TramForward

Campaigning for Trams and Light Rail

Light Rail Transit Association
138 Radnor Avenue,
Welling,
DA16 2BY

19th May 2019

Dear Sir

The Light Rail Transit Association (LRTA) was established in 1937 by a group of people concerned about the proposed closures of tramways in London. The Association has grown over the intervening 82 years into an international body with over 2,000 members around the world, half outside the United Kingdom. Although the LRTA's members come from all walks of life, they share a common concern with the development of good quality public transport through the use of light rail and tramways. Many are professionals working in the transport industries. The Association's monthly magazine, "Tramways & Urban Transit" is widely regarded as essential reading around the world by those concerned with the development, building, operation and use of light rail and tramway systems.

The Association's objectives are to educate people about light rail and modern tramways and to advocate the adoption of such systems as core components of modern integrated transport systems. The Association carries out its campaigning under the banner *TramForward*.

The Light Rail Transit Association would like to respond to your consultation questions as follows:

Q1 What is the potential scale of the opportunity for further light rail (or other rapid transit) systems to be introduced in England?

Potentially there are considerable opportunities for further light rail and tram systems where major towns and cities are suffering from congestion and traffic generated pollution. Any urban area with a population over or approaching 80,000 is likely to benefit from some form of rail-based rapid transit.

In France, for example, there are new tram lines in Aubagne (pop 45,000) and opening later in 2019 in Avignon (pop 92,000), while the tram cities of Besançon, Orleans, Rouen and Mulhouse all have populations below 120,000.

Several large towns and cities in England have official or community support expressed for tram and light rail systems, in particular:

- Bath
- Bristol - Portishead
- Oxford
- Cambridge
- Coventry
- Kent-Essex cross river (KenEx)
- Nottingham – Derby
- Leeds
- Blackpool to Lytham
- Warrington – Halton
- Wirral

Other towns and cities with the right mix of geography, employment, retail and residential areas would consider trams if there was a favourable political and economic climate for new tram systems.

There is also considerable scope for extending existing tram systems, as is currently happening in Manchester, Blackpool and Birmingham/Wolverhampton.

Q2 Is there an appetite for new systems to be introduced in our cities and towns?

Several Cities and large towns have local authorities that have commissioned studies or have community groups pushing for transport improvements to aid connectivity and develop the economy of the area. There is increasing concern about pollution in urban areas from both tailpipe and non-tailpipe emissions where people live, work and around schools, shopping and entertainment areas.

This is evidenced by the development of electric vehicle, both cars and buses, but this can be considered as mitigating only half the pollution problem.

Electric rubber tyred buses and cars still emit non-tailpipe particulates, a fine toxic dust sized $PM_{2.5}$ and below, that is particularly dangerous with regular exposure. Recent articles in the national media have highlighted these harmful impacts which together with improved connectivity are driving the appetite for light rail.

Additionally, road congestion has been growing in areas where there is no effective rail based urban transit system, particularly at rush hour and school run times.

Cities such as Oxford, Cambridge and Bath all have developed initial plans for modern transport links to relieve the renowned road traffic congestion in the city centres. Bath City Council have commissioned a report to look at the feasibility and route options for a tram network to reduce traffic within its historic city whilst connecting with suburban areas and park and ride facilities.

Whilst Bath and Oxford are considering trams and tram trains, Cambridge is looking at rubber tyred road trains that will only exacerbate the non-tail pipe emissions and concentrate them in the proposed tunnelled section. This is unlikely to give the benefits of a surface tram that would be pollution free and visible, key factors in the trams' success.

Wherever trams have been installed in the UK they have been successful in fulfilling the desires of the city's residents in providing a regular and reliable services with minimal pollution in the street and have proven to engender modal shift from cars that is not achieved by bus services. The patronage rises and popularity of tram systems are demonstrated by the usage and satisfaction statistic published by the DfT and Transport Focus respectively.

Q3 Is there evidence to support this appetite?

The appetite for light rail systems is evidenced by the interest shown by a good number of local transport authorities developing strategies and undertaking feasibility studies for new light rail systems. This evidence is reinforced by community groups campaigning for new tram and light rail systems. Many of the campaigning groups are producing well thought out and researched proposals that have been consulted locally and nationally at suitable fora including conferences, public meetings and political meetings such as those arranged by the All Party Parliamentary Light Rail Group for MPs and Ministers at the Palace of Westminster. This demonstrates both official and community support for new systems.

Taking a few examples:

London Tramlink – Sutton Extension.

The results of the TfL consultation were released on 30th April 2019 and 81% of respondents supported and 11% opposed the use of trams for the extensions whilst only 40% supported and 33% opposed the use of Bus Rapid Transit. This is a recent and clear indication that Tram has greater support than bus-based alternatives for new services. See https://consultations.tfl.gov.uk/trams/sutton-link/user_uploads/sutton-link-consultation-report.pdf

Bath and Bath to Bristol corridor

Bath Trams. There is a campaigning group that holds regular meetings, and held a conference hosted by Wera Hobhouse MP for Bath and attended by local councillors and local residents who received presentations from experts in tramways. The details of the activities of this group and its proposals can be found on its website https://bathtrams.uk/.

Bath City Council have supported this proposal and have commissioned an Initial evidence-based study into 'The potential introduction of trams to Bath' prepared by Atkins, a respected engineering consultancy experienced in transport planning:
https://democracy.bathnes.gov.uk/documents/s49556/Tram%20Report.pdf

The positive findings from this report have resulted in Bath and North East Somerset Council (BANES) having secured funding from the West of England Combined Authority (WECA) of £1.95m for the Bristol mass transit study to develop the feasibility and business cases which will include the spur from Bristol to Bath and villages and towns in between. A tranche of £450k has been secured from WECA to further develop the Bath mass transit study looking at all options including trams

Oxford area

Oxford Futures/URBED have prepared a proposal for trams and tram trains in and around the Oxford area demonstrating both feasibility and transport benefits.
https://www.oxfordfutures.org.uk/uploads/Trams_for_Oxford.pdf

Bournemouth and Poole area:

Members of Bournemouth council's environment and economy scrutiny panel agreed to further investigate the feasibility of a conurbation-wide light railway system. See
https://www.bournemouthecho.co.uk/news/16950808.light-railway-steams-ahead/

Southampton and Solent area:

Business leaders have expressed their interest in a super-tram system that would link Romsey with Southampton.

The project, developed by the Solent Local Enterprise Partnership (LEP) would see trams run from Eastleigh, past the airport, down to a new station at Southampton St Mary's, on to an interchange at Royal Pier, then back up to Westquay and Southampton Central railway station.

The LEP envisages the scheme would bring game-changing efficiencies for businesses and organisations seeking better connections to their customers, workforces and potential labour pools.
https://www.dailyecho.co.uk/news/district/romsey/15439764.Multi_million_pound_tram_plans_to_link_Romsey_to_Southampton_given_backing_boost/

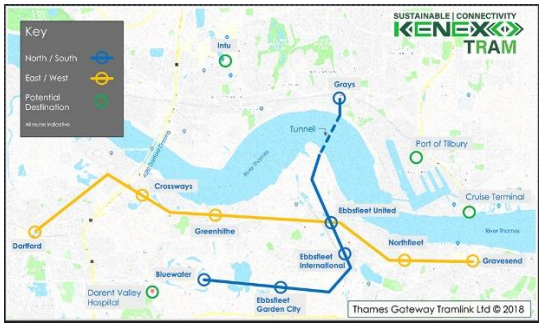
Bradford and Leeds City Region

Senior councillors in Bradford are looking towards a Leeds City Region transit network which officials say "would have significant benefits for the Bradford district" and are developing a transport strategy. In November 2018, Bradford council said that plans "include enhanced public transport provision via mass transit such as 21st century trams, linking Bradford's city centre stations for enhanced north-south connectivity, which would be integrated with Northern

Powerhouse Rail". https://www.yorkshirepost.co.uk/news/21st-century-trams-could-be-part-of-new-mass-transit-system-for-west-yorkshire-say-bradford-council-bosses-1-9464068

South Essex and North Kent – Improved Cross River Connectivity.

Business and transport undertakings are supporting a proposal from KenEx Tram, the Thames Gateway Tramlink Ltd.



KenEx Tram Proposal

Enhanced Connectivity, Local Economic Growth and Quality of Life.

The KenEx Tram Project can be broken down into two main corridors: –

1) The North / South link (via a new 1.2km submerged tunnel between Thurrock & North Kent)

2) The East / West link between Dartford & Gravesend

Thames Gateway Tramlink Ltd. are investigating opportunities that may exist beyond this proposal, including: –

- Darent Valley Hospital
- Intu Lakeside
- Tilbury Cruise Terminal (with dedicated express service from Ebbsfleet International)
- The Port of Tilbury – Employment opportunities

Full evidence is available on their website https://kenextransit.co.uk/

Blackpool and Fylde Coast

Blackpool Trams have benefitted from the recent refurbishment and are currently building an extension to Blackpool North railway station. This was studied as part of the SINTROPHER Project, EU funded research looking at improving connectivity at several cities in North West Europe. The UK partner, Blackpool, also considered extensions to Lytham or by Tram Train to Preston https://sintropher.eu/publications/reports/findings-report-WP6A29-South-Fylde-Line

This work has been continued by the campaigning group 'Trams to Lytham' who have studied the extension of the Blackpool Trams to Lytham using the spare trackbed on Network Rail's South Fylde line. https://en-gb.facebook.com/tramstolytham/

Warrington to Halton

Light Rail UK has studied the options and environmental and health benefits of introducing a tram service on a currently congested road corridor.

https://www.applrguk.co.uk/media/files/LR-UK-Trams-The-almost-complete-answer-to-poor-Urban-Air-Quality-Warrington-Haltonpdf

Some local amenity groups have suggested trams as a solution to their city's problems, e.g. The Norwich Society suggestion that 'catenary free' trams such as that used in Nanjing China could improve Norwich traffic congestion and air quality. https://s3-eu-west-

1.amazonaws.com/thenorwichsociety/resources/City-Centre-Report-2-2019.pdf?mtime=20190206194157

Transport Focus

Transport Focus surveys – Tram services show a higher satisfaction rate than for other public transport modes. The overall satisfaction level in the 2018 survey for trams was 91%. https://d3cez36w5wymxj.cloudfront.net/wp-content/uploads/2019/04/01192519/Tram-Passenger-Survey-2018-All-Networks.pdf

The average figure for bus users in England for 2018 was 88%. http://d3cez36w5wymxj.cloudfront.net/wp-content/uploads/2019/03/13201611/Bus-Passenger-Survey-Autumn-2018-overall-report.pdf

Q4 What would the environmental, economic and congestion benefits be?

Environment

Pollution – tail pipe and non-tail pipe emissions.

Trams are free from the majority of pollutants common with other road vehicles. Trams are normally electrically powered with zero emissions at point of use. The emissions at power stations are remote and more efficient than diesel or petrol powered vehicles as modern power generation is either emission free with hydro, wind or tidal power stations or now well controlled with fossil fuel based power generation. Diesel and petrol powered vehicles emit harmful PM_{10} and $PM_{2.5}$ particulates as well as NOx pollution, all harmful to human health.

Trams also do not produce the non-tailpipe emission common with normal road vehicles including buses. Steel wheels on steel rails wear much more slowly than rubber tyres on tarmac road surfaces. The erosion of rubber tyres and the road surface, particularly from heavy buses, lorries and cars produces a very fine toxic dust at $PM_{2.5}$ size that is particularly hazardous to health being easily absorbed by humans and can affect the brain.

As well as the tyre/road erosion, there is a fine dust produced from brake pad wear on road vehicles. Trams use electric braking with disc brakes only used in the final stages of braking minimising such emissions.

A Paper by Timmers & Achten in 2018 “Non-Exhaust PM Emissions from Battery Electric Vehicle” describes their research into non tailpipe illustrated in the figure below shows how significant the non-tailpipe PM emissions are from cars.

https://ac.els-cdn.com/B9780128117705000121/3-s2.0-B9780128117705000121-main.pdf?_tid=6b62b497-a681-487b-8197-cdee2b856a72&acdnat=1539618238_bb8bd197ceebdb35cab83cae03f785a9

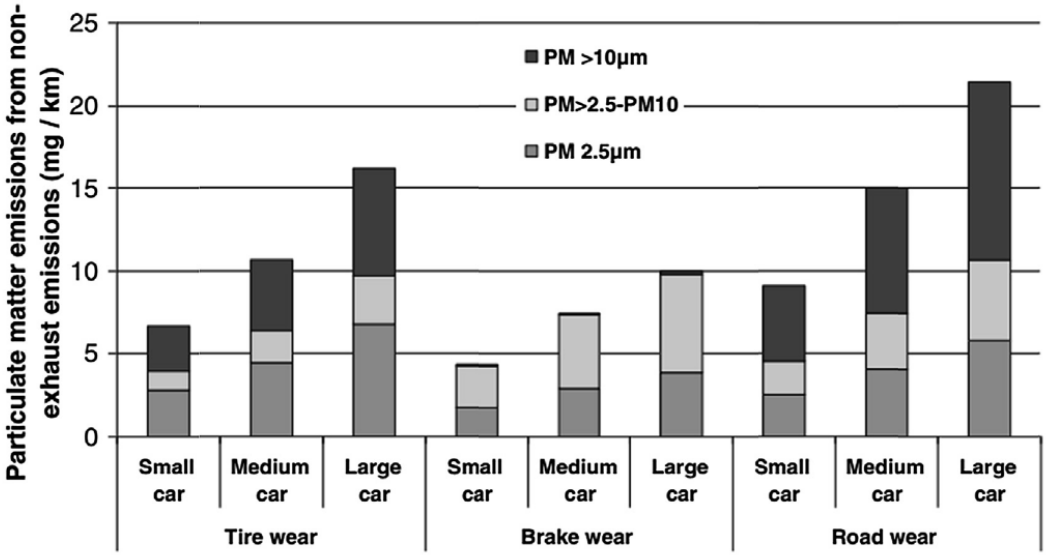


FIGURE 12.2 Non-exhaust particulate matter (PM) emissions by source and car size. *From Simons (2013) based on Ntziachristos and Boulter (2009).*

In Figure 12.2 they detail the difference in weight between electric vehicles (EVs) and their internal combustion engine (ICEV) counterparts showing that EVs are between 14.6% and 28.7% heavier. The paper also notes the resuspension of the PMs as vehicle re-lift PMs already lying on the roadway.

In the conclusions of this paper it notes that there is a consensus that whilst there has been a strong reduction in tailpipe PM emissions over the past decades and this will continue in the coming years, non-tailpipe emissions will account for 90% of PM emissions from traffic by the end of the decade. It also notes that claims that EVs are emission free are unjustified as the increase in weight is linked to higher non-tailpipe emissions.

This paper really brings together research into non-tailpipe emission and challenges the assertion that electric vehicles are the answer to transport emissions. The weight gain argument applies to electric buses as well as cars.

Trams running with steel wheels on steel rails eliminate both the tailpipe emissions and road and tyre wear emissions and the majority of brake pad wear as electric braking is used for the most of the slowing of the vehicles.

The outcome from the above is that Trams will eliminate both tailpipe and non-tailpipe emissions produced by vehicles with rubber types and that these PM_{10} and $PM_{2.5}$ are particularly harmful to health as noted in the World Health Organisation paper “Health Effects of Particulate Matter” which concludes:

“PM is a widespread air pollutant, present wherever people live.”

The health effects of PM_{10} and $PM_{2.5}$ are well documented. There is no evidence of a safe level of exposure or a threshold below which no adverse health effects occur.

Since even at relatively low concentrations the impacts of air pollution on health is significant, effective management of air quality aiming to achieve WHO AQG levels is necessary to reduce health risks to a minimum.

Monitoring of PM_{10} and/or $PM_{2.5}$ needs to be improved in many countries to assess population exposure and to assist local authorities in establishing plans for improving air quality.

There is evidence that decreased levels of particulate air pollution following a sustained intervention result in health benefits for the population assessed. These benefits can be seen with

almost any decrease in level of PM. The health and economic impacts of inaction should be assessed." (WHO, 2013, page 12).

http://www.euro.who.int/__data/assets/pdf_file/0006/189051/Health-effects-of-particulate-matter-final-Eng.pdf

Defra have recently concluded a 'Call for Evidence: Brake, Tyre and Road Surface Wear'

We await the results and how they will influence the Defra and DfT future strategies on Clean Air

Visual environment

New tram systems tend to be a catalyst for improvements. This is plain to see in the many cities where trams have been introduced into the city centre. In Croydon the environment along George Street from East Croydon Station through to North End and down Crown Hill has been much improved, demonstrating that trams can integrate with pedestrians much better than buses as the route is defined and there is a reduction in overall traffic.

This effect is also evident in Nottingham and Manchester. St Peter's Square is a prime example where trams and pedestrians co-exist well with the tram stop in the centre of the square.

Plain overhead wiring need not be particularly intrusive; in Birmingham's Corporation Street you would not be aware that it was there unless you were specifically looking for it. It is attached to adjacent buildings and uses lightweight suspension arrangements. 'Catenary-free' can be an alternative and has been used in Bordeaux France and will shortly be trialled in Birmingham. Whereas the Bordeaux system uses expensive in-road technology, the Birmingham trial will use on-board batteries which looks to be the way forward for 'catenary free' operation where overhead wires would be difficult or too intrusive.

Evidence for commercial development near light rail stops.

The best example where light rail has engendered commercial development is London's Docklands. As soon as the DLR was opened, the commercial developments followed, mainly offices but with the support services of restaurants and shops. This required extensions to the network and improved services to meet demand.

This effect, albeit less dramatic in scale, has occurred with tramway introductions. Media City in Manchester was made viable by the extension of the Metrolink services to Eccles including a spur to Media City funded by the occupiers of the development.

Increase in property values.

Nottingham Express Transit reported that a Nottingham Business School study in 2016 demonstrated how the extensions to the tram systems had 'brought £100m economic boost to Nottinghamshire'.

https://thetram.net/report-reveals-tram-projects-100m-economy-boost.aspx

The report is available at
https://thetram.net/UserFiles/PDFs/NET%20Phase%20Two%20Local%20Economic%20Evaluation%20-%20Final%20Report.pdf

A Report presented by Lloyds Bank in 2017 showed that property values were boosted by nearness to a tram line in 4 leading cities and also to metros such as Crossrail in London:

West Midlands

Manchester

Nottingham

Edinburgh and

London (environs of Crossrail)

This evidence was prepared using Land Registry data over several years once the tramway opened.

https://www.lloydsbankinggroup.com/globalassets/documents/media/press-releases/lloyds-bank/2017/120517_lb_regional_regeneration.pdf

Modal switch from cars greater than with buses

Permanency. In order to create sustainable housing and other developments that are not solely dependent on cars for transport, there needs to be a form of public transport that can be relied upon and thus be perceived to be permanent. History has shown that bus routes change and tend to be reduced, are perceived as transitory and cannot be relied upon into the future. Permanency can be provided by fixed rail systems as the investment in a tramway shows commitment to the future. Trams, where introduced have been a catalyst for development and are one of the few transport types to actually promote modal shift away from personal transport.

In Manchester it has been reported that “The increase in non-car trips since 2014 has been principally due to growth in rail journeys, Metrolink and walking trips (2% growth for each), with a slightly lower increase in cycling (1%)” and “Since 2002, car trips in the morning peak have decreased by 22%, despite an overall increase in all trips of 12% over the same period. In the off-peak, the number of cars coming into the City Centre has reduced by 19%.” (Manchester City Council, 2015, Reports - Cutting Carbon Emissions from Travel - page 5).

Park and Ride

Park and Ride has been integral to many new tram systems. Nottingham has several P&R locations on all its routes. Manchester and Sheffield likewise and all are well used. This has been a particular success for the Edinburgh Tram with Ingliston Park & Ride in the Newbridge area of Edinburgh. Sheffield has P&Rs at Meadowhall, Nunnery Square and Middlewood, and the new tram train service is adding Parkgate as an additional P&R site.

Congestion

By connection to these P&R sites, the trams are helping to reduce the need to enter the city centres by car and thus reducing congestion. Nottingham helped fund their tramway by introducing a work place parking levy which in itself encourages companies to promote public transport use and reduce city centre congestion.

World Example

Arizona – Phoenix

Since the LRT in December 2008, the following results have been reported:

Ridership:

The rail system almost immediately exceeded its target ridership numbers and today has an average weekday ridership of about 50,000, a number Valley Metro didn't expect to reach until 2020.

Investment:

Valley Metro estimates $11 billion in private and public investment has sprouted within a half mile of the light-rail line since 2008

See azcentral

Q5 What impact would it have on jobs?

Transport in general, but trams in particular, are known as a facilitator of growth in jobs along their routes. The permanency of the tramway encourages employers to choose locations close to tramways as they provide a reliable transport mode for employees.

In Edinburgh, according to section 4.16 (page 24) of the 'Edinburgh Tram & its Role in a City Deal' Final Business Case from February 2019: "There is significant employment growth forecast across Edinburgh. Edinburgh Park is forecast to expand significantly with 11,000 new jobs between 2016 and 2032. The city centre will also experience a significant increase in employment of 6,000 jobs over the same period."
https://www.edinburgh.gov.uk/tramstonewhaven/download/downloads/id/68/final_business_case.pdf. This employment growth is integral in this business case and based on the experience to date

Trams systems as part of an overall city-wide transport plan and designed within a wider City Development Plan can be used to facilitate both residential and employment opportunities and provide the necessary connectivity including serving other transport hubs.

The creation of sustainable business developments that are not solely dependent on cars for transport requires a form of public transport that can be relied upon and that is perceived to be permanent. For job creation, like housing as described in Q4 above, history has shown that bus routes change and tend to be reduced and thus are perceived as transitory and cannot be relied upon into the future. Commitment to the future is shown by the permanent fixed rail systems and the investment in a tramway. Trams, where introduced have been a catalyst for employment development and are one of the few transport types to actually promote modal shift away from personal transport.

Q6 Does light rail open up new housing or business developments or improve the urban fabric of the area?

Public transport in the form of Light Rail and Tramways provides the infrastructure backbone essential for housing and the connectivity with business developments. In order to create sustainable housing and other developments that are not solely dependent on cars for transport there needs to be a form of public transport that can be relied upon and thus be perceived to be permanent. As noted in the response to Q4 and Q5 it has been demonstrated that bus routes change and tend to be reduced, are perceived as transitory and thus cannot be relied upon into the future. However, the investment in fixed rail systems such as a tramway show commitment to the future. Trams are one of the few transport types to actually promote modal shift away from personal transport.

This is demonstrated by the experience in Manchester where it has been reported that the increase in non-car trips since 2014 has been principally due to growth in rail journeys, Metrolink and walking trips (2% growth for each). Conversely since 2002, car trips in the morning peak have decreased by 22%, despite an overall increase in all trips of 12% over the same period. In the off-peak, the number of City Centre journeys have reduced by 19%. (Manchester City Council, 2015, Reports - Cutting Carbon Emissions from Travel - page 5).

The Docklands Light Railway is a prime example of how a well-placed transport link has led to the opening up of an area in line with planning initiatives. The DLR was a low-cost system from Tower Gateway into the heart of the Docklands development area. It soon proved to have inadequate capacity and has been improved and expanded ever since. It has facilitated the opening up of the Docklands area into the extensive commercial and residential area it has become. The Beckton, Lewisham, Woolwich and Stratford extensions have led to significant further developments, now with Cable car, Underground and Mainline interchanges.

The old half hourly West Croydon to Wimbledon heavy rail branch was failing and lightly used and considered with disdain within BR. However, now that it has been converted to a tramway, developments along the route have grown extensively. Retail developments on the Purley Way area now have direct tram links to both central Croydon and Wimbledon enabling them to grow with the enhanced connectivity.

Much as the Metropolitan line opened up 'Metroland' the counties to the north west of London in the early 1900s, in other countries, a new tram line is often built first and the residential and commercial development then follows.

Q7 What can we learn from the experience of other countries in adopting new systems?

The LUAS in Dublin is a prime example where the new tram is so popular, they have had to lengthen the trams to meet demand on the north-south Green Line, now using one of the longest trams in Europe.

In France, many cities that lost their tramways in the 1940s & 50s are now rebuilding them as full second generation systems. Cities that have built new tramways include, Grenoble, Lyon, Besançon, Dijon, Orléans, Tours, Mulhouse, Reims, Strasbourg, Valenciennes, Paris, Brest, Le Havre, Rouen, Bordeaux, Montpellier, Toulouse, Angers, Le Mans, Nantes and Nice. Lille, Marseille and St Étienne retained their trams and have modernised them. Aubagne built its first system in 2014.

France gives local mayors significant authority to pursue new transport initiatives and trams are considered an emblem of modernity and efficiency for a French city. Through their less onerous appraisal, planning and funding arrangements, it is considerably easier to progress a new tram system in France and their cities are benefiting greatly therefrom.

Germany largely retained its trams, but has since modernised them.

Belgium benefits from extensive tram networks in its major cities

This is a story throughout Europe where trams in cities are the norm and the added connectivity provided shows the benefits of such systems. With this continuity, many issues present in Britain do not exist such as utilities

A tram line often creates a less congested less polluted environment, some now a more pleasant and liveable street experience. Put the transit development in before all other development. Systems do need to be well maintained, and kept up to date.

Portland Oregon in the USA has benefited from its new Streetcar where living close to a stop is considered a significant benefit.

Q8 What issues have helped progress light rail schemes or acted as barriers to their development?

Tramways have succeeded when specific circumstances have come together to force change and trams have emerged as a prime solution. Specifically, in Manchester when the Bury and the Altrincham line rolling stock came up for renewal, the unique trains and power supply systems needed major renewals. At the same time, proposals for linking Manchester Victoria and Piccadilly stations were also gaining popularity. The opportunity for a total rethink and a tram solution, albeit marketed as a metro, but including street running for the cross-city link, became credible and the preferred solution. Manchester hasn't looked back and Metrolink has been a great success.

Such circumstances rarely come together, but the conversion of redundant main line railways has enabled most UK tram systems to get started, such as London Tramlink, Midlands Metro, Nottingham Express Trams and Sheffield Supertram.

However, where such circumstances do not prevail, there are still good cases for new tram systems in medium to large cities. The problems arise when the processes to approve and build a new tram system are considered. Whereas a new bus route can be set up by an authority or

private operator with minimal permissions, this is not the case for a new tramway although the future benefits of the tramway may be much greater.

This leads to the first and possibly the greatest barrier being the Business Case and particularly the WebTAG appraisal process. When proposing a new tram system in a city where currently none exists funders presume that it will be unaffordable when compared with road transport. Thus, the first barrier to be overcome is the securing of the funds required to prepare an initial feasibility study with an outline transport and business case. The DfT appraisal guidance for the preparation of the Business Case, WebTAG is used to gauge the Value for Money of the options studied. WebTAG is considered by many to underestimate the value to the nation of the non-cash Sustainability benefits of tramways. WebTAG has been subject to review recently and we wait to see if it makes a fairer assessment for tram systems.

Once the outline Business Case is in place, funders need to be found. Local Enterprise Partnerships now hold public funds, which with local agreement can be used for a tramway, but this still needs DfT and Treasury approval before the funds can be allocated. With the high up-front costs associated with a new tramway, additional funds may be required, and this could come from central government or private sources. Nottingham has benefited from the agreement that it can charge a Work Place Parking Levy to provide an income stream to service loan or private capital.

The next major barrier is getting authority to build and operate the tramway. The Transport and Works Act 1992 Order procedure is the current way to secure such authority along with the powers and protections required to construct and operate a tramway. This procedure follows closely the Road Orders process, but with some differences to suit railways and tramways including on-road sections. This process is subject to a Public Inquiry where anyone can object and be heard. It is the way democracy is applied in England where powers may be taken over individual's property and public and private rights and gives significant powers to the promoter. It would be difficult within the political landscape of GB to change this system, but maybe guidance as to managing objections could be improved.

One of the main objectors will be the Public Utility Companies whose equipment may be affected by the scheme and would wish to protect their rights and access at all reasonable times. As their clients are the same local residents, the costs will end up being paid by the same group of householders no-matter how the cost are divided, so the effort should be put into minimising the costs over the long term.

For the future, restriction into where new utilities could be placed in roadways against local strategic transport plans may improve the situation, but this would require changes to legislation.

Q9 What and where are the future opportunities here in England for new light rail systems or alternatives?

This is largely covered with the answer to question 1. The opportunities do require the right political climate. The opportunities exist for all cities or city regions with populations in the region of 80,000 or more where there are defined areas for residential, commercial/business and community facilities such as entertainment, shopping, healthcare and educational.

Notable areas where tram schemes are being considered or promoted by local authorities or community groups include:

- Bath
- Bristol - Portishead
- Oxford
- Cambridge

- Coventry
- Kent-Essex cross river (KenEx)
- Nottingham – Derby
- Leeds
- Blackpool to Lytham
- Warrington – Halton
- Wirral

Q10 What are the key issues that are preventing light rail schemes from being delivered?

The key issues relate to political will, powers, finance and timescales for delivering light rail schemes.

A Light Rail project requires considerable political will to get it started and with the likelihood that it will not be completed within the tenure of an individual local politician. A Champion is essential to progress a light rail scheme

With the high up-front costs of a new light rail system, the current WebTAG appraisal guidance can make it difficult to show a value for money economic case as many of the no-cash benefits do not have monetised values assigned and the affordability case is often a considerable hurdle, albeit with a good multi-criteria lifecycle case.

Securing funding from Central Government, Local Enterprise Partnerships and through local financing initiatives as noted in the answer to Q15 below.

The timescales from conception of the idea, proof of feasibility and business case, then lead to the need to get authority under the Transport and Works Act 1992 Order procedure, again not a short process, before construction can begin.

With the need to lay tracks in the roadway, construction progress is likely to be slow, no matter what track form is chosen.

These long timescales do not help both the choice of light rail as a mode and the length of time of disruption experienced during construction before the benefits are achieved.

Q11 How can we deliver systems within a budget as has happened?

More predictable outcomes could be achieved by stricter control of the planning and building process with better analysis of costs and greater detail at an early stage in planning and much more attention to the drawing up of contracts and project management.

One of the problems with schemes in this country has been the intermittent nature of progress in their implementation. There has been a lack of light rail expertise due to lack of a pipeline of projects. More continuity in the progression of new schemes would help and would better enable rail engineers to retain their competence in light rail techniques. The Midland Metro Alliance shows how progress within one system can be coordinated to maintain and retain expertise and keep down costs.

One of the major expenses in construction is utility diversion. Better coordination of utility works during the construction period would help contain costs as well as reducing construction time and disruption to local businesses. Some countries, such as Singapore, are looking at construction of shared utility space. All this, however, would not be easy to achieve in our privatised utility market.

Greater standardisation in infrastructure and vehicles may help reduce costs. Up to now, each tram scheme has largely gone its own way in the specification of vehicles. A greater degree of standardisation and an acceptance of taking manufacturers' standard products should lead to a

reduction in costs. This would need a pipeline of projects and a range of standard products to suit the different cityscapes and road layouts.

Combining vehicle orders for two or more schemes would also bring down costs compared with several small individual orders. 25 seems to be the lowest economic order size for many manufacturers, unless there is synergy with other orders of the same tram type for another city. When Croydon Tramlink required a modest number of new trams it was able to arrange with Stadler to divert trams that were being built as part of an order for Bergen at a lesser cost than if the trams had been procured as a stand-alone order. Likewise, Vossloh (later Stadler) were able to offer Sheffield a better deal with the Citylink tram train by adding the small number required to the larger Karlsruhe order despite some differences in specification.

Manufacturers may be best at aligning such orders, but this would need certainty from the purchasing cities on timescale and specification together with competition rules within the EU.

Most English schemes have come within budget, or nearly so, Manchester phase 3 was early and saved about 10%. Where one of the above factors have not been in place, budgets and timescales have not been achieved.

Q12 What are the key lessons from Europe in progressing light rail and in what way are these different to the U.K.?

In Europe there is generally greater devolution of political power, including tax raising, to cities and regions. France, like Britain removed most of its first-generation tramways, but has been more successful in building second generation tramways in the last few decades. The powers granted to Mayors and the Versement Transport as a funding mechanism has enabled many French cities to invest in their future and install new tram and Tram Train systems.

In Germany, being a federal state, the devolution is to the regions. Political power and financial resources are vested in these regions and a prime example of this is the success of Kassel in North Hesse to invest in trams and Tram Trains to improve connectivity and investment in the region.

This has been studied by the EU SINTROPHER Project and their report “Investing in light rail and tram systems: Economic and financial dimension” looks at how different political, economic and financial environments have affected the ability of regions to invest in trams and thus regional connectivity. See the report for a full insight: https://sintropher.eu/sites/default/files/images/editors/2016.05.20%20Sintropher%20WP2%20WEB%20-%20printingfinal.pdf

Q13 What does the future of light rail look like with new generation transport schemes coming forward?

Light rail is a well tried and tested system, new technologies have yet to establish a track record. In-street rails and OLE have a certain ‘presence’ giving permanency and as such a reason to invest in adjacent developments.

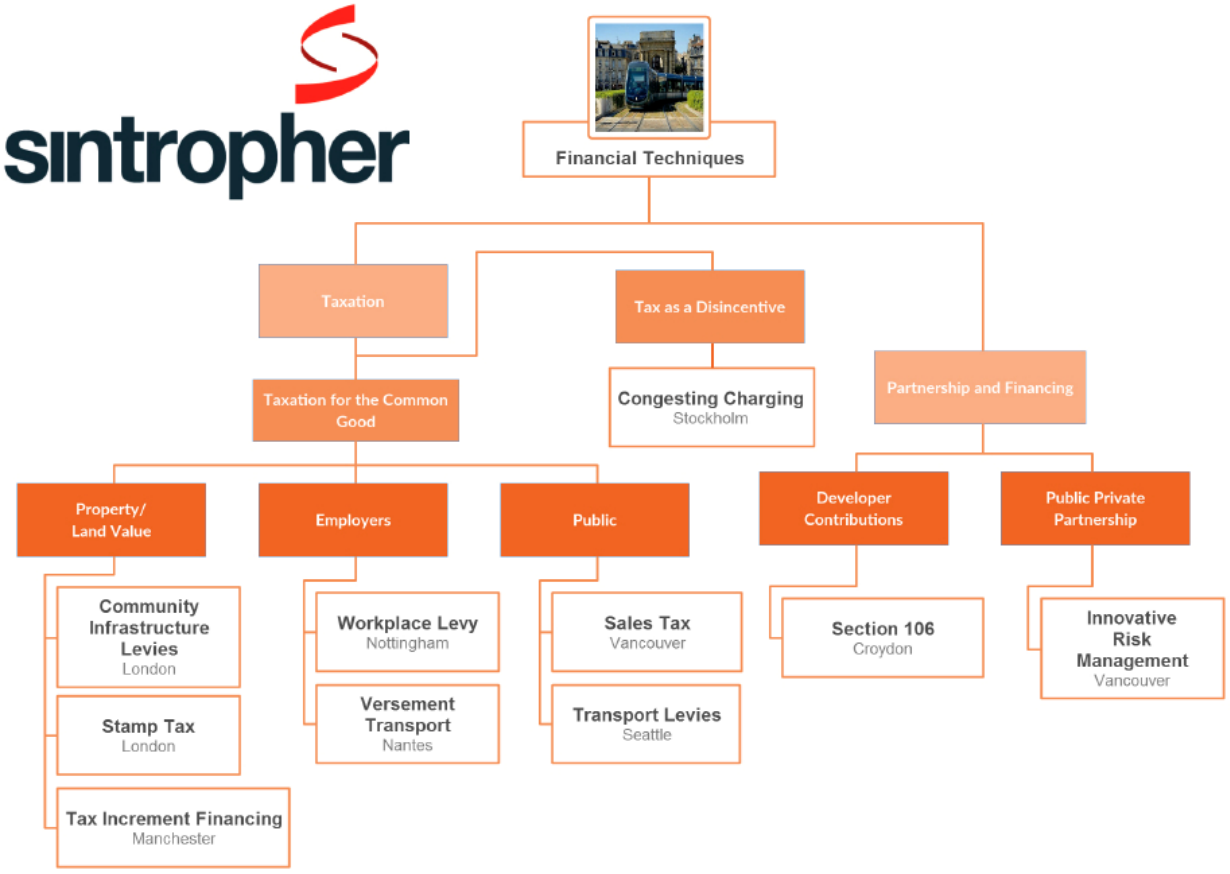
Light rail can adopt some of the characteristics of these new generation systems with the possibility of autonomous trams and battery power in sensitive areas. The low energy needs and high carrying capacity of trams with their minimal rolling resistance, a feature of steel wheel on steel rail, makes them ideal for the future of mass transport. Many of these new generation systems, POD, autonomous taxis and cars, electric and hydrogen powered buses and the like tend to have low capacity and still suffer from considerable non-tailpipe emissions making them less suitable for mass transit roles.

Q14 How do you see light rail aligning with new initiatives such as autonomous vehicles; cycling and walking; and wider Mobility As A Service initiatives?

Light Rail and tramways are compatible and complementary with new initiatives such as those mentioned. **M**obility **a**s **a S**ervice or MaaS is a service initiative to optimise the use of public and private transport and provide an end to end journey. A typical MaaS provider would use Light Rail as part of the journey, such as linking into metro or main line rail services as part of the 'first and/or last mile' element thereof. An autonomous taxi might link the travellers' start point to the tramway. Tramways are complementary to cycling and walking, potentially acting as the core part of a journey assuming that bicycles can be carried on the trams.

Q15 How can promoters leverage funding from sources beyond central Government?

The EU SITROPHER Project led by UCL investigated a variety of local funding options ranging from forms of local taxation and public private partnerships.



- **Community Infrastructure Levies** were used in Crossrail and can be used by local authorities to compel developers to fund a wide range of infrastructure need as a result of a new development. See the report for a detailed analysis. https://sintropher.eu/sites/default/files/attachments/CIL%20brief%202_0.pdf
- **Stamp Duty Land Tax**. Public investments, such as building transportation or sewer facilities, can increase adjacent land values, generating an unearned profit for private landowners. The unearned value (increases in land value which otherwise benefit private landowners cost-free) may be "captured" directly by converting them into public revenue through various mechanisms. Thus, value capture internalizes the positive externalities of public investments, allowing public agencies to tax the direct beneficiaries of their

investments. One such method of capturing this value uplift is through Stamp Duty Land Tax (SDLT). https://sintropher.eu/sites/default/files/attachments/Stamp%20tax%202_0.pdf

- **Tax Increment Financing** as used in Manchester. TIF is a financing mechanism created in the United States and employed for 40 years. It has been hugely popular with local authorities in raising funding for critical infrastructure and major urban regeneration schemes. Recently, TIF has spread outside North America, to be implemented in the UK. See the report for a detailed analysis. https://sintropher.eu/sites/default/files/attachments/Tax%20Increment%202_0.pdf
- **Work Place Parking Levies** as used in Nottingham. A Workplace Parking Levy is viewed by many as a tax on parking. More accurately, it is a licensing scheme that charges the occupier of premises or employer for the provision of workplace parking places. The cost may be passed on to the employee but it is left to the local traffic authority to determine who must apply for a licence and the appropriate sum per parking place. The purpose of workplace parking levies is to develop a revenue stream from measures that curb traffic demand and encourage modal shift. As per the UK Transport Act 2000, the revenue from WPLs must be used for investment in local transport. See the report for a detailed analysis. https://sintropher.eu/sites/default/files/attachments/Workplace%20levies%202_0.pdf
- **Versement Transport** as commonly used in France. The Versement Transport (VT) is a dedicated employment levy placed on employers within a transit service area. It serves to levy yearly funds from businesses and employers, in order to build and maintain transport links with strong connectivity in the region. The funds gained directly finance public transport initiatives, thus encouraging the workforce to use high-quality public transport services to access places of work, and create high public transit interconnectivity within the region. See the report for a detailed analysis. https://sintropher.eu/sites/default/files/attachments/Versement%20transport%202_0.pdf
- **Sales Tax Increase Financing** as used in Vancouver, Canada. Taxes have always been used to fund public spending. However, in recent years new tax-based funding schemes have been created in order to provide large funding inputs for particular projects and necessary public expenditures. Fuel taxes on petrol or diesel have been a popular choice, in which the funds from the sales tax imposed is used to finance public infrastructure improvements. Alternatively, taxes on goods are used to regulate and discourage usage of the goods in question. See the report for a detailed analysis. https://sintropher.eu/sites/default/files/attachments/Sales%20Tax%202_0.pdf
- **Transportation Levies** as used in Seattle. A levy is an administrative action by a governmental body under statutory authority, without going to court, to collect a sum of money in order to satisfy a household or individual contribution to a set funding initiative. Based on governmental power and decision, the local authority can levy upon a variety of possible sources, including wages, bank accounts, social security payments, accounts receivables, insurance proceeds, and property/households. These funds provide a large pool of public capital, which is then used for the pre-ordained plan or scheme that has been presented by government in order for the levy to be approved. Multiple variations of transportation levy enforcement exist. Methods of imposing the levy include property tax, development and zoning permit fees, vehicle purchase prices, etcetera, allowing for a creative implementation of the levy in a way that best suits the needs of the region. Generally, the levy is imposed on households, in order to target all residents of the area. See the report for a detailed analysis. https://sintropher.eu/sites/default/files/attachments/Transportation%20levies%202_0.pdf
- **Congestion Pricing** as used in Stockholm amongst other cities. Congestion pricing or congestion charging is a system of dealing with congestion on public services as a result of excess demand by passing on the cost to users. This might be in the form of higher peak charges for use of bus services, electricity, metros, railways, or road pricing to reduce traffic

congestion. This strategy helps to manage demand, making it possible to control congestion without increasing the supply. The theory that congestion charging is based on (Market Economics Theory) believes that users will be forced to pay for the negative results related to their use of a particular good (for example, traffic on roads). This makes the users aware of the costs when consuming during peak demand. See the report for a detailed analysis.
https://sintropher.eu/sites/default/files/attachments/Congestion%20Pricing%202_0.pdf

- **Planning Obligations – Section 106** as used in Croydon. New development can place extra burdens on the existing infrastructure and resources in the area (such as volume of traffic). It can also deal with existing problems in an area (such as a lack of affordable housing) and allow opportunities to be realised (such as archaeological study). Councils may require developers to make some reasonable financial or practical contribution to the community to address these types of issues. Commonly known as 's106' agreements in the UK, or 'public gain' in North America, these planning obligations provide a means to make a development proposal contribute funding to offset the site-specific impact of development on public infrastructure. S106 agreements are often referred to as 'developer contributions', and can be combined with other funding schemes such as the Community Infrastructure Levy. See the report for a detailed analysis.
https://sintropher.eu/sites/default/files/attachments/S106%202_0.pdf
- **Innovative Risk Management** as used in Vancouver, Canada. Governments are continuously challenged to develop public assets that meet taxpayers' expectations of quality, and also promise to stand the test of time, all while successfully funding the project. Canadian Public Private Partnerships (PPPs) are a means of ensuring an innovative risk management approach to infrastructure funding. They are a long-term, performance-based approach to procuring public infrastructure, and extend local authority's ability to hold the private sector accountable for public assets during their expected lifespan. PPPs draw on the expertise and innovation of the private sector and the discipline and incentives of capital markets, in order to deliver public infrastructure projects. Innovative risk management schemes transfer a major share of the risk associated with infrastructure development to the private sector. This is accomplished by engaging the private sector in a bundled contract for the life of the asset. This contract connects ongoing operations and/or maintenance payments to the quality of the original construction. See the report for a detailed analysis. https://sintropher.eu/sites/default/files/attachments/IRM%202_0.pdf

Land Value Uplift Capture

There has been much discussion of land value uplift capture, sharing in the increase of land values brought about as a result of the tram scheme. The problem with this is that the increase in value comes at the end of the project whereas the funding is needed at the beginning. It might be achieved by contractual arrangements with large developers profiting from the transport scheme contributing to its cost.

TfL published a report on this

https://www.london.gov.uk/sites/default/files/land_value_capture_report_transport_for_london.pdf

Money can be raised through locally imposed charges such as a congestion charge or the Workplace Parking Levy, as used by Nottingham to provide the local contribution to the funding of its tram extensions.

Money might be raised by local bond issues or by straightforward borrowing against future income from land value uplift or fare box revenues.

The Government has also introduced tax increment financing schemes, founded on the Business Rates Retention Scheme introduced in 2013-14. Under these schemes, local authorities may borrow for infrastructure projects, against the future growth in business rate receipts which will

result from the projects.
https://researchbriefings.parliament.uk/ResearchBriefing/Summary/SN05797#fullreport

Other Rapid Transit System Alternatives

Q16 Is there an appetite for considering Very/Ultra-light rail or Personal Rapid Transit as an alternative transport solution to light rail?

These systems have potential in small towns, localised districts, and as distributors from 'Light' and 'Heavy' rail. The only current example is the service between Stourbridge Town and Stourbridge Junction operated by Pre-Metro Operations on contract to West Midlands Trains, using the light weight Class 139 'Parry People Mover' units. The use of these innovative trains has enabled 6 rather than 4 services per hour to operate along the short branch line with vehicles that suit the demand and are fully accessible with level self-boarding for wheelchair users.

Coventry Council, working with the Warwick Manufacturing Group (WMG) at Warwick University are developing plans for a Very Light Rail service with the city.

WMG are developing a light railcar for this service to be tested at the new centre in Dudley. WMG are also looking at potential track forms, but recognise that the heaviest loads on all street tramways are not the trams but road vehicles such as buses and HGVs. We consider that these developments should be followed closely as they could lead to a way to bring pollution free, reliable and efficient public transport to the smaller towns.

This mode would also be an excellent and low-cost way to use segregated alignments for major parts of the routes. The light weight of the units would enable lighter weight track to be used, and unlike with street running, the VLR vehicles would be the largest load. Short lengths of street running may be required to link into shopping areas or main line stations.

Personal Rapid Transport (PRT) as used at Heathrow Airport seems to be a specialised type of premier service suitable for very specific circumstances. The wider use of this technology is yet to be proven as desirable or economically viable.

Q17 What are the estimated costs of delivering such systems and the wider benefits on offer? Please provide evidence.

As these technologies are still in development, there is little reliable evidence as to the costs. The Stourbridge Town branch service could give some indication for the vehicle operating cost, which in this example is higher than would normally be the case as it requires 100% over-provision of vehicles as the service requires only one vehicle with one spare. Normally the provision of spare vehicles would be in 5%-10% range, but at least one such vehicle is always required.

The work being undertaken by WMG should lead to realistic costs once the prototypes have been tested and the concepts proven. A demonstrator line would be a good way to both prove the concept and identify the costs and how they can be optimised.

Q18 Should such a system be a concept that is promoted?

We consider that this could be an exciting way to improve local transport in towns and cities where demand is lighter. Towns with suitable locations for such a service should be encouraged to look at the feasibility and benefits of VLR services with particular emphasis on the environmental benefits and reduction in harmful pollution.

However, the technology will need to be proven before implementation can start, identifying trial lines would assist the development.

Q19 How would this system provide a positive contribution to the economic productivity and development of a city or town? Please provide evidence.

As demonstrated earlier for light rail systems, VLR systems will provide similar contributions to the economic development of towns with industrial, commercial or business centres. As these systems are not established, the production of firm evidence is difficult, but by analogy to the contribution of trams in the larger cities, these systems should provide proportionate benefits at lower costs.

The rise in traffic using the Stourbridge Branch does show how such systems can provide the connectivity vital to urban development and the integration of all transport modes.

Q20 What are the barriers for developing such systems, particularly those with elevated sections? For example, public acceptance, or environmental sensitivities?

The introduction of less well understood technologies into the urban fabric will always be considered risky, particularly for local politicians and officials. Thus, confidence of success in a risk averse culture will often prove to be an overwhelming barrier. This can only be countered by support from central or regional governments who are prepared to be bold and de-risk the decisions at local level.

Public acceptance often only comes when the service comes into operation. Edinburgh Trams were vilified until the service started and now, they have one of the best approval ratings of all transport modes at 99%. See https://edinburghtrams.com/news/edinburgh-trams-uks-no-1-for-customer-satisfaction.

Likewise, the new tram train service between Sheffield and Rotherham Parkgate recently scored 100% customer satisfaction with usage exceeding predictions after only a few months of operation. See: https://www.transportfocus.org.uk/news-events-media/news/tram-passenger-satisfaction-riding-high/

Once initiated, many of the barriers to Light Rail listed in Question 8 also apply to these systems although it may be possible to streamline some processes.

The general population is not familiar with elevated transit systems along streets, although there have been viaducts carrying railways adjacent to streets in major urban areas such as East and South London and Manchester. Bridges carrying railways over streets have existed for over 150 years.

Conclusion

We believe that Light Rail and Trams have a significant role to play in improving transport links and inter-connectivity between transport system within cities and towns within the UK.

We suggest that the DfT considers the following initiatives along with the above responses to your specific questions.

- Appoint a Light Rail Champion;
- Prepare a Strategic Plan for LR to ensure that there is a steady supply of light rail schemes coming on stream. This will promote confidence and in itself reduce costs and avoid teams and expertise being dispersed;
- Take a lead in planning interchanges between light rail and other modes;
- Encourage local authorities, Combined Authorities, LEPs etc to consider light rail schemes;
- Encourage TfL to consider light rail schemes in London (e.g. Paris has eight);
- Fund some studies into light rail in some cities;
- Fund light rail R&D projects, such as VLR and the complete learning from the tram-train pilot.

We look forward to your response to this Call for Evidence and would be pleased to participate further. If you require any elaboration for any of our responses, we would be pleased to assist.

Tim Kendell

Tim Kendell BSc CEng MICE MAPM FPWI

Technical Director

For and on behalf of

LIGHT RAIL TRANSIT ASSOCIATION
A private company limited by Guarantee
Registered in England and Wales
Company number 5072319
Registered Office: 138 Radnor Avenue, Welling, DA16 2BY

E tim.kendell@lrta.org

T 07907 159441