



# Light Rail (UK)

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## Leigh Guide Busway Upgrade to Public Transport Pathway October 2020



*The Vantage service in October 2020*

The Leigh-Salford-Manchester scheme (LSM), which opened in April 2016, has delivered a high-quality public transport service linking Leigh, Atherton, Tyldesley, Ellenbrook, Salford and Manchester via a guided busway and on-highway bus priority measures.



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The Vantage service commenced operation in April 2016 and has been a great success with patronage levels far exceeding expectations.

The contract set a target patronage figure of 1.7m in year 4 (financial year 2019/20). The forecast figure is 3.1m, 82% higher than original expectations.

The most recent customer survey undertaken in early 2018 reports that 35% of all passengers had previously driven or travelled as a passenger in a car.

The development of Vantage so far has been achieved on the core

In April 2017, the service was fully extended along a transformed Oxford Road in Manchester city centre, creating better links to key sites along one of Europe's busiest bus routes. The scheme is expected to deliver high value for money, with an estimated BCR of up to 2.8 including wider economic benefits but details not available to the author

Services run on 21km of segregated bus measures, of which 7.5km, between Leigh and Ellenbrook, is a kerb-guided busway, with the remainder on-highway.

The scheme includes a guided section including seven pair of high-quality stops, 3 x Park and Ride, current total capacity for 450 cars, enhanced passenger waiting facilities at Leigh Bus station only,

Highway and bus priority improvements within Leigh, Atherton and Tyldesley town centres. A new premium bus service between Leigh, Atherton, Tyldesley and Manchester city centre – 8 services per hour timetabled with additional services in the peak to accommodate demand (4 services per hour to/from Leigh and 4 services per hour to/from Atherton although this is subject to operational variation due to the current pandemic



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## Service Provision as at Feb 2020, pre pandemic.



Current service levels can be broken down into four levels: -

- Tier 1 - Core contract operation of 15 minutes daytime service from both Leigh and Atherton. These combine at Tyldesley to provide a 7/8-minute headway through Salford.
- Tier 2 – utilising additional Vantage spec vehicles ordered shortly after service launch; the first round of extra peak hour journeys was added to provide extra capacity.
- Tier 3 – in September/October 2018 a further 7 non-Vantage vehicles were added in the peak hours providing further capacity, most of which is targeted at Salford residents who were unable to board journeys which had commenced in Leigh or Atherton.
- Tier 4 – a further 2 journeys were added to provide extra capacity linked to the launch of “Our Pass”. In practice, these have also become embedded for normal passengers.

32 vehicles are deployed in the morning peak providing an average headway of 2.5 minutes with data for November 2019 suggesting an average load of 77 passengers.



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The vehicles in service

Double-decker bus model used but not exclusively is the Volvo B5LH hybrids with Wrightbus Gemini 3 bodywork with a working life of 12 years, and like all heavy buses it is still hard on roads, it has an upper floor ceiling which punishes passengers above 5 foot 8 (ouch) and takes a long time to unload. However, unlike articulated buses, they hold many more passengers, can climb uphill on nearly all wet roads and don't get stuck in the snow as easily.



The current Vantage operator successfully operate trams in Croydon even in very narrow roads, 1 x driver x 250 passengers on a 2.5 headway at times



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Light Rail (UK) believe that Leigh, Atherton & Wigan lack of quality public transport leads to congestion, serious transport air pollution, and transport poverty which can best be tackled by provision of high-quality steel on steel street running public transport. It will also help futureproof connectivity for epidemics that have been advised to follow Corvid 19

This is also a serious opportunity in the proposed rebalancing of the North - South Economy especially in the "Red Wall Constituencies" This can be provided by "Build Back Better" and TfN as part of the "Rail North" proposals must include light rail and tramways, each mode providing optimal service for varying traffic flows.

The essential requirement is full integration of modes, Public Transport Pathways (PTP), in terms of interchange and through ticketing, allowing seamless journeys. Trams and light rail should form an essential component of our public transport provision especially connections in the East with Manchester Metrolink and eventually West to Liverpool City Region

We need our local politicians to be more Statesman like and be more proactive to secure Warrington's position as a central hub and future proof our transport links

Trams are an efficient way of moving large numbers of people in towns and cities from 150,000 citizens upwards and can cope with 2,000-18,000 passengers per hour. They have a proven record in attracting people out of cars; the rate of modal transfer from car to tram at peak times is typically around 27%. This compares with estimates of between 4% and 6.5% for quality bus investment, the Leigh Guided Busway starting from a low base may be the exception to the rule.

Levels of traffic reduction from trams are typically around six times greater than with bus schemes.

Reductions of road traffic of up to 14% after introduction of tram schemes have been recorded.

A tramway inclusion in a Public Transport Pathway will improve Leigh and Wigan's images and assists urban regeneration. Shiny rails instill investor confidence. All UK schemes have had positive effects on the image of the city in which they have been built, which has brought benefits in terms of attracting inward investment as well as business and tourist visitors, sometimes to the detriment of their non-tram neighbours



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As part of an integrated public transport system, tramways can attract motorists out of their cars and thus reduce the number of vehicles in the city centre, particularly in conjunction with park and ride provision. This not only reduces the number of vehicles moving on the street but also reduces the demand for city centre parking. Conversion of heavily trafficked bus corridors to tram also reduces the numbers of buses, replacing them with fewer trams providing the same passenger-carrying capacity.

There is a confusion in the term used to describe Light Rail as the scope of this and operations are very wide, so I will use the term Light Rail in specific and the term Tram in general as the term Light Rail generally has now become polluted by the sub conscious thoughts of over engineering, over costs and general urban blight etc., whereas the term

Trams are more acceptable in human and affordable cost terms

Very Light Rail, (VLR) or Trams, is a relative newcomer to the world of mass transit. Heavy rail and subways take a long time to build, and they are expensive to operate.

This is a mode of transport which uses rail vehicles which are more versatile than conventional "heavy rail" trains and have street running capabilities. A light rail vehicle can negotiate sharper curves than a conventional train (both vertical and horizontal), can negotiate steeper gradients and can stop much faster so can operate in line of sight mode without major signaling requirements.

The systems available provide the ability to follow the curves and gradients of the urban environment which a conventional train cannot do. Light Rail & Tram systems offer an attractive and effective system, reducing congestion and pollution by offering motorists an alternative to car use, Manchester Metrolink registered a modal switch approaching 32%, helping to create pollution-free zones in cities (clear zones).

It moves large passenger flows in a more cost-effective way than buses, but at a fraction of the cost of a full urban railway. Light rail/tram is mainly appropriate in urban or inter-urban systems in medium-sized cities where full metro systems are inappropriate.



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**TramTrain** has the potential to provide a new passenger to rail, a better transport offering whilst reducing overall costs to UK plc, development of a new service to rail users, providing new journey opportunities, taking the railway to where people want it to go to both origin & destinations, providing easier access to trains, in effect taking the railways to the people again. May have higher upfront costs but deliver lower whole-life costs.



TramTrain Sheffield, Street Running



TramTrain Kassel, Street Running

Substantial evidence from Europe shows that this develops into a significant revenue stream and enhances the modal switch from road to rail in the urban area, but will only be delivered if the wider industry work in partnership to make it happen

Examples in the UK are: Greater Manchester with plans for TramTrain in the Stockport/Marple area, Wigan & Warrington areas, Birmingham, Glasgow, Edinburgh, Liverpool, Leeds, London, Bristol, Cheshire, Cardiff Bay Development (vehicles have been delivered 0but to name a few who are almost TramTrain ready



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Liverpool City Region were ill advised and lost this option when they sold for scrap the high quality new tram rails originally to provide this option for Mersey Rail

A recent development at the other end of the scale, are Ultra-Light rail vehicles, easily recognised as trams with the growth of on-board fuel supplied vehicles giving catenary free vehicles powered by Hydrogen fuel cells or by BioMethane gas.

Several relatively low-cost hydrogen ultra-light trams have been developed and are in service since 2009 with installation from £10 + Million per track kilometre

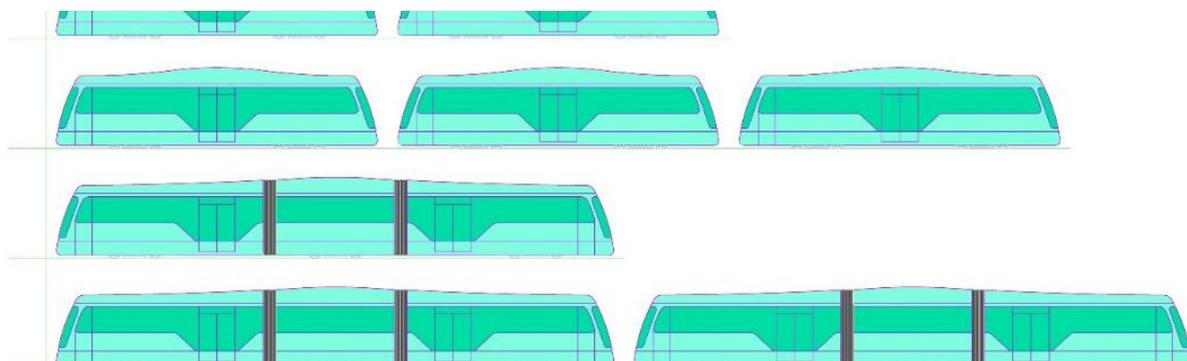
One successful hydrogen tram is operating in Aruba linking the Port with the capital city Oranjestad in the Tourist mode and in city mode Doha, Qatar



Single Hydrogen vehicle mode x 1 driver x 100 passengers



Lin autonomously, 1 x driver x 3 vehicles x 300 passengers





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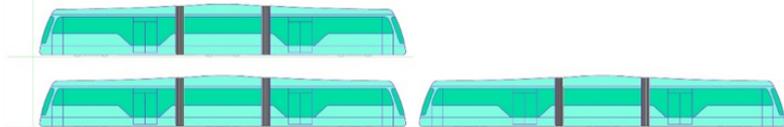
An articulated Hydrogen/BioMethane version is being installed



Riverside California 2021

Riverside California Spring 2021

Single Mode: 1 x driver x 200  
passengers



Link autonomously x 2 vehicles: 1 x driver 400 passengers

Air Quality Air pollution has been linked to coronary artery disease, heart attacks and strokes, with studies showing that traffic-related air pollution affects lung function in children and older people. Diesel vehicles emit more of the dangerous pollutants than petrol vehicles.

Sixteen cities and regions including London, Manchester, Warrington, Leeds, Birmingham, and Glasgow have illegal levels of air pollution long after they were obliged to comply with agreed limits



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## GMCA GREATER MANCHESTER COMBINED AUTHORITY



Greater Manchester needs to take action to improve air quality now and for future generations. Air pollution is linked to a range of very serious health conditions and contributes to early deaths.

Government has directed the introduction of a Greater Manchester-wide Clean Air Zone. It will bring harmful nitrogen dioxide (NO<sub>2</sub>) levels on local roads within legal limits in as short a time as possible.





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Particulates are one of the worst offenders in air pollution because they damage the lungs when inhaled. The "Oslo Effect" is produced by the road surface, tyres and brake linings which is now emerging as the "elephant" in the room.

A toxic cloud composed of predominately heavy metal dust, one in particular "Magnetite" recent research is showing a significant contribution to Alzheimer's Disease, Dementia, and other related types of mental illness

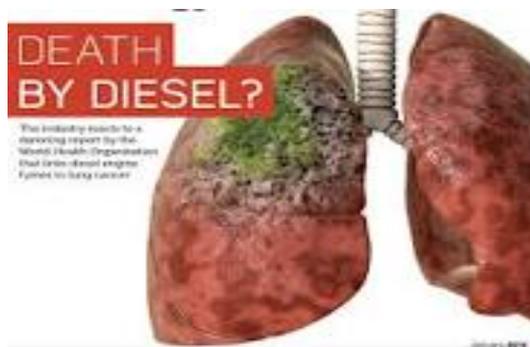
Stand at a busy road junction on a bright day and chances are you will see it: A Wacky Races cloud of black smoke left hanging in the air after a car pulls away. These clouds are actually particles of soot – partially burnt fuel from diesel engines – and they are arguably the worst environmental menace facing Leigh and District – and children in particular.

Particulates are one of the worst offenders in air pollution because

"Exposure to air pollution affects the health of everyone, especially children, and those living with pre-existing lung conditions. Developing and implementing a coherent strategy for reducing air pollution is therefore essential if we are to clean up our dirty air and protect the health of us all."

Air pollution causes 29,000 early deaths a year in the UK, more than obesity and alcohol combined. A look back at the costs in 1999/2000 to the NHS (when these figures in this format were last readily available) there were over 10,500 operations for respiratory disease.

The total cost of respiratory disease to the NHS 1999/2000 £2,576 million made up of Primary Care for respiratory disease across the UK costs £647.5, hospital inpatient care costs £1,062.2 million, hospital day case care costs £18.2 million, outpatient care costs £40.7 million, 2,800,000 bed days per year used for treatment alone. In 1999 alone, respiratory disease caused 153,000 deaths (74,000 men and 79,000 women) production losses due to respiratory disease £3,194 million, mortality £1,643.6 million morbidity, working days lost 28,309,000 multiplied by the average daily earnings produces an estimated £2,239 million pound





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The Government must take immediate action to tackle high levels of nitrogen dioxide (NO<sub>2</sub>) pollution in the UK following a landmark court ruling.

Supreme Court justices announced the verdict today and said ministers must draw up new air quality plans to meet obligations under European law on pollution limits.

A panel of five judges, headed by the court's president Lord Neuberger, ordered "that the Government must prepare and consult on new air quality plans for submission to the European Commission, no later than December 31, 2015

The Secretary of State "admits in this case the UK has failed to comply with the nitrogen dioxide limits first laid down by EU law in 1999, now contained in Article 13 of the directive". A DEFRA report from 2014 has lain unheeded until this court case

The Environmental Bill going through the UK Parliament at the moment (Oct 2020) will enforce in UK Law prevention of (PM10, PM 2.5, fine Particulates) which are produced by the Road/Tyre/Brake abrasions which only increase with electric vehicles. Urban buses create this kind of pollution in line with some LGVs and there is no safe minimum level in the built up areas (Defra NEE July 2019)

## Going Forward

Capacity 2020 – 2021 and beyond

As demand has continued to increase, any extra capacity added generally becomes embedded and would therefore be difficult to withdraw. Discussions will be required on extending and possibly enhancing current provision to cope with the "standard" growth rate.

The contract set a target patronage figure of 1.7m in year 4 (financial year 2019/20).

The forecast figure is 3.1m, 82% higher than original expectations, which going forward will give and estimated additional 2.5 million passengers per annum, a conservative total of 5.6 million

The right of way would have to be able, to handle a peak hour passenger load of 10,500 passengers per hour per direction, travelling on 185-200 buses per hour (65 percent of them will need to be articulated).

Coupled with the estimated 35% modal switch from cars a success indeed although the current Government Advice to avoid public transport indicates a London Centric ignorance of Public Transport and how it works

Infrastructure

When the "tram on tyres" or "rubber-tyred tramway" technology first emerged in the early 2000s, it was positioned as part of the new Bus Rapid Transit (BRT) concept attracting interest at the time. The argument went that "BRT" was "just like light rail, but cheaper", and the "rubber-tyred tramway" was intended to demonstrate that a "tram" constructed with automotive/bus technology could be "guided" just as a light rail transit (VLR) tramway was guided by its track rails, and able to operate extra-long, multi-articulated buses smoothly and reliably just like the tramcars on former railways.



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A number of cities have experimented with or adopted the technology, particularly in France, where cities like Nancy, Clermont-Ferrand, Rouen and Caen made the “tram on tyres” the centrepiece of their transit systems. Now, plagued by reliability and performance problems, Caen has converted to a standard tramway opening Spring 2020, Nancy and Rouen to follow shortly. Clermont Ferrand, home of the Michelin tyre giant will be the last to convert. Interestingly several Chinese cities including Guangzhou are offering this technology but fail to mention the sorry and expensive French experiences

Ottawa BRT was reasonably successful until they came to upgrade above 10,000 passengers per hour and discovered that the whole BRT infrastructure had to be replaced.

### **Wider Catchment Areas**

It is quite clear that we need to build on this success which confirms the pre scheme arguments to build an VLR rather than a BRT was the correct decision, but budget practicalities and short-term gains ruled the day. The question that arises here is should this project gone direct to VLR rather than BRT? After all, if it failed it would have been cheaper than a Metrolink failure. I would say especially with hindsight the gamble was the right decision and now we have to consider going forward, the question is how we build on this success.

It would be prudent at this time to consider the opportunities that exist to extend the routes thus widening the catchment area of Vantage VLR against the background of Air Quality, Carbon Reduction, Congestion, Clean air Zones, Low Emission Zones but to name a few

### **Possible Routes**

#### *Leigh to Wigan Junction 26 M6/M58*

By following the natural path of the busway towards Spinning Jenny Way A572 towards the Bus Station then take the B5215 in the direction of Atherton, Hindley Green, Hindley, Wigan Town centre connecting both Railway stations, Follow the A577 (several route options) to Junction 26 M6/M58 where there is sufficient land for P+R

#### *Ellenbrooke to Haydock P+R*

It would build on the success of the A580 East Lancs Road at this junction for to continue to Haydock and establish a P+R west of the M6. This would syphon off a significant number of polluting cars inbound to Manchester predominately from the south.

Additional routes include Bolton, Little Hulton, Golborne and Leigh Sports Village some of which could be accommodated by simple add-ons to existing journeys. Adjustments may be necessary further along the route to accommodate those passengers displaced by new users from the “outer” areas.



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### *New destinations*

Point 3 references the options to extend services at the “outer” end, opportunities also exist to provide links to new destinations on the inner section e.g. Salford Royal Hospital, Media City, RHS site at Worsley and key sites in South Manchester including the University. A tramline is proposed using the A57 from Manchester to Warrington which with various route options could be connected to Metrolink and give greater connectivity to the proposed East West Northern Rail upgrade. This would give Salford a significant tram system with its own distributor tramways

### **Utilisation of Spare Capacity**

Recognising the high peak only requirement on Vantage, options are being considered to operate local off-peak “community benefit” services in the Salford area which could be provided at relatively low incremental cost. An example would be an hourly off-peak link from Kersal to Eccles via Salford Royal.

### **ULEBS (Ultra low emission vehicles)**

TfGM were successful in applying for funding for 10 electric buses, 5 to be deployed replacing TfGM’s current fleet (tier 2 above), with the other 5 to be used to provide additional capacity for what was assumed at the time to be possible growth (since achieved and exceeded).

A bid for more vehicles was not submitted as electric buses would not have the capacity to cover the high mileage workings required on the service without the opportunity to recharge. This is now less of an issue as there are 13 peak hours only workings and therefore mileage could be redistributed more evenly across the fleet.

### **Note for the future circa 2025**

The Euro emissions standards are strict regulations which are designed to limit these exhaust emissions and protect the health of the general public. First introduced in 1992, these rules have undergone several revisions in the past few decades and now include the mandate of regular emissions testing and the integration of particulate filters into car designs

Euro emissions standards have far-reaching influence and are subject to all cars sold in the EU and the United Kingdom – even after Brexit. This means that if a manufacturer intends to sell a car in any of these locations, they must adhere to the specific laws laid out.

The Euro 7 emissions standard will be brought in from 2025 and is expected to be the final iteration of this type of legislation surrounding vehicle emissions. Fine details are yet to be finalised, but the EU is looking at three different options for when it arrives in a few years’ time.



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It is yet unknown (Dec 2022) as to which approach the EU will finally take but one option could also see the implementation of “automatically enabling a zero-emission mode depending on the location of a vehicle,” meaning your vehicle would change how it runs depending on your location. For example, if you were in a city such as London, your vehicle would produce fewer emissions than if you were in a more remote location with fewer people for instance.

The European Environment Agency estimates that more than half of the EU urban population is exposed to levels of Particulate Matter (PM2.5) exceeding the WHO guideline value. Up to 8% breathe levels of nitrogen dioxide above the EU’s legal limit. In 2021 the European Commission will publish a new ‘Zero Pollution Action Plan’ to prevent harmful levels of pollution.

**Emission limits for tyres and brakes:** tyres and brakes shed particulate matter (microscopic pieces of material) as they wear. Euro 7 will set limits for how much brake dust and tyre particles can be produced by rubber wheeled vehicles (Particulate Matter PM2.5)

**This is an entirely new requirement.**

In Conclusion.

With the Vantage Leigh BRT approaching maximum patronage it is very clear that we now need our local politicians at Parliamentary and our Council to press for a change in the Cost Benefit Ratio to enable funding to become available for to upgrade the investment Politically

A simple method of doing this is to change the DfT measurement tool Cost Benefit Ratio from the short number of years (12/20yrs) to something to reflect the generational benefits of Light Rail to 60 years + and be imaginative to capture many of the soft benefits as is done on many continental countries and then we can be a one nation enjoying our movements and health together and not one at the expense of the other

A recent report launched by UKTram at the summer meeting of the All Party Parliamentary Light Rail Group shows the significantly higher regeneration and jobs created in the 8 city regions in UK with this mode which will power the rebalancing and growth of the economy

Government have the money; we have the local experts and this nasty nettle must be grasped and a statesman's view over several generation funding is needed and we will go a very long way to cleaning up and regenerating our cities starting with Leigh and District

James Harkins FCILT MTPS  
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*A not for profit Company*  
October 2020

***A living document, work in progress!***