

A Roads Policy for London:

***Challenges and opportunities for maintaining
and improving road transport operations in
London***

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The Royal Automobile Club Foundation has commissioned a number of external experts to write a series of think pieces and occasional papers throughout the course of 2009/10. This paper is about A Roads Policy for London and is report number 09/129.

The Royal Automobile Club Foundation explores the economic, mobility, safety and environmental issues relating to roads and the use of motor vehicles, and campaigns to secure a fair deal for responsible road users. Independent and authoritative research for the public benefit and informed debate are central to the RAC Foundation's standing.

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Peter Brown has extensive experience in transport engineering, gained from over 40 years working both in London and abroad. Peter was Assistant Director in the office of The Traffic Director for London for 9 years before joining Transport for London (TfL) in 2000 where, in 2004, he was appointed Chief Operating Officer: Streets until his retirement in July 2009. During his time at TfL Peter was responsible for the optimal investment in and management of the maintenance and development of the Transport for London Road Network, London's Red Route Network, to ensure its effective operation.

1. Introduction

This report has been commissioned by the Royal Automobile Club Foundation to provide insight into the principal issues and considerations for maintaining a safe and efficient road transport operation in London. It covers the following:

- Lessons of the recent past
- Unavoidable short term challenges
- Broader considerations of demand
- Short term opportunities, medium term goals and a longer term perspective.

It is understood that the Outer London Commission has concluded against polycentric development¹ based on four outer hubs. This document is prepared on that understanding.

The document has been developed to form the basis for informed and focussed feedback on the MTS consultation draft, to be prepared subsequently by the Foundation.

2. Lessons of the recent past

It is a reality in local democracy that the political perspective dictates much of the direction of the executive, influencing funding priorities and in some cases the detail of transport proposals. The availability of and competing demands on inevitably limited funds are key determinants also. If authorities are to ensure optimal targeting of available funds, there has to be a sufficient evidence base for correctly-informed decision-making.

Notwithstanding the administrative overhead in their preparation, business cases must efficiently and sufficiently elaborate the relative benefit to cost, over time, of practical and affordable proposals, both for capital (CAPEX) projects and for proposals that demand significant annual recurring (OPEX) investment. Those elements that cannot easily be monetised need to be given sufficient weighting within an overall evaluation framework that provides a level playing field and clarity in the prioritisation of investment within and across modes.

It is important that business cases are informed by the experience and outcomes of previous investment, to help validate the inevitable assumptions around cost and particularly, the potential benefits to be derived. This gives credibility to the analysis and greater comfort that future investment decisions are being made on a sound footing.

¹ Polycentric development characterises a city with multiple strategic business districts of similar scale rather than one dominant central business district and smaller local centres. The Outer London Commission report can be viewed at <http://www.london.gov.uk/olc/docs/interim-conclusions.pdf>

Scarce resources and increasing pressure to achieve more for less do not encourage the completion of what is one of the most important phases of any investment, namely, ensuring that the intended benefits have been realised and to learn the lessons where they have not.

While the above will not prevent the political perspective or funding limitations from influencing future infrastructure development and renewal, it ought to provide the transparency and accountability that might reasonably be expected in a mature democracy and help to counter the prospect of:

- political expediency, in some cases to gain necessary minority support, distorting the balance in modal investment (and behaviours) e.g. focussing on specific modal spend as opposed to value for money and improved outcomes across all modes,
- political perspective constraining the scale of infrastructure investment e.g. not making future provision for wider rights of way when renewing structures and sections of major roads in order to discourage car travel (though it is also acknowledged that the current planning process does not help either).

The Mayoralty and by extension, TfL, has been accused in the past of a lack of transparency in the prioritising of investment decisions. This has raised questions as to whether such decisions (both OPEX and CAPEX) are rational and made on the basis of a level playing field across all modes. The absence of effective communication enabling a real understanding of the relative benefits delivered (and potentially to be delivered), for example, from the very significant investment in the Tube and bus network (and extent of fares concessions to specific groups of bus users), has left those in support of roads development less than satisfied that the funding balance is appropriate. Similarly, the difficulty in understanding and communicating the relative benefits, and in characterising the impact on network-wide traffic operations, of a myriad of small mode-centric schemes (in cycling, walking and bus priority), has brought criticism that TfL and indeed the Mayoralty have been anti-car.

A robust and simple to communicate evidence base and rationale is needed to convince stakeholders that available funding is being targeted appropriately across all modes and in a manner that recognises and is likely to appropriately address the particular and often competing demands. Also, while difficult given the amount of 'noise' in the data, TfL must continue to strive to understand the 'cause and effect' relationships that drive the continued decline in journey speeds in the Capital, which at first sight might appear counter-intuitive given that counted traffic volumes are also reducing. There must be little doubt, however, that the currently extensive road works to enable the construction of Crossrail and other rail improvements, to upgrade the Tube, and to facilitate major developments and the massive scale of renewal of London's ageing utility infrastructure, are a major contributor to the current poor network performance in the capital.

With such transparency and understanding, TfL can engage more meaningfully with stakeholders and gain a greater appreciation by them of its efforts to 'keep London moving'.

3. Unavoidable short term challenges/issues

Maintaining a viable traffic operation in London in the short term will be a particular challenge. While London has a record funding settlement, much of the money is committed to Crossrail, the Tube and maintaining the bus network and fares concessions. There is likely to be precious little money to devote to investment in the 'good state of repair' of the capital's highway infrastructure, needed particularly in its structures/tunnels and signals equipment.

There is likely to be an exponential increase in demand for skilled highways and traffic engineering resources, particularly traffic signals engineers, and on the supply-chain, as the measures necessary to deliver the journey times for Games 'family' traffic on the Olympic Road Network, and to support the many events planned for central London during the Games period, are detailed and implemented.

Such resources will also be needed to endeavour to mitigate the inevitable traffic impacts of the build for Crossrail and the Tube upgrades, and the major utilities renewal programmes. This will leave very limited, if any, of the highly-skilled resources needed to fulfil the day-to-day management functions for the majority of London's roads and its signals infrastructure, and risk the slow-down in delivery of TfL's signals timing reviews programme and other Mayoral initiatives.

It must be recognised that it takes several years to 'grow' the necessary expertise to optimise traffic signal operations effectively in a network as complex and constrained as London's. The demands of the Olympics represent a significant short term risk, therefore, to the delivery of other important initiatives to 'keep London moving'.

The build for Crossrail, the Tube and other rail upgrades, and the utility renewal programmes will constrain available road space, particularly in central and parts of inner London where traffic speeds are already low. Current build at Tottenham Court Road and Blackfriars is evidence of the extent of such interventions. While TfL's traffic and signals engineers will make every effort to mitigate the impact of these works, the central London road network is finite and operational resilience is low. These major works are extensive and largely committed and thus, beg the question as to whether before long it will remain viable to allow freedom of motorised access by other than bus and taxi to parts of central London, during the traditional working day.

Certain Mayoral initiatives also present a real challenge in the short term, both in terms of their significant call on TfL's highly constrained funding and skilled technical resources, and their potential impact on traffic operations on some of London's most important arteries. Three initiatives are of particular concern, namely, cycle 'super-highways', cycle hire and 'a new bus for London'.

In the case of the cycling schemes, it is appreciated that the Mayor rightly wishes to encourage choice in more active travel options, coupled with a 'civilising' of London's streets in terms both of their visual environment and their use. However, TfL's own research has indicated a relatively small overall market to exploit and little evidence that increased cycle ridership would materialise from existing car drivers, more likely from tube and bus users (and perhaps walk in the case of cycle hire). Cycle priority and reserved road space on already heavily over-subscribed major arteries is likely to serve only to reduce further the performance and resilience of London's main roads, while affecting mode share only marginally (cycling mode share is unlikely to exceed 5%).

A cycle hire scheme would have greater applicability in the context of restrictions on access to parts of central London (and congested outer town centres) during the working day, by motorised traffic other than buses and taxis, was such a policy to be progressed.

The 'new bus for London' is believed to be a reaction to a perceived dislike by Londoner's of the bendy-bus, fuelled by the London press, and an erroneous belief that they are less safe than the traditional London bus, and unsuited to its road network. The bendy-bus is an exceptionally effective mover of large volumes of people and extremely well used on the high-demand routes that the buses serve.

If it is to be replaced by a 'new generation Routemaster', it is likely that many more buses will be required to carry the same passenger demand. This will add to operating costs with the risk of later increased fares (or even less investment in roads), add to traffic volumes and bus-on-bus congestion at stops, and being a double-decker, is likely to require longer bus stop dwell times, despite open-boarding.

Bendy-buses operate in many major cities with similar network challenges to London because they are efficient environmentally and cost-effective in moving large numbers of passengers. It is true that when bunched in particular, they can block junctions and present an imposing obstacle to other road users. Their deployment is therefore limited to the highest-demand services. Traffic management measures to better accommodate their operation and improved service control, enabled through TfL's new iBus system, might enable TfL to mitigate some of this operational difficulty.

There is no evidence to suggest that the thousands of users of the bendy-bus would prefer to revert to a double-decker. There is no evidence that the bendy-bus presents a greater risk to road users.

It is clear, however, that to revert to a lower capacity double deck bus will increase bus volumes significantly on the busy routes if they are to serve the demand, with a consequent reduction in journey speed for their passengers and for general traffic.

It is difficult to believe that a business case can be made that would justify the prioritisation of scarce funds for the very significant investment in these Mayoral initiatives.

4. Broader considerations of demand

There are a number of fundamental factors to be considered when coming to a conclusion about which policies and actions have the greatest likelihood of success in contributing positively to the efficient operation of London's main road network. Perhaps the three most significant considerations are:

- Anticipated growth in population and employment (beyond the current recession)
- Likelihood of severe constraints on public spending for the foreseeable future in consequence of debt levels
- Spatial planning and development – how best can the city be developed to accommodate growth in context of the likely funding constraints.

Forecasts prior to the current recession suggested an increase in the population of Greater London of some 900,000 in the next 10 years, and the creation of a further 600,000 jobs, largely in the services sector.

It is absolutely essential in context of likely constrained funding that population and employment growth is planned for and accommodated to maximise accessibility to jobs and services, utilising existing infrastructure (and currently planned enhancements) to provide the necessary mobility. This argues for higher density housing development (with low parking ratios) to be focussed on brown-field sites close to line-haul transport as opposed to low density development in the outer reaches of London, impractical to comprehensively serve by public transport. Employment should be focussed in high density development in the centre of London (The City, West End, Canary Wharf and at the main rail termini) for agglomeration benefits² and to capitalise on the high carrying capacity of upgraded rail and Tube networks.

² Agglomeration benefits derive from businesses with similar interests (and those businesses that support them) co-locating, thereby optimising communication and market attraction. The focus for banking, finance and insurance in The City and Canary Wharf reflects such benefits.

Polycentric development based on a number of outer London hubs in theory would offer local job opportunities and reduce the need to travel. People's travel time tolerances are varied, despite the relatively stable daily travel time budget, and many will seek to maximise their job, schooling and leisure opportunities across considerable distances.

In practice, polycentric development is likely to increase travel between outer London town centres and without phenomenal investment in orbital rail, buses and roads would carry the additional burden. The road network in London is simply inadequate to cater for such increased demand and it is impractical to provide significant increased capacity in outer London without huge investment and very significant property take.

Continued growth not only creates increased demand for personal travel but also for the movement of goods and services, generally considered under the collective term, freight transport demand. 'Freight' has generally been the poor relation in the consideration of travel demand as it covers a broad church and is not well-understood, and the cynics might say that much of it doesn't have a vote. It is clear, however, that in cities, freight in all its guises must rely almost entirely on roads for its distribution.

There is a need for much greater understanding of the demand for and mechanisms that might influence 'freight' operations in London.

There is an inevitable conflict between personal mobility and liveability in cities. There is a clear challenge in accommodating aspirations for unfettered personal mobility and for our city streets to be uncluttered havens for quiet enjoyment and social interaction. There is a clear choice to be made between those roads that are key to movement and those which offer a sense of place and well-being.

There are those who suggest that constructing a tunnel network for fast road access would solve London's traffic congestion. Even if such tunnel network was affordable, traffic would need to come to the surface for local distribution with inevitable gridlock as large numbers of vehicles sought access to a ground level road network wholly inadequate to accommodate demand.

Others would argue that active travel, cycling and walking, is the panacea to London's road network congestion challenge. Over 30% of car trips are understood to be of one mile or less in length. It would take no more than 20 minutes to walk a mile and less than 5 minutes by bicycle. There is no doubt that in terms of sustainability and for improved local mobility and health reasons, Londoners should consider more carefully their choice of mode for short journeys. This is particularly so in central London, and in outer London where the public transport network is coarse and the road network constrained.

However, it has to be recognised that increased opportunities for cycling and walking are generally constrained to shorter distance local journeys. The car will remain the mode of choice for most journeys in outer London, and between outer London and the region, and freight distribution will continue to be served almost entirely by road.

Finally, it is important to remember those who through age or infirmity cannot easily walk or cycle, or perhaps through income or other constraints do not have access to a car. They must rely on rail and road-based public transport to access work, goods and services.

An efficient and well-designed road network maintained in a good state of repair is important in providing equality of opportunity to all, if Londoners are to aspire to a liveable society.

5. Short term opportunities

The above text has attempted to set the scene in terms of the significant issues for London in maintaining an efficient traffic operation, vital to the economic sustainability, liveability and vibrancy of the city.

From scrutiny of night and day-time traffic speeds it is incontrovertible that the level of demand for road space over supply is the greatest contributor to delay for all road users across the network. Nevertheless, the further removal of road space, either planned or in emergency, to accommodate events, as a consequence of accidents and breakdowns, due to security alerts or to access utility equipment for maintenance and repair, introduces significant additional delay and disruption to people's daily journeys.

The challenges to movement in the short term, particularly in central London, are exacerbated by the road-space demands of rail and Tube upgrades and are of course prior to that increased line-haul capacity being available. The demands of the Olympics on road space in the centre coupled with the utilities and rail upgrades do seriously bring into question the ability of central London's road network to efficiently accommodate motorised traffic other than buses and taxis during the traditional working day.

More broadly across the capital, there are a number of feasible short term actions outlined here that would make a significant contribution to traffic performance. Some are already being pursued by TfL but may prove to be at risk given anticipated serious funding challenges and competing demand on skilled resources in the short term. London cannot afford for the resources not to be dedicated to these short term imperatives.

Traffic Control Centre

TfL brought the London Traffic Control Centre (LTCC) into operation at the end of 2002 initially to support start-up of the Congestion Charging Scheme. Its capability has been strengthened over time as a real-time traffic control and information centre. Its core activity is to identify congestion/ disruption on the network and to intervene through introduction of signal contingency plans and the tasking of contractors and Police 'congestion' teams to the scene, with the aim to minimise disruption and network recovery time.

A secondary but nevertheless, extremely important function of the LTCC is as a traffic information centre. Work is needed here to ensure that relevant, timely and accurate information on network status (and likely future status) can be made available to road users, both before they commence a journey and while on the move.

Coupled with this, an upgrade to TfL's Journey Planner would allow those contemplating a journey to compare by means of web access, network performance and likely journey time by car and by public transport alternatives, enabling a far more informed choice of mode and route.

TfL is to co-locate the LTCC with Centrecom (the bus operations control centre) and Metrocom (Met Traffic Police control centre) later in 2009. While the nature of the work and knowledge and skills needed in the three 'businesses' are not identical, co-location and the consequently closer working ought to pay dividends in improved flow of information and speed of combined response to network incidents. A culture of mutual support towards a common goal to minimise disruption for all road users is essential to the effective working of the co-located control centre.

It is important also that the combined control centre is fully engaged in the forward planning of works and events that take place every day across the network, to influence the timing and methods of working and to prepare for effective mitigation of likely disruption. Such preparation must include the provision of timely advanced warning of significant disruption to road users through the media, TfL web-site and where appropriate, on variable message signs deployed at strategic points on the network. There is a clear interface here with a prospective works permitting activity mentioned later in this paper.

The time taken for accident clearance where there is the prospect of a fatality is worthy of special mention as this can take six or more hours for recovery. In such circumstances, the Police must treat the area as a suspected crime scene. Rules of evidence are such that the road must remain closed to enable the necessary accident investigation and forensics to be undertaken to the satisfaction of the investigating officer. Only then can the road be handed back to the highway authority for clearance.

There is a need for close examination of the resourcing and management of the processes that surround this activity. Bringing in recovery early, albeit that it must await clearance to remove debris and vehicles, can save considerable time in otherwise later negotiation of the serious congestion that inevitably builds over time following such events. Availability of sufficient trained police resources and equipment can be an issue. It is suggested also that a higher priority needs to be placed on recovery of the road to traffic than is evidenced currently, given the very serious disruption that such incidents currently cause. It is hoped that a co-located control centre will help to contribute to the necessary change in culture.

Signalling and traffic management

TfL is the traffic authority for the London Traffic Control System. As a part of the Mayor's 'smoothing traffic flow' agenda, TfL has embarked on a review of the operation of all of its approx. 5,400 signal installations. There is scope for improvement in traffic throughput by adjustment to methods of control, timings and offsets between adjacent sets of signals (for improved coordination), without unduly prejudicing the safety and convenience of other road users.

Undertaking such forensic reviews as it also progresses other signal works, such as equipment renewals and scheme works, TfL hopes to target 1,000 sites per year.

It is recognised that the work is extremely resource intensive and it is essential that the necessary skilled resources remain available for it.

There is good argument for extending the breadth of this work to consider where small changes in layout and alignment, or in approach parking/loading or bus stop locations, might provide scope for further operational improvement. The focus on modal funding and the fragmented nature of London's highway administration has not facilitated this broader perspective in recent years. TfL should not shy away from the removal of modally-focused schemes where these have clearly had an undue impact on general traffic operations. Such examination would also identify areas for targeted enforcement, where safety and efficiency is compromised by non-compliance. It may also be appropriate on certain major corridors to move away from traditional network optimisation to peak direction green signal progression (or green waves).

Apart from the consideration of peak direction green waves on key arteries in peak traffic periods, where this would not unduly delay bus operations or otherwise compromise network operability, other initiatives are being or need to be progressed (some requiring government support) to further improve signalling efficiency, including:

- The introduction of a signal aspect providing a countdown of the blackout period between green and red man, for pedestrian understanding, safety and to enable the minimising of the green man 'invitation to cross' period

- Using vehicle actuation and stage skipping to avoid bringing in side road phases at periods of low side road demand
- Robust detection technology deployed to enable the automatic cancelling of a pedestrian crossing stage request if the pedestrians have crossed already during the traffic phases.

(It is not recommended that a Mayoral aspiration for cyclists to be permitted to turn left on a red signal be pursued because of potential for conflict with other road users, particularly pedestrians crossing under a green man, and dilution of the requirement for all traffic, including cyclists, to stop on the approach to any red signal.)

About 3,000 of London's signals are under computer control enabling their operation to be monitored, timings to change to accommodate different traffic demands at different times of day and days of the week, and for signal plans to be downloaded remotely by the control centre in response to incidents. Consideration should be given to expanding the network under computer control to extend remote fault monitoring (and thereby improve operational resilience) and wider real-time intervention. Recognising constraints on public funds, effort should be made in collaboration with London's local planning authorities (the boroughs), to gain development contributions to fund such expansion of signal computer control.

Similarly, funding should be directed towards expansion, where appropriate, of the c. 2000 of those signals under computer control that operate SCOOT (Split, Cycle, Offset Optimisation Technique). SCOOT enables groups of signals to adapt to changes in traffic patterns on the network to minimise delays/maximise throughput in real-time. Coupled with this, TfL should also continue with work on automatic signal plan selection mentioned later aimed at mitigating the wider network impacts of congestion at known pinch-points on London's main roads.

Street and Road Works

TfL has expended considerable effort during the passage of the Traffic Management Bill and following Royal Assent, to meet both the spirit and the letter of the 2004 Act. It has established a close working relationship with the London boroughs to assist in the development of road schemes and to ensure that subsequent works to implement such schemes do not have an undue impact on network performance. It has developed LondonWorks, a web-based information portal to facilitate works planning and coordination by promoters, and public access for information on current and planned works (and to enable feedback where the public consider works are being poorly executed).

TfL has engaged proactively with the utilities industry to effect a culture change whereby increased effort is put in to works planning and coordination and to minimise the inconvenience and disruption that is an inevitable consequence of the current utilities renewals programmes. However, there is a long way to go and TfL is also proactive in taking to task those companies who fail in their responsibilities in regard to such works. TfL is hampered in this by current legislation that requires certain offences to be addressed to the Magistrates Court where maximum fines are paltry and have no deterrent effect.

TfL, together with some eighteen boroughs, has completed a consultation on a common London works permit scheme, for submission to and subsequent approval from government to allow implementation, and is validating the practicability of the scheme through the voluntary permitting of some of its own and some utilities works. Such a permit scheme would provide the foundation for far greater control on timing, layout and methods of working. While a very necessary improvement on the thoroughly inadequate regime of control that has existed to date, there will be no let up in the extent of utility companies' works in the next several years.

If resulting disruption is to be minimised, the boroughs and TfL must put serious and combined effort in to assuring that works are properly planned, coordinated and executed. Robust engagement in advance works planning and coordination with all works (and event) promoters must continue. Improved intelligence as to scale of risk in regard to points of failure of utilities underground plant is also needed to enable the targeting of investment so as to minimise emergency road openings.

TfL should continue to encourage the industry to develop and deploy lightweight bridging structures that enable excavations to remain open but temporarily covered to carry traffic during peak periods. Permit conditions can then require the use of such equipment at specific times of day. Recognising the costs of the disruption that utilities works can cause Londoners, borough environmental health officers should continue to offer as much flexibility as they feel able to facilitate night work. To assist, utility companies should plan how they execute works to enable less noisy activity to be scheduled at night.

Poor works execution by often sub-contract labour, with little or no supervision by works promoters, causes serious and avoidable disruption to the travelling public. An example is the removal of spoil adjacent to excavations during periods of heavy traffic flow. It is costly and impractical for the street authority to have continuous visibility of all works being executed on its network.

It is incumbent on works promoters to ensure adequate training of site operatives and to provide the level of supervision of their works to ensure their obligations to the travelling public are met.

All too often, oversight is devolved to the contractor with insufficient incentive to comply. There have been many cases where the street authority has been left with no choice but to instruct a utility's contractor in regard to the execution of works because the utility company itself, as works owner, had no presence on site. Incentives are needed to remedy this including a robust approach to the issue of penalty notices for infractions. Perhaps authorities might also consider the publishing of league tables of poor utility company works performance.

TfL has a considerable number of personnel deployed across the network at any one time undertaking a variety of activities, including street works and highways inspections, responding to issues in the bus operation, and dealing with fare evasion, parking offences and low-level crime on the bus system. TfL is trialling the use of all such operatives to fulfil the role of street works inspectors, thereby increasing the breadth of its own supervision of utilities works very significantly. This is an excellent initiative and should be fully developed together with the deployment of PDA's to such personnel, programmed to enable the automatic checking of details of permits and issue of Fixed Penalty Notices for infringements. The greater use of CCTV to monitor works execution should also be considered.

Finally, it is now clear from work recently undertaken by the Transport Research Laboratory on behalf of the CSS (County Surveyors Society) and TfL, that utilities' road openings do cause a significant deterioration in the fabric of the highway and contribute to a reduction in its useful life. This will be of little surprise to road users - a cursory inspection of Lower Thames Street in The City at the time of writing would leave no doubt in this regard. For safety, Lower Thames Street must soon be resurfaced at TfL's expense in consequence of the damage caused by successive utility companies' incursions.

It is outrageous that highway authorities should have to expend additional monies from a depleted public purse to bring forward major highway maintenance arising from the long-term damage caused by private utility companies.

The Traffic Management Act makes provision for government to bring forward regulations requiring that utility companies undertake 'half-width' reinstatements of the roads in which they have made significant incursions. The Mayor, TfL, the London boroughs and indeed, all UK highway authorities should now be pressing the government to bring forward these regulations. This is increasingly relevant in London, given the constraints on TfL and borough funding for highway maintenance and the current widespread and intensive utilities mains replacement programmes.

Temporary traffic signals

A particular cause of frustration to authorities and the travelling public is the deployment by works sub-contractors, with currently little control, of temporary portable traffic signals, generally to enable shuttle working in narrower two-way streets. Signal timings are set locally by the sub-contractor generally without reference to the highway authority or to TfL. There is no remote monitoring provision and little evidence of regular and frequent checks to ensure that timings remain appropriate or indeed, that the signals have not partially or completely failed.

It is recommended that a far greater degree of control should be exercised over such deployment, facilitated by the future works permitting regime. Works promoters should agree methods of signal control and timings with TfL. The control regime, and agreed timing and duration of deployment should be a condition of the permit. The sub-contractor should confirm deployment as agreed, or any variation to this determined and agreed as necessary from experience at the site.

The technology should include a remote monitoring capability such that TfL's fault control system is able to detect a failure (or timing variation). The sub-contractor should be subjected to a contractual response time for remedy once advised by the LTCC of the fault. For efficient coordination, the equipment should also be capable of cable-less linking to adjacent permanent signal installations.

Road space allocation

To a degree, network development has been driven by an unhelpfully 'siloed' modal focus. On occasions, internal 'modal clients/champions' (and fund-holders) have given insufficient regard to the multi-modal nature of the demand for road space and the delicate balance that must be preserved to adequately service those legitimate competing demands. It could be argued also that TfL has in the past invested in too many small-scale network interventions that have re-allocated road space from general traffic or otherwise compromised traffic operations without delivering a concomitant benefit to specific modes.

It is encouraging that TfL is re-organising to break down such silos and focus on the development of fewer, more balanced/holistic road schemes, targeted at real need and to maximise benefit/value for money. Through such schemes and as a part of general maintenance, TfL also intends to improve, or 'civilise' the street scene, removing extraneous clutter such as unnecessary pedestrian guardrail.

TfL and the boroughs should continue to invest in education and training of all road users to enable and encourage safe cycling and walking. To provide a safer environment for these modes, they should be thinking in terms of reductions in speed limits and measures to improve speed limit compliance rather than the re-allocation of scarce and over-subscribed road space.

The Mayor, supported by TfL and the boroughs, must continue to encourage Londoners to choose such 'active modes' for short journeys, particularly in central London and the outer London town centres.

6. Medium term goals

There are a number of further opportunities to improve the efficiency and management of the capital's road network that by their nature will take more time to come to fruition but that nevertheless could usefully be initiated now.

Establishing a network hierarchy

The London network comprises of some 14,000kms of public highways maintained by TfL, the 33 London boroughs and the Highways Agency. TfL is responsible as highway authority for only 580kms of these, comprising the generally higher capacity GLA Roads collectively known as the Transport for London Road Network (TLRN), and recognised as the capital's Red Routes. While only approx. 5% of the entire network, Red Routes carry approximately one third of London's traffic.

At the time of the development of the Traffic Management Bill in 2003, representatives of TfL and the boroughs assisted the Government Office for London (GOL) to identify a 'second tier' of borough roads that were also considered important for more 'strategic' traffic movement in the capital. The outcome of the process was to agree a network of important borough roads to be designated under the auspices of the subsequent Act as 'Strategic Roads'.

To safeguard 'strategic' traffic operations in London, the Government's intent under the Traffic Management Act was that boroughs would notify and gain prior agreement from TfL, for any of their schemes and works which might have an adverse impact on traffic operations on any GLA or Strategic Road.

A so-called 'Network of Interest' was identified by TfL of some 2,200 kms (additional to the Red Routes) which together carried about another third of London's traffic and the majority of its bus services. Borough representatives argued for a significantly smaller network (nearer 300 kms). It is understood that boroughs had concerns at the potential reduction in autonomy that such a regime represented and the bureaucracy it would introduce, and that neither they nor TfL had the resources to effectively administer such a regime if a larger network was designated. It was these concerns that influenced the extent of designation of Strategic Roads that they were prepared to support. Eventually, government designated a Strategic Road network of some 520kms.

The scheme/works notification process put in place by TfL and the boroughs is web-based, efficient and now well-embedded.

Information is sought early to allow dialogue and TfL provides technical support to jointly seek to facilitate borough aspirations and mitigate any undue effects of their proposals. TfL is active in seeking early engagement with boroughs and is understood to be moving towards a leaner touch to minimise the overhead that the notification process imposes on both parties.

An anomaly which serves to make the process less than comprehensive, however, is that boroughs need only to notify their own works proposals to TfL, where these might affect GLA and Strategic Roads, not works on their roads proposed by others such as developers and utility companies. TfL uses LondonWorks to help close the information gap here but in the absence of a London permit scheme, the information in LondonWorks remains less than accurate and complete. This limits TfL's ability to plan for and intervene through its signalling system to mitigate any undue traffic impacts of such works.

TfL's jurisdiction in regard to Strategic Roads does not extend to the pro-active development of schemes to improve their operational performance without prior agreement from the relevant borough. It is in the nature of local politics that the parochial interest often will outweigh more strategic considerations. London's bus routes pass through several boroughs. Resistance by any one borough for political or other reasons to practical and fundable opportunities to improve bus (and traffic) operations along a route by the introduction of a road improvement scheme on that boroughs roads, would impose undue costs on the bus operator (and by extension TfL), and delay to the travelling public. This cannot be right.

It is suggested that the Mayor commences a dialogue with London Councils around the benefits of extending the designation of Strategic Roads to more closely reflect London's main road and bus networks, to include agreement to TfL being more pro-active in the development of operational improvement schemes for these roads, the starting point for such dialogue perhaps being TfL's earlier 'Network of Interest'. This would, in effect, establish a network hierarchy for London, making explicit all those roads that are important for traffic distribution in the capital, as opposed to those necessary for more local access. Common standards for the operational management and development of the higher tier roads could be considered, with TfL and the boroughs jointly focussed on pinch-points: adapting layouts, enforcement regimes and signalling so as to expedite traffic movement (while always sufficiently providing for pedestrians).

Civilising London's streets

It would be unrealistic to suggest that all upper tier, distributor roads could sufficiently cater for ever increasing traffic demand into the future.

It is suggested earlier that in central London (and perhaps in certain outer London town centres), even the more important distributor roads may have to incorporate restrictions on access to motorised vehicles other than buses and taxis during the traditional working day. Such restrictions provide great opportunity, however, to 'civilise' those streets and create pedestrian-friendly environments in areas of greatest foot-fall.

Removal of traffic queues and improvements in the street scene can re-invigorate the local economy and create a secure and vibrant environment. TfL's re-configuration of the Shoreditch one-way system in 2003 achieved just this for Curtain Road, in that particular case, without the need to restrict vehicular access. Recognising, future public sector funding challenges, there is clear opportunity here for highway/planning authorities to work with the local business community to leverage monies to achieve such opportunity.

By establishing a network hierarchy that realistically reflects all those roads that cater for traffic distribution, we provide the opportunity to focus in a different way on roads that are primarily for local access. Here, a sense of community and peace should prevail with the motor vehicle taking second place to the many other activities that our local streets provide for. Here, perhaps, we should be looking to reduce speed limits to minimise the frequency and seriousness of injuries arising from collisions.

At slower speeds, those who choose to cycle and walk are far less intimidated by motor vehicles, are at reduced risk and indeed, would be encouraged to cycle and walk more. There is far less need for street signs, white lines and give way markings.

By creating a more attractive street scene and coherent sense of community, comes the opportunity to rediscover civic pride and responsibility and thereby help to 'civilise' local streets, enabling pedestrians to feel more secure.

Technology is now able at realistic cost to encourage and even ensure compliance with a 20mph speed limit. Wireless-enabled average speed cameras can be deployed at the boundaries of local zones to detect motorists who have traversed the network at more than an average 20mph and by automatic number-plate recognition technology, the vehicle's keeper can be served a penalty charge notice remotely. Intelligent Speed Adaptation (ISA) technology could, given some lead time and at little cost, control a vehicle's progression to the speed limit, thereby relieving the driver of the risk of a ticket. (ISA adapted vehicles might also enjoy reductions in insurance premiums.)

Average peak traffic speeds in London, are generally below 20 mph but currently, traffic operation is characterised by short bursts of speed and times of stop-start and stationary traffic. A 20mph speed limit on more local roads would serve to better regulate traffic flow, create a more level playing field between motorists and more vulnerable road users, and help encourage greater mutual respect and a safer environment for all.

Improving situational awareness and intelligent response

TfL has recently deployed IRID technology to about 60 of its CCTV cameras. The software identifies automatically when traffic is becoming congested and sends an alarm to the LTCC operator.

The operator can then turn his/her attention to the alarmed camera and seek to establish the cause of congestion and to initiate mitigation through the signalling system. Operators cannot monitor all c.1500 of TfL's CCTV cameras at once. IRID enables the onset of congestion to be identified early and a far quicker operator response, thereby reducing the extent of disruption and network recovery time. Relatively small additional funding is needed to enable roll-out of IRID technology across TfL's CCTV estate.

There is an enormous amount of network status and operational performance data available to TfL both historically and in near real-time from systems such as ITIS (for journey time data), TfL's own ANPR cameras (for time/distance information), LondonWorks, iBus, LTIS (the London Traffic Information System) and SCOOT.

TfL is understood now to be looking at how it can bring all such data sources together and to use the data in smarter ways to improve situational awareness, understanding and a better-informed response.

Looking further into the future, TfL has developed at low cost, in-house, an automatic feed from live SCOOT data to the VISSIM simulation model, with a view to fast-time replication of main road network operation. It is understood that it intends in time to link this to a compatible, higher level operational network assignment model (VISSUM) – such a model is already available for a part of central London. The objective would be to run a main road network model behind SCOOT that could test signalling/routing options in near real time and implement automatically the optimal regime (both signal settings and media/VMS messaging) to mitigate in fast time the onset of congestion in that network. A databank of such mitigation measures and outcomes would enable the system to 'learn' from past interventions and become quicker and smarter in responding. Ultimately, such a system would be responding constantly to anticipate and counter the onset of congestion so as to minimise delay and disruption in real time.

Was TfL to be successful in this aim, it will have taken technology with respect to the responsiveness of a city's signalling system to congestion as far as might reasonably be foreseen at this time. It is suggested that this relatively low-cost systems development work should continue though it is recognised that success is ultimately limited by the scale at which demand for road space will exceed supply over time.

Night-time servicing

For day-time access to central London and certain outer London town centres to be prohibited to motorised traffic (excluding buses and taxis), it would need to be practical for servicing activity to be adequately accommodated at other times of day or by exemption.

Perhaps the least well understood area of goods vehicle demand is in the services sector, generally small businesses that require a vehicle (the ubiquitous white van) to transport tools, building and cleaning materials and the like.

There is little practical alternative for the local builder, as example, but to use a van or small lorry during the working day to carry on business.

Other businesses could perhaps operate or at least undertake their heavier delivery and servicing activities outside traditional working hours, provided the customer made arrangements to accommodate this – but where is the current incentive for the customer?

In recent years there has been a trend away from on-site storage to maximise display floor-space/minimise rental cost, and a corresponding increase in off-site warehousing and ‘just-in-time’ deliveries. This has increased significantly the demand for servicing, mainly by smaller goods vehicles. Logistics costs to business will have increased both as a consequence of the change in the business model and increasing road congestion. The logistics industry will follow customer demand and significant competition in the industry regulates prices. Certainly, the full cost to society of the additional congestion is not felt by the retailer. To influence change to night-time servicing requires the customer to perceive (or be provided with) a sufficient business incentive to change his/her operation to accommodate ‘out-of-hours’ deliveries. The logistics industry will not change this itself.

Out-of-hours servicing is common-place for the larger businesses, particularly the supermarkets, where planning conditions do not preclude this. Planning restrictions, generally, were put in place as a palliative to local residents in gaining planning consent, and often many years ago when vehicles and the servicing activity were much noisier than they are today. Vehicle technology, plastic palletes, docking stations and the like, now enable such activity to be undertaken at far lower noise levels. There is now scope to further increase out-of-hours servicing through relaxation of such planning restrictions. Given advances in vehicle technology and need to spread demand to outside the traditional working day, the Mayor should also press for the termination of the London Lorry Control Scheme³ operating in some (not all) London boroughs.

³ The London Lorry Control Scheme places restrictions on the use of heavy goods vehicles to help minimise noise pollution in residential areas during unsocial hours through restricted use of designated roads. For more information on the London Lorry Control Scheme see: <http://www.londonlorrycontrol.com/>

Differential road pricing to incentivise a greater utilisation of road space in the quiet hours would provide an alternative to the prohibition of goods vehicles during the working day. This is considered further in section 7.

Incentivising utility companies

While the prospective London permit scheme offers considerable opportunity to deliver a step change in the quality of planning and level of control of street works, the quality and speed of their execution requires further incentive. There would be, for example, little to prevent a utility company from applying for a further permit should it find it is not able to complete its works in a timely fashion. It would not be easy for an authority to refuse the permit. By submitting a further notice/application and being granted a further permit, the utility may also avoid the authority imposing NRSWA (New Roads and Street Works Act) s74 over-run charges.

The introduction of road space (lane) rental, whereby the utility companies pay a rate, differentiated by location and time of day, for the road space they occupy would certainly incentivise them to carefully plan when they will undertake works and how they expedite them. The charges levied should be constructed to reasonably reflect the value of the piece of 'real-estate' occupied and the cost to society of any delay imposed. The concept is no different to that of on-street paid parking – why should a private utility company enjoy free road space when the motorist has to pay to park in such space? Lane rental has parallels also with a differentiated road user charging regime.

Government has been reluctant to progress such a road space rental option due to the potential inflationary effect on consumers utility bills. Trials a few years ago in Camden and Middlesborough, were argued to be inconclusive and the utilities lobbied extensively and successfully against any expansion of the trial. However, it was undoubtedly in the utility companies' interests not to change their behaviour and accordingly to carry additional lane rental cost for the trial period and areas, so as to be in a position to argue that such a regime was both ineffective and inflationary!

The regulatory environment would allow legitimate road space rental charges to be passed on to the consumer. A key issue currently is the difficulty of differentiating what would be legitimate costs to pass onto the consumer and what costs should be carried by the utility company for tardy or otherwise poor performance, as the regulators are not equipped to address this.

The role of the regulator has little bearing on the performance of utility companies in regard to the impact of their works on congestion and disruption to the travelling public. Indeed, it is a key objective of the regulatory regime to seek not to burden the utility companies, and by extension consumers, with undue cost.

The regulator has no incentive, as example, to require a utility company to employ greater supervision to ensure that works are expedited and disruption to the travelling public minimised.

A further issue that reduces the effectiveness of an authorities control over the execution of utilities works is the current requirement to resort to the Magistrates Court for redress as, for example, offences related to inadequate signing and guarding are not decriminalised. Authorities must invest considerable resource in bringing a case to Court. The maximum fine that a Magistrate is able to impose on conviction is in the order of a few thousand pounds, hardly a deterrent to large multi-national utility companies.

It is suggested that real change in the manner in which utility companies and their contractors plan and execute their street works to maximise safety and minimise disruption to the travelling public will only come with serious financial incentives.

It is recommended that the Mayor, through TfL, engages now with Government and the regulators to seriously explore:

- A road space rental framework that would enable regulators to differentiate between the quality of utilities' street works and to only pass on to the consumer the rental cost incurred where works have been properly planned and executed/expedited
- In the shorter term, a significant increase in the maximum level of fines that Magistrates are enabled to impose on conviction for offences under the NRSWA associated with the poor execution of works
- To avoid highway authorities having continually to resort to the Courts, subsequent decriminalisation of all offences under NRSWA and the setting of Penalty Charges to act as a realistic deterrent for such contraventions.

7. Longer term perspective

Unsurprisingly, there is no simple solution in seeking to keep London's traffic moving. While the above sets out actions that together would contribute significantly to maintaining an efficient traffic operation in the short to medium term, moving forward there are undoubtedly hard choices to be made.

For many years, transport planners and economists have recognised that the capacity of a city's road network is finite - it simply is not practical or affordable to build more road space to alleviate congestion without destroying the city's fabric and soul.

If the use of the roads is not to be governed by user's tolerance of congestion, with the waste and liveability issues that accompany this, the introduction of some mechanism for rationing the use of that space is unavoidable.

Pricing is the lever that best balances demand to the supply of a scarce resource and would facilitate the locking-in of benefits of any road network capacity improvement. It is argued that road user charging provides the most effective response to widespread network congestion, where the charge levied reflects the cost imposed on society. The resulting revenue stream could be hypothecated to fund highway capacity improvements, low-cost alternative public transport provision, and to enhance the public realm.

It is suggested that London-wide differential road user charging is the only sustainable solution to an efficient road network operation in the longer term. Such a charging mechanism would incentivise the use of roads at quieter times, spreading the peak load and improving utilisation at times of currently low demand. This would encourage out-of-hours servicing, freeing capacity for people movement during daylight hours.

People in general are resistant to change because of the uncertainty it brings and the fact that there are losers as well as winners. Change is, however, a part of life and can bring with it real opportunity and positive outcomes for society as a whole, albeit that the transition can be hard for some. Perhaps the greatest challenge is in sustaining major long-term change within a democratic framework with a four or five year election cycle. This is undoubtedly a key factor with respect to the deliverability of road user charging.

It is essential, therefore that London's voting population is fully engaged in understanding the challenge that London faces in maintaining a viable road network operation over time. Only then can politicians begin to gain sufficient buy-in to the inevitably hard choices in sustaining Londoner's overall quality of life and manage the electorate's expectations with respect to likely future costs, levels of service and constraints on mobility. Starting such engagement early would enable the voting public to make informed choices in good time as to future location for work, home, schools, etc.

The messaging is complex and difficult. It should be measured rather than alarmist, delivered through a communications plan that can raise understanding and gain belief that change in the parameters that currently govern choice in location and mobility is unavoidable. This is perhaps more the domain of the social psychologist and communications expert than the engineer. The difficulty in gaining the necessary understanding and buy-in over time cannot be under-estimated, as Manchester has found recently to its cost.

London is the economic engine of the UK economy and will remain so. The maintenance of an attractive and efficient road network operation is essential to its continued international competitiveness and Londoner's quality of life.

Notwithstanding the significant existing traffic congestion on London's roads, the current investment in rail and the emphasis on active travel options, there is little doubt that the car will remain the preferred choice for a considerable proportion of journeys outside central London, and freight distribution will rely almost entirely on road. Given such a conclusion, the Mayorality, through TfL, should initiate:

- A strategic assessment of London's road-space requirements for efficiency in the longer term, linked to a pricing mechanism that optimises network use across the 24-hour day and enables the locking-in of benefits of targeted investment, both in highway capacity improvements and in alternative public transport options that facilitate realistic choices; and
- A public engagement campaign at London and regional level to educate and gain understanding of the issues and to explore how such a demand management regime might become a reality within London's local democratic environment, and potential institutional changes to facilitate this (including to the planning and development control processes).

In the absence, in the longer term, of an active management regime, the demand for London's finite road space will be limited only by motorists' tolerance of congestion (which is known to be high⁴), threatening the efficiency and operational viability of the network, the capital's international competitiveness and consequently the country's economic well-being, and Londoners quality of life.

⁴ RAC Foundation and IPSOS MORI (2009) The Congestion Challenge www.racfoundation.org