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DEVELOPING THE DETAIL OF THE SUSTAINABLE TRANSPORT VISION

Stratford-on-Avon District Council, Warwickshire County Council & Homes England

Long Marston Airfield Garden Village

January 2023

The Vision – Part 2
Evidencing the Vision

Report control

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Primary Author:	Ellen Hill	Initialled:	EH
Contributor:	Taylor Davis, Ben Stone	Initialled:	TD, BS
Review by:	Mike Axon, Paul Curtis	Initialled:	MA, PC

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1 Executive Summary

1.1 The Vision for Long Marson Airfield (LMA) as presented in the Vision Document, sets out an ambitious package of interconnected placemaking and mobility components to foster a thriving local community which is centred around accessibility, liveability and minimising carbon emissions.

1.2 This report provides the technical justification and detail that supports the Vision for LMA, and contains an analysis of the realistic trip generation potential for LMA, an optioneering assessment of traditional mass transit options and innovative micromobility solutions, as well as an appraisal of a viable size for a truly self-sustaining settlement. The intention is that the findings presented in this report will allow decision makers to make an informed judgement on how LMA can be delivered in a policy compliant sustainable manner, utilising solutions that may offer alternatives to the South Western Relief Road (SWRR).

1.3 The assessment of mass transit solutions (MTS) and sustainable travel options demonstrates that there is limited social and carbon reducing benefit to be gained in implementing vastly improved traditional bus or rail services at the site, in the context of the high costs associated with each option. Some bus options included in this study however are recommended for further consideration by decision-makers, but in the framework of the wider mobility offering suggested for LMA through the Vision. Forward-looking options for sustainable travel outside of the settlement are regarded to be valuable alternatives such as demand responsive travel (DRT), autonomous shuttles, and micro-mobility (bicycle/e-bike hire, e-cargo bike hire, e-scooter hire, car clubs and carpooling). This package of measures should be supported by a network of on-site Mobility Hubs which have the dual purpose of providing a focal point for community interaction, boosting propensity for local living, and facilitating a central point for sustainable travel mode integration for onward (or internal) travel.

1.4 Based on the placemaking and mobility principles of the Vision, a comprehensive trip generation exercise has been undertaken to apply figures to concepts, and derive a total trip generation which is realistic rather than worst-case (as per NPPF direction). This is part of an overarching Vision and Validate (V&V) strategy.

1.5 V&V is distinguished from the now discredited and abandoned (except in particular circumstances) Predict & Provide (P&P) approach which placed road capacity and facilitating convenience by car above all else. In adopting this approach the demand is demonstrably flexible, and in busier situations the volume of traffic becomes increasingly a function of available roadspace. V&V does not support a situation where future traffic demand is thought of as a demand that must be provided come what may. It becomes more and more important to design the active and public/shared travel systems to accommodate the forecast demand conveniently, and to consider this across the full day. Adherence to a V&V approach places virtual and active travel at the forefront of new settlement design.

1.6 The trip generation exercise therefore begins with realistic levels of internalisation for residential-based trips, and overall levels of containment to account for other on-site uses (education, employment, retail, leisure). Where trips are then calculated to travel external to the settlement, a mobility influence area has been established. This is the area in which the mobility measures set out in the Vision can reasonably penetrate, and a series of judgements have been made on realistic future mode splits to these areas. The resulting external forecast trip demand is around 21,800 two-way trips across the 24-hour day, with around 13,500 of these being new vehicle trips on the local

road network. This equates to approximately 3,300 and 3,400 two-way vehicle trips in the AM and PM three-hour peak periods. The traditional peak hour impact on the local road network is some 47% and 39% less than the previously estimated trip demand in the AM and PM peak hours respectively.

1.7 In order to achieve this lower external vehicular trip demand we recommend the following:

- A change in development composition to provide 1 job per household (including in this an allowance or expectation for home or Third Place working), a good provision of local shopping including modest supermarket, comprehensive local centre facilities (leisure and social), primary and secondary schools on-site.
- Excellent placemaking as per the Vision, which places active travel at the forefront of design with vehicles accommodated as visitors to person spaces.
- A forward-looking package of mobility options for internal and external travel to LMA, enabling use of mobility as a service (MaaS) for maximum convenience and mode integration. The range of choice to travel by modes other than single occupancy vehicle must be available and more attractive for many.

1.8 In achieving this then we judge that there is no good case for the SWRR, although we recommend this is checked through the county-wide model. The best results are achieved through early delivery putting availability aside. This might be thought of as simply infrastructure to be provided from day one (much in the way a road is often thought of), as opposed to commercial entities to be merely encouraged.

1.9 Finally, this report provides an indicative assessment of what benefits and disbenefits a larger settlement at LMA might provide should it be nearer to 6,000 homes and additional land uses (factored up appropriately). The benefits of this are found to be greater viability of a secondary school (which should come at an early stage in any case), and greater critical mass afforded to the internalisation potential (placemaking) and mobility measures put forward. Disbenefits would naturally include a larger number of new vehicle trips on the local road network, however, for a 6,000 home settlement (and additional land-uses) in our trip generation assessment these are derived to be on par with those originally calculated for the 3,500 home allocation for LMA.

1.10 Large road building is known to induce vehicular demand and is synonymous with the Predict and Provide approach to transport planning. This has recently been rejected by the DfT in their Transport Decarbonisation Plan. It does not support a V&V approach to delivering much needed growth and may only offer a short-term ‘fix’ in any case. We believe that the provision of the SWRR would release almost none of the economic, environmental, social, health and accessibility benefits as offered by the excellent array of placemaking and mobility measures of the LMA Vision. As such the SWRR is a sub-optimal solution overall and does not go hand-in-hand with a Vision-led approach.

2 Introduction

2.1 Vectos is appointed by Stratford-on-Avon District Council (SDC), Warwickshire County Council (WCC), and Homes England, to undertake a study into sustainable transport options to support the Long Marston Airfield (LMA) site allocation for 3,500 homes and mix of land-uses. The purpose of the study is to assess and recommend options for sustainable travel (at a high level), taking into account placemaking and behavioural choices, necessary to facilitate the delivery of LMA.

2.2 This report forms Part 2 of this study and sits behind the Vision developed as Part 1. In doing so its purpose is to develop the detail of the vision and place tangible trip demand figures behind the principles established in the Vision. A high-level optioneering assessment of traditional mass transit solutions is also contained within this report, as is an analysis is the implications, good and bad, of increasing the size of LMA to establish where it becomes truly self-sustaining.

2.3 The study is framed in the context of declarations of climate emergencies by SDC and WCC and the UK's commitment to achieve 'Net Zero' by 2050.

2.4 Importantly, the full build-out at LMA is currently dependent on the delivery of the South Western Relief Road (SWRR) which is experiencing a significant lack of identified public funding. This is a substantial barrier to the much-needed development in the current framework. This study therefore has sought to identify if there is still a need for the SWRR based on current policy direction and climate change objectives, and how a new strategy can be developed to enable LMA to become a viable and sustainable garden community.

2.5 As Part 2 of the study, this report addresses the following:

- Assessment of Mass Transit Solutions & Sustainable Travel Options;
- Trip Generation Assessment; and
- Viable Size for a Self-Sustaining Community.

2.6 All workstreams contained within the brief and proposal are considered within the Vision, which ultimately feeds into the detail in this report.

3 Assessment of Mass Transit Solutions & Sustainable Travel Options

3.1 Where travel will occur outside of LMA it is crucial to provide a range of travel options beyond the single occupancy private vehicle, to maximise efficiency and socially inclusive accessibility. A comprehensive package of sustainable travel options has been identified in the Vision, recognising the site's proximity to Stratford-upon-Avon, and a supplementary optioneering assessment has been undertaken of potential mass transit options in this report.

3.2 On this basis, this section contains a high-level analysis of these options with regard to likely feasibility and viability, along with its relative value to LMA and the wider area. Importantly, the package of measures at LMA should maximise convenience, but in order of priority the more sustainable options should be more attractive than less sustainable options, and this is a large consideration of the study in the context of delivery and cost.

Mass Transit Optioneering Assessment

3.3 The study brief references mass transit solutions to include rail (two options), light rail, tram, bus rapid transit, and guided bus.

3.4 The two rail options are the rebuilding of the line between Stratford-upon-Avon, LMA, and Honeybourne, and reopening the existing line between LMA and Honeybourne (with some new line required). These options have been widely discussed during the stakeholder workshops, as have associated discussions on light-rail use as an alternative. The optioneering assessment takes these discussions into consideration and primarily summarises findings made through two rail studies undertaken by ARUP in 2012 and 2018, with recommendations drawn in the context of the potential schemes' cost benefit to the site and wider area.

3.5 The optioneering assessment establishes the pros and cons of each option at a high-level, along with providing details of potential costs where available. Where further investigation is deemed beneficial this is noted. A cost analysis for each option is provided where possible, assessed against the forecasted number of trips each mode is estimated to accommodate. Some schemes are ruled out at an initial stage of investigation where it is evident there is limited potential to benefit LMA or the wider area. The following options are considered:

- Bus (including bus rapid transit)
- Rail (including heavy, light and tram)
- Automated Shuttle
- Micro-mobility (including car clubs, bike sharing)

Bus Options

3.6 A number of bus options have already been explored by WCC for the local bus network with regards to development at LMA, and the below provides a summary of the options that have been explored:

— **Option 1** – Retention of existing bus service with improved frequencies;

- **Option 2** – On-carriageway bus rapid transit (BRT);
- **Option 3** – Part-segregated BRT (Seven Meadows Road to Evesham Road route);
- **Option 4** – Part-segregated BRT (Shipston Road to Clopton Bridge Road route);
- **Option 5** – Guided bus system on The Greenway; and
- **Option 6** – Electric BRT vehicles.

3.7 The findings for each of these options are combined in this report and assessed against the criteria specified above, in terms of effectiveness and cost. This allows comparison against other measures presented in this section of the report.

3.8 The trip generation exercise undertaken as part of this study indicates that the proposed development at LMA would likely generate around 1,270 two-way bus trips based on existing (2011) travel patterns). With effective and realistic changes to the bus/shared service is expected to, or could reasonably be designed to, generate up to around 1,700 two-way bus or DRT trips on a daily basis (based on the delivery of 3,500 dwellings). This encompasses all off site locations, with most trips by these either of these modes being to Stratford-upon-Avon and other local areas.

3.9 All costs provided for each option are derived directly from the WCC study previously undertaken.

Option 6 - Electric BRT vehicles

3.10 Option 6 relates to the provision of electric buses on routes to and from LMA. Whilst listed as the sixth option in the WCC study, it is included first within this document as it is considered a prerequisite to be delivered alongside any of the other options for buses.

3.11 Option 6 can be implemented in conjunction with any of Options 1 to 5, as electric buses will be able to operate on all routes.

3.12 It is expected that by the time any option is brought forward, the majority of commercial bus vehicles will be electric and therefore it is expected that Option 6 will be implemented regardless of whether the development comes forward or not.

3.13 The implementation of Option 6 will not reduce journey times in isolation and will not assist in alleviating congestion as the number of vehicles on the roads will remain unchanged. It is also unlikely that a switch from traditional buses to electric buses would encourage a significant mode shift, despite the improved passenger experience (less noise and vibration). However, an electric bus fleet will significantly help in working towards carbon neutrality in transport in the region, and should be considered essential should any of the above options come to fruition. WCC have already begun to roll out electric buses on their network, with electric Stagecoach buses operating between Leamington Spa town centre, the train station, and the National Grid site at Warwick Technology Park. We would expect the full fleet to be electric powered by the time the development commences.

Option 1 - Retention of existing bus service with improved frequencies

3.14 Option 1 would involve the re-routing of existing bus services (services 1, 2 and 3) into the site, following the amalgamation of bus routes with Bishopston Park & Ride.

3.15 At present journey times to Stratford-upon-Avon are in the region of 20-minutes, with services operating locally from the Meon Vale bus stops every 30 minutes from 10:35 to 14:07 Monday-Saturday with two further buses at 18:02 and 19:37 in the evenings . This level of service is not conducive to commuting trips as no services are provided to or from Stratford-upon-Avon during either traditional peak periods. Additionally, there are currently no services from this area to Honeybourne.

3.16 Enhancing this service to provide an hourly evening service (Monday-Thursday (as set out in WCC study)) and providing an hourly service to Honeybourne Station is forecast require an initial financial contribution in the region of £1,100,000 to support the initial development of this enhanced service, although this figure does not include ongoing operational costs.

3.17 The existing frequency (once every 30-minutes) could be doubled to provide improved public transport infrastructure, supporting a turn-up-and-go approach, costing in the region of £900,000 per annum to establish the services.

3.18 Bus patronage is known to have been severely impacted by the Covid-19 pandemic and had been steadily reducing in the region since 2016 (Warwickshire Enhanced Partnership Plan and Scheme for Buses – Figure 6.2). Re-uptake of bus services is not expected to reach pre Covid-19 levels again. Increasing the frequency, reliability and comfort of buses however is a known package to increase patronage and so these are the elements necessary to focus on. Option 1 meets the first criterion but does not strictly meet the other two criteria. Even if it is assumed that these costs did enhance the comfort of all buses (including physical comfort, free Wifi etc), reliability is not met due to the buses operating on the existing highway network. This leaves peak services susceptible to network constraints that car drivers face, and reduces reliability in journey times.

3.19 The implementation of this option is deemed unlikely to significantly increase the bus patronage from residents at LMA therefore. This is due to the fact that journey times by bus will be comparable to journey times by private car and so there is limited perceived benefit to bus use. A total cost of circa £2m investment is required to deliver these upgrades, and additional ongoing costs will be required to maintain the bus fleet and service costs, for limited expected mode shift to bus use from LMA. The consequence of this can be running low occupancy large vehicles, which is a high carbon generation using traditional ICE buses, but even with an electrified fleet this would add unhelpful vehicles on a congested network.

Option 2 - On-carriageway bus rapid transit (BRT)

3.20 Option 2 would fulfil the reliability aspect of making a bus service more attractive, and is essentially an additional improvement to Option 1, with the standard bus services operating at a 15-minute frequency and serving stops that will be provided within the site. Option 2 would be delivered in addition to Option 1.

3.21 Modernised bus stops would be provided which would provide real-time bus information, lit bus shelters and raised boarding/alighting areas. WCC indicated that ”super-stops” would be provided within the town centre which is assumed to refer to enhanced bus stop facilities.

3.22 The cost of this option would be approximately £1,000,000.

3.23 In order to supplement the punctuality and reliability of the BRT service, junction improvement schemes would be required at the following key junctions at a cost of around £85,000 in order to support reliability, punctuality and schedule adherence of the bus service:

- Greenhill Street/Arden Street/Alcester Road (A422)/Grove Road;
- Alcester Road (A422)/Western Road; and
- Alcester Road (A422)/Masons Road.

3.24 These improvements cover three of the central junctions within Stratford-upon-Avon but do not include for bus priority at other key junctions before entering the town centre.

3.25 The resultant total cost of the Option 2 scheme would be approximately £1,085,000. This would allow for the increased frequency of existing bus services, improved bus stops, and junction improvements.

3.26 Alternative routing options other than the existing highway network are not deemed viable (at a high-level) to support a scheme the size of LMA, given expected take-up of bus services even with the aforementioned improvements.

3.27 The punctuality of the service would therefore be heavily reliant on the operation of the local highway network and for this reason it is not expected to instigate a considerable increase in terms of passenger numbers from those detailed above. Given car travel is likely to have a similar journey time there are limited anticipated incentives to using the bus in this scenario without Authority intervention on a wider scale with measures such as parking restrictions, and the high cost of this option outweighs the expected benefits.

Option 3 - Part-segregated BRT (Seven Meadows Road to Evesham Road route)

3.28 Option 3 will build on the BRT provisions that would be implemented as part of Option 2.

3.29 In addition to the Option 2 scheme, this option would provide segregated bus only infrastructure at locations in which delay on the carriageway is expected, allowing for shorter journey times in comparison to the private car. The bus only infrastructure would include bus lanes, or bus-only sections of road.

3.30 Option 3 would deliver a segregated bus route between Seven Meadows Road and Evesham Road although the precise route of this option is not provided within the WCC study. This would be a notable improvement to bus connectivity into Stratford-upon-Avon town centre (in combination with Option 2).

3.31 The cost of the infrastructure associated with Option 3 is expected to be £2,250,000. This would be in addition to the cost of implementing BRT (Option 2), bringing the total cost to £3,250,000. The operating costs of Option 3 are expected to be similar to the operating costs of Option 2, with the majority of the outlay associated with the infrastructure changes.

3.32 Whilst punctuality and reliability of the service is still somewhat reliant on the operation of the local highway network, as some of the most constrained parts of the route would be segregated, there is less potential for punctuality and reliability to be compromised by congestion on the local highway network.

3.33 There is potential for additional bus trips to be generated by the proposed development following the implementation of Option 3, this is due to the fact that this option will provide the quickest route to the Stratford-upon-Avon centre. It is expected that LMA would generate over 4,000 external daily trips by all sustainable transport modes, and a generous assumption for this part of the study has been made that approximately 40% of these could be by bus following bus network improvements such as per Option 3, equating to approximately 1,700 daily bus trips generated by LMA. Existing census data suggests that should no improvements be made, the development could expect to generate about 1,270 daily bus trips, and therefore assuming as a best case that the additional bus trips would shift from private vehicle travel between LMA and Stratford-upon-Avon, the estimated saving is around 430 daily trips removed from the network against an estimated cost of £3.25m. Whilst this number of trips removed from the network should be viewed as a best-case scenario, the estimated cost is relatively low in comparison to the benefit to the bus network in terms of passenger numbers and the road network in terms of daily trips saved.

Option 4 - Part-segregated BRT (Shipston Road to Clopton Bridge Road route)

3.34 Option 4 will build on the BRT provisions that would be implemented as part of Option 2, as an alternative to Option 3.

3.35 As with the previous option, Option 4 would provide segregated bus only infrastructure at locations in which delay on the carriageway is expected, allowing for shorter journey times in comparison to the private car. The bus only infrastructure would include bus lanes, or bus-only sections of road.

3.36 Option 4 would deliver a segregated bus route between Shipston Road and Clopton Bridge although the precise route of this option was not provided within the WCC study. No costings have been worked up for this option as it was deemed by WCC, within the LMA Sustainable Transport Requirements – Options Assessment document, to have a low feasibility upon initial study. This option was deemed unfeasible as it would require the use of the Tramway which is narrow in places allowing for capacity to only run buses in one direction, and requiring the closure of existing pedestrian/cycle route on this bridge. In addition, this option was deemed highly likely to generate significant public opposition due to the proximity to residential properties. We agree with these initial findings and therefore it has been ruled out also for the purposes of this report.

Option 5 - Guided bus system on The Greenway

3.37 Option 5 will build on the BRT provisions that would be implemented as part of Option 2.

3.38 This option would provide segregated bus only infrastructure along the Stratford Greenway which is traffic free, allowing for shorter journey times in comparison to the private car. This would comprise a guided busway system, similar to that seen in Bristol (Long Ashton Park & Ride to Cumberland Road).

3.39 The Greenway is currently used as an active travel route which would be retained as a result of this option coming forward, although additional land adjacent to the Greenway may be required to fully accommodate both a pedestrian/cycle route and guided busway. We understand that further land is available along the Greenway to provide this widening, however there may be pinch-points where third-party land is required or bridge infrastructure will need to be further investigated to support a guided busway.

3.40 Option 5 would deliver a segregated bus route between the site and Seven Meadows Road via the Greenway, allowing for the avoidance of significant congestion points on the local highway network at the Clifford Lane/Shipston Road and Shipston Road/Severn Meadows Road roundabouts. The precise route of this option was not provided within the WCC work. Buses would join the existing road network at the Severn Meadows roundabout and the highway improvements as part of Option 2 would be required to create a fully enhanced route.

3.41 The cost of the infrastructure associated with Option 5 is expected to be £50,000,000. This is likely to be in addition to the cost of implementing BRT (Option 2) which addresses service frequencies, bringing the total cost to £51,000,000. The operating costs of Option 5 will be similar to the operating costs of Option 2, with the majority of the outlay associated with the infrastructure changes.

3.42 The cost difference between Options 3 and 4 when compared with Option 5 is considerable. However, Option 5 offers a partially segregated BRT service between LMA and Stratford-upon-Avon up to the Severn Meadows roundabout. Assuming other considerations such as comfort are also provided for, this is the most attractive bus option and has the greatest propensity to influence the uptake of bus trips. Based on an adjusted distribution and mode shift for journeys to Stratford-upon-Avon (excluding that there may be some journeys using the bus then travelling onwards by other means), this option is estimated to have the potential to capture circa 430 additional bus trips from LMA from the starting position (with normal services). Assuming a best-case scenario where these shift from vehicle travel to between LMA and Stratford-upon-Avon, the estimated saving is around 430 trips or more removed from the network against an estimated cost of £51m. This is a more realistic shift in trips than for Option 3.

3.43 Option 5 will re-join the local highway network at the Seven Meadows Road/A4390 Roundabout, which is within a congested part of the network and therefore limits the benefits associated with this option somewhat. There is potential to implement part of Option 3 (delivery of bus only infrastructure along Seven Meadows Road to Evesham Road) alongside Option 5, which would further increase the journey times and avoid buses being delayed within the congested network. There would be additional costs associated with this, although as detailed within the Option 3 assessment, this is likely to be in the region of a further £2,250,000.

Bus Options – Conclusions

3.44 The presented options were originally investigated as part of a study undertaken by WCC (Long Marston Airfield Garden Village: Sustainable Transport Requirements) to understand the potential feasibility, and viability of improving the bus offer at LMA. Options 3 and 5 present as feasible although further detailed investigations are required to confirm deliverability, including technical analysis of land-take and ownership required. Option 5 provides the most attractive option but comes at an estimated up-front cost of £51m. The projected number of trips made by bus following network

improvements is 1,700 daily trips, increasing from 1,270 based upon census data, assuming no changes to the network. Therefore there is potential for up to around 430 vehicle trips to be removed from the highway network between LMA and Stratford-upon-Avon.

3.45 There will undoubtedly be some benefit to existing communities along the routes also (including Meon Vale), however the gains from this are likely to be comparatively low in order to maintain a rapid route between LMA and Stratford-upon-Avon, and this is especially true of Option 5 which utilises the Greenway. The increase in frequencies towards Stratford-upon-Avon which would be delivered alongside options 1-4 will provide wider benefits for Clifford Chambers, allowing for existing residents to utilise the improved and more frequent services. The improved services would allow for easier access to Rosebird retail area (providing a superstore, pet shop and pharmacy), allowing for journeys for the purpose of shopping to be undertaken by bus without requiring access to Stratford-upon-Avon.

3.46 Option 6 should be considered as a prerequisite for any of the above options as well as in existing fleets, particularly given the Government's internal combustion engine (ICE) ban for the sale of new commercial vehicles to be implemented by 2040.

3.47 Buses offer a high-capacity transport option that helps to reduce unsustainable vehicle trips in particular, thus working towards a carbon neutral goal, especially assuming an electric vehicle fleet. Noting the general trend of bus use (beginning before the Covid-19 pandemic) however, and in particular that up to only 18% of all trips from LMA are anticipated to travel between the site and Stratford-upon-Avon in the peak periods, the benefits of Options 3 or 5 are not considered to outweigh the costs. Our understanding is that in the current context these schemes are unlikely to be considered affordable, although this is not a matter that we make judgement on ourselves.

Demand Responsive Travel (DRT)

3.48 A DRT scheme could be implemented as a standalone measure or in addition to any of the bus options outlined within this section.

3.49 DRT schemes are becoming operational within the UK with schemes in Leicester and Milton Keynes performing well. DRT is a flexible service that provides shared transport to users who specify their desired location and time of pick-up and drop-off via an app. The vehicles used as part of the DRT typically comprises of small mini-bus style vehicles.

3.50 DRT can complement fixed route public transport services, as are provided a present, and improve mobility in low density areas and at low-demand times of day.

3.51 Arriva Click have provided a DRT service at the new Lubbesthorpe Estate in Leicestershire, located five miles west of Leicester. The distance from the Lubbsthorpe Estate to the centre of Leicester is similar to the distance from LMA to Stratford-upon-Avon. The operating area of the DRT encompasses the Lubbesthorpe Estate and the city of Leicester. It has been shown that 9% of the demand for the DRT has been generated by the Lubbesthorpe Estate, and for context, the Lubbesthorpe Estate comprises just 2% of the population of the full operating area.

3.52 Via operate a DRT scheme in Milton Keynes, offering low-cost shared transport trips to key facilities including the train station, health centres and shopping centres. The DRT service operates daily

between 6am-11pm (9am to 6pm on Sunday) with travel costs as low as £2.50 during off-peak periods. The low costs, and long operating hours coupled with the accessibility to key destinations provide a real alternative transport option, reducing the number of vehicles on the road.

3.53 DRT operational areas are typically confined to the nearest town or city, and in the case of LMA would likely stretch from LMA to Stratford-upon-Avon whilst potentially encompassing a number of other local villages. This will provide a wider community benefit to those living within the study area and looking to travel locally by shared transport. To encourage uptake from future residents at LMA, reduced price travel or free membership could be offered from the initial implementation of the DRT.

3.54 DRT will be required to use the existing highway network, and therefore is likely to incur delays as a result of congestion on the network. This would result in journey times being slower than by a private car and therefore people may choose to drive as this may be seen as the most efficient method.

3.55 Costs associated with the DRT will vary considerably, with variations based on the size of the operating area, operating times, the type of vehicles used and the number of vehicles available. Should this option be taken forward, bespoke quotes can be obtained based on the requirements of LMA.

3.56 It may be possible to utilise DRT for a set time period to gauge the desired distribution of trips and in the future this data can be used to implement regular fixed bus services, should demand be there.

Rail Network

3.57 Two options are identified for introducing rail at LMA, and have both been previously explored by ARUP in two separate studies:

- **Option 1** – Shuttle Service from LMA to Honeybourne Station; and
- **Option 2** – Reopening of the Stratford-upon-Avon to Honeybourne Line.

3.58 The trip generation exercise indicates that the proposed development at LMA is capable of generating over 4,000 two-way trips by all sustainable transport modes on a daily basis (based on the delivery of 3,500 dwellings). It is expected that without any improvements to the existing rail network approximately 5% of all sustainable transport trips would be by rail, equating to approximately 1% of all trips generated by the development. This equates to approximately 250 daily two-way trips. This number is based upon typical rail take-up within the surrounding area, and therefore is the level of trips that would be expected if no station were available at LMA. This is the starting point and means that these 250 trips would travel to the nearest stations (likely Honeybourne or Stratford-upon-Avon) by other modes directly from the site. These are likely therefore all vehicle, bus or bicycle trips in the absence of a station at LMA.

<u>Option 1</u>

3.59 Option 1 would involve the introduction of shuttle rail services between LMA station and Honeybourne station. The station at LMA would be located to the south west of the site alongside the current Greenway. On the current masterplan this is shown as a potential mobility hub.

3.60 Details relating to this option have been obtained from the 2018 ARUP study – 'Provision of a rail shuttle service between Honeybourne Station and Long Marston Airfield'.

3.61 Honeybourne station is on the Worcester-Oxford-London Paddington rail line, and the shuttle connection would allow for residents at LMA to travel to destinations including London Paddington, Worcester, Evesham, Moreton-in-Marsh, Charlbury and Oxford with one change at Honeybourne. This is therefore an attractive rail option.

3.62 In order to reopen the line between LMA and Honeybourne 2.07km of new track is required, whilst a further 4.84km of existing track will need to be upgraded. A proportion of the Greenway will be required to deliver some of the required new track, whilst 1.36km of new track bed will be required for the connection between the Greenway and the existing line. This will result in the loss of some active travel space on the Greenway. Should the Greenway be kept as an active travel route, additional space on either side of the Greenway may be required, increasing the forecast costs.

3.63 Services would be provided every 30 minutes in both directions, which does not quite facilitate a turn-up-and-go approach.

3.64 A one-way rail journey from LMA to Honeybourne is forecast by ARUP to take anywhere from 9 to 18 minutes, depending on cab turn-around times at LMA station. In comparison, a journey by car is expected to take approximately 15 minutes from LMA to Honeybourne along a usually free-flowing route (according to Google Maps typical traffic data), suggesting that in some cases it may be quicker to drive rather than use the train service. Driving would also allow residents and workers at LMA to access rail services at Honeybourne door-to-door, whereas reaching the station at LMA would involve additional travel time (proposals for this are considered in more detail in the Vision), meaning in most cases it is likely the overall journey time to Honeybourne station would be quicker by car. This is important in considering overall anticipated uptake of this option.

3.65 ARUP's 2018 report indicates that a relatively small number of residents would utilise the shuttle service, with 94 daily trips forecast from the first phase of the development (500 units). This was based on 2011 census data which was before opening of Meon Vale. Factoring up to the full development of 3,500 homes this equates to circa 650 trips, however this is a high-level estimate as distance to the station will vary and influence the likelihood of using the new station. This also excludes estimated incoming trips for employment, retail, and leisure purposes so the figure may be slightly higher in reality.

3.66 Reopening the line for passenger travel between the site and Honeybourne Station would cost in the region of £37,500,000 as set out within the ARUP 2018 report, with additional ongoing costs henceforth. This cost accounts for construction costs (including a bridge structure on Station Road) and improvement of existing tracks, and contractor costs along with a 66% increase for optimism bias. This does not include the costs of land and property, rolling stock or costs associated with the modification of existing roads. It is expected also that this figure would be higher again given the increase in costs since 2018 associated with infrastructure. The cost of providing rolling stock is expected to be between £200,000 to £418,000 per annum, based on numbers provided within the ARUP report. Whilst a bridge structure is likely to be costly, the alternative of a level crossing is unlikely to be accepted as Network Rail (NR) are committed to closing level crossings where feasible

due to safety concerns. In our previous experience, NR are opposed to the opening of any new level crossings.

3.67 As shown above, assuming that the number of residents wishing to travel to the key destinations offered by this option is at least maintained from the 2011 census, the implementation of this option is unlikely to significantly increase the number of rail passengers (instigating approximately up to 400 new rail trips assuming all current rail trips would travel to Honeybourne and onwards). This is on the basis that all of these people would prefer to access the station at LMA via another mode (active travel or automated shuttle as set out in the Vision) than use the car to reach Honeybourne station. Whilst indicated to be a feasible option by ARUP (at a high-level), at a cost of approximately £37.5m this is unlikely to represent good value in terms of mode shift. Viability is therefore queried.

3.68 The ARUP report considered that a number of flexible alternatives may constitute better value for money, including connection via a busway to Honeybourne station, a minibus service, a tram train or a light rail system.

3.69 Tram and light rail are considered further in this section, and shared/public transport options are set out in the Vision to comprise DRT which would offer a flexible option for access to Honeybourne.

Option 2

3.70 Option 2 proposes the complete reopening of the Honeybourne to Stratford-upon-Avon line, routing via a new railway station at LMA. Land has been safeguarded between Stratford-upon-Avon and Honeybourne for a number of years to allow for the reopening of the railway line, which would provide a stop at LMA. This land routes along the Greenway active travel corridor.

3.71 The railway route between LMA and Honeybourne would follow the line that is currently used only for freight traffic between Honeybourne and LMA Depot, although some additional track would be required, and upgrades to existing track to accommodate passenger trains. This is the same as required for Option 1.

3.72 The route between LMA and Stratford-upon-Avon would follow the previous rail route that has now become the Stratford Greenway at its southern end, and has been built upon within Stratford-upon-Avon itself. This would impact the active travel route which would need to be reallocated adjacent to the carriageway. Part of the previous route from LMA to Stratford-upon-Avon has been replaced by the A4390 (between Seven Meadows Road and Evesham Road) and therefore a direct route is no longer feasible without the delivery of new level crossings which Network Rail are against, the potential loss of this arterial road link, demolition of properties within the town, or significant under or overground infrastructure. The implications of each of these options are substantial.

3.73 Due to the existing congestion observed on the local highway network, and Network Rails efforts to close level crossings where possible, it is unlikely that level crossings will be an acceptable solution to this issue. The preferred option (as per the ARUP 2012 report) is for a dive-under structure to be provided to the south of Stratford station, running alongside a realigned Seven Meadows Road. This solution would provide capacity for two trains in either direction per hour (plus additional capacity for freight). This allows for a service at LMA in either direction every 30 minutes, and whilst this is good level of frequency, it does not quite facilitate a turn-up-and-go approach.

3.74 The ARUP 2012 report suggests that the reopening of the line would result in an annual increase in demand of 256,282 passengers, with 30,062 of these deriving from LMA. This number however only considers a development of 500 dwellings at LMA.

3.75 The report further indicates that of the circa 30,000 yearly trips from LMA, only around 780 trips would be generated from distances of further than 800m from the railway station, suggesting that the majority of the trips generated by the station would be from the 500 dwelling development itself. Assuming distance from the station is not a consideration for the purposes of comparison, uplifting this figure to the full development of 3,500 homes would provide up to 205,000 annual trips from LMA (excluding other uses on site). This equates to about 560 daily trips by rail, equivalent to a split of 13% of all sustainable transport trips.

3.76 The trip generation forecast developed as part of this study indicates that the full development would generate circa 240 daily rail trips using current travel patterns, equating to an annual rail trip generation of approximately 86,500. Should a station be provided on-site this number could be expected to increase to between approximately 560 and 660 daily trips.

3.77 The mobile network distribution data (MND) utilised for this study shows that Stratford-upon-Avon attracts around a quarter of AM home-based journeys to work, however it is becoming increasingly clear that leisure trips form as important, if not more important of a role in rail use, and should be taken into account. Frequent short rail journeys have the potential to capture a large proportion of these trips travelling north.

3.78 Option 2 is forecast by ARUP to cost in the region of £96.9m, although this cost is over 10 years old and accounting for inflation will be substantially more now. A bid was submitted to DfT for the inclusion within the National Infrastructure Strategy which has recently been rejected for public funding for the next stage of the Business Case, meaning it is now unlikely that this option will go ahead at least in the timeframe of LMA.

3.79 In addition, the economic benefits of the reimplementation of the line are constrained by the capacity restrictions on the North Cotswold Line between Oxford and Worcester and consequently the line can only be delivered in the long term. This means that even should a bid for public funding in the future be successful (or monies were sourced from other funds), LMA is likely to be built before work on the rail line can commence and unsustainable travel habits may already be instilled at this point if reliance on these improvements is made.

3.80 Whilst there is some potential for mode shift following the implementation of this option, the costs of the project are judged to far outweigh the benefits and it is unlikely that this option would therefore be viable. Additionally, the mode shift benefits associated with more economical options including bus service improvements are greater and therefore represent better value for money than the reintroduction of the railway line.

Light Rail & Tram

3.81 Potential to introduce light or very light rail as an alternative to heavy rail has also been investigated at a high level, with each of these options likely requiring less infrastructure than the two heavy rail options as well as being able to join the road network within Stratford-upon-Avon as a tram system.

3.82 Light rail and trams are a convenient way of transporting a large number of people across relatively short distances that would be perceived to be outside of appropriate walking distances. Trams in particular are commonplace within the UK, with networks operating in cities including Nottingham, Sheffield and Manchester.

3.83 A light rail option could operate from LMA along the Greenway, connecting with the Severn Meadows roundabout beyond the Greenway, where there is potential that it could operate as a tram system and route towards the centre of Stratford-upon-Avon. It is possible that either heavy rail route option could be implemented as light rail.

3.84 A light rail system would require new rolling stock as the existing heavy rail stock would not be suitable, and therefore higher costs are to be expected when compared with either of the heavy rail options. This option would also require the alteration of the existing line between Long Marston rail depot and Honeybourne, should this route be taken further.

3.85 The benefits of a light rail option are similar to those of either heavy rail option by providing future residents with the option to undertake journeys towards Stratford-upon-Avon/Honeybourne in a short amount of time, with a shuttle service be provided at reasonable frequencies, supporting a turn up and go approach.

3.86 However, this option, should it extend on to the local highway network, would require road space reallocation which may prove difficult due to the constrained nature of the existing network. Additionally, distribution data has shown that only up to 18% of trips would be towards Stratford-upon-Avon which would limit the potential reach of this mode of transport. Should the light rail extend between Stratford-upon-Avon and Honeybourne, the potential number of users would be expected to be higher.

3.87 Furthermore, the implementation of light rail on the Greenway would result in the loss of active travel space, with additional space potentially required, should the Greenway be kept as an active travel corridor.

3.88 It is considered that taken in the round, light rail and tram options offer a benefit that can be achieved in alternative ways with less up-front infrastructure and cost required such as autonomous vehicles and DRT (as included in the Vision). They also do not provide the continuity of service that a full heavy rail option between Honeybourne and Stratford-upon-Avon would achieve. These options are therefore deemed unsuitable for inclusion within the mobility Vision at LMA. Tram and rail options are likely to be far out of proportion to the development size and the likely costs will be significant.

Rail Network – Conclusions

3.89 Two heavy rail options have been considered in this study, along with scaled down light rail/tram options for each of the rail approaches.

3.90 The Honeybourne to Stratford-upon-Avon rail option has been recently rejected from the next stage of Government funding, and it is considered that the relative benefits of such a scheme specifically to LMA are somewhat limited in terms of mode shift and overall vehicle trip reduction. Even with another source of funding this option is unlikely to be delivered in a timeframe that supports the

much needed development of a garden village community at LMA and therefore will have limited to no impact on instilling sustainable travel behaviours in a short to medium time frame.

3.91 The option to re-open passenger services between LMA and Honeybourne has similarly been investigated in this study at a high level, and using figures derived by ARUP in their 2018 study, the actual potential mode shift is limited in the context of cost spent. It is deemed more attractive to fulfil this essential connection through a DRT shuttle between LMA and Honeybourne station, avoiding heavy infrastructure and at a significantly reduced cost. A DRT connection will also capture trips closer to their origin point thus further incentivising use over travelling to a rail station on LMA from homes further from the station.

Automated Shuttle Service

3.92 An alternative travel option to bus and rail is an automated shuttle service to serve LMA along the Greenway. These innovative shuttles are emerging as an efficient and useful technology in transporting moderately sized numbers of people between key destinations, and comprise small automated and electric shuttles which typically accommodate up to 10 passengers at any time (at the moment). These would route along the Greenway to the point at which is connects to Severn Meadows roundabout in Stratford-upon-Avon. The journey time between LMA and Severn Meadows roundabout is expected to be under 15-minutes at a speed of approximately 20mph subject to detailed investigation of shuttle capacities.

3.93 Unlike the light rail option, the automated shuttle service would not require any rail infrastructure. This will allow additional space for active travel modes. Compared with the BRT option along the Greenway, this option could operate on a demand-based schedule, and savings would be made on driver costs.

3.94 Initially it may be beneficial to operate this route with mini-bus style vehicles, and when technology advances flip to autonomous vehicles in the future.

3.95 Shuttle schemes in the UK and abroad are already integrating with road traffic, albeit in controlled areas such as science park campuses. As technology advances, there is potential for the automated shuttles to increase in capacity, and to integrate with road traffic safely on public highway which would allow for direct connections between LMA and Stratford-upon-Avon centre, or to Honeybourne.

3.96 An example of where these shuttle bus services are currently in operation in the UK is in Cambridge, introduced in 2021 (Electrek, 2021). This shuttle operates on a 2-mile route and passengers are picked up at a number of locations and can request the shuttle via an app. The shuttle buses are driverless and can operate up to 20mph, with shuttle capacities of 10 people.

3.97 As per the Vision, the automated shuttles could facilitate a turn-up-and-go approach to travel and could route from within the site rather than only via the propped mobility hub/station on the Greenway. A turn-up-and-go facility would involve ensuring there are enough shuttles to provide a service every 10 to 15 minutes, which can be increased as demand dictates.

3.98 Whilst the shuttle buses would operate along the Greenway, and would be intelligent enough to avoid other pedestrians and cyclists, they could be provided with a segregated corridor, separated by a

small fence to protect dogs and users of impaired vision from the corridor. The automated shuttles are smaller in size than buses, trams and trains and thus the space required for the automated shuttles on the Greenway would therefore be considerably less than would be required for a railway, light railway, tram, or bus route to be provided. It is judged from a high-level analysis that there would be ample space along the entirety of the Greenway for a segregated active travel corridor in addition to the automated shuttle corridor. The automated shuttles which are being used in Cambridge are 2.28m in width[1] and therefore the anticipated width needed is expected to be in the region of 5m at most to allow for two-way movement although this is subject to further investigation and would be dependent on the vehicles used. A further 3 to 4m would be required for a dedicated cycleway and 2m for a dedicated pedestrian route (as per LTN1/20 guidance). Some additional infrastructure would be required at bridge and road crossings on the Greenway also, which would require further detailed investigation and costing. However, the weight and versatility of the automated shuttles lends them to incurring less infrastructure heavy costs than previously discussed options as less space is required for the shuttles and also minimal segregation between active travel and shuttle services would be necessary.

3.99 In the future, as technology advances, there would be the potential for automated shuttle buses to integrate with other vehicles on the local highway network and this would allow for trips directly in to the centre of Stratford-upon-Avon or to Honeybourne, and potentially would further encourage sustainable travel. Given the speed that technology is advancing, it is expected that the automated shuttles would have the potential to integrate with other vehicles by the time LMA opens. Although this change would require the vehicle to wait in traffic on the local network, unless a segregated route was to be provided, and this would reduce the attractiveness of this option somewhat. Notwithstanding this, the innovation and novelty of the shuttles would feasibly draw in users over and above any traditional bus or rail scheme.

3.100 The cost of one automated shuttle bus is to be confirmed, as is the initial fleet required to provide a suitable level of service. There will be costs associated with the widening and resurfacing of the Greenway and ongoing maintenance costs, however these are likely to be considerably lower than the costs associated with a bus or rail option on this route. Further detailed investigation is required to confirm feasibility in this respect.

3.101 It is considered that this option provides a scaled down version of mass transit as provided by traditional modes such as bus and rail. In this way it is more suited to support the proposed settlement at LMA as per the vision. The trip generation analysis (contained in the following section) indicates that around sustainable transport methods will accommodate over 4,000 daily two-way external trips. A reasonable assumption has been made that 20% of these will be made by automated shuttles at this level of service, equivalent to approximately 900 total trips. The vast majority of these trips have potential to be captured by a convenient, affordable, and novel automated shuttle system

[1] https://electrek.co/2021/05/28/cambridge-launches-driverless-electric-shuttle-buses/

on the Greenway even with some anticipated delay between Severn Meadows roundabout and the town centre/rail station. It is expected that this presents a more favourable option over the equivalent bus option due to the convenience level within LMA, anticipated reduced costs due to automation, and upfront infrastructure costs likely to be lower, along with the attractiveness of a new mobility mode such as this over a traditional bus. However further investigation into the likely costs of this scheme are required. Automated shuttle buses represent the future of shared/public mobility whilst buses reflect quite the opposite.

3.102 To support the Vision for LMA as a progressive and exemplar scheme in the UK, the viability of the implementation of an automated shuttle service is strong, with the potential to offer a quick, reliable and potentially lower-cost option for travel towards Stratford-upon-Avon. The costs for the implementation of the automated shuttles are anticipated to be low in comparison to the costs associated with the infrastructure required for the reimplementation of the railway line and would likely require less space. This allows for the Greenway to continue to operate as an active travel corridor. The Vision document has identified case studies when automated shuttles have been implemented and these have been well received to date.

Micro-Mobility Solutions

3.103 As per the Vision, the suggested micro-mobility package of measures are identified and analysed in the following section.

Car Club

3.104 Now very much commonplace in new developments the size of LMA, a car club forms part of the Vision offering car travel without needing to own a car. Car club operators have a wealth of experience in estimating vehicle demand at sites such as LMA and schemes are designed to flexible to increase the number of cars when and where needed.

3.105 Car clubs typically operate on a member only service and do not normally need to be booked in advance, and hence lend-themselves for easy use by residents and workers at a site such as LMA. They would be distributed around the site at key locations such as Mobility Hubs, so as to ensure easy access within walking distance. It is expected that all car club vehicles at LMA would be electric vehicles, which will further increase the sustainability of the site. In order to encourage future staff and residents of the site to utilise the car club from the outset, free memberships for residents and employees at LMA would be provided.

3.106 Car clubs are noted to encourage sustainable behaviour changes to car use amongst users where they are already in use, by providing an alternative to owning a car and shifting attitudes to shared ownership and transport on the whole. Providing access to a car club means that a higher level of day-to-day travel is undertaken by other sustainable modes, and typically only the weekly shop is by car for example. Of course, once somebody no longer owns a car, they may shop differently, and change travel habits here as well, undertaking smaller shopping trips by foot or cycle or having shopping delivered.

3.107 In 2018 CoMoUK suggested a car club space could displace 6.1 private vehicles. In their most recent guidance based on data in 2021, it states that one car club vehicle has the potential to replace 20 private cars.

3.108 The cost of one car club vehicle is in the region of £10,000 per year with minimal annual costs, and the potential to include membership fees within the base cost. CoMoUK New Development Guidance (2022) suggests that an edge of town development of 500 units would require up to 11 car club vehicles (1 vehicle per 45 dwellings), which would allow for a reduction of 100 car parking spaces. Based on a development of 3,500 dwellings and a ratio of 1 vehicle per 45 dwellings, 78 car club vehicles could be provided, which could facilitate the reduction of 700 car parking spaces. Delivery of 78 vehicles at LMA could therefore cost in the region of £780,000 per year (subject to discussion with a service provider).

3.109 Membership should be provided to all residents and workers on site in the initial stages of the built-out development, however as use becomes normalised it is anticipated that residents purchase their own membership in subsequent years, thus creating a scheme that is commercially viable. At the same time, if demand exceeds capacity cars can be added quickly and easily to the site's fleet. With the rapidly rising electrification of cars on the road also, it is expected that all car club cars at LMA would be fully electric.

3.110 Whilst car clubs are not a catch-all solution to car-based travel, they are known to reduce car ownership rates and influence travel behaviour. Even assuming that external vehicle trips are not impacted in the peak periods, the likelihood is that the pattern of trips will change across the day as people choose to work from home and use a car club car to access a meeting for example, and that the number of cars owned by residents in particular at LMA will reduce.

Bike Sharing

Bike & E-Bike Sharing

3.111 The Vision encompasses a fleet of bicycles and e-bikes that can be hired on short-term rentals by future residents, staff and visitors to the site. Bicycle and e-bike hire have become commonplace in cities and towns across the UK, with schemes operating in London, Exeter, Cardiff and Bristol to name a few. There is increasing interest in providing these schemes within smaller communities recognising the potential take-up of these bikes for short trips from home to shops, leisure facilities, transport hubs, and employment for example.

3.112 With technology now bringing significant change to the cycling industry, e-bikes are now the biggest single market sector in the cycling industry and have opened up cycling to a range of users it may have previously been prohibitive to. E-bike sharing schemes can be operated in the same way as traditional bike sharing schemes, with charging completed at docks.

3.113 There are many operators of bike/e-bike sharing schemes across the UK with many reporting commercial success, and data indicating that many users were not already bike users. This implies that some consumers of these bike schemes have switched from another mode of travel, either due to the convenience of the availability of bikes, or potentially this in combination with access to an e-bike (which are normally substantially more expensive to own than a push-bike).

3.114 CIHT (Planning for Cycling) suggests that 80% of cycling trips are for distances below 8km. It is expected therefore that due to the increased speeds and lower levels of exertion associated with e-bikes, the distances that people are willing to cycle will be further than 8km. A journey to the centre of Stratford-upon-Avon along the Greenway is approximately 9km, which could be easily reached by e-bike. E-bikes provide an excellent low-cost alternative to driving around the site and local area for short to mid-distance journeys, and has the potential to reduce the number of car trips being made towards local areas including Stratford-upon-Avon.

3.115 As with car clubs, bike scheme operators are experienced in estimating the likely demand for bikes and e-bikes at settlements such as LMA, and these would be set up as part of the essential infrastructure prior to first occupation (and immediately for the already occupied dwellings). As demand changes then additional bikes would be added. The scheme could comprise a dock or dockless system depending upon discussions with operators, and alternative options such as Brompton bike lockers can be explored.

3.116 We know that the typical costs associated with a provision of a fleet of 12 e-bikes is in the region of between £35,000 to £100,000, with annual maintenance and upkeep costs excluded. This level of provision is deemed appropriate for a residential development of 1,500 dwellings, and therefore it is expected that a fleet of 48 e-bikes would be appropriate to meet the initial demands of LMA with further bikes and docks added rapidly as demand dictates. The cost of this level of provision is expected to be in the region of between £140,000 to £400,000 although a full quote would need to be obtained from a provider, with annual maintenance and upkeep costs excluded. The variation in price is dependent on whether an automated dock (allowing for pre-booking and collectable 24/7) or a virtual dock (collection from a set location e.g. reception or mobility hub) is to be provided. This figure does not account for the payments that would be received for hire by future users following an initial period of developer funded subsidisation/membership.

3.117 Bike docking stations will need to be located at key destinations, which are likely to be on the route to Stratford-upon-Avon, Stratford-upon-Avon railway station and within the centre of Stratford-upon-Avon. The precise location of these will need to be investigated further should this measure be taken forward, although typically bike docking stations are located at strategic locations on pavements or in a purpose-built lay-by adjacent to the road. The delivery of docking stations in Stratford-upon-Avon will provide a wider benefit as residents and staff within the town will be able to use the bikes for local journeys, potentially reducing the number of car driver trips made on the constrained network.

3.118 The potential for external journeys to be made by e-bike rather than car are high, given the high quality of proposed bike infrastructure (including the Greenway) and the proximity of the development to nearby areas including Stratford-upon-Avon (via the Greenway).

E-Cargo Bike Sharing

3.119 There is the potential for the development to provide E-cargo bikes for hire on short-term rentals by future residents, staff and visitors to the site. Similarly to the bike and e-bike schemes aforementioned, the rentals could be controlled by an app system.

3.120 E-cargo bikes are becoming more commonplace within cities and towns and provide a sustainable alternative to the car where transporting goods is required, such as for a local shopping trip when more shopping is purchased than can easily be carried.

3.121 BlueZoom recommends that 1 cargo bike is provided per 140 residents, resulting in a total provision of around 60 e-cargo bikes provided across the entire development, based upon an average of 2.5 residents per dwelling.

3.122 To ensure maximum take up, membership and subscriptions should be contributed towards by the developer, and the scheme itself would be funded for a minimum of 5-years.

3.123 E-cargo bikes have the potential to reduce the number of local trips generated by the development, perhaps for purposes in which residents may struggle to carry goods after a shopping trip. E-cargo schemes can facilitate the 'first' or 'last-mile' element of a journey to increase take-up of sustainable travel over the private car. This is unlikely to greatly impact external trips to/from LMA.

3.124 The expected relatively low costs of an e-cargo scheme are not considered to outweigh the potential benefits that may occur as a result of the implementation, although costs are subject to further investigation.

Scooter Sharing

3.125 As with bike and e-bikes, the development could incorporate a fleet of e-scooters that can be hired on short-term rentals by future residents, staff and visitors to the site.

3.126 E-scooters are becoming more and more commonplace in cities and towns, with rented e-scooters becoming legal in July 2020 on UK streets within pilot schemes. Private usage of e-scooters is expected to be legalised in 2022. Existing e-scooter schemes are present in a number of cities within the UK including Bristol, Bournemouth and London.

3.127 A fleet of 50 scooters is likely to be sufficient upon first occupation of the development and the fleet size could be increased to anything up to 1,000 scooters if demand dictates. These e-scooters can be geographically ringfenced in order to keep them close to the development and whilst this will limit journeys to shorter distances, it will be more convenient for prospective users to hire an e-scooter.

3.128 It is expected that use of e-scooters would be most valuable within the site and potentially on the Greenway towards Stratford-upon-Avon, however this is subject to take-up within the town itself.

3.129 E-scooters provide an excellent low-cost alternative to driving around the site for short distances although is unlikely to greatly influence external trips to LMA.

3.130 The costs associated with the initial provision of a fleet of 50 e-scooters is expected to be in the region of £40,000, with annual support, maintenance and upkeep costs of approximately £90,000. This figure does not account for the payments that would be received for hire by future users.

Mobility Hubs

3.131 To encourage active travel and to provide a central location in which micro-mobility modes can be accessed, the hypothesis is that a primary mobility hub will be provided within a focal point of the

development, supported by secondary hubs at additional key locations, with smaller tertiary mobility hubs distributed elsewhere within the site to ensure there are no gaps in provision and all residents and workers can access a hub within walking distance. A secondary hub is anticipated to be located adjacent to the Greenway.

3.132 Primary hubs are staffed by a community concierge team and should include a café, all mobility options, WiFi, a cycle surgery etc, and are located in a central location on highly trafficked active travel routes. This primary hub would also act as a micro consolidation centre for deliveries, a Work Hub, a community space, and the community concierge team will not just be a friendly part of the community, but they will work with schools, business and residents on bespoke travel planning.

3.133 Mobility hubs can improve integration between modes to let people make more seamless door-to-door journeys, and are a relatively new tool which is being used to create space designed specifically to house different mobility modes. They are taking different forms from large city centre hubs to suburban mini mobility stations or those tailored to workplace or housing developments.

3.134 The expectation is that mobility hubs will employ specialist staff who will encourage residents to travel sustainably, and will likely be host to the car-club parking spaces, e-bike hire virtual dock, e-scooter parking area as well as providing community concierge and micro-consolidation centres for private and commercial deliveries. The mobility hubs will provide a focal point for community interaction, providing co-working areas, cafes and bike surgery, and all residents will be able to access a primary, secondary or tertiary mobility hub within a 10-minute walk from their home.

3.135 The provisions that are typically available at each level of mobility hub is shown at **Figure 2.1**.

PRIMARY	SECONDARY	TERTIARY	MOBILITY SERVICE	SUPPORTING FEATURES
x	x	x	Car club bays (min 2)	Step-free access
x	x	x	Cycle share scheme	Branding
x	x	x	Cycle parking	Street lighting
x	x	x	Bus stop	Free Wi-Fi
x	x		EV car club bays	Realtime PT information
x	x		EV Charging Points	Toilets
x	x		eBike share scheme	Benches
x	x		Multiple bus interchanges	Café with co-working space
x	x		DRT pick up / drop off bays	Bike repair shop
x	x		Secure cycle parking	Concierge, travel advice, parcel collection
x	x		Carpool scheme (lift-sharing)	Wayfinding totem for walk and cycle trips
x			Cargo bike / Brompton cycle hire	Lockers
x			Rail / metro interchange, national links and terminus	

Figure 2.1 – Mobility Hub Hierarchy

3.136 It is expected that the primary mobility hub will be able to accommodate all the mobility services and supporting features listed in **Figure 2.1** and in the Vision, with the exception of a rail/metro interchange which has been deemed unfeasible at this time to support LMA. The secondary and tertiary mobility hubs will also meet these criteria as a minimum**.**

3.137 Vectos has overseen the proposal of a number of mobility hubs and supported delivery of a variety of sizes, and the costs of a mobility hub vary depending on size but could be expected to start from £100,000. As the development will provide secondary and tertiary hubs, additional up-front costs and ongoing fees would be required. The operation of the community concierge for example will result in ongoing costs, which are expected to be in the region of £50,000-75,000 per year. It is recommended that the community concierge is funded for a minimum of 10 years from the outset of the development.

Micro-mobility Conclusions

3.138 The Vision sets out a clear package of sustainable travel options including those which fall under the micro-mobility umbrella. In isolation each of these measures will have a modest impact on mode shift external to the site, but combined they have the opportunity to effect real change to travel attitudes and ultimately reliance on vehicle travel outside of the site in a way that MTS might have done traditionally. Within the site these are key components of the placemaking aspect of the Vision and work together to create places within the community, where simply reaching for the car keys on leaving the house is not the norm.

Summary, Recommendations & Conclusions

3.139 This section has detailed a number of potential sustainable travel measures, ranging from heavy rail to e-bike hire, and has weighed up the pros and cons of each measure whilst demonstrating the feasibility at a high level. It is considered that the micro-mobility measures, including bicycle hire, car

clubs, mobility hubs and e-scooter implementation would be the most cost-effective options in terms of mode shift potential, along with automated shuttles.

3.140 This subsection will detail which measures we recommend pursuing further.

Bus

3.141 On the basis of the information provided within this chapter, it is recommended that Option 3 and Option 5 are pursued further and should they be delivered, electrified buses (Option 6) should be provided as an essential. The delivery of Option 3 or Option 5 offers real potential for mass-transit journeys to be made between the site and the centre of Stratford-upon-Avon without reliance on the operation of the local highway network.

DRT

3.142 It is recommended that a DRT scheme is pursued further. This section has shown that DRT has been implemented elsewhere successfully and LMA fits the required characteristics for a successful and sustainable DRT operation.

Rail

3.143 Based on the information provided within this section, in conjunction with rail studies undertaken by ARUP, it is not recommended that either rail option is pursued further.

Light Rail/Tram

3.144 It is not recommended that the potential implementation of a light rail/tram system is pursued further.

Automated Shuttles

3.145 The implementation of automated shuttles should be considered further, and the impact of technology on the operation of such shuttles should be monitored closely to understand the capacity in which these could operate from the proposed development.

Car Club

3.146 It is expected that a car club will be a requirement of the highway authority, to be delivered at the development and therefore the implementation should be explored further.

Bike and Scooter Sharing

3.147 It is recommended that micro-mobility solutions in the form of bicycle and scooter sharing should be explored further. These will allow future residents to undertake journeys to and from the site in sustainable ways, without actually owning a bicycle or scooter. Upcoming technological advances should be observed in order to deliver state-of-the-art services.

Mobility Hub

3.148 It is expected that mobility hubs will be delivered within the development, further exploration into the facilities that could be provided should be pursued, and also where within the site these will be situated.

Conclusion

3.149 To conclude, this high-level optioneering assessment has set out a number of potential options that could be implemented at LMA in order to encourage the uptake of sustainable travel. Some options have been shown to be unfeasible, including the reopening of the rail line along the Greenway, whilst others have been shown to potentially result in significant benefits such as the implementation of automated shuttles and mobility hubs.

3.150 The evidence presented in this section supports the overall Vision developed for the site and where it is recommended to undertake further investigations, this is for measures that are moving in line with emerging transport trends and climate change and health policies.

3.151 The next step of investigation will be to solidify cost estimates (both upfront capital investments, and ongoing operational costs), land-take required, and to understand the relative time savings of mass transit measures (such as bus options 3 and 5) within the County-wide microsimulation model.

3.152 The findings of this section combined with the overall Vision have been incorporated into the trip generation assessment.

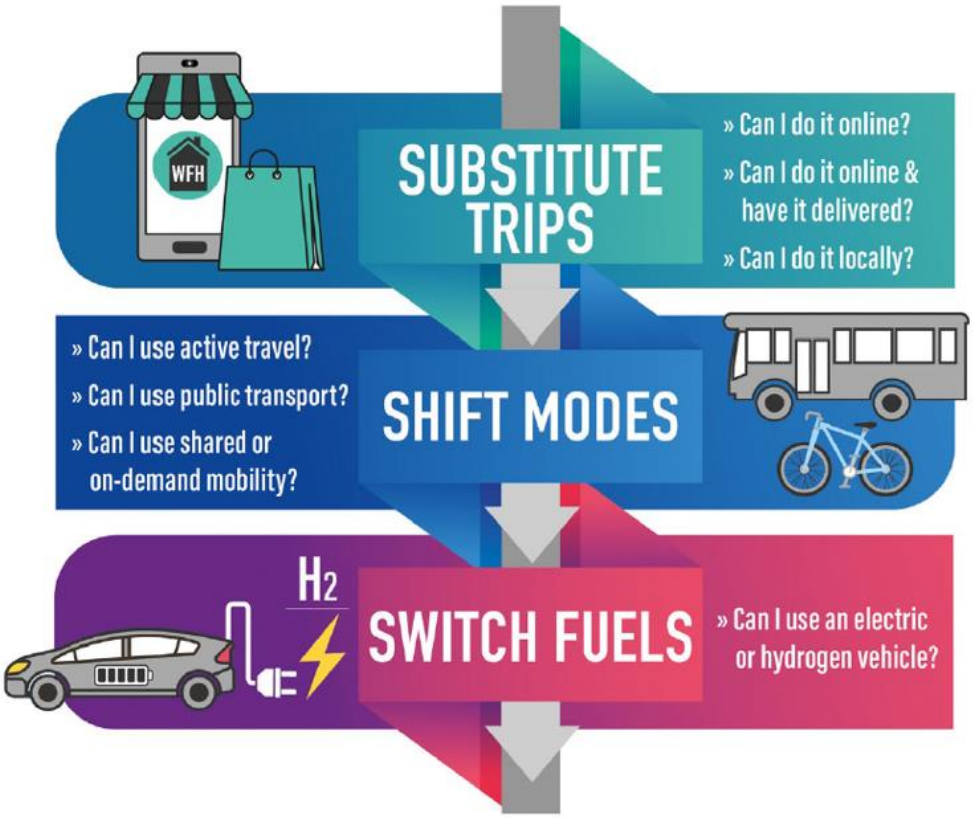
4 Trip Generation Assessment

4.1 A comprehensive trip generation assessment has been developed for LMA based upon the Vision components, encompassing reason for, destination, and mode of travel undertaken by residents and workers at the community.

4.2 As part of a vision and validate approach, likely trip patterns have been considered rather than a worst-case scenario, which would follow a highway capacity-led predict and provide approach. This is now acknowledged to be an outdated methodology and the antithesis of current and emerging Government policy, particularly in light of critical climate emergency declarations.

4.3 As such, the strategy at LMA starts with seeking to minimise the need to travel in the first instance. The SAM (Sustainable Accessibility and Mobility) Framework[2] is therefore relevant and should be utilised in the way it relates to new settlements, as shown in **Figure 4.1**.

Figure 4.1 – SAM Framework for Community Planning



[2] RTPI Research Paper 'Net Zero Transport' (January 2021)

4.4 The SAM Framework advocates designing new communities in the most sustainable way whilst reducing the need to travel, supporting uptake in shared and active travel and advancing low emission vehicles; as follows:

- Substitute Trips (minimise trips): Minimise travel demand by applying 15-minute neighbourhood principles to site design. Maximise opportunities for living local with safe streets, amenities, superfast broadband, co-working spaces and micro-consolidation of freight;
- Shift Modes (minimise least sustainable modes): Make shared mobility the natural choice over private car with Demand Responsive Transport (DRT) and public transport enabled by Mobility as a Service applications, integrated mobility hubs offering communal bikes, e-bikes, cargo bikes and EV car clubs; and
- Switch Fuels (minimise most polluting fuels): Future-proofed charging infrastructure to enable growth in electric vehicles and hydrogen fuel cell vehicles.

4.5 The use of a private car, and the need for a private car, is now at the bottom of the mobility hierarchy, and this should now be reflected in the way in which LMA will be developed from the outset, with everything required to deliver local, sustainable, convenient day-to-day living provided. Accommodating growth in this way will be attractive to future residents – it is how people want to live, it directly addresses health, environmental and social inclusion objectives, and it also responds to Covid-19 crisis and provides more resilient communities which are better placed to withstand possible future pandemics.

4.6 The strategy is therefore underpinned by the fundamental objective of providing people with a choice in how to access services, and how to travel, in combination with prioritising socially inclusive, environmentally friendly, high-density modes of travel including walking, cycling, and public/shared transport ahead of the private car.

4.7 Vision and validate (V&V) is an expression coined to represent current planning policy expressed in the NPPF. It is also known as Decide & Provide (D&P)[3]. These labels have been applied to distinguish the approach from the discredited and abandoned, except in particular circumstances, predict and provide (P&P) approach which places road capacity and facilitating convenience by car use above all else.

4.8 DfT Paper 'Decarbonising Transport' (July 2021) endorses the V&V approach:

"We need to move away from transport planning based on predicting future demand to provide capacity ('predict and provide') to planning that sets an outcome communities want to achieve and

[3] http://www.trics.org/img/trics%20dp%20guidance_web.pdf

provides the *transport solutions to deliver those outcomes (sometimes referred to as 'vision and validate')."*

4.9 Leading transport guidance, amongst many other things, includes a commitment to embed transport decarbonisation principles in spatial planning and across transport policymaking and accelerate modal shift to public and active transport (Department for Transport paper – Decarbonising Transport published in July 2021[4]).

4.10 In adopting a V&V approach it is not the case that forecast of future traffic demand is thought of as a demand that must be provided for come what may, or accommodated conveniently. The demand is demonstrably flexible, and in busier situations the volume of traffic becomes increasingly a function of available roadspace. It becomes more and more important to design the active and public/shared travel systems to accommodate the forecast demand conveniently, and to consider this across the day.

4.11 Accessibility and mobility are both a function of placemaking and is about accessing day-to-day facilities such as schools, shops, friends/family, healthcare, and the workplace. Large strategic sites such as LMA allow a planned and coordinated development providing effective mobility infrastructure from the outset. The aim of this approach is thus first and foremost to minimise the need to travel, followed by supplying the means necessary to reduce the distance required to travel, offering a range of choice in how to travel.

4.12 The requirement for access to local shops and services has been amplified by the Covid-19 pandemic with an increased level of dependence on neighbourhoods and neighbourhood centres, rather than larger urban centres traditionally relied upon for access to jobs, shops and other community-based services.

4.13 The Vision for LMA does this, it provides access to a varied transport network with priority towards active travel users (within and locally to the site) and opportunities for workers to access leisure, retail, education, and employment facilities on foot or by bicycle. Public/shared transport can provide connections to the wider area to which travel active travel is not possible for many.

4.14 In combination with increasing attitudinal flexibility towards travel, ownership and sharing, providing effective MaaS at LMA would decrease not only the need to travel for many, but also aid in reducing single occupancy car driver trips external to the site. Good design promotes this and offers the key travel choices from the outset of the journey, instilling sustainable travel practices from the beginning.

4 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1009448/decarbonising-transport-a-better-greener-britain.pdf

4.15 This change in attitude towards travel and mobility has been facilitated by a number of factors including the rapid growth in smart phones with internet access, combined with location services enabling users to access, order and pay for transport services in an integrated way, as well as the recent Covid-19 pandemic and a renewed desire for local living.

4.16 Car use has been considered the dominant travel mode in the UK for decades, and this has led to P&P approach to development planning. P&P involves predicting a demand (usually car) and trying to make it fit on the existing road network, where it did not fit additional capacity was built in. In its place a V&V approach is essential for adoption at LMA, this helps to advance sustainably designed, low carbon and future-proofed settlements by placing greater importance on the Vision. This defines what the vision will allow thus placing greater importance on sustainable (including virtual) mobility.

4.17 The Covid-19 pandemic has provided a step-change in working habits when it comes to revealing to employers and employees alike, that working from home or from a 'Third-Place' is a viable and attractive option for every-day life. During the first Covid-19 pandemic in the UK, every worker who had the ability to work from home did so.

4.18 More than working habits however, the Covid-19 pandemic has shown people the benefits of local living and taking an active part in their local communities, something which a pattern of building dormitory settlements has eroded. It has never been more important to build for communities where residents can visit friends and family within their local neighbourhood, get a coffee, or pop to a shop for milk all within a walk or cycle from their home.

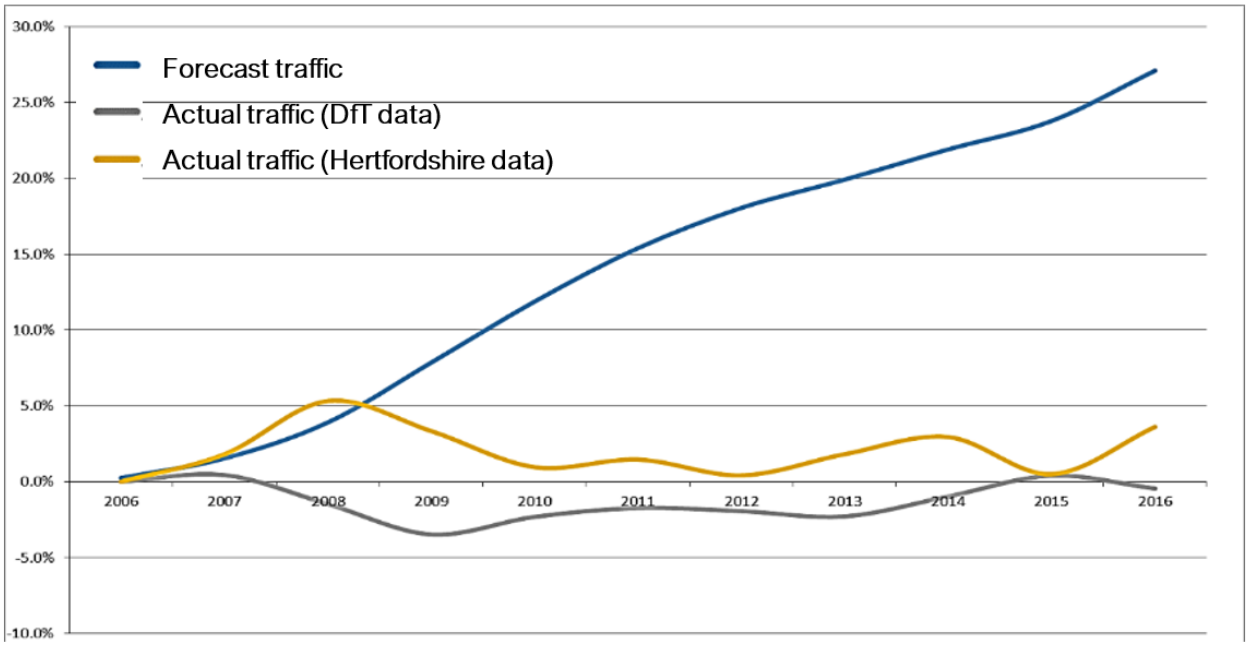
4.19 During the various lockdowns in the UK traffic on the roads reduced to unprecedented levels, and whilst these levels have bounced back to an extent across the day as restrictions ease, it demonstrates the extreme end of the scale that can be achieved as people learn to change habits.

4.20 New development at LMA must grasp the opportunities to provide for the change in behaviour by designing for liveability from the very outset.

4.21 Traffic is demonstrated to be a function of road space time and time again where national and local traffic forecasts predict a steady increase in traffic in general accordance with population and economic growth, but the traffic growth does not in occur in actuality.

4.22 It is evident from **Chart 4.1** that predicted traffic growth over the 10-year period between 2006 and 2016 did not materialise for the area of the study (case study in Hertfordshire). Whilst forecast traffic levels were predicted to rise by 25%, both DfT and Hertfordshire data showed fluctuations in traffic levels, with the local data showing at most 4% growth over the period. These sorts of trends are typical across England and Wales.

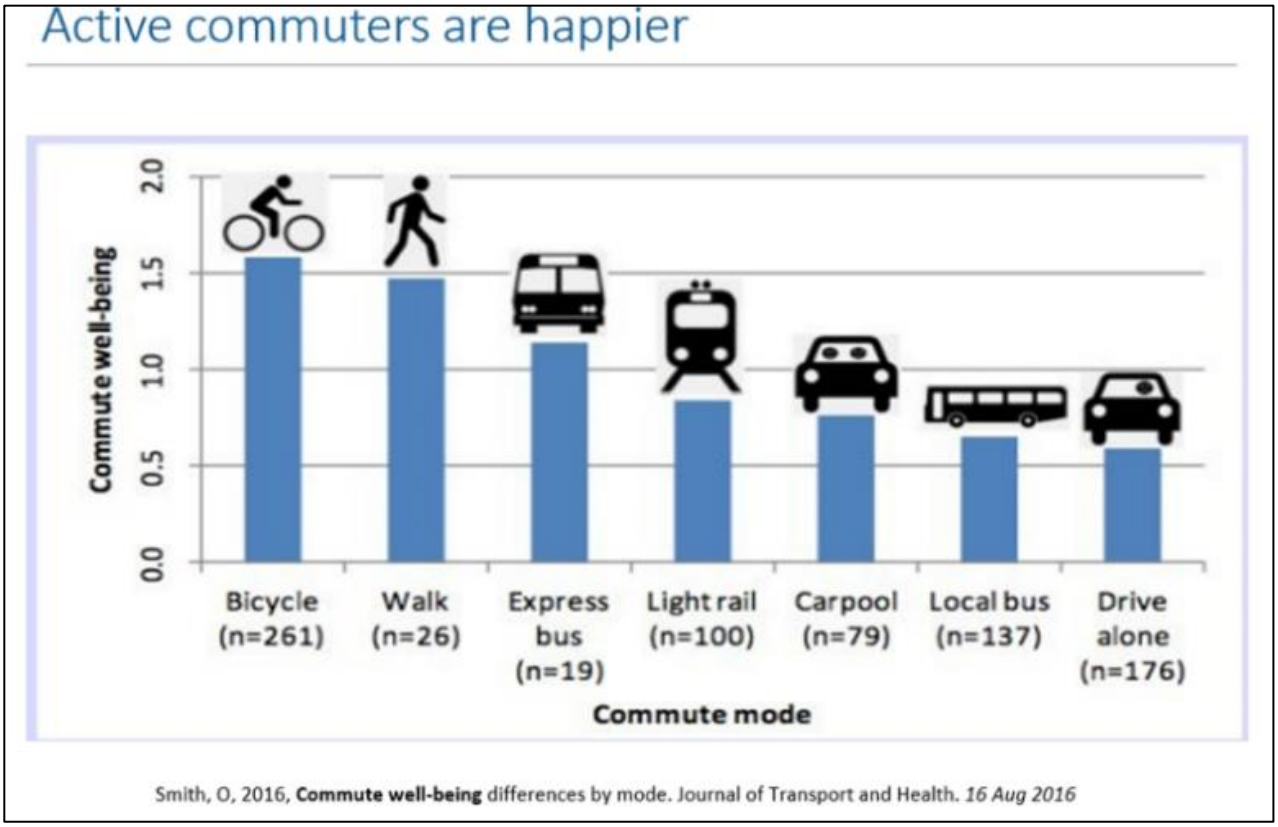
Chart 4.1 – DfT vs Actual Traffic (Hertfordshire)



4.23 The question is, therefore, how is the population and economy growing without a reflective growth in local traffic levels. One of the reasons for this can be attributed to a desire for local living (where the car does not necessarily play a defining role) and the rise of virtual mobility allowing for working from home, internet shopping and delivery etc. Other likely factors are that movement on the whole did grow, but that this is spread across other transport modes such as public transport and active travel modes, it just did not occur as vehicular traffic.

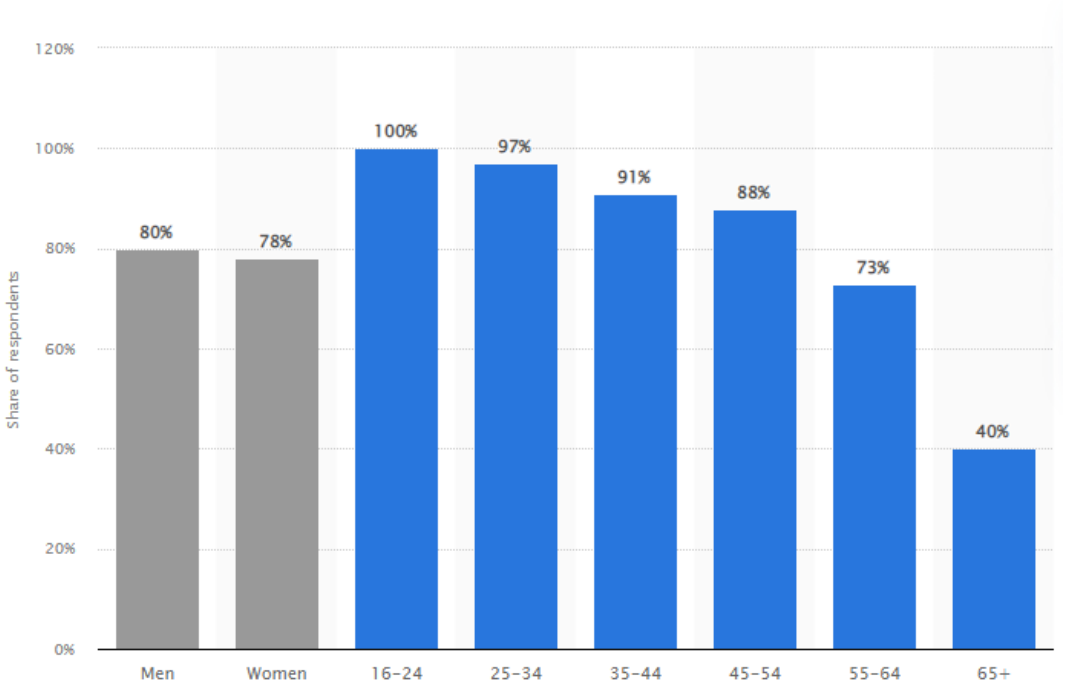
4.24 Research published in 2016 into commuter wellbeing ranked different modes of transport with car driver alone ranking the lowest and bicycle and walking featuring the highest. This bolsters the case for local living and for new settlements to be designed to accommodate active travel users as a highest priority. This is illustrated in **Chart 4.2**.

Chart 4.2 – Wellbeing of Commuters by Mode



4.25 Furthermore, the intergenerational divide has increasingly shown how travel patterns and trends in movement patterns vary by age. **Chart 4.3** shows mobile internet access by age group in Great Britain.

Chart 4.3 – Share of individuals who accesses the internet via a mobile phone in GB (2018)[5]



4.26 It is clear that younger generations are increasingly using their smart phones to access mobility and including payment for transport related activity, be it bus and rail journey planning and payments, taxi bookings such as Uber or demand responsive bus travel. This also extends to working and shopping all done virtually.

4.27 In the past there has been significant growth in the number of households with access to a personal vehicle, spurred in part to the decreasing relative cost of owning a vehicle over the same period (as shown by the National Travel Survey). This is despite vehicles being parked on average over 80% of the time.

4.28 With changing attitudes to car ownership and increased opportunities to relinquish ownership of a car (such as car clubs), private car ownership is anticipated to decline.

4.29 This reflects the changing attitudes of younger generations such as millennials towards the car, where Prophet Marketing Agency[6] have previously reported the following:

— 67% of millennials would rather buy a used car and spend the saved money on other things;

— [5] DfT Young People's Travel – What's Changed and Why? (January 2018)
— [6] Survey with 1000 responses from 18-34 year olds across the UK, USA and Germany (February 2015)

- 65% say that the latest smartphone has more value to them than the recent model of a car;
- 50% agree the car is losing its significance as a status symbol among their peers; and
- 69% are sure that car sharing and carpooling should be more common that car owning.

4.30 Behaviour change is at the forefront of the Vision and is integrated into the trip generation exercise as appropriate to remain realistic to this Vision. This includes changing attitudes to local living, modes of travel, and destination of travel.

4.31 Importantly in a V&V approach it is not the case that a forecast or future traffic demand is thought of as a demand that must be provided for come what may, or accommodated conveniently.

4.32 Adherence to this hierarchy places active travel at the forefront of new settlement design where LMA already excels (external to the site) with direct access to the Stratford Greenway.

4.33 Active travel has become more popular following the Covid-19 pandemic, with a demonstrated rise in cycling and an increased need for local living. Where active travel is excelling, public transport is still recovering from a drop in popularity due to social distancing concerns. At present trains are seeing about 55.4% (according to the Office of Rail and Road) and buses between 60 and 80% of pre-Covid-19 patronage. Whilst public transport is not currently seeing levels of use on par with pre covid-19 levels therefore, these options are still considered key to the strategy and vision for LMA, when offered in combination. Public and shared transport in the form of traditional buses and DRT are discussed in the Vision and in **Section 2** above.

Mobility Analysis Paper (MAP)

4.34 A Mobility Analysis Paper (MAP) contains the detailed trip generation methodology across the 3-hour morning and evening peak periods, and a 24-hour day. This is contained in **Appendix A** and a summary of the principal points is included in this section.

4.35 The development composition for LMA has been based upon a fixed starting point of 3,500 homes. Additional land use sizes are set out within the Transport Assessments prepared as part of the Phase 1 and Phase 2 planning applications by Mode Transport, and these have been adjusted in order to provide the optimum offer in terms of trip internalisation. The resultant development composition is therefore as follows.

Table 4.1 - Development Quantum Summary

Land Use		Size
Residential	units	3,500
E(c)/E(g) employment	sqm	53,572
E(a) Retail (Food)	sqm	1,000
E(a)/E(b) Retail (Local Shops)	sqm	2,000
Primary School	FE	Equivalent of a 4FE (840 pupil)
Secondary School	Pupil	900

4.36 Employment land uses have been calculated based on providing 1 job per household. This is considered best practice for a site of this scale from a transport internalisation perspective; however an economic assessment is required to confirm this meets the region's requirements. Similarly, the size of retail offer at LMA is based on examples at similar new settlements, and is large enough to provide a supermarket suitable for weekly shops as well as local shops. This fills the geographical hole of supermarkets in this part of Stratford-upon-Avon region and will attract and contain existing local communities. Leisure use is deemed fully ancillary on a weekday basis and therefore no land-use size is provided for these purposes. It is expected that this may draw some external movement, however this would be very limited. Economic assessments will be required to confirm and refine the retail and leisure offering at LMA.

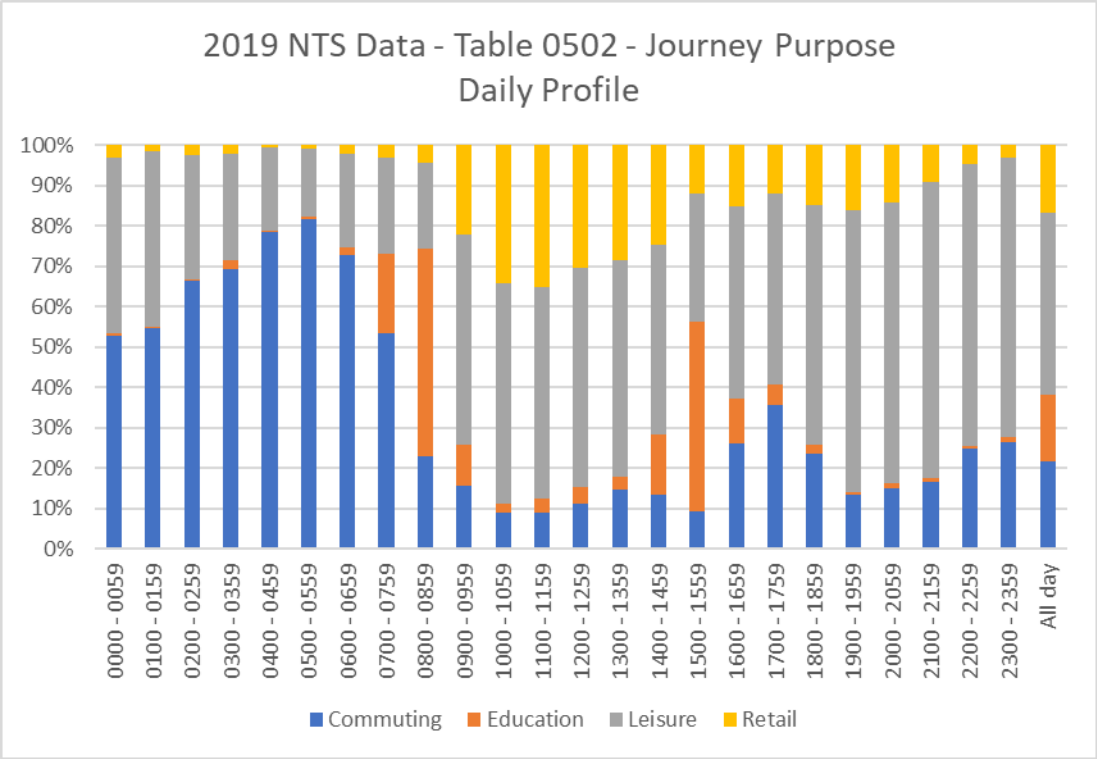
4.37 The MAP provides a comprehensive breakdown of the trip generation process, and includes a number of judgements based on evidence from the UK and elsewhere with reasonable professional judgements on realistic behaviour change. Where a judgement is made it is made clear in the MAP where this is based upon empirical evidence, professional judgement, or a combination of the two.

4.38 The traditional network peak periods, and the importance of the peak periods are being diluted as virtual connectivity gains strength in our everyday mobility habits, with working from home removing trips from the peaks further and travel for other activities becoming more flexible. Even before the Covid-19 pandemic travel patterns were changing, but mobility still occurred throughout the day and was not restricted to just two peak hours in the full 24-hour period.

4.39 The trip generation assessment therefore begins with an appropriate trip rate broken down into the peak 6-hours of the day (3 in the AM and 3 in the PM) which captures the broader range of movement, as well as a 24-hour day. Journey purpose is then the first consideration and can be categorised into travel for 'education', 'commuting', 'retail' and 'leisure'.

4.40 The profile of journey types in 2019 across the day was as follows (latest data available).

Chart 4.4 – Journey Purpose



4.41 It is clear that 51% of trips between 8 and 9am are made for education purposes, with 23% for commuting and 26% for retail or leisure reasons. This therefore provides a sector to target when considering methods to reduce trips in the morning peak periods, i.e. providing primary schools and a secondary school on site will internalise a large proportion of these trips, and offering school travel planning to existing local schools can act to minimise the vehicular impact of the remaining education trips. The likely education destinations have been determined by school catchment information where available.

4.42 Commuting trips or trips for business purposes here are actual trips that manifest on the mobility networks and hence do not account for remote working 'trips' already occurring at the time of survey (2019) which have been derived separately.

4.43 Incoming employment and retail trips will also occur and these are factored into the complete trip generation analysis contained within the MAP.

4.44 Establishing reason for travel is the starting point for the residential trip generation analysis, which is then applied to the specific Vision for LMA. All local living and mode choices are established through application of the Vision and are informed further by the optioneering assessment contained in **Section 2**.

4.45 The total trip generation for all movement (by all modes), both internal and external to the site, is shown in **Table 4.2**. This is then broken down into journey purpose for residential trips, incoming employment, and incoming retail trips. Some of these trip types overlap (i.e. home to work on LMA will also be an incoming employment trip). Further detail is provided in the MAP.

Table 4.2 – Total People Trip Generation (3,500 dwellings)

Time Period	Arrivals	Departures	Totals
07:00 – 08:00	340	1967	2307
08:00 – 09:00	644	2650	3294
09:00 – 10:00	672	977	1649
16:00 – 17:00	1820	861	2681
17:00 – 18:00	2205	886	3091
18:00 – 19:00	1901	1033	2933
Daily (24hrs)	14066	14116	28183

Trip Generation – Internalisation (Placemaking Components)

4.46 Starting with residential trips, the first consideration for application to total people trip generation disaggregated by journey purpose is the placemaking elements of the Vision. This provides a map for calculating realistic levels of internalisation within the site. Key considerations are working from home, education, commuting, retail, and leisure where the trip will occur from/to home, to/from somewhere else in LMA. In the case of homeworking no such 'trip' will actually occur unless this is to a third-place within the site itself. These 'trips' are accounted for as home working 'trips'.

Home to Education within LMA

4.47 Education internalisation is based upon NTS data (latest from 2019), local school attendance data, and the capacities at proposed on-site schools. Based on these factors the anticipated internalisation of school trips from residents at LMA to schools at LMA is 91% for primary and secondary school students, and 45.5% for further education (6th form).

Working from Home

4.48 Vectos/SLR have developed a tool to collate data on pre-Covid (2019) levels of working from home at the LA District level and then estimate both variation in working from home according to area classification within Districts, as well as to estimate future (2022+) working from home rates by district and area classification.

4.49 Based on the working from home rates combined with data on proportion of car commuters who drive to work and average distance of car commutes in each area, the tool then generates estimates of the number of car trips avoided due to working from home, the car vehicle-km saved, and the associated CO2 reductions this produces. The full methodology is included in the MAP.

4.50 Utilising this working from home tool, the pre Covid-19 data shows that in the area of LMA 18.8% of people worked from home, and the forecast data for the same area for post Covid-19 indicates 25.8% of people are likely to work from home at any given time (on an average weekday).

Home to Employment within LMA

4.51 Employment at LMA comprises the employment specific uses and an element of retail, and based on local census internalisation factors for residential to employment, it is judged that up to 40% of residents travelling from LMA for work will also work within the site. An additional 4% of residents are estimated to work at the retail land uses. Further detail is included in the MAP.

Home to Retail within LMA

4.52 In the absence of any more recent data, 2011 census data has been used to make a reasonable judgement on residential to retail internalisation within LMA. This data provides an average distance travelled for shopping which has been applied to the relative size of LMA. On this basis, and also due to the recommended retail offer at LMA to cater for day-to-day trips, around 90% of trips are expected to be internalised. Further detail is contained in the MAP.

Home to Leisure within LMA

4.53 Using the same methodology as for retail trips, allowing for different leisure trip types and the design, layout, and ethos of LMA, it is expected that around 63% of home to leisure trips will remain internal to LMA. Further detail is contained in the MAP.

Education from Home within LMA

4.54 There will be an element of external demand for education at LMA, and education trips that derive from LMA are already accounted for within the residential trip generation, with the arrival and departure profiles reversed. As such, 74% of education trips are internalised daily in this assessment.

Employment from Home within LMA

4.55 Employment trips that derive from LMA itself are already accounted for within the residential trip generation, and where these are discounted from the total employment demand the arrival and departure profiles are reversed. As such, 22% of employment trips are internalised daily in this assessment.

Retail from Home within LMA

4.56 Retail trips that derive from LMA itself are already accounted for within the residential trip generation, and where these are discounted from the total employment demand the arrival and departure profiles are reversed. As such, 56% of retail trips are internalised daily in this assessment.

Total Internalisation

4.57 The placemaking element of the Vision is represented here through a detailed trip internalisation analysis, with supporting evidence, judgements, and comprehensive methodology set out in the MAP at **Appendix A**.

4.58 This methodology demonstrates that around 72% and 68% of residential trips are likely to be internalised in the AM and PM peak (3-hour) periods respectively, which equates to an internalisation factor of 71%% across the day from residential trip generators.

4.59 Factoring in additional land uses at LMA, containment of all trips across the site is realistically in the region of 49% over the day. These trips will be split across a range of modes with the vast majority made by active travel modes accommodated within the site. It is reasonable that a very small proportion might be made by car however the masterplan would be designed to facilitate this type of car movement, but not promote it above more sustainable modes (for example roads being non-direct and designed to a pedestrian scale, with active travel corridors being direct).

Trip Generation – Mode Shift (Mobility Components)

4.60 Acknowledging the internalisation factor set out in the previous section, the external trip demand for all modes combined for LMA is set out in **Table 4.3**.

Table 4.3 – Total People External Trip Demand

	External		
	AM (3hr)	PM (3hr)	Daily (24hr)
Total People	5,420	5,512	21,844

4.61 In order to apply knowledge of existing mode split data, reasonable adjustments to account for changing habits and attitudes, and for the specific locational features of LMA and the mobility aspect of the Vision, the first step is to understand where people are travelling (along with what purpose).

4.62 Mobile network data (MND) has been interrogated to understand the recorded general distribution for external trips, although this is limited as it only really considers vehicle trips. This exercise has allowed identification of the number of trips that are likely to be influenced by the mobility measures set out within the Vision. These trips include the following destinations:

- Stratford-upon-Avon
- Honeybourne Rail Station
- Wellesbourne
- Meon Vale
- Lower Quinton
- Long Marston
- Warwick and Leamington Spa

4.63 Some of these destinations will be fully encompassed within the proposed mobility offering such as Meon Vale, Lower Quinton, and Long Marston, with journeys to Stratford-upon-Avon being targeted by not only active travel but also automated shuttles and DRT. Honeybourne station can be addressed through DRT as can Wellesbourne, Warwick and Leamington Spa.

4.64 It is considered that through the measures contained in the Vision to connect LMA to Stratford-upon-Avon in particular, that this destination will be more popular than shown in the existing dataset; i.e.

people may choose to live at LMA to utilise the excellent non-vehicle reliant connections to Stratford-upon-Avon. As such, demand to this destination has been adjusted within the distribution analysis.

4.65 The areas outlined above are hence estimated to consume approximately 22-32% of all external trips (AM and PM peak periods, home to work or home to other), with the remaining number of trips travelling further afield. It is these trips which the mobility package in the Vision seeks to influence. Further detail on the methodology applied is contained in the MAP.

Mode Split & Shift

4.66 External mode split varies by journey purpose and destination, and the distribution analysis above provides an estimated upper limit of overall mode choice. Using this data results in an upper mode split for sustainable travel modes (automated shuttle, bus, walking, cycling, and train (accessed by a secondary mode)) for up to 20% for commuting, 9% for retail, 15% for leisure, and 18% for external employment trips. This is for all external destinations.

4.67 Within the area of influence this equates to travel by sustainable travel modes of circa 63-69% for commuting, 38-41% for retail, 63-68% for leisure, and 56-62% for external employment trips. Further detail on the distribution and mode shift analysis is contained in the MAP.

LMA to external Education

4.68 Whilst the majority of education trips are anticipated to remain within the site, where external trips will occur these trips are expected to be outside of dedicated school transport or walking/cycling distance. As such the mode split is based on NTS data (2019) based on distance criteria of over 5 miles for primary, secondary, and further education. The resultant mode split is contained in **Table 4.4**.

Table 4.4 – External Mode Split – Education Trips

Mode	Primary Education	Secondary Education	Further Education
Walking	0%	0%	0%
Cycling	0%	0%	0%
Car or Van	81%	40%	50%
Bus	19%	60%	50%
Total	**100%**	**100%**	**100%**

LMA to external Commuting

4.69 The mode split for all external commuting trips is based on 2011 census journey to work data as a starting point, in the absence of any more recent data. This starting point has been adjusted to derive a realistic mode split reflective of changes to travel habits since 2011 and the Vision for LMA. This also accounts for fettering of the highway network due to known congestion during the peak periods (car travel is considered less attractive to the influence areas than the alternatives to be provided). The resultant mode split is demonstrated in **Table 4.5**.

Table 4.5 – External Mode Split – Commuting Trips

Mode	Census	LMA
Sustainable Travel Modes	8%	20%
Taxi	0%	0%
Motorcycle, Scooter or Moped	1%	1%
Driving a Car or Van	86%	64%
Passenger in a Car or Van	5%	15%
Other Method of Travel	0%	0%
Total	**100%**	**100%**

LMA to external Retail

4.70 The retail offer within LMA will internalise the majority of day-to-day trips for this purpose within the site, however where trips occur external to the site the mode split has been based on 2011 census data for journeys to work, in the absence of more relevant or recent data. Realistic adjustments have been applied to this mode split to account for the type of shopping trips expected to occur outside of the site, such as day trips to Stratford-upon-Avon or Birmingham for example (given day-to-day options will be within LMA). In these instances it is reasonable to assume that passenger numbers will be significantly higher than recorded for commuting trips in the census data. The resultant mode split is set out in **Table 4.6**.

Table 4.6 – External Mode Split – Retail Trips

Mode	Census	LMA
Sustainable Travel Modes	8%	9%
Taxi	0%	0%
Motorcycle, Scooter or Moped	1%	1%
Driving a Car or Van	86%	60%
Passenger in a Car or Van	5%	30%
Other Method of Travel	0%	0%
Total	**100%**	**100%**

LMA to external Leisure

4.71 As for external retail trips, the mode split for external leisure trips has been based on 2011 census data as a starting point although to reflect commuting trip patterns from some 11 years ago. Leisure trip patterns will naturally vary massively to this including a higher proportion of car passengers and sustainable travel modes. The reflective mode split is shown in **Table 4.7**.

Table 4.7 – External Mode Split – Leisure Trips

Mode	Census	LMA
Sustainable Travel Modes	8%	15%
Taxi	0%	0%
Motorcycle, Scooter or Moped	1%	1%
Driving a Car or Van	86%	64%
Passenger in a Car or Van	5%	20%
Other Method of Travel	0%	0%
Total	**100%**	**100%**

External to LMA Education

4.72 Due to standard school capacities and estimated internalisation figures for on-site schools there is likely to be some external demand for the proposed schools at LMA. In time, this would realistically have a containment effect on existing local trips, thus reducing over miles travelled. Using the same principles for mode split as for LMA residents travelling off-site to schools (over 5 miles), the resultant mode split is shown in **Table 4.8**. It is likely that if students travel in from local villages then they may walk or cycle, meaning the vehicle trips would be lower than reported.

Table 4.8 – External Mode Split – Incoming Education Trips

Mode	Primary Education	Secondary Education	Further Education
Walking	0%	0%	0%
Cycling	0%	0%	0%
Car or Van	81%	40%	50%
Bus	19%	60%	50%
Total	**100%**	**100%**	**100%**

External to LMA Employment

4.73 The mode split for commuting trips into LMA to the employment offer at the site is based on 2011 census journey to work data as a starting point. As with outbound commuting trips, this mode split has been adjusted accordingly to reflect the mobility package in the Vision. Specifically this includes an uplift to sustainable travel journeys reflective of the DRT offer and improved active travel links into the site, and an increase to car passengers which is indicative of proposed workplace carpooling schemes and related incentives. The resultant mode split is demonstrated in **Table 4.9** and further detail is contained in the MAP.

Table 4.9 – External Mode Split – Incoming Commuting Trips

Mode	Census	LMA
Sustainable Travel Modes	6%	18%
Taxi	0%	0%
Motorcycle, Scooter or Moped	1%	1%
Driving a Car or Van	80%	62%
Passenger in a Car or Van	13%	20%
Other Method of Travel	0%	0%
Total	**100%**	100%

External to LMA Retail

4.74 The retail proposed at LMA would also attract external trips in its own right, and is designed within the Vision to do so by providing a much-needed supermarket in this area. The closest supermarkets to existing communities are located in Stratford-upon-Avon, with all but one on the western side of the town which incurs high levels of congestion in peak periods. Therefore, whilst the retail provision at LMA will have an external trip demand, this is anticipated to contain a significant number of trips that are already on the highway network and travelling further, thus reducing overall miles travelled.

4.75 The mode split applied for these trips is as per LMA residents travelling external for retail purposes, as shown in **Table 4.10**.

Table 4.10 – External Mode Split – Incoming Retail Trips

Mode	Census	LMA
Sustainable Travel Modes	8%	9%
Taxi	0%	0%
Motorcycle, Scooter or Moped	1%	1%
Driving a Car or Van	86%	60%
Passenger in a Car or Van	5%	30%
Other Method of Travel	0%	0%
Total	**100%**	100%

4.76 Considering a reasonable catchment area of a 20-minute drive from LMA, a population of approximately 79,000 people are susceptible to capture pass-by, diverted, or linked for retail, leisure or commuting purposes within LMA. Even if 1% of this population visited LMA in this manner this would reduce the distance driven of existing vehicles for 790 journeys.

Total Trip Generation

4.77 The total internal trip generation for LMA incorporating residential trips for each journey purpose (and therefore encompassing internal trips for employment, retail, leisure and education) is summarised on **Table 4.11**. These are total people trips and are likely to be split amongst active travel modes, with a very small number of trips made by car within the settlement. This represents an containment factor of 49% across the day.

Table 4.11 – Total Internal Trip Generation (total people)

	Internal		
	AM (3hr)	PM (3hr)	Daily (24hr)
Total People	5,580	6,267	20,982

4.78 The total external trip generation for LMA including residential, employment, education, retail and leisure elements of the settlement is summarised on **Table 4.12** by mode.

Table 4.12 – Total External Trip Generation (by mode)

Mode	External		
	AM (3hr)	PM (3hr)	Daily (24hr)
Sustainable Travel Modes	1,178	1,049	4,304
Taxi	3	4	11
Motorcycle, Scooter or Moped	41	45	178
Driving a Car or Van	3,314	3,422	13,445
Passenger in a Car or Van	885	992	3,906
Other Method of Travel	0	0	1
Total	5,420	5,512	21,844

4.79 This trip generation is considered a starting point based on realistic judgements based on changing attitudes to travel, the excellent offer of mobility measures set out within the Vision, and the direction of local and national transport, health, and climate policies which are more crucial than ever. The likelihood is that by designing for this vision, vehicle trips would be decreased from this forecast with a higher level of internalisation and more trips placed on sustainable travel modes. The mobility package and site design form the carrot for behaviour change, and the stick is the known congested highway network coupled with rising fuel prices.

4.80 A comparison has been undertaken between the above forecasted external vehicle trips and those set out in the planning applications for LMA, as derived by Mode Transport for the full site. This comparison is provided in **Table 4.13**.

Table 4.13 – Comparison of External Vehicle Trip Generation

	AM (0800-0900)	**PM (1700-1800)**
Original Application (400 units)	326	297
Original Application (3,100 units)	2,641	2,096
Original Application (collective 3,500)	**2,967**	**2,393**
MAP (3,500 units)	**1,574**	**1,399**
Difference	**-1,393 (-47%)**	**-944 (-39%)**

4.81 The realistic trip generation developed as part of this study takes into account the Vision for LMA, and informed by the mass transit optioneering assessment in **Section 2**, results in 1,393 and 944 fewer vehicle trips on the network in the AM and PM peak periods (1-hour peaks). This equates to up to 23 fewer vehicles on the road network using in applying the Vision to LMA.

4.82 Additionally, and as previously stated, this trip generation is very much a starting point as travel trends are rapidly changing and should be expected to lean further towards sustainable travel modes in the future.

The Road Network – Justification for the SWRR

4.83 The impact of the development is limited and it is determined that the level of forecast impact does not justify the need for the provision of the SWRR. Further detail regarding this justification is provided at **Section 6**.

5 Viable Size for a Self-Sustaining Community

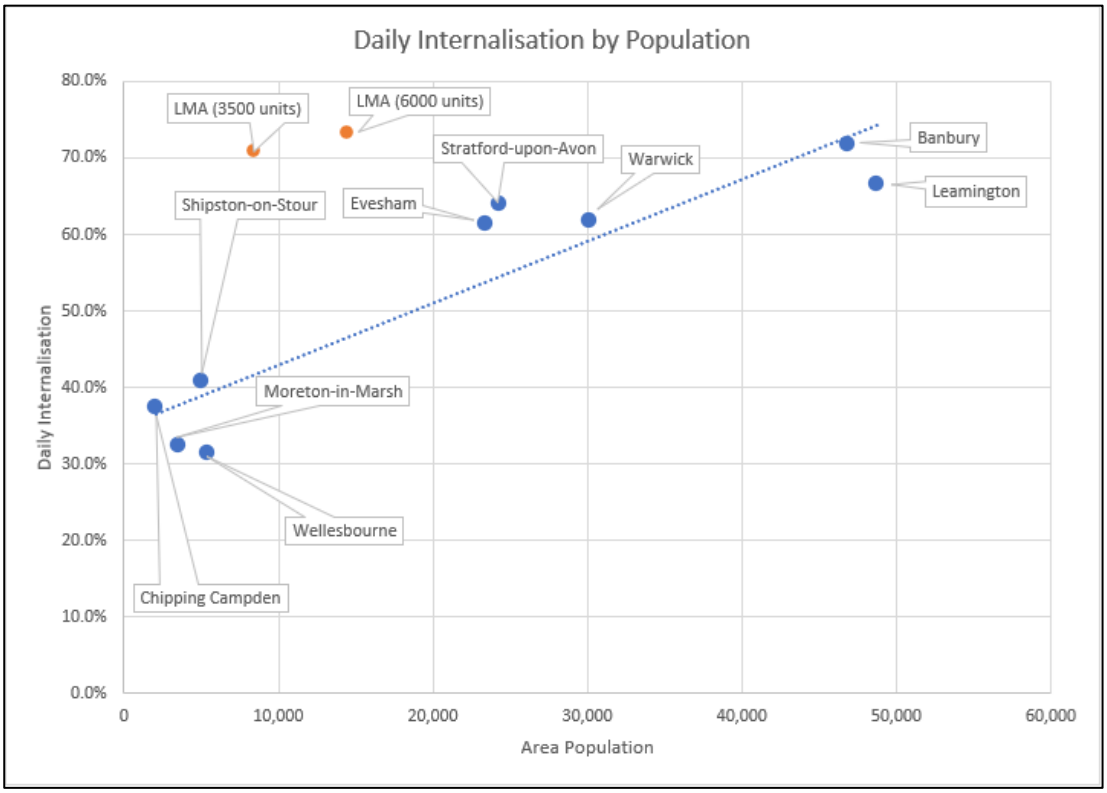
5.1 Garden village settlements become self-sustaining when infrastructure, such as schools, mobility hubs, open space, leisure facilities and work hubs (third places) and workplaces for instance are present. This is as much necessary infrastructure as roads are, and should be provided for before a site can become commercially self-sufficient.

5.2 The scale of such settlements is important in establishing the tipping point where critical mass achieves higher levels of internalisation along with plateauing levels of external vehicle movement. The overall benefit of a larger settlement in housing and employment numbers will often outweigh external movement across the day. A crude illustration of the estimated levels of internalisation of movement across the day, plotted against relative population size, is shown at **Graph 5.1** to demonstrate how increased levels of development create increasing levels of sustainability. It is important to note that size is not the only factor that affects internalisation, for example Shipston-on-Stour has a large and well-established town centre that not only internalises trips but also attracts more trips from further afield.

5.3 The expected internalisation of LMA (3,500 dwellings and 6,000 units) is also presented within **Graph 5.1**. This demonstrates that despite having a smaller population, a development that is built with internalisation as a key design theme from the outset has the potential to operate with internalisation levels in line with those observed at larger areas. The population at LMA for this purpose of this graph has been calculated based on ONS data which indicates that each household has 2.4 residents on average[7].

[7] https://www.ons.gov.uk/peoplepopulationandcommunity/birthsdeathsandmarriages/families/bulletins/familiesandhouseholds/2020

Graph 4.1 – Estimated Levels of Internalisation by Population



5.4 LMA is the right location to provide such a self-sustaining settlement, and work has been undertaken to establish a threshold where more crucial development can be provided without incurring detriment to the external movement networks. Thus, working towards the UK's net carbon zero aspirations whilst maintaining necessary growth. In order to transition to net zero carbon in the transport sector, a place-based approach which focuses on solutions to create better neighbourhoods, and healthier, happier and more resilient communities is critical.

5.5 New and independently located settlements such as that at LMA maximise on the garden village principles in becoming self-sustaining communities in their own right, rather than bolt-on development to existing urban settlements. In designing such a settlement from its very inception, a truly socially inclusive place to live and work can be made.

5.6 Not only will LMA allow for levels of internalisation beyond that of established small settlements of a similar size, but it will act as a new centre for day-to-day needs for existing residents in the surrounding villages.

Key Considerations

5.7 Stakeholder discussions raised concerns over the viability of a secondary school at LMA within a timeframe to support high internalisation of school movement. Whist the currently proposed settlement size of 3,500 homes supports a secondary school in theory, we understand from the Infrastructure Planning Lead at WCC that this is unlikely to be supportable until the very final stages of the development, and even then this is on the cusp of being unviable in reality. Discussions WCC have had with local secondary schools have also illuminated practical concerns over expansion of their sites to LMA. As such, it is understood that the level of secondary school provision at a 3,500

home LMA does not meet the Vision for a self-sustaining settlement within the timeframe needed to cement travel habits from the outset or early stages. As a result, we were advised that a figure closer to 6,000 homes would be a good level of critical mass to meet the Vision from the beginning with regards to a secondary school.

5.8 Education has been demonstrated to be the cornerstone of local living and thus internalisation of movement in the peak periods. As such a starting point of 6,000 homes at LMA has been taken as a minimum for a thriving viable self-sustaining settlement and the trip generation has been amended to reflect this.

5.9 Starting with 6,000 homes at LMA, the development composition has been amended as follows:

- Employment – 91,837 sqm GFA (1 job per household)
- Retail (Food) – 1,767 sqm GFA
- Retail (Local Shops) – 3,533 sqm GFA
- Primary School – equivalent of a 7FE (1,470 pupils)
- Secondary School – 1,050 pupil capacity

5.10 Whilst there is a higher propensity for internalisation for this size of settlement, there would also be a higher demand for external trips (i.e. more employment, more shops etc). What this level of development would also provide is additional critical mass to support larger (and costlier) mobility schemes for external site travel.

5.11 The internalisation judgements for this scenario are follows:

- Home to Education (Primary / Secondary) – 91.0%
- Home to Education (Further Education) – 45.5%
- Home to Employment – 44%
- Home to Retail – 95% (5% increase)
- Home to Leisure – 67% (4% increase)
- Education from Home within LMA – 89% (15% increase)
- Employment from Home within LMA – 22%
- Retail from Home within LMA – 57% (1% increase)

5.12 The detailed analysis and set of judgements accompanying this assessment are contained in the MAP at **Appendix A**.

Total Trip Generation

5.13 The total internal trip generation for LMA incorporating residential trips for each journey purpose (and therefore encompassing internal trips for employment, retail and education) is summarised on **Table 5.1**. These are total people trips and are likely to be split amongst active travel modes, with a very small number of trips made by car within the settlement. This represents an overall containment factor of 52% across the day but internalisation of residential based movement of 73%.

Table 5.1 – Total Internal Trip Generation (total people)

	Internal		
	AM (3hr)	PM (3hr)	Daily (24hr)
Total People	9,757	11,148	37,224

5.14 The total external trip generation for LMA including residential, employment, education, and retail elements of the settlement is summarised on **Table 5.2** by mode.

Table 5.2 – Total External Trip Generation (by mode)

Mode	External		
	AM (3hr)	PM (3hr)	Daily (24hr)
Non-Car Modes	1,681	1,556	6,376
Taxi	4	6	17
Motorcycle, Scooter or Moped	70	74	294
Driving a Car or Van	5,397	5,487	21,782
Passenger in a Car or Van	1,478	1,606	6,409
Other Method of Travel	0	0	1
Total	8,630	8,730	34,879

5.15 A comparison between the forecast trip generation for the currently allocated 3,500 homes (and mixed land-uses) scheme and the threshold of a 6,000 home (and mixed land-uses) scheme alongside the original TA assessments is provided in **Table 5.3**.

Table 5.3 – Comparison of External Vehicle Trip Generation (3,500 to 6,000 homes)

	AM (0800-0900)	**PM (1700-1800)**
Original Application (400 units)	326	297
Original Application (3,100 units)	2,641	2,096
Original Application (collective 3,500)	**2,967**	**2,393**
MAP (3,500 units)	**1,574**	**1,399**
MAP (6,000 units)	**2,525**	**2,278**

5.16 It is evident that whilst there are naturally more external vehicle trips in the 6,000 home scheme, that this does not result in a pro-rate increase to external vehicle trip demand. In fact, the traditional peak hour comparison with the trips defined for the original application of 3,500 dwellings (and associated mixed uses) is still higher than the forecast external demand for a 6,000 home community.

Conclusions

5.17 On the basis of the above, the trip generation exercise undertaken supports a larger site to the currently allocated 3,500 home settlement.

5.18 The benefits of creating critical mass to support further the mobility measures suggested and to support higher levels of local living are regarded to outweigh the additional expected vehicle trips on the local highway network. In the context of the need for the SWRR having been demonstrated to be unfounded, this level of development is deemed viable to create a truly self-sustaining community as per the Vision.

6 The Road Network – Justification for the SWRR

6.1 The trip generation exercise developed as part of this study has demonstrated that a realistic trip demand from the site encompasses all modes of travel, taking up the entire mobility network. The forecast demand for external vehicular trips at LMA (applying the Vision) consequently results in substantially fewer trips on the local road network. This is a realistic assessment as per prevailing policy direction which accords with the V&V approach.

6.2 The implications of this to the need for the SWRR are important. Firstly, this is a reduced figure from that previously applied in the County-wide microsimulation model which is likely to result in more favourable outcomes in an unfettered network assessment, thus reducing the justification for the SWRR.

6.3 However more importantly to the V&V mindset to delivering growth (and in line with policy stipulation), is the trigger for new road infrastructure due to a congested road network and the antiquated view that inconveniencing vehicle travel is the greatest barrier in facilitating growth. Infrastructure to support planned development in the right location (such as LMA) should begin with enabling virtual mobility (ability to work from home, order shopping online to be delivered to a micro consolidation centre, and getting news and information without needing to travel), followed by providing for classic travel (2 legs/2 wheels), then by shared or public transport, and with facilitating convenient car travel at the bottom of the hierarchy.

6.4 The NPPF (2021) has made moves to embed this approach including reference to the 17 Global Goals for Sustainable Development at paragraph 7, the need for plan making to promote sustainable patterns of development to align growth and infrastructure with improving the environment and mitigation climate change (paragraph 11a) and planning for larger scale development needing to be supported by necessary infrastructure and facilities including a genuine chose of transport modes (paragraph 73). Additional helpful references are made to planning policies which aim to achieve healthy, inclusive and safe places through the use of attractive, well-designed, clear and legible pedestrian and cycle routes.

6.5 There is a fundamental difference in thinking between national planning policy and P&P when it comes to traffic. In real life, as concluded within the CREATE project, traffic is a function of available roadspace. At busy times, increasing road capacity generates traffic, and reducing road capacity reduces traffic. Capacity is a tool. This can be seen by observed effect throughout the country. It is no coincidence that gridlock never occurs on a regular basis.

6.6 Evidence is also available that shows that when sustainable transport is prioritised ahead of car travel, the number of trips made by car is reduced. An example of this is in Vauban, Freiburg in Germany. Vauban was constructed in 1998 and high priority is given to pedestrians and cyclists with low car parking provision (and parking restrictions on-road), provision of car-free streets and widely available cycle parking facilities. As a result, less than 20% of all trips generated by Vauban are made by car with 64% made by non-motorised users.

6.7 P&P looked at it a different way. It made the judgement that a notional forecast of traffic would come what may, and because of that it needed to be accommodated, often by road building. This was self-fulfilling, and is one of the reasons why P&P can now be the antithesis of national planning policy in delivering sustainable development. Indeed, there is no expression in the Framework which promotes P&P, but promotes instead an approach that has been characterised by the phrase V&V which includes a commitment to mitigating climate change and specifically, the need to provide a genuine choice of transport modes in supporting new settlements, i.e. not just expecting and modelling for unsustainable car-based journeys. Liveable neighbourhoods and sustainable transportation modes need to be built into the design of a large-scale development to comply with the NPPF.

6.8 In 2016, Stevenage Borough Council submitted a Mobility Strategy in support of their Local Plan, and with the agreement of Hertfordshire County Council as Highway Authority. The strategy explained that it steered away from the historic and opposing policy P&P, and that instead of prioritising road building the strategy was to prioritise Mobility as a whole. It assumed no peak period traffic growth beyond the designed capacity of the network, taking into account some pinch point works, focussing its infrastructure funding on more sustainable means of movement. The Local Plan Inspector endorsed this approach[8].

6.9 The V&V approach is unequivocally set out in the Garden City principles (which the NPPF para 73 c directs the reader to) and endorsed by the industry bodies including the Department for Transport (Decarbonising Transport – A Better Greener Britain), the Royal Town Planning Institute[9], the Chartered Institution of Highways and Transportation[10], the Town and Country Planning Association[11] and TRICS[12].

6.10 Equally, these industry bodies explain that Predict & Provide is abandoned and is used to the detriment of planning better places.

[8] Report on the Examination of the Stevenage Borough Local Plan 2011-2031, Reference: *PINS/K1935/429/6*

[9] Net Zero Transport (RTPI Research Paper, January 2021)

[10] Better Planning, Better Transport, Better Places (CIHT, August 2019)

[11] Garden City Standards – Guide 13: Sustainable Transport (TCPA, September 2020)

[12] TRICS Guidance Note: On the Practical Implementation of the Decide and Provide Approach (February 2021)

6.11 Following the V&V approach is in accordance with national planning policy, and it is difficult to justify how the P&P approach could achieve all the sustainability and climate change commitments of the Framework in limiting growth at LMA by the requirement of road infrastructure such as the SWRR.

6.12 This is all reflected in the recent draft update to DfT Circular 02/2013. Whilst this is in draft currently and limited weight can be placed upon it, it indicates Government direction with regards to the strategic road network (SRN). Paragraph 15 refences the Transport Decarbonisation Plan where it states a move towards V&V is the correct approach, and paragraph 34 states the following:

"While it is the responsibility of the local authority undertaking its strategic policy-making function to present a robust transport evidence base in support of its plan or strategy, the Company can review measures that would help to avoid or significantly reduce the need for additional infrastructure on the SRN where development can be reasonably delivered through identified improvements to the local transport network, including sustainable travel choices, such as walking, wheeling, cycling, public and shared transport. Demand forecasting models are expected to account for the effects of possible mitigation scenarios that shift demand into less carbon-intensive forms of travel, so to inform analysis of alternatives."

6.13 An estimate of daily CO2 emission has been derived using:

- Journey purpose data[13]
- Average trip length (miles) by journey purpose data[14]
- Average of 280 grams of CO2 per mile[15]

6.14 This analysis only accounts for the external vehicular movements. It does not consider any internal vehicular movements or trips made by other modes (bus, train etc). However, it generally indicates the benefits where internal trips and other modes would typically generate less CO2 than external vehicular trips.

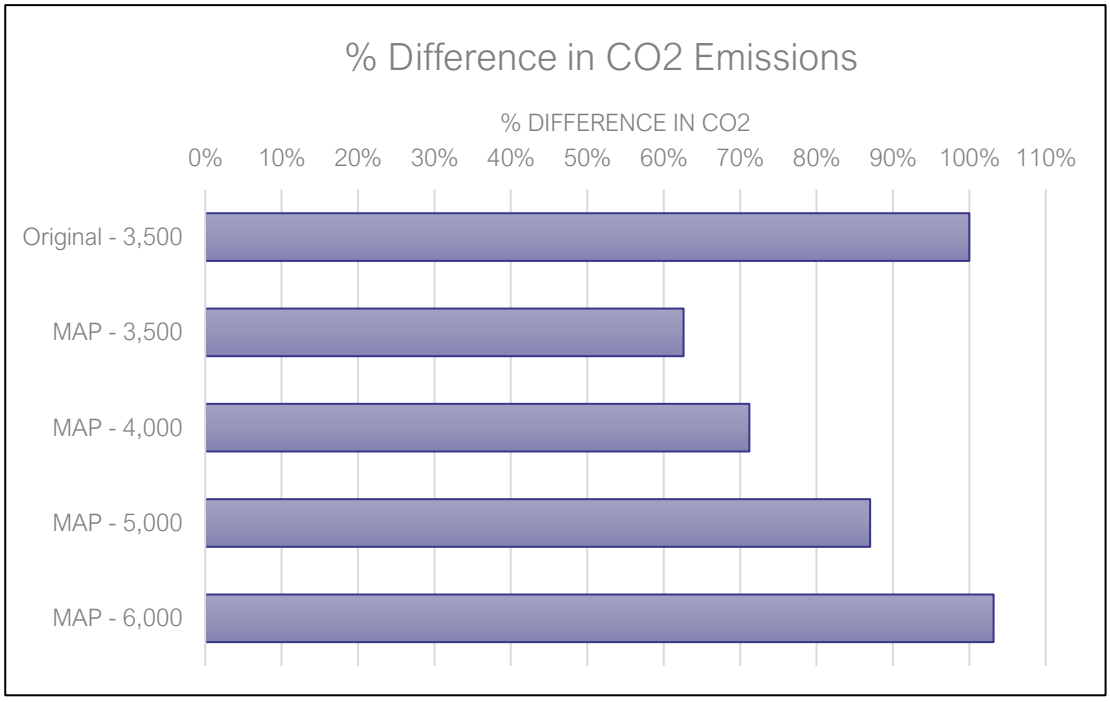
6.15 The relative differences in CO2 emission for the external vehicular trips has been estimated as indicated in **Graph 6.1** and **6.2**.

[13] NTS – Table 502

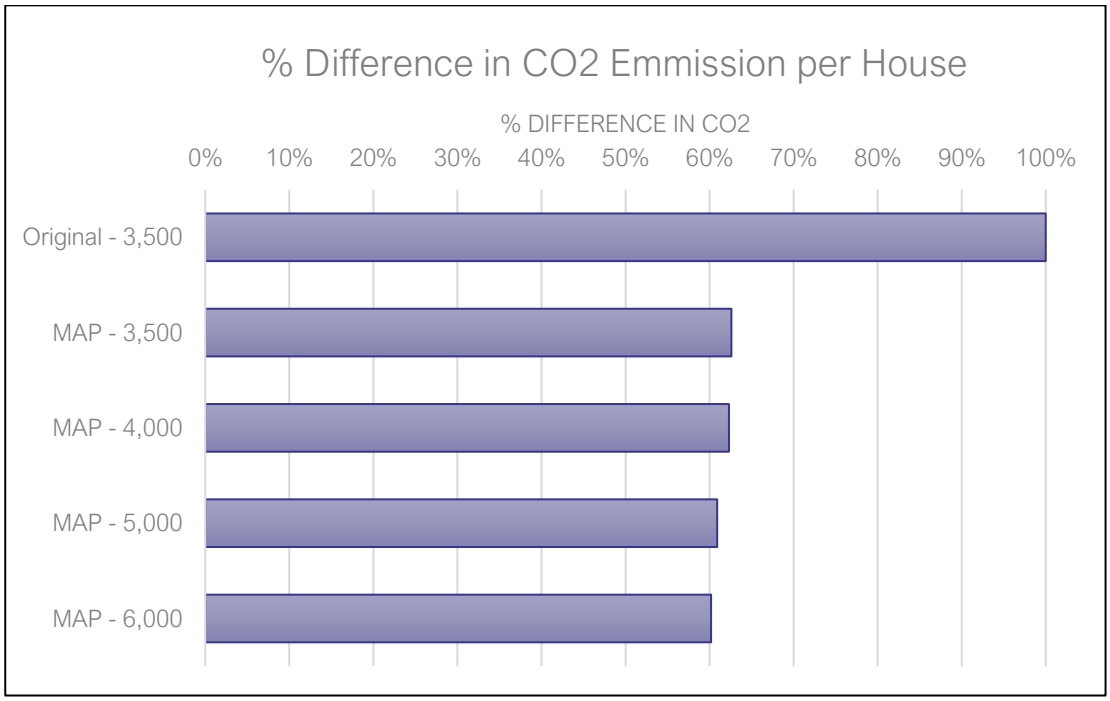
[14] NTS – Table 9912

[15] https://www.carbonindependent.org/17.html

Graph 6.1 – Relative Difference in CO2 Emissions for External Vehicular Trips – Total Emissions



Graph 6.2 – Relative Difference in CO2 Emissions for External Vehicular Trips – per House



6.16 Whilst this refers to the SRN the emphasis on limiting unnecessary road building is clear and can be applied to the justification of the SWRR and it is considered that the Vision for LMA meets these aspirations to find alternatives to new road building.

The Need for the SWRR

6.17 It has been made evident that providing for new road infrastructure to provide for necessary growth (where alternatives are available) is neither necessary nor desirable. This is framed in terms of national policies and the Climate Emergency. Even ignoring these factors, the SWRR is likely to induce vehicle demand and provide only a short-term 'fix' to a problem that cannot be addressed through facilitating unsustainable travel habits. A different solution is needed.

6.18 This solution is demonstrated through the placemaking and mobility components of the Vision and the estimated trip demand in this report. This study demonstrates that a well-designed settlement combined with a package of alternative travel options can create the change needed to move away from theoretical reliance on the SWRR. We would recommend that such a package needs to be put in place from the outset to realise the maximum effect.

6.19 In order to provide further assurance that LMA can come forward without delivery of the SWRR it is recommended that the trip demand presented in this report is run through the County-wide microsimulation model with adjustments made to the model scenarios. These adjustments should accept road capacity as a fettering feature of the model runs where additional demand is moved to the shoulders of the peaks, or to other modes (or the trip does not occur in the first instance) to reflect realistic reactions to an inconvenienced network. The Vision would then be validated against the traffic model but the model does not provide a pass or fail test to development at LMA, but rather shows the impact of the development.

7 Conclusions

7.1 The potential to develop a successful and thriving new Garden Village at LMA has been demonstrated through the Vision, and supported through the detail provided in this document. Large-scale development prospers when designed in a coordinated manner, with the key placemaking and mobility features providing for truly socially inclusive communities that prosper. In this case, local living is placed as the highest priority, followed by a movement hierarchy with convenience of single occupancy vehicular travel at the bottom.

7.2 The Covid-19 pandemic has seen an uptake in the desire for local living and resulted in a monumental increase in virtual mobility. Along with a significant take-up of active travel modes for short purpose driven trips and well as leisure trips in particular, there are ample reasons to consider that already changing attitudes to travel will remain altered moving forward.

7.3 Policy guidance is also changing to reflect these trends and to present a vision-led approach which acknowledges that development cannot go on in the way it has done traditionally. More and more emphasis is now being placed on meeting climate change targets and this means reducing carbon emissions, thus reducing the need to travel and increasing sustainable travel uptake for new developments where growth must occur. There is now ample expression in Government policy to this effect, and the recently published draft DfT Circular 02/2013 now states at paragraph 12 that;

"New development should be facilitating a reduction in the need to travel by private car and focused on locations that are or can be made sustainable. In this regard, recent research on the location of development6 found that walking times between new homes and a range of key amenities regularly exceeded 30 minutes, reinforcing car dependency. Development in the right places and served by the right sustainable infrastructure delivered alongside or ahead of occupancy should have no significant impact on the SRN. This is a key principle for planning for development in all local authority areas and will be an expectation of the Company."

7.4 Whilst this refers specifically to the SRN it represents the clear way forward for designing new settlements in line with Garden Village principles.

7.5 The trip generation assessment summarised and appended to this report demonstrates what is realistic when applying the Vision to LMA (taking account of the MTS assessment), and concludes that the following site characteristics are needed to achieve this:

- A change in development composition to provide 1 job per household (including in this an allowance or expectation for home or Third Place working), a good provision of local shopping including modest supermarket, comprehensive local centre facilities (leisure and social), primary and secondary schools on-site.
- Excellent placemaking as per the Vision, which places active travel at the forefront of design with vehicles accommodated as visitors to person spaces.
- A forward-looking package of mobility options for internal and external travel to LMA, enabling use of mobility as a service (MaaS) for maximum convenience and mode

integration. The range of choice to travel by modes other than single occupancy vehicle must be available and more attractive for many.

7.6 In achieving this then we judge that there is no good case for the SWRR, although we recommend this is checked through the county-wide model. The best results are achieved through early delivery putting availability aside. This might be thought of as simply infrastructure to be provided from day one (much in the way a road is often thought of), as opposed to commercial entities to be merely encouraged.

7.7 The infrastructure that we expect to be needed to avoid the need of the SWRR is as follows:

- On-site education facilities to enable internalisation;
- On-site local amenities including shops and leisure uses to enable internalisation;
- On-site employment land uses to allow for residents to live and work locally and avoid travelling off-site; and
- Micro-mobility measures as set out within **Section 3** to encourage sustainable transport to local external destinations.

7.8 Finally, this report provides an indicative assessment of what benefits and disbenefits a larger settlement at LMA might provide should it be nearer to 6,000 homes and additional land uses (factored up appropriately). The benefits of this are found to be greater viability of a secondary school (which should come at an early stage in any case), and greater critical mass afforded to the internalisation potential (placemaking) and mobility measures put forward. Disbenefits would naturally include a larger number of new vehicle trips on the local road network, however, for a 6,000 home settlement (and additional land-uses) in our trip generation assessment these are derived to be on par with those originally calculated for the 3,500 home allocation for LMA.

7.9 Large road building is known to induce vehicular demand and is synonymous with the Predict and Provide approach to transport planning. This has recently been rejected by the DfT in their Transport Decarbonisation Plan. It does not support a V&V approach to delivering much needed growth and may only offer a short-term ‘fix’ in any case. We believe that the provision of the SWRR would release almost none of the economic, environmental, social, health and accessibility benefits as offered by the excellent array of placemaking and mobility measures of the LMA Vision. As such the SWRR is a sub-optimal solution overall and does not go hand-in-hand with a Vision-led approach.

7.10 This report presents a high-level study and furthermore detailed assessments are required to confirm these findings. As such, it is recommended to decision-makers that the next steps are as follows (but not limited to):

- Undertake viability assessments of the suggested development composition.
- Re-model LMA within the county-wide microsimulation model as per the recommendations in this report, to confirm there is no good case for the SWRR.

— Undertake further detailed studies into all mobility options suggested as beneficial to further investigation, including DRT options and cost.

— Conduct a study into the potential funding mechanisms for site-based infrastructure which is needed up-front.

Appendix A – Mobility Analysis Paper

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Contact

London
Network Building,
97 Tottenham Court Road,
London W1T 4TP.
Tel: 020 7580 7373

Bristol
5th Floor, 4 Colston Avenue,
Bristol BS1 4ST
Tel: 0117 203 5240

Cardiff
Helmont House, Churchill Way,
Cardiff CF10 2HE
Tel: 029 2072 0860

Exeter
6 Victory House,
Dean Clarke Gardens,
Exeter EX2 4AA
Tel: 01392 422 315

Birmingham
Great Charles Street,
Birmingham B3 3JY
Tel: 0121 2895 624

Manchester
Oxford Place, 61 Oxford Street,
Manchester M1 6EQ.
Tel: 0161 228 1008

Leeds
7 Park Row, Leeds LS1 5HD
Tel: 0113 512 0293

Bonn
Stockenstrasse 5, 53113,
Bonn, Germany
Tel: +49 176 8609 1360
www.vectos.eu

Registered Office
Vectos (South) Limited
Network Building,
97 Tottenham Court Road,
London W1T 4TP
Company no. 7591661