Innovative Solutions to Traffic Congestion in Tunbridge Wells Discussion Document

Background

The Tunbridge Wells Town Forum and Joint Transportation Board have each requested that Kent County Council (KCC) and Tunbridge Wells Borough Council (TWBC) carry out an assessment of driverless and/or innovative transport systems as a means of easing the impact of traffic congestion on the town. It was requested that primary consideration be given to the relief of the A264 Pembury Road between Tunbridge Wells Hospital and the town centre.

Members will be aware that the Tunbridge Wells Transport Strategy will be presented to the Joint Transportation Board for final consideration in July of this year. The Strategy proposes a number of interventions to address existing congestion problems in and around the urban area, as well as to mitigate the impact of the housing and economic growth proposed by the Borough Council's emerging Local Plan. This report does not seek to pre-empt the outcome of Members' debate on those issues but has instead been prepared to prompt a high-level discussion around the potential opportunities and constraints relating to new and emerging technology in the field of urban transport systems, which could form the basis of further study work over the coming months.

Transport is widely acknowledged as a vital ingredient of any credible strategy for the sustainable development of urban areas because of the fundamental role it plays in promoting economic development, quality of life and wellbeing. Although it has undisputedly transformed overall quality of life in many ways, concerns over the limitations and external impacts of private car transport (not least traffic congestion, environmental degradation and social exclusion) have for many years stimulated various initiatives designed to mitigate and/or reverse these impacts. These have mainly centred around promoting modal shift towards public and 'active' forms of transport by enhancing related infrastructure and services and restricting the availability of road space and car parking. However, these interventions have often proved unpopular, particularly during the recent economic downturn, when it was widely claimed that measures to restrict car use in towns and cities were exacerbating the impact of the recession on High Street traders.

During the early part of the 21st Century, when economic conditions were more favourable, the Government and local authorities invested heavily in new urban transport systems, including light rail and metro networks. These projects not only sought to tackle the environmental and social disbenefits of car travel but they were generally considered to be stylish additions to the urban realm that were popular amongst policy makers, planners, economic development professionals and the wider public alike.

Today, as local authorities throughout the UK prepare their spatial strategies for the next 15 to 20 years and levels of capital investment begin to grow once more, an important opportunity is presented to reconsider the case for promoting new and innovative forms of urban transport and to assess the role that new technology can play in solving the challenge of delivering sustainable development in a manner which is affordable, deliverable and broadly acceptable.

Driverless cars

The advent of 'autonomous' technology in vehicles has recently made national headlines and offers significant opportunities with regard to road safety, more efficient management of road space, and the reduction of emissions. It also raises the possibility that human error could be reduced or even eliminated as a contributory factor in road accidents and that associated efficiency gains could lead to lower costs for road users and less energy consumption. Vehicles with greater levels of autonomy could improve mobility for those unwilling or unable to drive, thereby enhancing their quality of life. However, there are evidently risks associated with this embryonic technology, including the practical considerations of safety, ensuring legal certainty for its users and the matter of social and public attitudes and acceptance.

Figure 1: A Google prototype driverless car (courtesy of Google and The Guardian)

The Government announced in its 2013 Autumn Statement that the Department for Transport (DfT) would conduct a review of the legislative and regulatory framework for developing and testing driverless cars in the UK. It also announced that £10 million would be awarded to towns or cities to develop testing grounds for driverless cars. The results of these trials will be used to inform policy development and direction and to understand public perception and the impact that such vehicles would have on society. In December 2014, it was announced that four cities had been selected to undertake formal trials that will last between 18 and 36 months from January 2015, namely:

- Greenwich;
- Milton Keynes and Coventry (working together on a single project); and
- Bristol.

The Greenwich research project brings together representatives from Imperial College, the University of Greenwich and the Transport Research Laboratory, with contributions from the Royal College of Art, General Motors, the AA and the RAC, and is aiming to commence its first trial of automated shuttles conveying members of the public in May of this year. These shuttles will be tested on closed roads and in simulation facilities. The Greenwich project will also test cars that can drop off passengers, park themselves and return on command. In Milton Keynes and Coventry, a consortium consisting of Ford, Jaguar Land Rover and consultants Arup will test both self-driving cars on the road as well as self-driving pods within pedestrianised areas. This project will focus on car-to-car and car-to-road communication and the infrastructure required. In Bristol, the City Council, South Gloucestershire Council, AXA, Williams Advanced Engineering, Fusion Processing, the Centre for Transport and Society, the University of the West of England, the University of Bristol and the Bristol Robotics Laboratory will manage the trial. This will involve tests investigating legal and insurance issues, as well as public reaction to self-driving cars. The three projects will be linked by an external monitor who will coordinate all of the data arising from them.

These trials will yield rich and valuable information about the key barriers and opportunities relating to the widespread introduction of driverless vehicles to the streets of Britain. Indeed, similar trials have already been underway for several years in the laboratories of the global automotive and automation industries. Yet as the DfT has acknowledged, much more exhaustive testing will need to be undertaken before this technology can be given the go-ahead for general sale to the public. It will also be necessary to reconcile it with the long-accepted standards around driver testing and licensing, driver behaviour, vehicle standards, insurance and liability. Moreover, like other new technologies in the field of urban transportation, it poses fundamental questions about the existing and future design of towns and cities which may be less palatable in historic centres such as Tunbridge Wells than they are in more modern and evolving settlements such as Milton Keynes. The extent to which it can tackle existing peak time congestion problems is also questionable on the basis of the information currently available, as it does not represent a particularly efficient mass transit option.

Ultra Personal Rapid Transit

The Ultra Personal Rapid Tranist (PRT) system is an automatic on-demand transport system that utilises small electric vehicles (or ‘pods’) that travel on dedicated, often elevated, guideways. Stations have level entry and are located off-line, which allows the vehicles to operate on a non-stop basis from origin to destination. The vehicles typically seat between six and eight passengers, are battery powered and based on conventional automotive technology. PRT offers low or no passenger waiting times, a more personal and private service than other forms of mass transit, predictable travel times and significant local environmental benefits. Where non-linear networks are implemented, the time penalty associated with interchange between routes – which can often be significant for conventional mass transit systems – can be significantly reduced or even eliminated.

PRT guideways are constructed with standardised dimensions, which allows for flexibility and variety of usage. They generally consist of open steel or a concrete beam and overhead rails of 1.4 metres in width. Stations can be small and are easily adaptable for disabled persons.

The world’s first commercial application of Ultra at London Heathrow Airport Terminal 5 (connecting the business car park to the terminal) has been operational since 2011. It incorporates three stations, 21 vehicles and a total of 3.8 km of one-way guideway. To date, it has carried over 700,000 passengers and in May 2013 it surpassed its 1 millionth autonomously driven mile.[1]

Figure 2: Ultra PRT system at London Heathrow Terminal 5 (courtesy of Ultra Global PRT)

PRT is not a new concept. In fact, the first large-scale system – serving the separate campuses of the West Virginia University and the Morgantown Central Business District in the United States – opened in 1975. The system today consists of five stations and 8.7 lane miles of guideway and was originally operated by 71 vehicles. To date, the system has completed over 67 million passenger trips without injury and has made a significant contribution to managing congestion on the public roads that join the University's three campuses. It should be noted, however, that the system primarily serves the University's students and staff, with just 6.5% of the passengers surveyed in November 2008 falling outside of these user groups. [2]

Figure 3: PRT system at West Virginia University (courtesy of West Virginia University)

[1] See http://www.ultraglobalprt.com/wheres-it-used/heathrow-t5/
[2] See http://assets.slate.wvu.edu/resources/1610/1404928039.pdf

It is notable that there have been relatively few applications of PRT in the intervening period and that none of those systems that have been introduced has involved retrofitting the technology into historic urban environments, as would be necessary in the case of Tunbridge Wells. Indeed, having initially considered it as an option for inclusion in its transport strategy for the regeneration of land around Temple Meads Station, Bristol City Council recently dismissed it on these grounds; PRT having typically only been applied in controlled environments such as airports, shopping malls, university campuses, hospitals, business parks and tourist attractions, where it is often used to perform a park and ride function. Bristol City Council also cited the significant capital cost estimate of £60 million to £100 million, which would not be paid back for at least 30 years, the capacity limitations of PRT and the potential impact of its associated structures on the quality of the built environment.[3] These concerns are considered to be equally applicable to Tunbridge Wells, in view of the rich and sensitive nature of the town's architecture and public realm, the limited opportunities to modify the geometry of existing highways to accommodate the necessary infrastructure, and the potentially limited demand for such a system of mass transit relative to its significant capital and operating costs.

<u>Light Rail Transit</u>

Light Rail Tranist (LRT) has recently been adopted by a number of urban areas in the UK (including Croydon, Manchester, Birmingham, Nottingham, Sheffield and Edinburgh), as well as many more in Continental Europe, as a potential intermediate public transport solution. LRT offers a number of advantages over other public transport options, including:-

- Ability to penetrate town and city centres with generally acceptable infrastructure;
- Delivery of predictable, regular and fast journey times, providing a high capacity service on simple and easily understood routes;
- High level of reliability due to segregation from other traffic and priority at junctions;
- Accessible, well equipped and visible stops;
- High ride quality;
- Permanence of infrastructure, vehicles and operations, promoting confidence amongst individuals and businesses to make long-term locational and investment decisions that drive sustainable patronage growth.[4]

Like PRT however, LRT has a significant capital and operating cost and as such is generally only feasible in medium-sized cities where full metro systems are inappropriate. Whilst smaller cities and large towns may also have corridors where the application of LRT may be considered, such schemes are only likely to be practical in cases where there are significant tourist and/or retail attractions drawing large numbers of visitors, or disused railway routes which might reduce the cost of provision, for example.

The construction of the Edinburgh LRT, which was completed last year, also highlighted a number of significant issues with regard to the delivery of such projects in city centre environments. The total scheme outturn cost was double the initial estimate (amounting to some £375 million) and the duration of the construction phase was twice as long as originally

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[3] See http://www.bristolpost.co.uk/Plug-pulled-automated-pods-ferrying-people-car/story-20830805-detail/story.html

[4] Luke, S., *Public Transport Mode Selection: A Review of International Practice*

anticipated. This led to widespread criticism from businesses regarding the impact on trade and is currently the subject of a judge-led inquiry.

Figure 4: Edinburgh Tram on Princes Street (courtesy of express.co.uk)

<u>Bus Rapid Transit</u>

Bus Rapid Transit (BRT) is a high-quality public transport system that seeks to deliver fast, reliable, comfortable, low-cost and user-friendly urban mobility. BRT systems incorporate many of the folllowing elements, several of which can also make a valuable contribution to improving regular bus services:-

- Dedicated bus corridors with physical separation from other traffic;
- High-quality waiting facilities with pre-board ticketing and cycle storage;
- High-capacity, comfortable buses with low-emission engines;
- Bus priority at junctions, either as signal priority or physical avoidance;
- Integrated ticketing that enables transfers between public transport operators and modes;
- Real-time information displays of expected bus arrival times;
- A commitment by the Local Planning Authority(ies) to Public Transport Oriented Development, with higher land-use densities around BRT stops;
- Park and Ride facilities (see below);
- Sophisticated marketing that encompasses branding, positioning and advertising.

Figure 5: Fastrack BRT system in Kent Thameside (courtesy of go-fastrack.co.uk)

In summary, BRT offers higher speed, higher frequencies, better information and greater comfort relative to regular bus services and seeks to offer many of the advantages associated with rail-based systems at a much reduced cost by utilising new technologies.

The majority of UK-based applications of BRT have been in areas experiencing large-scale, high-density housing and/or employment growth, which has provided the necessary political impetus, the necessary Government and third-party funding contributions and the necessary land availability to enable successful implementation. Examples include the *Fastrack* network within Dartford and Gravesend (Thames Gateway Growth Area), the Cambridgeshire Guided Busway (London-Stansted-Cambridge-Peterborough Growth Area) and the Luton-Dunstable Busway (Milton Keynes / South Midlands Growth Area). In the case of the latter two schemes, it is notable that the BRT service operates largely over the route of disused railway lines.

There are relatively few examples of BRT being implemented in existing urban areas in isolation of major new development schemes and international experience suggests that it is unlikely to be successful in low-density suburban areas or cities with inadequate road widths to accommodate the required infrastructure.[5] Indeed, a feasibility report prepared for Tunbridge Wells Borough Council (TWBC) by Jacobs in 2009 concluded that: “there would appear to be little scope for a large scale completely segregated ‘tracked’ or bus-way system”. However the report did note that: “the application of a high quality look and feel to a set of core routes will provide the spirit of a BRT system and may be the first phase in improving inter-urban links and access to key locations such as health and leisure facilities”.[6]

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[5] See http://www.theguardian.com/cities/2014/aug/27/buses-future-of-urban-transport-brt-bus-rapid-transit

[6] Jacobs (for TWBC), *Conceptual Design of a Bus Rapid Transit and Park and Ride Network for the Town and Urban Area*, September 2009.

Figure 6: Luton-Dunstable Busway (courtesy of Luton Borough Council)

It should be noted that the urban bus network within Tunbridge Wells already benefits from a number of the key features of BRT outlined above, including bus priority lanes on the A26 corridor to the north of the town centre, an increasing number of low emission vehicles and improved waiting facilities, and more sophisticated marketing initiatives by the principal commercial bus operators, including the use of social media and mobile phone applications. Collectively, these have driven patronage increases in recent years against a background of falling bus passenger numbers elsewhere in the UK. Nevertheless, bus modal shares remain low overall and it is clear that more robust interventions would be required in order to achieve significantly higher bus ridership, including restrictions on long stay car parking within the town centre and more overt bus priority measures on radial routes (see below).

<u>Park and Ride</u>

There have been two formal Park and Ride feasibility studies for Tunbridge Wells undertaken in recent years, with the aim of testing the potential for this concept to tackle peak period traffic congestion on the A264 Pembury Road and A26 London Road corridors in particular.

The first, prepared by Jacobs in 2009, recommended a phased approach to the development of a Park and Ride network for the town. Phase 1 would involve the provision of the permitted 300 to 400 space site adjacent to the Tesco superstore at Pembury, which would be served by a peak-time only high-frequency dedicated bus service and an inter-peak service consisting of improvements to Route 6 (Tunbridge Wells to Maidstone via Paddock Wood). To assist the viability of this service, it was recommended that potentially 'radical' bus priority measures would be required on the A264 Pembury Road, which could include a single bus lane catering for tidal flows during the morning and evening peak hours, or a segregated bus lane in one direction.

Phase 2 would involve the expansion of the Park and Ride service to Knights Park and Tunbridge Wells Hospital, while Phase 3 would involve the development of a further Park and Ride site at Mabledon, on the A26 corridor, subject to the outcome of more detailed feasibility studies.

Figure 7: Canterbury Park and Ride service (courtesy of Flickr)

An updated Park and Ride feasibility study was undertaken by Amey in 2014 to inform the emerging Tunbridge Wells Transport Strategy.[7] This specifically focused on the viability of the Pembury Tesco and Mabledon sites (the Knights Park site having been dropped), as well as the additional measures that would be required to deliver a successful Park and Ride operation.

The study reported that the current availability of relatively low cost car parking within Tunbridge Wells Town Centre and the extensive free parking available within a 10-15 minute walk of the town centre would act to significantly undermine any Park and Ride service. This would need to be addressed by reducing the number of free on-street parking spaces within walking distance of the town centre (for example, by introducing and/or extending Resident Parking Zones) and closing or restricting long-stay car parking within existing car parks.

The study also emphasised the importance of bus priority measures on Park and Ride corridors to ensure that the service can offer a competitive journey time relative to the car. The multi-modal transport modelling undertaken by Amey to inform the feasibility study suggested that a 33% reduction in bus journey time would be required to ensure the success of any Park and Ride service. This would entail extensive bus priority measures between the Pembury Tesco and Mabledon sites and the town centre, which – like many of the other interventions considered in this report – would require radical changes to the streetscape of the A264 and A26 corridors, with potentially significant implications in terms of capital cost and local amenity.

With regard to the proposed Park and Ride sites themselves, the study noted that whilst access to the Pembury Tesco site is relatively straightforward, a new signalised or roundabout junction would be needed to serve the Mabledon site, which would incur considerable cost as well as introducing additional delay to through traffic on the A26.

[7] Amey (for KCC and TWBC), *Tunbridge Wells Park and Ride Feasibility Study*, June 2014.

Summary and Conclusion

Transport for London (TfL) has produced a broad assessment of the primary public transport based options for urban areas, which usefully summarises the analysis contained within this discussion document (see Table 1).

	Bus	**BRT**	**Busway**	**Tram**	**Light Rail**	**Heavy Rail**
Maximum Capacity	2,500 pphpd*	4,000 pphpd	6,000 pphpd	12,000 pphpd	18,000 pphpd	30,000+ pphpd
Capital cost per km	< £1m	£1m-£2m	£1m-£20m	£15m-£20m	£10m-£45m	£45m-£250m
Operating cost per passenger place km	3.8p–8.8p	2.5p–5.8p	2.5p–5p	1p–2.1p	1p–1.4p	1.5p–1.8p
Average speed	10–14km/hr	14-18km/hr	15-22km/hr	15-22km/hr	18-40km/hr	18-40km/hr
Reliability	Improving	Medium	Good	Medium to Good	Good	Very Good
Roadspace allocation	Mixed running with traffic	Mixed running and on-road bus lanes	Totally segregated alignment	Mixed running and on-road tram lanes	Largely segregated alignments	Totally segregated
Land use 'best fit'	Lower density dispersed urban form	Lower density dispersed urban form	High demand corridors in medium to low density areas	Higher densities or connecting denser urban centres	Higher densities or connecting denser urban centres	Very high density urban development

*Passengers per hour per direction

Table 1: Characteristics of Primary Public Transport Modes (courtesy of TfL)

Based on the above information, it is apparent that Tunbridge Wells and its hinterland does not currently exhibit the necessary urban form, development density or travel behaviour to support rail- or guideway-based transport solutions. Moreover, the configuration of the town's highway network, around which its acclaimed architectural and cultural heritage has developed, provides limited opportunities for the more innovative bus-based mass transit systems considered in this report to be implemented to the extent required to achieve meaningful modal shift and consequent congestion reduction. These issues are exacerbated at present by the ready availability of low cost or free long-stay car parking within close proximity of the town centre.

The preparation of the Tunbridge Wells Borough Local Plan and Transport Strategy nevertheless presents the Borough Council, its residents and stakeholders with the opportunity to reflect on these constraints and to consider the extent to which there is the desire and capability to overcome them in the medium term. Should it be decided that further study and development work will be progressed, then it is recommended that a more detailed appraisal of the more viable options available be commissioned, with a view to gathering a sound evidence base relating to passenger demand, capital and revenue costs, potential funding sources, operating models, and planning constraints to inform future decision-making.

Notwithstanding these considerations, it is apparent that there are numerous transport solutions that can be implemented more readily during the period of the Tunbridge Wells Transport Strategy to address peak period traffic congestion in and around the town. These will be outlined in detail in the Strategy itself when it is presented to the Joint Transportation Board in July. However, the following provides a brief summary of the work that is already ongoing in this respect.

Highway Capacity Enhancements

Members will be aware that KCC recently secured £1.75 million from the Single Local Growth Fund (SLGF) for a scheme of highway capacity improvements to the A26 / Yew Tree Road / Speldhurst Road junction in Southborough, which is due to commence later this year. The County Council has advised that there is likely to be sufficient funding remaining following the implementation of this scheme to undertake further capacity improvements to the A26 within Southborough and these are currently the subject of a feasibility study. In order to ensure that the Borough is best placed to secure additional Government funding in future competitive bidding rounds, KCC and TWBC, together with their respective transport consultants, are currently undertaking a further feasibility study to identify opportunities to enhance the operational capacity of the A264 Pembury Road corridor. These studies will focus on low-risk, targeted junction capacity improvements that can be readily delivered in the short-term, as well as more expansive schemes whose delivery may need to be phased over a longer time period in order to assemble the necessary land and funding and to reduce construction impacts. The emphasis will be on maximising the use of existing highway assets wherever possible, as well as ensuring that the needs of vulnerable road users and air quality issues are fully addressed and that the ability to incorporate innovative transport technologies as part of any future upgrades is not precluded.

Cycling infrastructure

In addition to the award of SLGF funding for the A26 / Yew Tree Road / Speldhurst Road scheme, KCC has also secured a total of £4.89 million with which to establish a Local Sustainable Transport Fund for West Kent (encompassing Maidstone, Sevenoaks, Tonbridge and Malling and Tunbridge Wells), which will be allocated on a competitive basis from April 2015. TWBC is well placed to secure a significant proportion of this funding, having advanced proposals for Phase 2 of the Town Centre Public Realm Programme, as well as cycle route improvements for the A26 corridor between Tonbridge and Tunbridge Wells, which have been identified in partnership with the Tunbridge Wells Cycle Forum. Whilst it is acknowledged that levels of cycling in the Borough are relatively low at present, due to perceptions and barriers including topography, road safety, cycling competency and a lack of knowledge about routes and parking facilities, it is nonetheless clear that there is growing interest in cycling amongst groups and individuals and that it offers an increasingly important and low cost opportunity for modal shift.