South West Hertfordshire Growth and Transport Plan Interventions Ideas Paper

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1. Introduction

This Interventions Ideas Paper is one of a portfolio of documents which make up the South West Hertfordshire Growth and Transport Plan.

The purpose of this paper is to broadly identify a toolbox of potential types of transport interventions that could be used to address growth and transport challenges in South West Hertfordshire.

The GTP advocates an approach which recognises that whilst a challenge may materialise at a local level, i.e. a 'symptom' (for example congestion at a particular junction) this may be a consequence of an underlying 'cause'. This cause could be occurring at a separate location to the symptom or it could apply to a much larger area.

It is important that the type of transport intervention implemented is appropriate for addressing a challenge by tackling the underlying cause. For instance, congestion on an inter-urban road between two towns may be caused in part by insufficient public transport services. Improved public transport services could provide an attractive alternative to the car. Instead of tackling the effects of traffic congestion by widening roads or enlarging junctions, it may be more appropriate to devise interventions which tackle the underlying issues, for example investment in public transport which could provide an attractive alternative to the car, thus helping to manage traffic volumes and in turn reducing traffic congestion.

The characteristics of a challenge need to be understood to find an intervention which fits the problem. For instance, a new cycleway would not be an appropriate solution to address congestion on a major motorway between two towns. Improved access to stations on a rail main line which serves the same corridor as the motorway to encourage modal shift could however be an appropriate course of action.

Consideration of the characteristics of the challenge and the potential broad direction of interventions is discussed in **Section 2** of this paper.

An awareness of wider transport and demographic trends can provide useful context for some of the growth and transport challenges, in particular in terms of identifying interventions which could address a challenge. Emerging new technologies and wider trends create a great deal of uncertainty with how the transport network of the future will look and operate. It may create new challenges as well as opportunities in relation to how we travel from A to B, when and by which route. Recognition needs to be given to these trends and the prospect of big shifts in how and where we travel, even if no immediate action can be taken. This aspect is discussed in **Section 3** of the paper.

A range of transport interventions are available from a current 'toolbox' which is utilised by planners and decisions makers in today's context. This toolbox will remain relevant for some years and will potentially evolve as new best practices, technologies and legislation come into effect. There are other interventions which could be considered which may or may not have been implemented in Hertfordshire and it is useful to give recognition to these types of projects. They could for instance help to implement the ambitious objectives of the GTP particularly in relation to enhancing walking and cycling infrastructure and improving public transport services and connectivity.

This is not intended to be an exhaustive list of every possible type of transport intervention. The examples presented in this paper should serve to illustrate the potential different directions which could be taken to address a wide variety of transported-related challenges.

A simple SWOT analysis has been carried out to highlight potential Strengths, Weaknesses, Opportunities and Threats associated which each scheme type. The types of interventions, including references to case studies, and the high level SWOT analysis, are described in **Section 4** of this paper.

A series of workshops have taken place with members and officers to discuss trends in transport, the growth and transport challenges, and examples of transport schemes that could potentially be applied to address these challenges. A summary of key points from workshops are discussed in **Section 5** of this paper along with the set of information cards which are used in the workshops to prompt discussion amongst participants.

2. Challenge Characteristics

A series of challenges for South West Hertfordshire have been identified through a process of understanding the symptoms and potential underlying causes. The process is discussed further in the Evidence Analysis Paper.

To help identify appropriate types of interventions, the challenges need to be considered in terms of whether they are, in spatial terms, local and/or strategic. Local would imply that the challenge is small-scale whereas Strategic would imply that the challenge covers a wider area, including corridors between towns.

The challenges are summarised in relation to the following challenge groups. It is important to emphasise that many of these challenge groups overlap. Therefore in terms of devising interventions, it may be feasible to address more than one challenge / challenge group through a single intervention or package of interventions.

Challenge Group
Hemel Hempstead Urban Area
Watford Urban Area
Watford - St Albans Corridor
Watford - Hemel Hempstead Corridor
M1 Corridor
Rail Commuting

Hemel Hempstead Urban Area

Congestion at A414 Breakspear Way / Green Lane roundabout

M1 Junction 8 and the immediately adjacent A414 Breakspear Way/Green Lane junction act as a major gateway to Hemel Hempstead, including the large Maylands employment area. The majority of the traffic using this junction on journeys external to Hemel Hempstead and are therefore likely to be longer distance in nature.

There is a lot of housing and employment development proposed on land north and south of the junction to the east of Hemel Hempstead, including expansion of Maylands as part of the Enviro-Tech Enteprise Zone. This development is expected to generate additional traffic demand on the strategic M1 and A414 corridors, but also could generate new local trips across the A414, for instance between different parts of the proposed development. This could especially be the case if schools are only provided in one part of the development.

The characteristics of traffic using this junction could therefore change in the future with an increasing proportion of local as well as strategic journeys. Local journeys could cross the A414 north-south, for instance parents taking children to school within the East Hemel Hempstead development.

This challenge may therefore need to be addressed by a package of local and strategic interventions and therefore the focus could be on providing:

- Highway capacity improvements at the existing junctions to provide shortmedium term relief to already severe congestion
- Measures to help facilitate safe and attractive journeys on foot or by bike, north-south across the A414 (e.g. between different parts of planned new development on the eastern side of Hemel Hempstead)
- Measures to tackle mode choice along the M1 and A414 corridors do such journeys need to be made by car or could alternatives such as bus/coach be made more attractive?
- Consider the opportunity to provide cycling facilities towards St Albans alongside the A4147 and/or A414 to improve inter-urban connectivity particularly in terms of accessing jobs within Maylands and the Enviro-Tech Enteprise Zone.

Congestion around Hemel Hempstead station and accessibility issues

There are numerous highway junctions and links within Hemel Hempstead which experience congestion, in particular those within the Two Waters area on the western side of the town.

Hemel Hempstead station is located on the edge of town and is physically separated from the town centre and main residential areas by parkland, rivers and the Grand Union Canal at Boxmoor, and is not expected to be within easy walking distance for a large portion of the town's population. The private car may therefore be perceived as the only convenient means of getting to/from the station.

Localised traffic congestion could be addressed by enhancements to alternatives modes linking the wider town to the station.

The focus could therefore be on providing:

- Improved links for pedestrians and cyclists across Boxmoor, building upon recent improvements to cyclways, with a focus around Fishery Road which acts as the conduit between the station and a large residential area of Western Hemel Hempstead including Warners End and addressing the A414-A4251 London Road crossroads which currently acts as a point of severance for pedestrians and cyclists.
- Alterations to Hemel Hempstead station forecourt with a focus on enhancing pedestrian and cyclist facilities.

There is also potential to further address this challenge through a combination of interventions across Hemel Hempstead, all of which could recognise the need to reduce car dependency for trips occurring within the town.

Maylands congestion

Congestion within the Maylands industrial area of Hemel Hempstead can be considered to be both a local and strategic challenge. Evidence analysis indicates that there are journey to work in Maylands which are occurring over relatively short distances, for example from neighbouring residential areas such as Woodhall Farm. The Maylands area also generates movements from a much wider area, including from towns within and outside Hertfordshire, including Luton. Because of its edge of town location, private car is the most convenient means of getting to/from Maylands. Whilst there are several inter-urban bus services which run through or close to Maylands, some are infrequent and they do not operate at times of the day which are attractive to the Maylands workforce, particularly those who may work shifts and start/end work outside of the traditional weekday AM and PM peak periods, and some routes are slightly detached from the employment area which would require passengers to walk some distance to their place of work after disembarking a bus, potentially along routes not suitable or attractive to pedestrians.

Planned development on the eastern side of Hemel Hempstead, immediately adjacent to the Maylands area, will generate new travel demands. This could bring about new pressures on the surrounding transport network but could also bring forward an opportunity to enhance the transport offer in this remote part of the town.

There is also planned regeneration development within Maylands itself, and the area is also part of the designated Eco-Tech Enterprise Zone.

The focus could therefore be on providing:

- Increased bus service frequencies, new/altered routes, enhanced bus stop facilities both within Hemel Hempstead but also better links to neighbouring towns such as Luton.
- A new public transport interchange hub to act as an eastern anchor point for all bus/coach services in the area with strong links to the town centre and railway station to the west, as well as other towns along the M1 corridor (including Luton) and A414 corridor (including St Albans and Hatfield).
- Improved walking and cycling facilities across the Maylands area (some improvements as part of the Heart of Maylands regeneration scheme are planned or are already underway).

Improved connectivity east-west across Hemel Hempstead should be a priority. Hemel Hempstead railway station would form the western-most anchor point for public transport services; Maylands and East Hemel Hempstead development would form the eastern mostanchor point; and important trip attractors will be served in between, notably the Town Centre and Jarman Park.

The corridor is currently very car focused with the A414 forming the main arterial route across the town. Consideration could therefore be given to the future form and function of the A414, including whether it can continue to cater for high traffic volumes or whether there is an opportunity to provide better non-car facilities for journeys both within the town and beyond if a significant shift to non-car travel can be achieved especially for journeys within Hemel Hempstead, and new alternative routes provided to take pressure off the A414. Furthermore, enhancements to existing routes in the wider area may help to relieve pressure on the A414 within Hemel Hempstead, including M25 Junction 20 and the A41.

Watford Urban Area

Bushey Arches Congestion

The series of junctions which are collectively referred to as Bushey Arches, lie at a point where a series of radial routes leading to/from central Watford, converge. Evidence indicates that Bushey Arches caters for a mixture of journeys - both local and strategic. This would

suggest therefore that there is unlikely to be a simple 'one-size-fits-all' type of solution that will address all congestion issues at the junction.

It is a local challenge because there are local journeys being made between Bushey and areas south of Watford including Stanmore, Carpenders Park, South Oxhey and Northwood, and Watford town centre, retail parks and the business parks accessed off Ascot Road.

The junction is also being used by strategic journeys coming from areas to the south of Watford that are travelling through the centre of Watford in order to access the M1. It is important to note that M1 Junction 5 is the only point at which to access the M1 to travel to/from London because junctions further south only provide limited movements and access. Therefore, to travel from Bushey to Brent Cross, traffic would either need to route via the London road network including the A41, or route north to M1 Junction 5 and then head southwards on the M1 to Junction 1, because it is not possible to access the M1 at either Junction 2 or 4 from the local road network to head southwards.

Bushey Arches is in a constrained urban location. The roads are flanked by residential and commercial property, and the junction is traversed overhead by the Victorian brick arches which carry the West Coast Main Line. This significantly limits the opportunity to enlarge the junction, should this be a preferred course of action.

Alternative approaches therefore need to be explored which aim to reduce congestion at Bushey Arches. This could involve measures to encourage travel by alternative modes which avoid the junction. The nature of journeys routing through the junction means that it may not be feasible to achieve significant modal shift to walking and cycling as these modes are not viable alternatives to the car especially for longer distance inter-urban trips. However shorter distance trips could be encouraged to switch from car to walking, cycling or bus if suitable provision is made. For strategic trips, consideration could be given to the role and influence of the M1 and its connectivity with the surrounding local transport network.

The focus could therefore be on providing:

- Walking and cycling infrastructure improvements on the network surrounding Bushey Arches which would enable people to make these types of journeys without travelling through the junction. Particular journeys could be between Bushey, South Oxhey, the Hospital and Western Gateway business park
- Improved highway links elsewhere to make journeys towards the M1 possible without routing through Bushey Arches.

Air quality issues and congestion at the Dome roundabout and on the Colne Way

Congestion and air quality issues at the Dome roundabout on St Albans Road and the A41 in Watford are both local issues as they are caused by traffic routing towards amenities near to the junction in addition to the route being used by longer distance trips along the A41 corridor between Hemel Hempstead and Watford, and between St Albans and Watford.

The Dome roundabout has been the subject of localised improvements over the years, and whilst there may be small potential for some further improvements to the junction, these are unlikely to deliver significant improvement in terms of reduced congestion and improved journey times. The roundabout is constrained on all sides by a mix of land uses including residential and retail. A step-change in highway capacity, if this were deemed desirable, would not necessarily be considerate of these land uses and may in turn encourage more traffic to route through the junction in the longer term.

Recognising the strategic role the junction plays, the focus could therefore be on providing:

• Improvements to 'first and last mile' of inter-urban journeys within Hemel Hempstead and Watford, i.e. improving links to the main railway stations in each town to make a journey by train in conjunction with a journey on foot, by bike or by bus at either or both ends, more attractive than the car.

High traffic levels entering Watford

Access to Watford from the east can be achieved via M1 Junction 5 and the adjoining A4008 on Stephenson Way. This section of the highway network can experience congestion. A large proportion of trips using M1 Junction 5 are those to/from the M1 and these trips can therefore be considered longer distance in nature. The A41 also links into Junction 5, and this road carries a mixture of shorter and longer distance trips.

Trips entering Watford from the M1 could be coming from a variety of locations. Evidence indicates that St Albans, Hemel Hempstead and Luton are key origins for such trips. It will not be possible to influence mode choice for all these journeys.

The focus could therefore be on providing:

- Improvements to 'first and last mile' of inter-urban journeys within Hemel Hempstead and Watford, i.e. improving links to the main railway stations in each town to make a journey.
- Enhancements to the Abbey Line to make it a more attractive alternative to the car, by way of improved stations, additional or relocated stations and service enhancements.

Watford - St Albans Strategic inter-urban route

Congestion between Watford and St Albans

This challenge focuses primarily on traffic congestion that is occurring on the A405 corridor between Watford and St Albans, with concentrations of congestion at key junctions including the A41 Dome Roundabout (Garston), M25 J21a (near Bricket Wood) and the A405-A414-A5183 Park Street Roundabout (between Park Street and St Albans).

The Abbey Line linking St Albans Abbey and Watford Junction stations, runs broadly along the same corridor.

The corridor carries a mix of local and strategic journeys. The more strategic nature of the M25 in particular means that the A405 corridor is used as a leg on much longer distance journeys. In contrast however, because there are not many alternative, direct highway routes between Watford and St Albans, the A405 is likely to carry a large proportion of journeys by car between the two settlements.

There are a number of settlements along the A405/Abbey Line corridor including Bricket Wood which are likely to be heavily influenced by highway provision.

It is considered that this challenge is both strategic and local in nature, although it is considered that a higher proportion of inter-urban trips are occurring along the corridor especially to access key roads such as the A41, A414, M1 and M25.

This would suggest that a series of local-focused schemes may not be the appropriate course of action to take in order to address the challenge. The longer distance journeys may also be difficult to influence, especially those where there is not a viable, attractive public transport alternative. Journeys between Watford and St Albans could be influenced by a corridor wide approach as opposed to a single intervention. The Abbey Line is a key asset and there may be opportunity to maximise its potential.

The focus could therefore be on providing:

- Larger-scale interventions which potentially separate out the longer distance journeys from the shorter distance journeys, as well as provide some relief to what is already significant congestion;
- Measures which maximise public transport by providing more attractive endto-end journeys (recognising for instance that the Abbey Line does not route directly into either Watford or St Albans centres); and
- Some limited smaller-scale local improvements if applicable which improve connectivity to places and stations between Watford and St Albans, and which could reduce severance for pedestrians and cyclists.

M1 Corridor Strategic inter-urban route

Harpenden peak period congestion

The A1081 links Luton and St Albans and runs through Harpenden. It is the main arterial road serving the town and can also act as an alternative, diversionary route to the M1 between St Albans and Luton, particularly during periods of significant congestion or when major incidents occur on the M1. This can therefore be considered to be a strategic challenge.

It is also considered to be a local challenge because the route caters for local journeys occurring to, from and within Harpenden. It forms the main distributor road through the town and a large proportion of the town centre shops are located on the main road.

A perceived lack of resilience to major incidents on the M1 could be having a direct impact upon local roads in Harpenden. As Harpenden potentially expands in the future, with development proposed on land to the north west of the town (near Kinsbourn Green), this is likely to generate additional travel demand on the A1081, particularly for future residents wishing to gain access to Harpenden railway station.

If there are strategic journeys re-routing through Harpenden as a result of congestion on the M1, the approach should not be to increase capacity on the A1081. The road's current form and function both as an inter-urban route between towns, and as a multi-modal distributor road within Harpenden, should be maintained whilst ensuring it does not become an attractive alternative to the M1 when the strategic road network experiences day-to-day congestion.

There may be opportunities to address this challenge through a combination of:

- More strategic-type interventions which focus on the resilience of the M1 such as enhanced traffic management and patrols to respond to incidents, better information for motorists to plan ahead
- More locally-focused measures geared towards encouraging shorter distance trips occurring within the town, particularly to/from Harpenden station,

including demand generated by potential new development as well as existing areas, to occur by bike or on foot

- A step-change in walking and cycling provision along the A1081, enhancing connectivity and reducing congestion caused by short-distance car travel, although this must be balanced against the need to maintain the A1081 as a strategic diversionary route. Enhanced cycleway and footway provision between planned development north of the town and Harpenden Town Centre and railway station should be a priority
- Provide 'gateway' junctions at either end of the A1081 entering Harpenden to help manage traffic flows
- Introduce new features along the high street which makes it easier to cross the road on foot and to cycle safely, and to reduce the bias towards motorised traffic.

Rail Commuting

Infrequent Services on the Abbey Line

This challenge recognises the infrequent services on the Abbey Line. It is a strategic issue because it covers journeys within the Watford – St Albans corridor. It relates strongly to Challenge 1 in terms of mode choice for trips between the two settlements, and the level of congestion on parallel roads such as the A405.

Enhancements to the Abbey Line could help address localised congestion, however the level of effectiveness of enhancements may depend on the type or scale of intervention.

The focus could therefore be on providing:

- Increased service frequencies if a sufficient business case could be made this may require a capacity increase
- Enhanced access to local stations, especially those which are more remote or face away from the communities they serve such as Bricket Wood station
- Consolidating the number of stations to provide a more 'express' type service
- Improving connectivity at either end of the line into St Albans city centre and Watford town centre
- Enhancing linkages to the south of St Albans, potentially with an extra station which could also act as a park and ride type facility attracting car trips off the A414 and A405.

3. Future Trends

There are potentially a range of emerging and future trends which could have a bearing on travel behaviour and transport investment decision-making in South West Hertfordshire. It is important that these trends are recognised and consideration given to how they may influence future decision making on how to address growth and transport challenges.

The world of transport is predicted to undergo some significant transformations in the coming years however the future for transport and how society uses it is not an easy concept to forecast.

With the pace of development, it is difficult to predict with any certainty the longer term changes in travel patterns and behaviour which could occur.

The arrival of new so-called 'disruptive technologies' could change our day to day lives in ways that we cannot currently predict. To predict what might happen in the future, it is typical practice to extrapolate current trends and make provision for future potential disruptions.

It is reasonable to expect continuing urban growth as Local Plans and central government forecasts make full provision for this. Current travel patterns will reflect growth. Existing movements are likely to persist, others will increase in prominence and new ones may materialise. There will be increased travel within and between towns, and a greater need for safe, reliable journeys on a resilient, efficient transport network which offers choice and flexibility.

The rate of traffic growth has slowed over the last two decades, and levels fell immediately after the 2008/09 economic downturn. In more recent years traffic growth has recovered to pre-recession levels as growth in Gross Domestic Product (GDP) has recovered. The average distance travelled per person increased to 2000, but then levelled off. Although the majority of all trips are for non-commuting purposes, provision of transport infrastructure is generally based around the needs of commuters and peak hour travel patterns.

Within the last decade there has been a change in how people work with increasing flexibility to work more remotely from an office which has been made possible through improved technology such as faster broadband. As a consequence, travel patterns and the time of travel could continue to become less fixed for an increasing number of people. Remote working is not possible for all the sectors of the economy such as for those working in healthcare, education, retail and manufacturing sectors.

The impact of high housing prices on the ability to live close to a place of work, which is an issue across Hertfordshire and southern England, and the high cost of commuting means that with good broadband connectivity, the pool of labour available to employers could widen. The benefits of agglomeration between companies locating in economic clusters are well known, but the future trend may be to provide a pool of labour in satellite towns to service the jobs.

South West Hertfordshire could be impacted by these patterns as more people commute between the principal settlements of Hemel Hempstead, Watford and St Albans, to other parts of Hertfordshire, and to surrounding areas such as Greater London.

The medium to longer term impact may well be an increase in total travel demand, but this could be mitigated by an increase in remote working and more flexibility in travel times.

This will require continued investment in transport infrastructure but also allow flexibility to make best use of existing assets.

One of the most significant areas of change in the transport and travel sector could be technology. The impacts of technological innovation on travel patterns are more difficult to predict.

There is an expectation that autonomous vehicles will allow new trips to take place, and potentially improve access to essential services to parts of society who would not normally travel such as the elderly or mobility impaired, including those who have difficulty walking to a bus stop or who do not have a local or frequent bus service. Instead they could book a demand responsive autonomous vehicle offering a door-to-door service, and these vehicles could be designed and engineered in such a way to provide easy access.

There could be an impact on other providers such as bus services if society sees a switch to autonomous vehicles. Increasing use of autonomous vehicles for private travel combined with a potential reduction in bus use could contribute to increasing congestion. Nevertheless, autonomous technology could present greater flexibility and offer in terms of mass transit. Autonomous vehicle services could offer users the choice for private or shared travel preferences. Bespoke communal autonomous bus services could be formed along routes by picking up people on request who are making similar journeys using connected technology.

Autonomous, driverless vehicle technology is being explored across the world. The UK Government is actively exploring the potential opportunities and risks posed by this new technology, with eight projects having been awarded £20 million in funding in 2016 ¹including developing autonomous shuttles to carry visually-impaired passengers using advanced sensors and control systems, to new simulation trials for autonomous pods to increase uptake and improve real-world trials. Trials to test driverless cars on the streets are currently underway in places such as Milton Keynes and in Greenwich (London).

Autonomous vehicles will help support the Mobility as a Service (MaaS) concept. MaaS has been defined by Transport Catapult as "...using a digital interface to source and manage the provision of transport related service(s) which meets the mobility requirements of a customer"². The prevalence of smart phone technology, GPS, and in vehicle trackers should allow for more accurate monitoring and charging for users of the service. It will provide users with the opportunity to make an informed decision on when and where to travel based on their own needs and on the cost for that journey. It could also mean that the current model of car use shifts from that of ownership to subscription, particularly if modal choice increases.

Research has shown that younger generations are increasingly favouring access over ownership. Faced with increasing costs of ownership, they prefer to pay-per-use or rent everyday items from smart phones but also cars. Those aged between 18 and 35 are 40% more likely than other age groups to move to leasing as opposed to ownership of cars, certainly if costs continue to rise ³.

The expectation is that the mix of trip types will change, but not the need for travel such as for commuting and the school run, but advances in technology and changes in land use may lead to a better / more efficient use of infrastructure.

How cars are powered is also changing. Electric vehicles are increasing in popularity and it is predicted that even if fuel efficiency improves in more traditional petrol and diesel powered vehicles, electric vehicles will be cheaper to own than conventional vehicles by 2022⁴. Substantial investment will be needed in supporting infrastructure such as charging points.

¹ UK Government (February 2016) Eight projects have been awarded £20 million in funding to develop the next generation of autonomous vehicles <u>https://www.gov.uk/government/news/driverless-cars-technology-receives-20-million-boost</u> ² Transport Systems Catapult (July 2016) 'Mobility as a Service – Exploring the Opportunity for Mobility as a Service in the UK' <u>https://ts.catapult.org.uk/wp-content/uploads/2016/07/Mobility-as-a-Service_Exploring-the-Opportunity-for-MaaS-in-the-UK-</u> Web.pdf

³ ABN Amro (August 2016) 'On The Road To The Circular Car', <u>http://circle-economy.com/thecircular</u>

⁴ Egerton-Read, S. (March 2016) Circulate News <u>http://circulatenews.org/2016/03/electric-cars-will-be-cheaper-than-</u> <u>conventional-cars-by-2022-new-report-predicts/</u>

The UK Government is releasing funding to support an accelerated take-up of hydrogen vehicles and infrastructure ⁵. It will take more coordinated action such as this from central and local governments, and the wider industry including car manufacturers, power companies and infrastructure providers, to help facilitate an increase in adoption of alternative powered vehicles.

New cars entering the market today are already incorporating ever more advanced technology – sensors, parking assist systems, automatic braking – and manufacturers are exploring increased connectivity so that a vehicle's navigation system can detect available parking spaces and can communicate with traffic signals to optimise traffic flow.

A series of trends or broad themes which point to future opportunities or threats, were presented at officer and member steering group workshops to provide context around generating ideas around interventions. It was the intention that by presenting these trends, consideration could be given to more appropriate interventions. Trends were summarised on prompt cards and officers/members were asked to prioritise these (cards are provided in the appendix).

The following trends were selected due to their relevance to transport and to the South West Hertfordshire area. Figure 4.1 shows the how the trends relate to society, the environment and the economy and those which are more cross-cutting in scope.

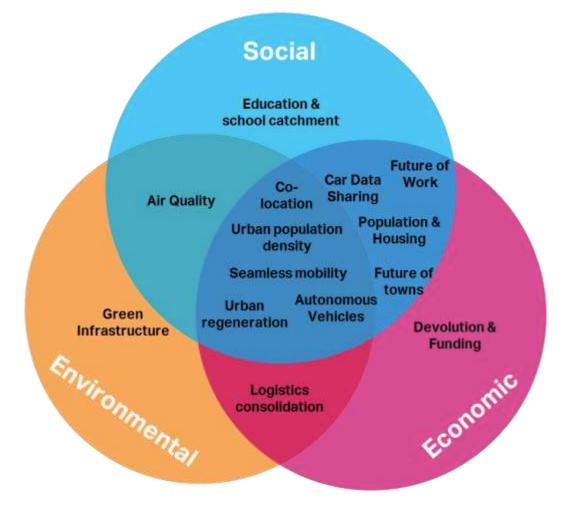


Figure 1- Big Trends (Threats and Opportunities) in relation to society, the environment and the economy

⁵ UK Government (March 2017) £23 million boost for hydrogen powered vehicles and infrastructure <u>https://www.gov.uk/government/news/23-million-boost-for-hydrogen-powered-vehicles-and-infrastructure</u>

Air Quality

With regards to maintaining the population's health and improving the environment, the quality of the air in Hertfordshire has high importance,

Air pollution is costing the UK around £16billion a year, most of which is from health costs. The majority of domestic emissions (93%) are from road transport. Hertfordshire currently has a higher percentage of air pollution related deaths than Essex, Buckinghamshire and Central Bedfordshire, at 5.8%.

Watford has the highest percentage of deaths attributable to air pollution (6.3%) in Hertfordshire.

Autonomous Vehicles

These are vehicles that require little or no human involvement to operate and could run on roads alongside conventional cars and buses. The technology can be applied to private vehicles, buses, HGVs and taxi services, and the car technology could be a serious competitor to existing public transport services. Hertfordshire's extensive road network could be greatly affected by this trend.

Data Sharing and Connected Technologies

Data is collected from vehicles and traffic management, and is able to alert users about road conditions or available car parking spaces. The software will connect to the 'Internet of Things' to then connect data to other vehicles, and potentially make driving safer and reduce congestion.

Co-location of services

Co-location of services or companies into one space within one building could be a solution for areas such as Watford with limited urban land available.

It is important to recognise any emerging proposals to co-locate key facilities and consider these could be supported long term by improvements in transport services.

Devolution and Funding

Devolution is currently happening in Hertfordshire; with Hertfordshire LEP securing a Local Growth Funding of £221.5m combined from funding rounds one and two, and is currently applying for £87.1m further. Since April 2013, Local Authorities in England have been able to retain business rate growth.

The Enviro-Tech Enterprise Zone designation will allow business rate receipts to be retained locally and reinvested in the local area, including improvements to transport infrastructure.

Accessing Education

Schools and school catchment areas are changing and therefore so are journeys to school and work (for parents of school children). Children within the same families are attending different schools, putting pressure on parents on the school run. Where schools are far apart and some distance from home, the private car is likely to be the most convenient method of transport. Local roads can experience congestion during the morning and afternoon as parents park outside schools.

Role of Town Centres

With the combination of the growth of online shopping and the increasing demand for housing due to population growth, the purpose of towns is predicted to change. Towns may become more residential and the convenience of online shopping could influence the decline of shop buildings, which would significantly change the purpose of the town centre and the purpose of local journeys.

Working Patterns

Travel to work areas are expanding and journey lengths for commutes are growing. The three travel to work areas in Hertfordshire are the economic orbits of Luton, Welwyn-Stevenage, and London. Flexibility of where we work is increasing at the same time, so commuting may become longer but it could also be less frequent.

Green Infrastructure

Green infrastructure consists of networks of areas of green or blue space, such as ponds, woodlands or parks, and is located in or around transportation corridors. Green Infrastructure can be used to create mitigation schemes for flooding, improve environmental conditions, and be a form of water management.

Logistics Consolidation

Logistics consolidation allows for goods to be dropped off in an area outside of an urban centre and then be delivered locally by a different mode of transport. It has the potential to enhance the efficiency of goods delivery, reduce traffic, and improve air quality in urban centres. Logistics consolidation could potentially reduce congestion and carbon emissions in town centres and business parks, in particular in Watford and Hemel Hempstead.

Population and Housing

The population in South West Hertfordshire could grow by 140,000 in the next 20 years to 2036. 43% of this growth will be made by the over 65 population, which is predicted to rise from 16% to 21% by 2036.

2,800 new houses per year would be required to be constructed to support a population growth at that rate (at 2.5 persons per dwelling), over double the 1,280 completed in 2015.

Seamless Mobility

Seamless mobility could be achieved by producing fully integrated transport systems that connect multiple modes together. Allowing transport modes to communicate with each other through intelligent transport systems, with assistance from schemes such as integrated ticketing systems and integrated payment options, could significantly influence travel behaviour. In advance of the take-up of new technologies, there is potential to integrate cycling, walking, rail and other modes of public transport within South West Hertfordshire.

Population Density

Increase in population combined with a lack of available space on the ground due to high urban density can lead to towns and cities building upwards to acquire more space for development, both industrial and residential. Changes in urban population density create a demand for changes in the transport networks within the urban area.

Urban Regeneration

Regeneration of urban areas has the potential to revive areas and provoke positive environmental, economic and social change. Brownfield sites can be used to provoke this change, and when combined and integrated with transport systems, can rebuild a community's economic base.

4. Types of Intervention

As discussed in the previous section, there is the prospect of a fundamental change in travel behaviour and mode choice influenced by new technology in the medium to long term.

Autonomous Vehicles, next-generation vehicle connectivity and tele-commuting, big data and 'Mobility as a Service' are just a few examples of potential major shifts.

There is significant uncertainty around when and to what extent these advancements in technology, and how we live and move day by day, will begin to take effect.

This poses a significant challenge to transport planning decision making today. The rapid rate of development in new technologies means that emerging and novel technologies of today could become a common feature of everyday travel within 10 years and potentially much sooner.

However, in recognition of the level of uncertainty surrounding the release and adoption of new technologies and wider trends, the Growth and Transport Plan needs to be based on today's toolbox of interventions, whilst acknowledging where in particular large-scale investment may be required, there is a risk or opportunity that new technologies may supersede or re-shape that investment.

The majority of the challenges the South West Hertfordshire GTP area faces relate in some way to traffic congestion. Existing evidence indicates that current journey patterns will persist and that people will continue to require access to a variety of transport modes.

Investment in highway infrastructure by providing additional capacity for vehicles can encourage more traffic onto certain routes. Gradually over time, any additional capacity could be used up by additional traffic which has been attracted to the route because of reduced journey times or increasing journeys time on alternative routes which have not been improved. Research undertaken for Highways England has indicated that journey times over parts of recently widened sections of the M25 in Hertfordshire are now longer than before so-called Smart Motorway capacity improvements were made ⁶. Although day-by-day journey time reliability was found to have improved, it has been determined that the additional capacity has attracted thousands more vehicle trips onto the road which has resulted in longer journey times for travellers.

An alternative approach which is entirely focused towards investment in non-car services and infrastructure may be an aspiration, especially if this can bring about an improvement in the health of the population and in air quality therefore delivering improvements to quality of life.

This approach assumes that alternative modes have sufficient capacity and can deliver attractive journey times to encourage sufficient modal shift away from the private car. Some people travel by car because they travel significant distances and/or travel at times of the day that would not be feasible by bike, and public transport may not be accessible.

Investment in public transport can be supported by other complementary tools which can be used to reduce demand for road space. These may require a change in legislation and tax arrangements at a national and local level. This could involve raising fuel taxes and car taxes,

⁶ Local Transport Today (March 2017) 'Extra traffic prompts longer journey times on widened M25' <u>https://www.transportxtra.com/publications/local-transport-today/news/53100/extra-traffic-prompts-longer-journey-times-on-widened-m25</u>

increased fees for obtaining a driving licence, or more innovative forms of road pricing (such as London's Congestion Charge). Marketing and travel demand initiatives can seek to incentivise and enhance the attractiveness of non-car modes.

It is likely that whilst there should be caution against building substantial new highway infrastructure, smarter and more selective investment in some roads could continue to represent a pragmatic course of action to help tackle particular congestion challenges in the short and medium term especially where this can be balanced with investment in alternative non-car modes or where alternative modes are unlikely to have a significant effect.

Improving a highway junction could involve building in additional capacity for vehicles, but it could also involve introducing improved traffic signals which optimise the flow of traffic; incorporating priority for buses such as bus lanes, priority signals and banned turns for general traffic (but excluding buses); and incorporating attractive shared pedestrian and cycle crossings along key desire lines between places. Highways investment could help to alleviate alternative routes where the focus of investment could instead be shifted towards cycling and other non-car measures.

A highway junction improvement could be complemented by investment in bus services along a corridor which the junction is located within. At a more strategic scale, improvements to rail services and/or access to railway stations at either end of an inter-urban journey between two towns could provide a more attractive and viable alternative to substantial investment in highway capacity along the entire route between the same towns.

This could result in a re-prioritisation of the transport system – a form of demand management- by ensuring the right types of journeys (short or long distance, for commuting, shopping, school-run purposes etc.) are occurring on the most appropriate types of routes.

Hertfordshire's Transport Vision 2050⁷ advocates a Transport User Hierarchy. This recognises that roads and urban areas have largely been designed to prioritise motorised vehicle movements which has been to the detriment of other modes of transport (walking, cycling and public transport). This has resulted in these alternative modes being relatively less attractive than travel by car and has therefore encouraged higher levels of car use, traffic volumes and ensuing congestion.

Hertfordshire County Council's Vision 2050 advocates a change in priority afforded to various modes which supports improved streets and places, sustainable modes of transport, reliable car journeys, reduced congestion and reduced vehicle emissions. The Vision considers that the hierarchy will be most effective in urban areas where population densities and more localised travel habits can increase the potential for reduced car use and a switch to alternative modes.

The hierarchy is as follows:

- 1) Indentify options for reducing the need to travel
- 2) Optimise travel for pedestrians and cyclists
- 3) Optimise travel by public transport and powered two wheelers
- 4) Cater for commercial vehicles including car based shoppers and visitor access
- 5) Cater for car based commuter access.

⁷ Hertfordshire County Council (December 2016) Hertfordshire Transport Vision 2050 <u>https://www.hertfordshire.gov.uk/about-the-council/consultations/transport-and-highways/hertfordshire-transport-vision-2050.aspx</u>

In the context of the South West Hertfordshire GTP, which encompasses 'inter-urban' journeys between towns as well as 'intra-urban' journeys within towns, the Vision hierarchy approach is highly applicable.

A choice made on the travel mode for the main (longest) part of a journey between towns could be influenced by infrastructure and service provision within towns at either end. If getting to the railway station on foot, by bike or by bus is difficult (e.g. infrequent or indirect bus services, poor facilities for pedestrians and cyclists) this may influence the choice of mode for the main part of the journey – in this instance, a journey between towns which could be made by train may be less attractive than the private car as a result of poor connectivity within a town at either or both ends.

There is likely to be a more complex set of factors which influence mode choice, for example the cost of travel by different modes, access to and cost of parking at the destination, overall journey times and user specific preferences. The extent to which local authorities can influence these wider set of factors can be limited in some cases, however one area of opportunity is through planned developments and wider regeneration initiatives whereby local authorities can engage with private developers and local communities in agreeing and setting the requirements which influence how people travel.

It is important to identify what investment can and should be made in the transport network which is appropriate in terms of the types of journeys it seeks to influence; the cost of that investment versus the likely benefits; and the strategic fit with overarching policy including the Local Transport Plan (and emerging Vision 2050) and Local Plans.

With the above hierarchical approach in mind, Hertfordshire County Council and partners have a toolkit of approaches which could be applicable to help address challenges and positively influence transport and travel behaviour. Some of the more generic types of interventions are shown in the figure (overleaf).



Figure 2 - Current toolbox of transport interventions

Non-physical interventions such as marketing campaigns, travel planning and better information can be used to influence travel decisions either in isolation or in combination with physical interventions.

In addition to the more generic scheme types highlighted above, a desktop search of transport scheme types has been carried out using knowledge and experience from the UK and Europe.

Particular attention has been paid to identifying example of schemes which can be considered to represent best practice and are innovative in their execution. Not all of the schemes will necessarily be applicable to South West Hertfordshire. Neither will they necessarily be proposed as part the GTP.

Furthermore the list is not exhaustive. For instance, it does not cover more traditional transport interventions such as junction capacity improvements, traffic signal optimisation, pedestrian crossing improvements or speed management interventions.

Each scheme type is described in the following pages, including hyperlinks to web sources for further information on the schemes. A simple **SWOT** analysis has been conducted to identify potential **Strengths**, **Weaknesses**, **Opportunities and Threats** associated with each scheme type. These criteria will enable the features of particular schemes to be matched to the features of particular challenges.

The following scheme types are not described in any order of preference.

Bus Rapid Transit ('BRT')



Google Images

BRT is a form of urban rapid transit in which buses run regularly in exclusive bus priority lanes or segregated bus corridors to avoid traffic, allowing for a high speed and high quality service. See below for SWOT analysis on the scheme idea.

Case studies of BRT include: Zuidtangent, Amsterdam; Nottingham Eco-Expressway.

https://www.engineersireland.ie/EngineersIreland/media/SiteMedia/cpd/training/Seminars%2 Otemp/BRT%20Seminar/3-David-van-der-Spek.pdf

Strengths	Weaknesses
Potential to enhance connectivity;	May require destroying natural areas (e.g.
Segregated bus lanes could reduce congestion;	verges and hedgerows) to create room for bus priority lanes;
More reliable bus journey times because services are separated from general traffic.	Heritage constraints may not always allow for full length bus lanes.
Opportunities	Threats
Hybrid or electric buses could reduce air pollution along corridors;	Private car could be a threat if it is cheaper or faster and therefore more desirable.
Could create revenue from ticket prices;	Actual uptake of service may not justify the
Potential to be on school bus routes;	initial capital investment and cost to the environment.
May reduce vehicle emissions if modal shift achieved, congestion reduced and bus journeys are more free-flowing.	is

Form part of a wider branded network of exemplary PT routes distinguished from 'ordinary' bus routes.	
Reduce car travel and ensuing congestion.	

Guided Busway



Google Images

A guided busway is a form of BRT in which the vehicles run on segregated paths that are designed so that small guide wheels attached to the bus can hook underneath the path and the bus therefore can guide itself along the busway 'track'. This can enable buses to travel at higher speeds than they would on ordinary roads. Vehicles can also divert off the busway at designated points to run on normal roads. Guided busways can enable buses to run at higher speeds, two-way movements. It is a scheme more suitable for longer distances, each between towns or across major urban conurbations. See below for SWOT analysis on the scheme idea.

Case studies of guided busways include: Cambridgeshire Guided Busway; Luton to Dunstable Guided Busway.

http://www.thebusway.info/about.shtml

https://www.luton.gov.uk/Transport_and_streets/Transport_planning/Luton%20Dunstable%2 OBusway/Pages/default.aspx

Strengths	Weaknesses
Limited stops to provide an express (rail-like)	May require destroying natural areas to
service;	create room for busway (e.g. highway verges,
Traffic free on guided sections to achieve	railway embankments) depending on type of
more reliable journey times and timetables;	alignment;
Potentially less infrastructure and lower	Heritage constraints may restrict may not
operating costs required compared to light	always allow for full length busways to be
rail;	implemented;
Passengers feel more comfortable using a	Pollution could be created during construction;

service which has a clear path free of traffic.	Requires more infrastructure than BRT. Depending on the alignment, guided routes may be set away from population centres thus creating longer distances for passengers to walk to bus stops – may still not attract the same walking catchment areas as a railway (e.g. 800m – 1km). Limited stops to provide an express (rail-like) service. May still suffer from an image problem like 'ordinary' buses.
Opportunities Flexibility – core guided route complemented by on-road feeder routes. Opportunity to create multiple services with very high frequencies on core guided section. Hybrid or electric buses could reduce air pollution and boost the image of the guided bus as a distinctive, innovative transport service compared with traditional buses; Could create revenue from ticket prices; May reduce exhaust emissions if substantial modal shift is achieved, congestion reduced and bus journeys are more free-flowing.	Threats Private car could be a threat if it is cheaper or faster and therefore more desirable. Buses could be affected by congestion on the non-guided sections much like normal bus services – this could undermine the reliability and attractiveness of the busway services Incidents have occurred on existing busways, including buses running off the guideway tracks and vandalism. There have been a few instances where private cars have entered the guideway in error. This could create a significant maintenance burden on the county council/operator(s). New technology may require driver training leading to higher operating costs. Actual uptake of service may not justify the initial capital investment and cost to the environment.

Sharing Buses

Sharing bus organisations run voluntary car services to provide people living in rural areas with accessibility to attend health appointments. They also exchange different groups contact details, and when the minibus is not in use it can be shared amongst the community. See below for SWOT analysis on the scheme idea.

Case studies of sharing buses include: ACRE Network, Gloucester.

http://www.acre.org.uk/cms/resources/policy-papers/new-acre-transport-ppp-rgb-2014.pdf

Strengths	Weaknesses
Potential to increase community involvement and promote cohesion; Buses could be used for other purposes when not being used as part of scheme;	Requires volunteers to run who may not always be available to run a consistent, reliable service;
Reduces private vehicle trips on the road network; Volunteers reduce operating costs.	
Opportunities	Threats
Bus-shares could reduce emissions that might be created by individual car users (although users are less likely to have access to a car); Potentially gives people who may not usually be able to access a key service an opportunity to do so; Could reduce feeling of isolation in rural areas.	There may not be sufficient volunteers to run the service regularly, risking the longevity of the measure; Requires Council resource to promote and maintain the service.

Emission Zones / Congestion Charges



Google Images

Congestion charging involves applying a fee to vehicles that are driving within an agreed designated zone between set times and days of the week, usually during peak hours and during the day, or at all times of the day. It is cheaper if users register for Congestion Charge Auto Pay. Exemptions can be made to low emission vehicles. See below for SWOT analysis on the scheme idea.

Case studies of congestion charging include: Congestion Charge, London; Ultra Low Emission Zone, London.

https://tfl.gov.uk/modes/driving/congestion-charge

https://tfl.gov.uk/modes/driving/ultra-low-emission-zone

Strengths	Weaknesses
Could reduce congestion;	Growth in number of false number plates;
Potential to reduce air pollution;	Potentially expensive to administer.
Could encourage car users to take more environmentally friendly modes of transport.	Unless combined with an improved and attractive public transport and Non Motorised User (NMU) offer to be most effective, opponents may argue that the congestion zone is harmful to the local economy.

Opportunities	Threats
May raise revenue which can be used to invest in alternative modes of transport such as bus; Might reduce air pollution due to modal shift to public transport; Congestion estimated to cost UK economy £20bn a year (time wasted in businesses etc.) so reducing it will help to lower this cost; Encourages an uptake in cycling and walking, which could promote more physical activity in the community.	Potential for diversions and displacement of parking around the zone to be made and therefore causing congestion on other roads. Could limit access for freight to local businesses within the controlled zone.

Organised Road Closures

Residents are able to apply to have their street closed for a certain length of time, as long as the road is not a main road or bus route. Residents are still able to drive to and from their houses at a max speed of 5mph. The closed street then becomes a "play street" which enables children to play with their neighbours, potentially increasing the sense of community. See below for SWOT analysis on the scheme idea.

Case studies for organised road closures include: Hackney Play Streets, London.

http://www.hackneyplay.org/playstreets/home/

Strengths	Weaknesses
Increased social interaction within	Some vehicles may have to be diverted;
community; Increase quality of life;	Responsibility to organise road closure can lie on one individual.
Increases awareness of road safety and the streets not exclusively used by motorised vehicles.	A one-off event - significant organisation required if it were to become a regular feature – one day may be insufficient to encourage a change in behaviour for a prolonged period.
Opportunities	Threats
Could encourage walking or cycling shorter distances;	Lack of participation from all residents may undermine the event.
Can be incorporated within walking to school schemes;	
Potentially encourages children to be active and to exercise;	
Encourages stronger ties within communities if they are also engaged to help initiate and organise schemes;	
Change perceptions - streets may feel safer.	

Cycle Highways

Cycle highways are segregated cycle paths that are for cyclists and pedestrians only. The paths often run along old railway lines or on segregated routes through urban areas and can be used by commuters and for recreational purposes. See below for SWOT analysis on the scheme idea.

Case studies for cycle highways include: Bike Autobahn – Radschnellweg RS1, Germany; The Green Path, Copenhagen.

http://www.rs1.ruhr/

http://www.kobenhavnergron.dk/place/den-gronne-stinorrebroruten/?lang=en

Strengths	Weaknesses
May encourage more active lifestyles;	Would have to ensure that adequate facilities
Cycling is arguably cheaper than driving;	for cycling are available at work places (such as storage, showers etc.) to achieve modal
Reduced risk of collision compared with	shift.
cycling on the road alongside motorised traffic;	Can be difficult to implement safe and attractive facilities at complex junctions.
Provides more opportunity to cycle for those people who are less confident to cycle on the road;	Ongoing council cost for upkeep and maintenance.
Requires less space (width) than roads for larger vehicles.	
Opportunities	Threats
Modal shift to cycling could reduce exhaust	May be difficult to achieve modal shift;
emissions on parallel roads;	Constrained urban road network may make it
Could encourage exercise and healthy lifestyle through making cycling longer	difficult to provide an exemplary facility of a higher quality than a conventional cycleway.
distances more attractive.	
Could be successful if complementary 'stick'	
measures are introduced to make driving less attractive particularly for journeys that could	
be made by bike.	

Cycle Bridge



Google Images

High quality cycle bridges can be provided over major roads and complex junctions to allow cyclists to cross/avoid complicated junctions safely by using a bridge. Measures can be made to make it more attractive to cyclists of all abilities, such as lowering the road underneath the bridge so that the gradient that cyclists have to climb is reduced. See below for SWOT analysis on the scheme idea.

Case studies for cycle bridges include: Hovenring Circular Cycle Bridge, Netherlands.

https://hovenring.com/

Strengths	Weaknesses
Could encourage active lifestyles; Potentially accessible for cyclists of all abilities; May create a landmark feature; Junction could connect towns or neighbourhoods together.	Could require significant construction works which could be very disruptive. Typically a high capital cost and difficult to quantify the benefits needed to justify the cost.
Opportunities	Threats
Encourages cycling along commuter routes instead of driving and getting stuck in traffic –	Hovenring in Netherlands required significant maintenance early on after opening.

congestion costs businesses money;	Lack of use could create a 'white elephant'
Encourages exercise and healthy lifestyle	especially if connecting routes and wider
through making cycling longer distances more	network is not sufficient to encourage modal
accessible.	shift.
Opportunity to form part of an exemplary, distinct cycle network more on a par with road, bus and rail routes.	

Cycle Hire Scheme



Google Images

Cycle hire schemes can either involve non-electric or electric bikes that are located at docking stations in set locations across an urban area. They can be hired out for certain lengths of time for set amounts of money. Arguably it is a cheaper alternative to buying a bike in the short term. See below for SWOT analysis on the scheme idea.

Case studies for cycle hire schemes include: Santander Cycles, London; Co-Bikes (Electric), Exeter

https://tfl.gov.uk/modes/cycling/santander-cycles

https://www.co-bikes.co.uk/

Strengths	Weaknesses
Could encourage active lifestyles;	Can be inconvenient if there are no docking
Potentially provides people who do not own a bike with a flexible means to cycle from A to B	spaces or insufficient number of bikes available;
at an affordable price;	The scheme may be less effective if there is
Could create positive publicity for cycling.	insufficient supporting infrastructure such as cycle lanes and safe crossings.
Electric bikes could be additionally attractive especially in areas with hilly terrain.	Requires other facilities such as showers and changing rooms at key destinations.

Opportunities	Threats
Could encourage cycling instead of using vehicles that create harmful exhaust emissions; Potential to create revenue from bike hire; May encourage cycling on journeys that would have been completed by car or public transport otherwise; Physical and mental health benefits could occur.	 Arguably less convenient than owning a bike; May not be suitable for commuter routes unless adequate docking space at employment hubs were provided. May not generate sufficient revenue to cover maintenance and operating costs. Risk of inexperienced cyclists using the roads and creating a safety risk to themselves and others. Potential reduction in public transport revenue as people cycle instead of using the bus for shorter trips.

Cycle Lanes on Roundabouts

Cycle lanes on a roundabout allow for cyclists to cross junctions with more ease whilst feeling safer, encouraging urban journeys to be taken by cyclists. Cyclists would have lanes that only they could use and the junction would be signalised to allow cyclists and cars to turn at different times. See below for SWOT analysis on the scheme idea.

Case studies for cycle lanes on a roundabout include: Queens Roundabout, Battersea.

http://www.wandsworth.gov.uk/news/article/12467/work to begin on innovative cycle frien dly roundabout

Strengths	Weaknesses
Could encourage active lifestyles; Potentially accessible for cyclists of all abilities; Could make cycling across junctions safer and easier; Reduce the risk of road collisions.	In the example of Queens Circus Roundabout, greenspace in the centre of roundabout had to be removed.
Opportunities Arguably encourages walking or cycling from town to town across large junctions or within an urban centre; Encourages cycling along commuter routes instead of driving and getting stuck in traffic – congestion costs business money; Cycling to school would be safer and more accessible for cyclists of all abilities if on school route; Encourages exercise and healthy lifestyle	Threats As an unconventional, unique layout, this may create confusion from different users, potentially heightening any risk of collisions occurring. If the junction is mainly used by longer distance trips, there may not be sufficient modal shift from car to cycle as cycling longer distances may not be suitable for all.
Reduce severance and potentially encourage community coherence.	

Underground Bike Storage

Underground mass bike storage areas are spaces in which commuters can leave their bikes for the day. The storage vaults can have lockers, showers, bike racks, repairs area, CCTV surveillance, and keyfob entry. Such facilities can be standalone or incorporated within an office building or station facility. See below for SWOT analysis on the scheme idea.

Case studies of underground bike storage include: Midtown Cycle Vault, London.

http://cyclevault.inmidtown.org/index2.php

Strengths	Weaknesses
Secure, sheltered storage for bikes creates reassurance for users that their bikes will not be stolen.	Could limit cyclists to location of storage hubs – the hub may not be conveniently located for all for users;
Opportunities	Threats
Potential to encourage cycling for all or part of journeys that would normally be taken by car; Might encourage exercise and healthy lifestyle through making cycling more accessible and attractive at the other end of the journey. Potential to combine with a cycle maintenance retailer hub to reinforce an overall cycle culture. Potential to combine with employer-led incentives to encourage employees to cycle to/from work	Cost of maintaining and operating facilities may not be sufficiently covered by revenue generated by cycle customers.

TfL 'Mini-Holland' Schemes

TfL provided funding to three London boroughs to create packages of innovative schemes that encourage cycling by making it safer and more convenient. The London Borough of Enfield (Cycle Enfield) is adding segregated cycle routes to link key places in the town centre. The London Borough of Kingston (Go Cycle) has planned to build a riverside cycle route, the "Thameside Boardway". The London Borough of Waltham Forest (Enjoy Waltham Forest) has begun to construct a fully segregated bike route along Lea Bridge Road. All three are adding cycle storage hubs at train stations in the boroughs. See below for SWOT analysis on the scheme idea.

https://tfl.gov.uk/travel-information/improvements-and-projects/cycle-mini-holland
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Strengths	Weaknesses
Could allow for areas to plan solutions to cater to their specific needs and issues in the borough; Potential to bring benefits to community; Modal shift could become more achievable by all.	Arguably only suitable for local challenges. Uncertain benefits in terms of mode shift to cycling and walking in relation to potentially high implementation costs.
Opportunities	Threats
Could be used as a tool for regeneration; Could incorporate journeys to school schemes; Could be used to educate people on sustainable transport; Encourages exercise and healthy lifestyle when travelling.	The convenience of car travel could be a potential threat. Resistance from local businesses if road system is significantly changed.

Cycle-Rail Integration

Cycle-rail integration schemes involve train operators providing cycle hubs and improved cycle parking at major rail stations. This could encourage users to cycle to their nearest rail station and be able to leave their bike there safely. See below for SWOT analysis on the scheme idea.

Case studies of cycle-rail integration include: Abellio Bike & Go scheme.

https://www.abellio.com/sites/default/files/downloads/cycling_the_abellio_way.pdf

Strengths	Weaknesses
Seamless mobility;	Success is dependent upon a safe and
Multi-modal transport;	attractive network of cycle links to/from the station – not just investment at the station
Benefits environment by encouraging a	itself.
mode shift from private vehicles to cycling to access rail stations.	
Opportunities	Threats
Potential to connects economic hubs	Car travel as an alternative door-to-door
together along with residential areas if appropriate connections are in place;	travel mode may be more appealing if there is adequate parking supply at the rail station
	(cycle investment could be maximised if car
Encourages active lifestyle on daily commute;	parking provision is controlled).
Opportunity to reduce demand for car	Will not encourage an uptake in cycling if the
parking (and future expansion).	connecting cycling infrastructure to stations
	does not exist.

Light Rail



Google Images

Trams, metros and other forms of light rail are all railway operations that use vehicles that are generally smaller than traditional heavy rail. Tram tracks can be built on streets that cars also use, whereas tram-trains can use tram tracks as well as conventional rail tracks. See below for SWOT analysis on the scheme idea.

Case studies of light rail include: Tram Train, Sheffield; Nottingham Express Transit Tram.

https://www.sypte.co.uk/tramtrain/

http://www.thetram.net/

Strengths	Weaknesses
Connections to urban centres, main stations or other modes of transport; Spacious vehicles, room for luggage; Ground-level access (accessible for all); Stops are more integrated into urban environment than train stations.	High cost/train-km to construct and operate; Difficult to integrate into existing road network (particularly historical roads), stops and routes can conflict with cycle lanes and incur loss of parking and road space which may be viewed negatively especially by local businesses; Noise and vibrations generated by moving trams can be intrusive especially in built up areas.

Opportunities	Threats
Reduction in air pollution due to modal shift to public transport within urban area; Opportunity to provide additional public realm improvements as a result of re- designing streets and stops for light rail infrastructure; Can encourage increased development close to rail lines and potential uplift in land values.	Other similar schemes that do not require rail infrastructure (such as BRT) are cheaper/quicker to implement.

Park and Ride



Google Images

Park and ride allows for car users to park cars in designated car parks, usually on the outskirts of urban centres or the edges of towns, and then use a dedicated bus service to access the urban centre. There are different systems in place, with some sites charging separately for parking and for the bus, and others only requiring the payment of a bus fare. See below for SWOT analysis on the scheme idea.

Case studies of park and rides include: Cambridgeshire Park and Ride; Nottingham Express Transit.

http://www.cambridgeshire.gov.uk/info/20149/park and ride/556/park and ride

http://www.thetram.net/park-and-ride.aspx

Strengths	Weaknesses
Revenue could be created through ticketing;	Maintenance costs could be high;
Could create control and ownership of car parks; May reduce congestion in urban centres;	Not competitive with private car travel to urban centres if the connecting public transport service does not provide an equivalent or shorter travel time;
Less space for parking required in urban centres.	May encourage inter-urban journeys by car rather than by longer distance public transport.

Open Data

Open data is information that can be used freely by anyone. A way this can be provided for is through mobile app technology. Apps can vary from parking apps that alert users on areas where there are parking spaces available, apps that help users to plan a journey by public transport, cycling or walking, or apps that encourage users to share lifts with people making similar journeys, to mention a few. See below for SWOT analysis on the scheme idea.

Case studies of open data include: Citymapper; Liftshare; Parking App AA.

https://citymapper.com/london

https://liftshare.com/uk

http://www.theaa.com/apps/parking-app.html

Strengths	Weaknesses
Easily adaptable to changes in transport; Potentially encourages the use of alternatives to car; Easy access to live travel information to enable users to make wiser mode choices and create a more efficient transport network; Designed to make travel easier and more convenient.	Requires users to own a smart phone or tablet to use apps; Travel apps often use a lot of battery life on smart phones; Parking/driving apps could potentially encourage using a mobile phone whilst driving.
Opportunities	Threats
Could encourage use of non-motorised modes of transport;	May not be able to keep up with changes in technology;
Has potential to reduce number of cars on the road;	Arguably not accessible for all – technology may be a deterrent for some people.
Could encourage active lifestyle.	

Walking Bus

A walking bus is a scheme primarily used for school journeys. It requires volunteers and allows children whose parents who are unable to walk them to school to be able to walk with a group that is supervised by adults. It is designed to reduce the number of car trips to schools and encourage a more active lifestyle for children. See below for SWOT analysis on the scheme idea.

Case studies of walking buses include: Walking Buses, Medway.

http://www.medway.gov.uk/roadsandpavements/roadsafety/travellingtoschoolsafely/walkingbuses.aspx

Strengths	Weaknesses
Community involvement might be encouraged as a result;	Reliance on active volunteers to be successful;
Could encourage active lifestyles; Low or zero cost to implement.	Arguably not accessible for all, such as disabled or those who live on a road without proper pavements; Requires the walking route to school to be safe and accessible for pedestrians and prams.
Opportunities	Threats
Could encourage school children to take modes of transport daily that encourage healthy and environmentally conscious lifestyles;	Potential road safety risks.
Could encourage active lifestyles from a young age that children continue into their adult life.	

Area-Wide Wayfinding

Wayfinding schemes involve providing sufficient signage at public transport stations or along routes in urban centres that could be walked easily rather than driven. Information can include a local map of key destinations and walking times to nearby locations such as rail stations. For example, a sign that has the walking journey time to the closest train station from a bus stop could encourage users to walk rather than waiting for the bus if it is only a short walking distance away. See below for SWOT analysis on the scheme idea.

Case studies of wayfinding include: Legible London, St Albans City Centre Wayfinding Signage

https://tfl.gov.uk/info-for/boroughs/legible-london

http://www.spectrumarchitectural.co.uk/news-for-architects-and-designers/wayfindingsigns-architectural-signage/

Strengths	Weaknesses
Could be low cost; Potential to encourage exercise; Could encourage alternative modes to car	May not always be adequate footpath width to provide regularly spaced signage; Difficult to fully quantify the benefits of investment in monetary terms.
Opportunities	Threats
Might encourage active lifestyle choices; Could encourage more visitors to an urban centre as it is easy to navigate around the centre and visit places of interest; Opportunity to introduce a local branding scheme associated with the signage that creates a sense of identity for a town; Could form part of a wider public realm scheme to enhance the urban environment and make it more attractive to visitors.	Prone to vandalism; Walking and cycling routes associated with the signage and maps need to be accessible for all levels of mobility, therefore may require some infrastructure improvements to support the wayfinding scheme.

'Paris Breathes'

Certain routes in Paris are closed to traffic on the first Sunday of every month for a day to address air pollution issues. A trial in September 2015 saw 40% drop of harmful exhaust emissions in parts of the city. See below for SWOT analysis on the scheme idea.

http:/	/next.pa	aris.fr/e	enalish
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Strengths	Weaknesses
Potentially encourages active travel as an alternative to car travel;	Could cause congestion on alternative routes;
Sense of community could be encouraged; Could improve air quality.	May not be supported by local businesses along the route.
Opportunities	Threats
Benefits to air quality and the quality of the natural environment by reducing congestion in the area surrounding the closed road could be achieved; Improved air quality could happen as a result;	Accessibility issues for people who rely on car travel that cannot walk/cycle.
Increases community awareness of the impact of car traffic on air quality and urban environments in general.	

Transit Orientated Development



Google Images

Rather than enhancing public transport routes to key destinations, an alternative could be to turn an existing station into a destination. This could support wider regeneration of an area. This would require cooperation between transport operators, local authorities and land owners. At a smaller-scale, station refurbishments and forecourt improvements can enhance stations as key gateways into towns. See below for SWOT analysis on the scheme idea.

Case studies of railway stations as destinations include: King's Cross area, Hatfield Station redevelopment

https://www.kingscross.co.uk/

http://www.thameslinkrailway.com/about-us/news/hatfield-partners-celebrate-completionof-station-redevelopment/

Strengths	Weaknesses
Railway stations could become more desirable which may encourage more rail trips;	Likely to be expensive (especially if a large scale project is required) and require significant developer investment;
Could be used as a tool for regeneration;	Amount of change may be limited by
Potential for benefits to the local economy;	heritage constraints associated with the station and local area;
Could discourage the need for car travel.	Some of the benefits may be difficult to quantify.

Opportunities	Threats
May encourage an uptake in public transport Opportunity to regenerate an area if successful, particularly if the right balance of housing and retail is provided;	challenge, and in most cases developer investment will be required.
Opportunity to provide more affordable housing in a very accessible location;	
Encourage economic growth by attracting new businesses to the station;	
Improved air quality from reduced need for private vehicle travel;	
Opportunity to implement car-free development.	

Integrated Ticketing (e.g. Oyster Card)



Google Images

Integrated ticketing such as London's Oyster cards and other public transport cards allow for users to top up their card before use and travel on any public transport mode available in an urban area with more ease by tapping in and out of each station they begin and end at. Oyster cards can be used on buses, trains, trams, DLR and the London Underground within the London travel zones. Users get charged per journey they make or have the option to buy daily, weekly or monthly travel cards. Furthermore, the same ticketing system now allows users to use their own contactless bank cards to tap on to the system, reducing the need for a dedicated travel card. Either way, this is still a useful system as it allows for seamless travel between modes without having to buy separate tickets. See below for SWOT analysis on the scheme idea.

Similar case studies include: Charlie Card, Boston.

https://oyster.tfl.gov.uk/oyster/entry.do

http://www.mbta.com/fares and passes/charlie/

Strengths	Weaknesses
Could provide benefit to a wide area;	Threat to users privacy could be an issue;
Multiple modes of transport can be used on the same ticket;	May not cover whole length of all journeys if journeys occurring within urban areas;
Arguably more convenient and cost effective than buying multiple tickets per journey; Travel data collected from the system can be useful information for other government studies into travel patterns and behaviour.	Difficult to implement as it requires integration across a number of separate public transport operators.

Opportunities	Threats
Might encourage wider use of public transport; Reduction in number of printed tickets; Integrated ticket/card is cheaper than standard tickets and therefore arguably more	Users may forget to touch out at stations without physical barriers and charged penalty fares as a result; Faulty equipment can sometimes charge users the maximum fare;
appealing.	Not all transport operators may wish to participate therefore the card could become less attractive to users.

5. Officer and Member Workshops

Overview of Workshops

Both the Officer Steering Group Workshop and the Member Steering Group Workshop were the third meeting in a series of workshops which have aimed to discuss the South West Hertfordshire Growth and Transport Plan.

The Officer Workshop was held on the 30th September 2016 in County Hall, Hertford and a replica of this workshop was held on the 20th October 2016 in AECOM House, St Albans for officers from Dacorum.

The Member Workshop was held on the 21st October 2016 at County Hall, Hertford.

Aims and Objectives of Workshops

The aims of the workshops were as follows:

- To introduce the South West Hertfordshire Growth and Transport Plan Objectives to the attendees;
- To consider the big trends in transport that may influence scheme identification;
- To consider the scope of previously identified challenges and identify whether they are local or strategic or both to shape our consideration of schemes;
- To discuss potential scheme ideas in response to the challenges identified.

Structure of Workshops

The workshops began with an introduction to the Growth and Transport Plan and the objectives that were in place at the time of the meeting. These were discussed and suggestions for changes were noted.

The scheme cards displayed in Appendix A were then used to discuss schemes in transport that had been successful in the UK and other European countries.

Attendees then discussed the scheme concepts and how they could be used in the Growth and Transport Plan and how they could be applied to the challenges identified.

Challenges in South West Hertfordshire were then identified using the challenge cards shown in Appendix B. Participants were divided into groups, which each group representing a town or corridor.

The big trends in transport were then acknowledged using the Big Trends cards displayed in Appendix C, and were then discussed amongst attendees, with an opportunity to give feedback to the whole group at the end of the discussion.

Key Points made in the workshops

It was identified in the meeting on the 30th September that some of the objectives in the GTP needed altering to become more clear and specific to South West Hertfordshire and the GTP, in particular Objective F, which focuses on safety and the perception of safety. It was also suggested by officers that the safety of car users cannot be ignored, but it was concluded that the purpose of the GTP is to focus on local and strategic issues that other documents

and plans may not cover in as much depth, and therefore the safety of pedestrians and cyclists is the key focus of the safety objective in the GTP.

A general theme that was discussed in the workshops was that there is an existing desire for modal shift in transport away from the car in South West Hertfordshire, and therefore there is also a demand for schemes that allow a sufficient modal shift away from the car by providing attractive alternative options including in particular buses for inter-urban travel.

The importance of ensuring that transport in South West Hertfordshire provides equal opportunities for all by improving accessibility was highlighted and discussed.

As part of the discussions around the big trends, the importance of the changing trends in transport was highlighted, with particular emphasis around autonomous vehicles and the impact they may have on future transport schemes.

Whilst discussing potential scheme ideas to help resolve the challenges, the potential for open data in the form of apps that provide options for schemes, such as lift share and wayfinding, was addressed. It was mentioned that there are already some apps that provide these features but many people are not made aware of them, which could possibly be a solution that could be achieved by advertisements and promotions, which is out of the GTP's control.

Another key point made in the workshops was that transport must support planned new urban developments – both commercial and residential – as well as developments that are currently being built or are planned for in the future.

The need for enhanced connections to Maylands (eastern Hemel Hempstead) and Watford business parks (western Watford) from residential areas, the respective town centres, railway stations and neighbouring towns was discussed on multiple occasions. It was considered that these employment areas are vital to the local wider regional economy, and therefore improved connectivity not just by car is a significant priority.

A key point that was brought up in the workshops was the idea of shifting the car outside of towns to reduce urban congestion and therefore improving air quality, which would help to achieve Objective D. This could be done by creating Park and Rides and transportation hubs on the outskirts of urban centres such as Watford and Hemel Hempstead.

Many participants raised the issue about why people travel and that there may be increased opportunity to reduce the need for travel. This could be done by enhancing amenities in residential areas, changing the way local services are offered, improved technology and more flexible working arrangements. Whilst these measures are outside the control of the GTP, they could play a significant part in people's travel needs and choices in the future.

When developing transport schemes, it was mentioned that there is a need to acknowledge the impact that the weather and the seasons have on transport choices made by the public. For example, on a cold, rainy day people may be less likely to want to cycle even a short distance. Therefore the provision for cars and the opportunities for improved bus services should not be overlooked.

Appendix A

Workshop prompt cards – Scheme Ideas



Bus Rapid Transit Zuidtangent, Amsterdam

- 41km in length, 23km core section.
- Regular service, 8-10 buses/hr on weekdays, runs 24/7.
- Park and Ride facility for bikes and cars.
- Costs 280 million euro (publicly funded).



Relevance

 Fills gap between regular buses and light rail, and connects towns efficiently. Reduces the amount of traffic in town centres through park and ride facility.

Scheme Idea #2

Cambridgeshire Guided Busway

- 25km in length, world's longest guided busway route.
- Affordable travel cards available.
- Park and Ride facility cheaper than parking in town.
- Accessible to all users.
- Estimated to cost £65 million, actual cost £181 million.

Relevance

 Provides high quality inter-urban transport while minimising environmental impact.



Bike Autobahn - Radschnellweg RS1

- Traffic-free bicycle highway, mostly run on unused railway tracks.
- Eventually will be 62 miles, with width of 4 metres, giving space to overtake.
- Should take over 50,000 cars offroads.
- Mostly lit, and covers routes commuters use.
- · Aided by the popularity in electric bikes.
- Cost for 62 mile route: 180 million euro.

Relevance



 Providing a high quality segregated route could make cycling attractive for longer inter-urban journeys.



Scheme Idea #4

Innovative Circular Cycle Bridge - Hovenring

- Suspended with 24 steel cables, circular bridge deck, 70m high pylon.
- · Easy, safe way to crossjunctions for cyclists.
- Has become a landmark.
- Road lowered to reduce gradient for cyclists, therefore easy for cyclists of all abilities.
- Cost: 6.3 million euro.



Relevance

 This type of bridge gives cyclists the opportunity to cycle alongside busy roads, and relieve them of the uncertainty of having to cross busy junctions.



Santander Cycles

- Proven to be popular and successful.
- In 5 years there have been 43 million hires.
- Very affordable. Prices start at £2.
- Picking up a bike nearby and cycling to work can be more direct than other modes of transport.
- Cost: £140 million for 338 docks.



Relevance

 Boost in cycling popularity is filling up bike racks at stations. Flexible hire options, gives practicality of being able to cycle without needing to store bikes at destination.

Scheme Idea #6

Green Routes, Copenhagen

- Green routes are several km in length. 6km has been financed, a further 51 km planned.
- Encourages walking and cycling through countryside.
- Money saving alternative to driving.
- Encourages using safer methods of transport for all purposes.
- Costs 1.25 million euro per km, 40 million euro extra for bridges.

Relevance



Green routes could connect towns through the countryside, providing both
practical commuting routes and attractive leisure facilities to raise the profile of
cycling as an activity.



Tram Train, Sheffield

- Expected opening 2017 with three services per hour.
- Will connect Supertram route in Sheffield city centre to Rotherham Central and Parkgate.
- Total of 48 stations and cost £51 million.
- Provides both high speed travel between urban areas and seamless connectivity into urban centres.
- Uses tracks of existing train lines.

Relevance



 Would be used for inter-urban and intra-urban connections. If tram network through towns not possible, use of Park and Ride on outskirts an alternative. Possibility to expand rail lines (such as Abbey line) into urban centres.



Scheme Idea #9

Destination Hereford, Herefordshire

- Reduces congestion and improves journey choices.
- 40 Park and Choose sites introduced, allowing users to complete their journey by car-share, cycling or bus.
- Opened December 2013, connected to National Cycle Network.
- Council awarded £4.97 million from Local Sustainable TransportFund.



Relevance

 Flexible variation on park and ride model, which provides more choice in implementation and cold be adapted to suit South West Hertfordshire.



Open Data: Citymapper App

- Over 35 cities worldwide use this app.
- Covers bus, ferries, bike/car sharing, Uber, metro systems and locations of bike docks.
- Shows quickest and cheapestroute with prices.

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Relevance

- This simple app is based on open data sources and simplifies complex multimodal networks to provide users with a custom journey plan.
- Expansion of Citymapper to Hertfordshire could increase the profile of public transport networks, increase patronage and improve integration with TfL services.

Scheme Idea #11		
 Lift Share (App) Over 400,000 members. Offer and request lifts. 38 million empty car seats each rush hour on UK roads. Price calculated by HM Revenue and Customers Approved Mileage payment allowance. 	Your journey details First @ (pestook, strut or tour) To @ (pestook, strut or tour) To @ (pestook, strut or tour) Share as a @ Onew and/or pacenger Onew and/or pacenger Driver Pacenger Jurney fragueny @ new off Outpacendeduct Magnine @ new off Outpacendeduct	Add a journey
 Relevance Opportunity to reduce car ownership as part of Reduces congestion and carbon footprint. 	Travel schedule & savings	



Park and Ride (Tram), Nottingham

- Simply park your car for small fee, and travel the bus, train or tram.
- 7 Park and Rides, with 5,000 car spaces.
- Park and Ride sites are served by tram and bus services.
- Cost £570million, with £371 million DfT funding.



Relevance

 Discourages drivers to use city centres and reduces congestion in urban centres with street layouts unsuitable for car traffic.



Scheme Idea #13

Oyster Card, London

- The Oyster card well known and used in all of London, from zone 1-9.
- Used for bus, tram, tube, DLR, TfL and over ground.
- Easy top up in stations or online.
- Can also use contactless bank card, smart phone or smart watch.
- Already ready to be used in train stations in SW Herts, would not be costly to activate.

Relevance



 Extending the oyster outside of London would make it easier for people to travel. It would make travel on buses/trains more convenient.



Paris Breathes

- Certain routes closed to traffic on first Sunday of every month for a day, to address air pollution.
- Museums offer free entry on the same day.
- Trial in September 2015 saw 40% drop of harmful exhaust emissions in parts of the city.



Relevance

 Major roads are closed, forcing people to take alterative routes to work and raising awareness of the impact of traffic on the city.

Scheme Idea #15

The Dome, Watford

- Large junction that has continually been adjusted to meet traffic demand.
- Changes have included improving cycling network, adjustments to traffic lights and widening roads



Relevance

 The Dome Roundabout is a congestion hot-spot. Successive attempts to provide additional highway capacity at this location have not reduced congestion at the junction.

Appendix B

Workshop prompt cards - Challenges



Challenge #1

Congestion between Watford and St Albans

Symptom:

 Congestion on A406/A414 between Watford and St Albans, in particular Park Street Roundabout and M25 J21a.

Causes:

- Demand on the road network between Watford and St Albans exceeds capacity.
- Capacity at Park Street Roundabout is further constrained by the high number of trips eastwest on A414.
- Abbey Line and bus services not frequent enough to provide an attractive alternative, and PT journey times are longer than by private car.
- Lack of connectivity between St Albans Abbey station and St Albans City station.



Flow proportions on Park Street Roundabout, A414 eastbound, AM Peak (0800-0900) . Source: COMET Select Link Analysis Data, AM Peak (0800-0900).

Challenge #2

Watford-HH Corridor

Congestion at junction in Hemel Hempstead

Symptom:

 Congestion on A414 Breakspear Way/Green Lane roundabout.

Causes:

- High volumes of traffic travelling off roundabout due to amenities located there.
- Only access to/from M1 for Hemel Hempstead.
- A414 only continuous east-west route through HH.
- No rail access to urban areas northwards on the M1.

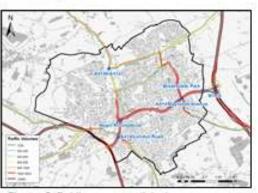


Figure 2: Public transport links between Watford and Hemel Hempstead. Source: OS Data @Crown Copyright and database right; (2016); Trafficmaster 2014-2015 AM Reak (0800-0900) data. C

Challenge #3

Watford-HH Corridor

Congestion around Hemel Hempstead station

Symptoms:

 High traffic volumes and congestion during peak period on roads approaching Hemel Hempstead railway station, in particular the Plough Roundabout and A414/London Road junctions.

Causes:

- Hemel Hempstead railway station at least 25-30 minute walk from town centre.
- Limited active travel routes and public transport provision



Figure 3: Proportion of speed limit, AM Peak. (08:00 - 09:00). HH station: Sources: OS Data & Crown Copyright (and database right) (2016): Trafficmaster 2014-2015 AM Peak (0800-0900) data.

Challenge #4

Watford-StAlbansCorridor

Infrequent services on Abbey Line

Symptom:

Low patronage on Abbey Line

- Rail service on Abbey Line is infrequent during peak times, only one AM peak service.
- Poor connectivity at St Albans Abbey station, lack of integration with local bus services and active travel routes.
- Both St Albans Abbey station and Watford Junction station are some distance from the town centres.

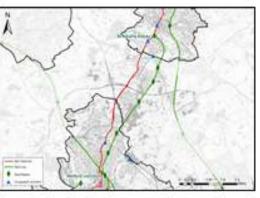


Figure 4: Public Transport links between Watford and St Albans. Source: OS Data @Crown Copyright and database right (2016).



M1 Corridor

Diversion from M1 to A1081 corridor

Symptom:

 Intermittent congestion on A1081 through. Harpenden, between St Albans and Luton.

Causes:

- Incidents on the M1 cause traffic to re-route via A1081.
- A1081 is an unsuitable route for M1 strategic traffic including HGVs.
- Increased demand exacerbates existing congestion issues in the centres of Harpenden and St Albans.

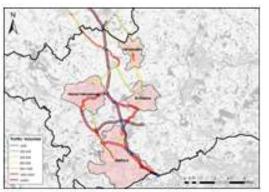


Figure 5: Traffic volumes on M1 corridor routes, AM Peak (8:00 - 09:00). Source: OS Data @Crown Copyright and database right (2016); 2011 Journey to Work Census data.

Challenge #6

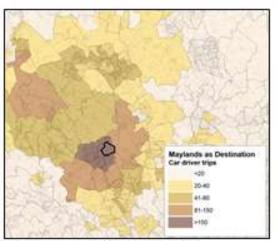
Hemel/Maylands

Congestion near Maylands

Symptom:

 Congestion on the A414 and routes leading to Maylands Business Park.

- High number of commuting car trips to Maylands Industrial Estate, in particular from within Hemel Hempstead itself.
- · Lack of multi-modal network.
- Many trips from areas with poor public transport connections to Maylands.
- Poor public transport and active travel connections to train stations.



Commuting trips to Maylands by car Source: OS Data @Crown Copyright and database right(2016); 2011 Journey to Work Census data.



Challenge #7

High levels of traffic entering Watford

Symptom:

 Congestion on A4008 Stephenson Way and at M1 Junction 5.

Causes:

- Main M1 Junction for Watford, also connects to A41 which is major regional interurban route.
- Journey times between Watford and Hemel Hempstead are faster by car than by public transport.
- Bushey Arches is main junction that provides access across Watford.
- Lack of integrated alternatives to private car, discouraging methods of transport that are less detrimental to the environment such as public transport.



Figure 7: Traffic flow of A4125, eastbound, through Bushey Arches. Source: comtribute: unk analysis but and rock ostbootoo

Challenge #8

Watford & Croxley

Congestion in Watford

Symptom:

 Congestion on A41 Colne Way in Watford increasing journey time in between towns and London.

- Major regional interurban route with numerous exists means it is an attractive route to use as an orbital route for local traffic.
- A41 uses A414 to cross HH to access M1 junction.
- Lack of alternative method of transport that provides flexibility. Therefore does not promote behaviour change to modes of transport that are less detrimental to environment.

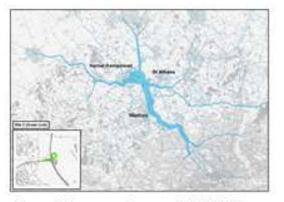


Figure 8: Flow proportions on A414/M1 JB eastbound, AM Peak (0800-0900). Source: COMET Strategic Model, 2014 Base Year, AM Peak (0800-0900).



St Albans

Congestion surrounding St Albans City station

Symptoms:

- Congestion on Hatfield Road and Victoria Street, St Albans.
- Both roads lead to or towards StAlbans City railway station and bus station.

Causes:

- St Albans City station in centre of town.
- Traffic is travelling to/through St Albanson these routes, as well as travelling to the bus/railway station.
- Discourages use of public transport in order to access stations, likely to have to experience road congestion.

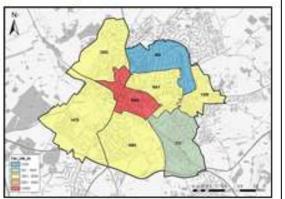


Figure 9: Inbound car trips to St Albans urban area MSOAs. Station within 6383. Source: OS Data @Crown Copyright and database right (2016); Census 2011 Journey to Work.

Challenge #10

M1 Corridor

Congestion at crossroads in St Albans

Symptom:

 Congestion on A1081 towards the Ancient Briton crossroads which connects St Albans to Luton via Harpenden.

Causes:

- Road connects St Albans to Luton as well as neighbouring towns and villages, meaning popular with commuters.
- Crossroads in residential area, congestion is not family friendly and does not improve the health of individuals, contributing to air and noise pollution.
- M1 southbound traffic using road as route between M1 junction 7/8 and M25 junction 25.



Figure 10: Traffic volumes in the St Albans urban area, AM Peak (08:00 - 09:00). Source: OS Data @Crown Copyright (and database right) (2016): Trafficmaster 2014-2015 AM Peak (0800-0900) data.



StAlbans

Congestion on A roads in St Albans

Symptom:

 Congestion on Batchwood Drive/Beech Road, St Albans in residential areas.

Causes:

- Road contributes to outer "ring road" surrounding St Albans, therefore connecting A5183 and A1081 without going into city centre.
- Goes through residential area, preventing the improvement of individuals' health and increasing journey time due to congestion.
- Residential roads only way of connecting A roads.

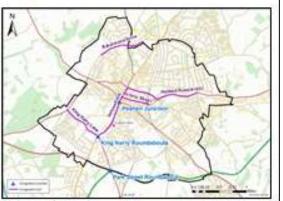


Figure 11: St Albans urban area overview. Source: 05 Data @Crown Copyright and database right (2016)

Challenge #12

M1 Corridor

Congestion between Watford and Luton

Symptoms:

- Congestion on the M1 Southbound during AM peak and Northbound during PM peak between J7 and J10.
- Roads connect Luton and Hemel Hempstead, and Watford and Luton.

Causes:

- Public transport access between Luton and Watford/HH means behaviour change to alternatives to the car cannot be achieved.
- Therefore restricting enhancement to environment.
- Roads not sufficient enough for volume of traffic during peak times.

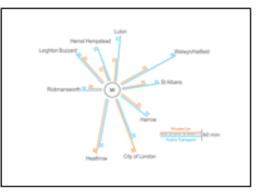


Figure 12: Journey time comparison to centres of major destinations from Watford town centre, between public transport and private car.

Challenge #13

St Albans

Access/egress issues at St Albans City Station

Symptoms:

- Constrained access/egress at St Albans City Station during peak period.
- Large volume of passengers and therefore not easily accessible for all passengers.

Causes:

- Existing ticket halls have insufficient capacity to cope with influxes of passengers (train arrivals in PM peak).
- Train station and bus station in same location.
- Safety risk high due to high levels of passengers.
- St Albans City station major connection to neighbouring towns/London as well as major bus station.
- Abbey Line serves less areas.

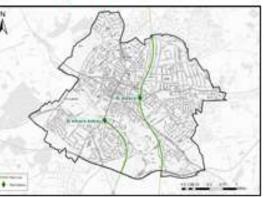


Figure 13: Rail network and stations within the St Albans urban area. Source: OS Data @Crown Copyright and database right (2016)

Challenge #14

St Albans

Congestion near St Albans Abbey Station

Symptom:

 A5183 Holywell Hill St Albans congestion, road leading to Watford/St Albans Abbey station.

- Road connects St Albans Abbey railway station to St Albans city centre and cathedral
- Also leads onto road connecting Watford.
- Bus route, therefore high volume of people travelling along this road.
- Only road that goes north-south/south-north through and out of St Albans.

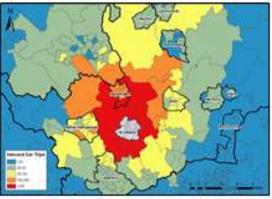


Figure 14: Inbound car commuting trips to St Albans urban area. Source: OS Data @Crown Copyright and database right; 2016; 2011 Journey to Work Census data.



Causes:

- Low parking costs causing high car usage.
- Alternative methods such as public transport, that may enhance the natural environment, are less desirable, preventing behavioural change.
- Congestion is found where cheaper alternatives to car travel are not available.
- Out of town location of St Albans Abbey station and Hemel Hempstead stations.

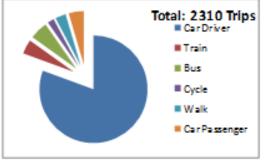


Figure 15: Mode share for Watford to St Albans trips. Source: 2011 Journey to Work Census data.

Challenge #16

Watford & Croxley

Air quality issues and congestion at Dome roundabout

Symptom:

- Congestion and poor air quality on the "Dome" roundabout, St Albans Road, A41.
- Consequently detrimental to environment and contributing towards air pollution.

- Many amenities near junction generating many trips.
- Combined with bus routes on roads that are not wide enough to give buses priority, preventing the use of multiple methods of transport.
- Cycling provision is poor therefore not promoting behaviour change to alternative methods of transport.
- Abbey Line is only rail route in area, with limited connections.



Figure 16: Flow proportions on Dome Roundabout, A41 eastbound, AM PEAK (0800-0900). Source: COMET Select Link Analysis Data, AM Peak (0800-0300).



Hertfordshire-wide

Poor rail connections to London

Symptoms:

- Rail services to London suburbs are not meeting demand.
- Congestion at key rail stations (Watford Junction, St Albans, Borehamwood).

Causes:

- Lack of investment, lack of government funding and lack of communication with Network Rail.
- Not supporting efforts to meet UK Carbon budget by reducing greenhouse gas emissions.
- High volume of passengers atrail stations increases safety risk.

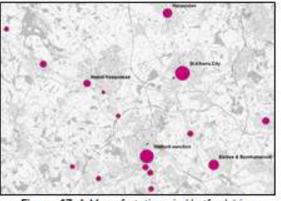


Figure 17: A Map of stations in Hertfordshire with relative size of symbol representing entry & exit totals. Sources: 05 Data © Grown Copyright (2016) Office of Rail and Road Estimates of Station Usage.

Challenge #18

Hemel/Maylands

Maylands Industrial Area

Symptoms:

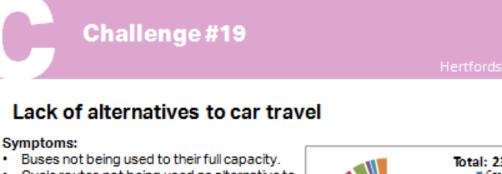
- Congestion levels high in Hemel Hempstead.
- Car parking capacity not meeting demand in Hemel Hempstead.

Causes:

- Connections between east and west poor in Hertfordshire.
- High numbers of car users.
- High number of HGVs accessing Maylands.
- A414/Maylands Avenue, main access to Maylands Industrial area, is the only east-
- west route through or around Hemel Hempstead.
- Sub-regional employment area, high level of car usage for employment trips especially amongst local traffic to Maylands.



Figure 18: Hemel Hempstead urban area. Source: OS Data @Crown Copyright and databaseright (2016).



- Cycle routes not being used as alternative to car.
- Road networks congested.

Causes:

- Social stigma around buses as well as high cost.
- Lack of cycling infrastructure, lack of multi operator ticketing.
- Surrounding road network weak, historic road network unsuited to cars, suggests road network cannot support demand therefore alternative methods need to be enhanced.

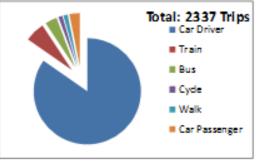


Figure 19: Mode share for St Albans to Watford trips. Source: 2011 Journey to Work Cansus data.

Challenge #20

Hertfordshire-wide

Limited access routes to Tring train station

Symptom:

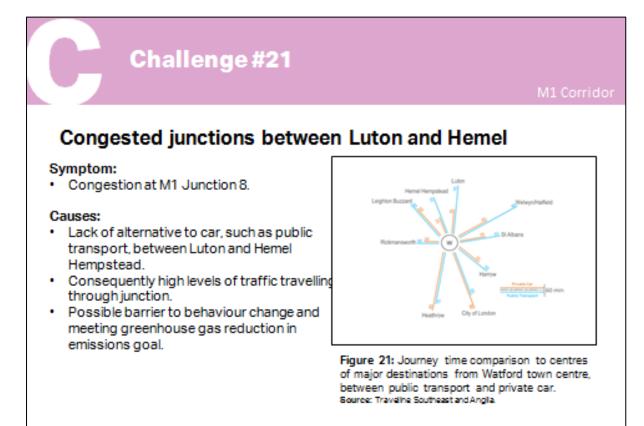
High volume of cars needing to access Tring station.

Causes:

- Station is a 40 minute walk from town centre along country lanes.
- Poor public transport access.
- 120 cycle storage spaces and cycle path but road between town and station not lit, preventing modal shift or behaviour change.



Figure 21: Tring train station location in relation to Tring. Source: ArcNap, ArcGIS.



Challenge #22

Watford & Croxley

Poor connections between Central Watford and London

Symptom:

 Congestion in West Watford on A412 route to/from Rickmansworth.

- Central Watford is not served by the London Underground yet.
- Limited alternatives to the car that connect the town centre to areas in the east and west.
- On street parking west of Croxley station narrows road space, slowing down traffic.



Figure 22: Rail network and stations within the Watford urban area. Source: OS Data @Orown Copyright and database right (2016).



Watford & Croxley

Lack of transportation to Watford business parks

Symptom:

 Watford business parks poorly connected to residential areas and centre of town.

Causes:

- Limited commuter routes to both business parks.
- Both business parks only accessible via Ascot Road only.
- Business parks located on outskirts of town, far from stations with poor bus services.

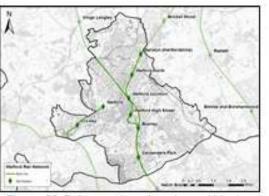


Figure 23: Rail network and stations within the Watford urban area. Source: OS Data @Crown Copyright and database right (2016).

Challenge #24

Hemel/Maylands

Land use issues in Hemel Hempstead

Symptom:

 Land in Hemel Hempstead not used to its full potential in urban areas

Causes:

- Restrictive planning laws in Hemel Hempstead.
- Unattractive used land for developing on which means it is struggling to sell.

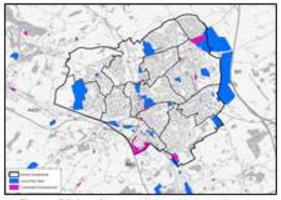


Figure 24: Land use and growth areas in Hemel Hempstead urban areas. Source: OS Data @Crown Copyright and database right (2016); SMART.

Challenge #25

St Albans

Bus services within St Albans

Symptoms:

- Bus services in St Albans are infrequent and unreliable.
- Bus services do not run late or early enough for commuters.
- Not enough information displayed about real time of buses.

Causes:

- Insufficient investment in local public transport meaning that services are not as regular or reliable as patronage demand, reduces chance of a shift in behaviour.
- Car travel gives more flexibility and allows people to travel at own convenience.



Figure 25: Bus network within the St Albans urban area. Source: St Albans Intallik Map.

Challenge #26

M1 Corridor

Interurban connections

Symptom:

 High volume of cars during commuter times between Redbourn and St Albans/Harpenden.

Causes:

- Limited alternatives to car and lack of cycling infrastructure.
- No train station in Redbourn.
- Commuters have little alternative to the car in the interurban routes.
- Accessibility to key services has not been fully enhanced.

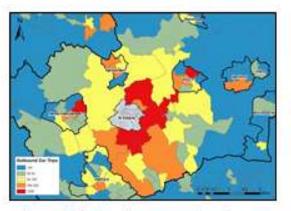


Figure 26: Outbound car commuting trips from St Albans urban area. Sources: OS Data & Crown Copyright (and database right) (2016): 2011 Journey to Work Census data.

Challenge #27

St Albans

Congested junctions in historical St Albans

Symptoms:

- High congestion at Peahen junction, King Harry Lane, and Hatfield Road St Albans.
- Historical environment of Hertfordshire could suffer from air pollution caused by congestion.

Causes:

- Junctions have low capacity so cannot meet the demand.
- Historical road network is unsuited to cars.



Figure 27: Traffic volumes in the St Albans urban area, AM Peak (08:00 - 09:00). Sources: OS Data & Crown Copyright (and database right) (2016); Trafficmaster 2014-2015 AM Peak (0800-0900) data.

Challenge #28

St Albans

Public transport connections to London Colney

Symptoms:

- Cars used between London Colney and St Albans station to connect London Colney to railway route into London.
- Congestion increases upon approach into St Albans.

Causes:

- Alternative routes less desirable and public transport more expensive.
- Cycle infrastructure needs improving to achieve behaviour change in methods of transport used.
- No train station in London Colney.
- Suggested route to St Albans is via Park Street roundabout – congested junction.



Figure 28: St Albans urban area overview. Source: OS Data @Crown Copyright and database right (2016)



Hemel/Maylands

Heavy Goods Vehicles in Hertfordshire

Symptom:

- Road traffic collisions and congestion caused by HGVs.
- Noise and air pollution.

Causes:

- Locations of delivery points unchangeable, but Satnav routes could be altered.
- Noise and air pollution generated by HGVs, which also impose a risk of not reaching road safety standards.
- HGVs using commuter routes in areas such as Maylands industrial area in Hemel Hempstead.

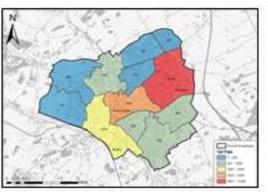


Figure 29: Inbound car trips to Hemel Hempstead urban area MSOAs. Source: OS Data @Crown Copyright and database right (2016); 2011 Journey to Work Census data.

Challenge #30

Hertfordshire-wide

Alternative Modes for School Runs in Hertfordshire

Symptom:

 High number of cars being used especially used for journeys to and from school.

Causes:

- Walking and cycling is an option but the infrastructure is lacking.
- If used, these methods would enhance health of individuals by reducing air pollution.
- Rail links only north-south/south-north.

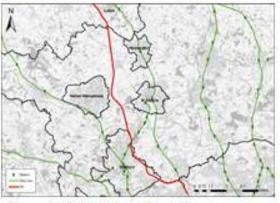


Figure 30: Rail links in the South West Hertfordshire. Source: 05 Data @Crown Copyright and database right (2016).

Challenge #31

Watford & Croxley

Bushey Arches Congestion

Symptom:

 Bushey Arches Junction bottleneck in Watford with large amounts of traffic entering one junction.

Causes:

- Cheap parking nearby does not support capacity needed.
- Bus routes are available, could improve road safety by reducing the amount of cars that are used.
- Railway station close to main road means many people are using the roads.
- Shortcut to M1 access for south of Watford and surrounding areas.

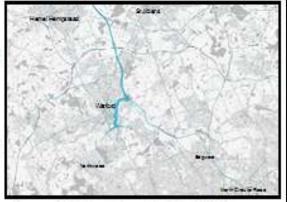


Figure 31: Select link analysis of traffic from Lower High Street, southbound, into Bushey Arches,

Source: COMET Select Link Analysis Data, AM Reak (0800-0900)

Appendix C

Workshop Prompt Cards – Trends

Air Quality

- Air pollution costs the UK around £16 billion a year, mostly in health costs.93% of total domestic emission are from road transport;
- 5.8% of deaths in Herts are attributable to air pollution. This is higher than Essex, Bucks and Central Beds. Watford has the highest percentage of deaths attributable to air pollution in Herts (6.3%);
- Stricter regulations for cars could gradually improve air quality.

Relevance

 Action Plans are in place currently to improve air quality for roads in parts of St Albans and around Bushey Arches.

> "Estimating Local Norsky Budenses acclared vith Particulars Air Educion: Public Maath England, 2014

Big Trends

Autonomous Vehicles

- Operate with little or no human involvement, which may allow close platooning of vehicles and radical redesign of junctions;
- Bus and taxi services such as Uber could become autonomous;
- Autonomous Vehicles may compete with and disrupt existing public transport service models.

- The self-driving vehicle revolution An illustration of potential growth 2015 200 200 The governments begin to alogit AWs Consumers begin to alogit AWs
- Hertfordshire has an extensive road network and limited dedicated public transport infrastructure. Autonomous vehicles represent an opportunity to increase accessibility and make more efficient use of the road network. However, they also present a risk that sole-occupancy vehicle trips will continue to be attractive and congestion levels will be maintained or increase.



Car Data Sharing

- Unlike autonomous vehicles, this software is unable to access core controls such as break controls, and will be, ideally, impossible to hack;
- Designed to collect vehicle and traffic management data, and will connect it to the IoT (Internet of Things);
- Warns users about road conditions from the sensors or from the data from other cars.



Relevance

- It is to make the world safe, more efficient place as well as more technologically relevant to people;
- Could reduce congestion when there are road accidents/road works by diverting people.

Big Trends

Co-location

- Sharing space is a way to combine multiple companies or services within one building;
- "Cottage" hospitals give high quality care, but in one space. These hospitals can be hubs for local healthcare facilities to integrate;
- In London in 2010, co-located stroke services saved 400 lives in three years. Survival rates after 90 days raised from 82% to 89%.



- Without the room to expand outwards, sharing buildings with another company or service can be a way to provide more without having to plan new buildings;
- Savings of £811 per patient episode while providing high quality care, meaning it is affordable.

Devolution and Funding

- Hertfordshire LEP secured £221.5m from Local Growth Funding, from funding rounds 1 & 2 combined, and is currently applying for a further £87.1m
- Capability for Local Authorities to retain business rate growth came into force in England in April 2013;
- Further devolution via combined authorities and other arrangements is being pursued.



Relevance

- · Central Government grant funding will continue to decline within the devolution agenda;
- Local infrastructure not on the strategic networks will need to be funded via alternative mechanisms in the future;
- Tax Increment Financing, Growth Zones, LEP funding are becoming increasingly important.

Big Trends

Future of Towns

- Online shopping is quick, easy, open 24/7, saves on fuel, can have next day delivery and does not require queuing;
- Popular sales, such as Boxing Day Sales, enhance the appeal of online shopping. By 2018 store numbers are predicted to reduce by 22%;
- Shopping centres seen as more attractive compared to town centres due to car parking facilities.



- Could impact technology in retail patterns and working patterns;
- Potential to change the way people travel and where they travel to.

Future of Work

- Travel to work areas are growing larger, as commuting takes longer. Three travel to work areas in Hertfordshire: are the economic orbits of Luton, Welwyn-Stevenage, and London;
- At the same time, flexibility in where we work is increasing i.e. commuting may be longer but less frequent;
- London and its CAZ continue to grow. Surrounding areas provide housing for labour or benefit from overspill of knowledge intensive industries requiring high levels of connectivity.

Relevance

- Hertfordshire is exceptionally well connected to London and will remain so via the strategic network. Place-quality will become increasingly important in the locational decisions of firms and individuals;
- From an April 09 recession-low, house prices in Hertfordshire have risen 77% in just 7 years.

Big Trends

Green Infrastructure

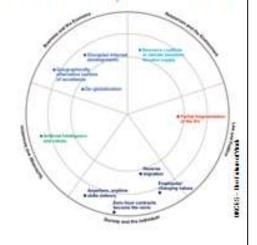
- Located in or around transportation corridors, green infrastructure consists of areas of green or blue spaces, such as ponds, woodlands or parks;
- Benefits include water management, flood mitigation and improved environmental conditions.



Relevance

 Potential for green infrastructure to be applied to transport corridors in SW Herts. Could also increase air quality in congested areas.

Potential future disruptors to where we work



Logistics Consolidation

- Introducing consolidation centres can enhance the efficiency of goods delivery in urban areas;
- Consequentially can reduce traffic and improve air quality in town and city centres;
- Regent Street, London has successfully reduced deliveries through logistics consolidation centres by 80% (2009-2014).



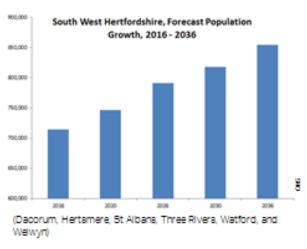
Relevance

 Opportunity to reduce congestion in the town centres and business parks of Watford and Hemel Hempstead.

Big Trends

Population and Housing

- The population of SW Herts could grow by 140,000 in the 20 years to 2036;
- Growth in the population aged over 65, will make up 43% of this growth, rising from 16% of the population at present to 21% in 2036;
- Population growth at this rate could imply a requirement for 2,800 new homes p.a. in SW Herts at 2.5 people per dwelling (completions in 2015 were 1,280).



- House price growth will continue to rise if demand continues to outpace supply;
- Major transport decisions will need to be taken about how to provide additional housing;
 The 'grey pound' is a huge potential asset for local business but will increasingly require
- greater accessibility in transport solutions.

Seamless Mobility

- Allowing transport modes to communicate with each other through intelligent transport systems to produce fully integrated transport systems;
- Examples include interoperable ticketing systems, integrated payment options;
- Potential to integrate cycling, walking, rail and other modes of public transport.



Relevance

- Many public transport commuter routes in SW Herts require purchasing multiple tickets;
- A unified ticket system could make using public transport more affordable and convenient.

Big Trends

Urban Population Density

- Increase in urban population density and Watford's proximity to London means it is unable to expand outwards, so another solutions is building upwards;
- Part of Watford's Local Plan focuses on Watford's approach to building taller buildings;
- There are 10 criteria that must be followed when constructing a tall building. These include the visual impact, the environmental impact and the transport infrastructure.



Relevance

Relevant to Watford and Hemel Hempstead as both towns are already dense and with
population growth will create demand for increase in available office space as well as
residential space. Building upwards is an opportunity for more space in areas where
there is not much space available on the ground.

Urban Regeneration

- When implemented correctly, has potential to revive areas and provoke positive environmental, economic and social change;
- Use of brownfield sites to provoke change;
- When integrated with transport systems can rebuild a community's economic base.



Relevance

Regeneration areas exist in Hemel Hempstead and Watford. Urban regeneration
presents an opportunity to concentrate development in accessible locations.

Appendix D

Officer Workshop 1 Attendees

(30th September 2016 in County Hall, Hertford)

Names	Organisation
Amanda Tobin	AECOM
Antony Oldridge	Hertfordshire County Council
Barry Wickenden	AECOM
Catherine Durbin	AECOM
Dave Barnett	Hertfordshire County Council
David Pendlebury	AECOM
lan Dunsford	Watford Borough Council
James Povey	Hertfordshire County Council
Jenny Applestone	Hertfordshire County Council
Matthew Allsopp	Hertfordshire County Council
Muthiah Gunarajah	Hertfordshire County Council
Nick Gough	Hertfordshire County Council
Rajesh Kungur	Hertfordshire County Council
Martin Wells	Three Rivers District Council
Robert Surridge	Hertfordshire County Council
Simon Willison	AECOM
Stephen Lloyd-Jones	Hertfordshire County Council
Tai Tsui	Hertsmere Borough Council
Trevor Mason	Hertfordshire County Council
Wendy Frost	St Albans City and District Council

Officer workshop 2 Attendees

(20th October 2016, AECOM House, St Albans)

Name	Organisation
Amy Findlay	AECOM
Andrew Freeman	Hertfordshire County Council
Catherine Durbin	AECOM
Chris Taylor	Dacorum Borough Council
James Doe	Dacorum Borough Council
Nathalie Bateman	Dacorum Borough Council
Sam Thrower	Urban Flow
Shalini Jayasinghe	Dacorum Borough Council
Simon Willison	AECOM

Member Workshop

(21st October, County Hall, Hertford)

Name	Organisation
Andrew Freeman	Hertfordshire County Council
Barry Wickenden	AECOM
Councillor Graham Sutton	Dacorum Borough Council (Leverstock Green)
Councillor Ian Reay	Hertfordshire County Council (Berkhamsted)
Councillor Julian Daly	St Albans City and District Council (Harpenden West, Chair of Cabinet and Portfolio Holder for Planning)
Councillor Terry Douris	Dacorum Borough Council (Grovehill) / Hertfordshire County Council (Hemel Hempstead North West)
Odette Carter	Hertfordshire County Council
Councillor Sandy Walkington	Hertfordshire County Council (St Albans South)
Simon Willison	AECOM
Wendy Frost	St Albans City and District Council