate bus priority in future if necessary. The further expansion of UTC and MOVA (covered earlier in this document) across the Borough's road network will be key to facilitating bus priority measures and the resultant improvement to bus journey times.

Furthermore, the development of the UTMC common database has led to the addition of the ICARUS system which give us the ability to track bus movements throughout the borough in real time, allowing the ability to publish accurate web based information to the public. We will have the ability to use the live data to facilitate a bus priority system at key UTC enabled junctions, this system will actively monitor bus movements in relation to timetables and if necessary speed up the movement of buses through junction by means of priority signaling (provided buses are equipped with the necessary technology and operators are prepared to send the data to the council).

Hurry Calls and Vehicle Priority measures

A hurry call is an occurrence which forces the traffic signal controller to the demanded stage as quickly as possible, essentially it 'hurries' the controller along. (Whilst the next stage is reached as quickly as possible, a hurry call does not allow the violations of minimum green times or inter-green periods as these are integral to the safety of a traffic signal installation.)

Hurry calls can also be used in connection with queue detectors where a certain level of queuing will force a clearance stage to reduce the queues on a specific approach. This is often implemented on signal controlled roundabouts to prevent long queues on the circulatory carriageway locking up the roundabout, as at the Jennett's Park A329 roundabout in Bracknell.

The pace of change in prioritisation and vehicle technology, combined with a degree of uncertainty on what traffic in the Borough will look like at the end of the LTP3 period in 2026 and beyond is such that it is difficult to clearly set out how new measures might be used or trialled in the Borough. In other authority areas where traffic congestion is significant, traffic authorities have used measures such as 2+ lanes (prioritising cars with more than one occupant), or allowed use of electric vehicles in bus lanes. It is unlikely that such measures will be necessary in a more suburban setting such as Bracknell, but the Council will continue to monitor the options available as they develop.

Key actions

Investigate and apply appropriate bus priority measures in future improvements to the highway network corridors and key individual junctions where benefits can be achieved

Be prepared to consider new technology prioritisation measures, or congestion management measures as they emerge to the market, and consider successes or failures of new measures in other authority areas

Provide reliable travel information to road users, so that they can make informed decisions before and during their journey

Car Park Variable Message Signing (CPVMS)

CPVMS, led by car park entry/exit counters, provides travellers with information on the number of available car parking spaces at the principal car parks within an urban area. This reduces queuing on the highway network and the search time and distance travelled to find available car parking.

Within the redeveloped Bracknell town centre, the use of CPVMS will be key contributor towards maintaining the efficient circulation of traffic around the core of the town, ensuring the economic viability of town's car parks and potentially enabling the routing of car trips during peak periods. The recent introduction of a modernised car park management systems, within Council owned multi-storey car parks, will facilitate the use of CPVMS.

Strategic Variable Message Signing (SVMS)

SVMS are typically free text variable message signs which can be used to display strategic travel information at key decision points on the road network. Their intention can be to simply inform drivers of current, or imminent, network conditions or advise upon alternate routes to avoid congestion or a specific incident.

The future management of the Borough's main network corridors, and a redeveloped town centre, could benefit from SVMS technology in the longer term future. The implementation of signs, likely in a radial format, would provide opportunities to advise town-bound traffic of alternative transport opportunities and availability – such as future temporary car parking facilities at peak trading times.

The Council has plans to install Variable Message Signs (VMS) at key 'gateway' points to Bracknell, to inform road users of any delays or issues, or show car park capacities as they enter the town. These can also be used to warn of any upcoming events or road works which may cause delays.

Real Time Passenger Information (RTPI) for buses

The increasing use of information technology and electronic communications has raised travellers' expectations on the provision of transport information. The purpose of bus RTPI is to provide information, accessed by a combination of physical displays and internet connected personal devices to people waiting at bus stops which will indicate to them the expected time of arrival of their bus. The broader intention of RTPI is that this type of information should build confidence in the use of public transport and encourage modal shift towards the bus.

With the procurement of the additional ICARUS UTMC system we now have a far superior means of tracking bus movements through the borough. This system provides both the means to give priority to bus services (to keep them on timetable) but also the ability to relay route information and live bus times to public through various media. The Council has recently purchased a series of new RTPI signs which will give the public up to date live bus times on key stops. This system is also included within the redeveloped bus terminal and will expand further into the new town Centre upon its completion.

Live travel information

Traditionally, local news and radio have provided information on problems with the road network for commuters. However, sat-nav systems are an increasingly popular and effective means of providing live travel information, offering re-routing suggestions to avoid problems and delays. As an example, the council uses data which is available through Google to monitor the road network, which anyone with a smartphone or modern navigation device has access to.

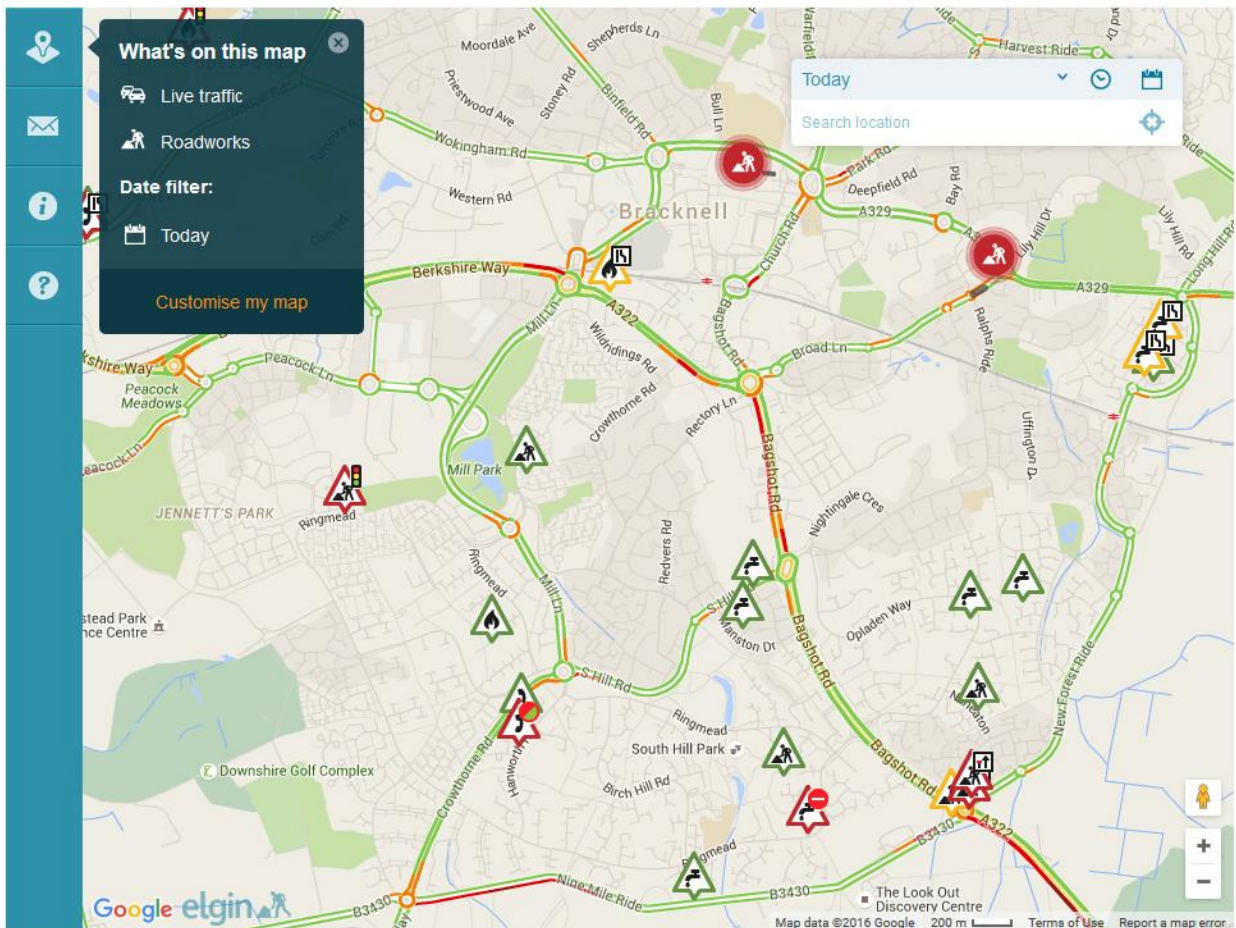
The ability to access information about problems on the network is central to journey planning. A travel web-site is an essential means of fulfilling the obligation to inform the travelling public, and emerging technology is now enabling a variety of information to be presented on dedicated travel web-pages - such as road works information, average journey times, real time passenger information, car park occupancy and general transport network information.

Road user's access to reliable multi-modal travel and network information within Bracknell Forest will be key to enabling informed decisions both before and during journeys.

Broader knowledge and visibility of network performance will also enable the co-ordination of street works to be conducted with evidence based knowledge of traffic patterns at key locations. This will aid in the assessment of likely disruption and enable appropriate directions to be placed upon works promoters.

Roadworks information

Road users can find out when and where road works are taking place on the council's roadworks finder on the website. This map-based tool provides live information about road closures, roadworks, obstructions, events and other information for road users in Bracknell Forest and further afield. <http://www.bracknell-forest.gov.uk/roadworksfinder>



Key actions

Promote and raise awareness of the live travel and roadworks information through traditional web platforms and smart phone applications

Install VMS signs at key gateway points to inform road users of network issues and car park information

Exploring new opportunities for ITS technology to improve road safety

In most cases, ITS measures fundamentally improve safety. Some do so directly, for example Vehicle Activated Signs (VAS) which illuminate when vehicles are travelling over the speed limit, whilst others do so more as a secondary consequence of their operation, for example CCTV systems allowing the monitoring of road conditions from a UTMC system.

For the main purposes of safety, Bracknell Forest Council currently uses the following measures:

- Advisory wig-wags outside schools
- VMS / VAS – not just for car parks or speed limit enforcement, but also to provide safety messages
- Real Time Passenger Information – so that public transport users can feel safe in the knowledge of when their service will arrive
- Speed safety and red light cameras

As ITS technology continues to advance, we are seeing more innovative systems which are intended to improve safety, although some are more costly than others. Current examples include:

- Improved LED lighting across the borough (currently subject to a £7 million upgrade of street lights) improving visibility at night, and reducing energy costs
- Intelligent road studs, which light up using LEDs like 'cats eyes' in the road, and can be coloured to demarcate junctions, laybys and lanes.
- Traffic and pedestrian / cyclist signal detection, to give priority to certain road users – an advance on existing MOVA signal technology, which uses better sensors to tailor the required time for movements (also potentially increasing efficiency)

Key actions

Investigate how new technology could make sustainable modes safer and more attractive

Continue to use ITS to influence positive driver behaviours

Consider the safety benefits that smarter vehicle technology may offer in future and how this links with UTMC advances (**see Smarter Vehicle Use Strategy**)

Delivering Change

Implementation

The implementation of this strategy will require a partnership approach bringing together colleagues from both inside and outside the authority, public and private sector.

Partnership working is particularly important to effective implementation given the cross-boundary effects and implications of congestion, and the rapidly evolving technology of ITS, some of which can come with a significant capital cost.

Schemes involving ITS elements are appraised to take account of the wider policy goals, and overall deliverability. These schemes, if considered economically and practically viable, are then taken forward as part of the annual Integrated Transport Capital Programme.

Transport improvements featured within the programme are key to facilitating existing and future development within the Borough and thus contribute to the growth agenda

Funding

Historically the overall Integrated Transport Capital Programme was funded from the Integrated Transport Direct Grant, Borough Capital and S106/CIL developer contributions for transport related improvements

To further support this the authority has, in recent years, secured additional funds from central government towards more strategic schemes aimed at unlocking growth. Therefore in accordance with the National Planning Policy Framework and to help achieve economic growth and bring forward stalled developments, the Local Authority will continue to work proactively to help meet the development needs of business and support an economy fit for the 21st century.

To date the Council has helped implement over £20m worth of transport improvements aimed achieving economic growth and bringing forward stalled developments such Warfield and the Town Centre regeneration.

Much of this funding has been secured through Government Initiatives such as the Local Pinch Point Programme and the Local Growth Fund with the Authority providing a local contribution towards the scheme through a combination of Borough capital and developer S106 contributions.

Monitoring

Monitoring progress will be an important part of ensuring that the objectives of the strategy are being met. There are a range of publically available data sources and data routinely collected by the Council which will be used to provide a measure of our progress. This data is used to inform Key indicators, annual progress reports, DfT returns, evidence in reports etc.

The Annual Travel in Bracknell (TiB) report is an annual analysis of the changes in travel in and around the borough. Data is captured from a range of sources to inform on rail and bus use, cyclist and pedestrian movements, and traffic flow. By reporting on changes in rail, bus, cyclist, pedestrian and vehicle travel, the Council can assess the progress being made towards delivering on the vision outlined in the LTP:

“To develop a sustainable transport system that supports the local economy, provides choice, and improves quality of life in a safe and healthy environment”