



Milton Keynes Council

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# INFRASTRUCTURE PLAN

Stage 1 Evidence Review





**Milton Keynes Council**

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# **INFRASTRUCTURE PLAN**

Stage 1 Evidence Review

**TYPE OF DOCUMENT (VERSION) PUBLIC**

**PROJECT NO. 70048619**

**OUR REF. NO. 001**

**DATE: JANUARY 2019**

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# QUALITY CONTROL

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Issue/revision	First issue	Revision 1	Revision 2	Revision 3
Remarks	Client Draft	Final		
Date	October 2018	January 2019		
Prepared by	Andi Redhead	Andi Redhead		
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Authorised by	Adrian Hames	Adrian Hames		
Signature				
Project number	70048619	70048619		
Report number	TN01	TN01		
File reference	Stage 1 Evidence Report	Stage 1 Evidence Report		



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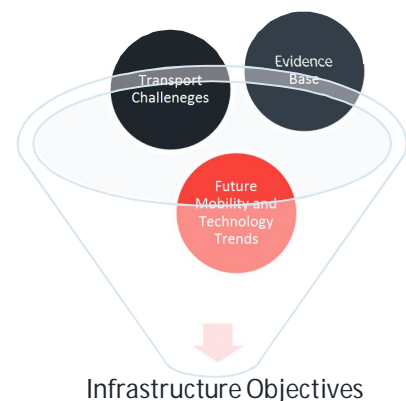


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# EXECUTIVE SUMMARY

This Evidence Review report has been prepared to inform the development of a Transport Infrastructure Delivery Plan for Milton Keynes Council. It reviews an **evidence base of existing and future transport challenges, planned growth and future mobility and technology trends** to identify the key issues and opportunities that infrastructure will need to address. By identifying the main transport challenges, a series of **draft infrastructure objectives** have been identified to be refined in the next stage of the study.

This report demonstrates that Milton Keynes is strategically located at the heart of the Cambridge-Milton Keynes-Oxford growth corridor and has performed strongly in a range of social and economic indicators in the past 5-10 years. Milton Keynes has the largest economy within the arc (both in terms of number of jobs and GVA) and has the potential to grow substantially over the Local Plan period and in the longer term to 2050.



- Milton Keynes is an innovative and forward-thinking location, with a strong appetite for housing and employment growth. To support the growth aspirations of Milton Keynes Council and the National Infrastructure Commission will require investment in transport infrastructure both at a strategic level (East West Rail and Oxford-Cambridge Expressway) and locally within the borough and neighbouring districts.
- Milton Keynes has grown substantially in recent years. The well-known high capacity grid road network and low density residential housing estates have proved popular with residents but also visitors and workers alike, who benefit from quick and easy vehicular access to key destinations within the urban area. As a result, private car commuting dominates the travel modes into and within Milton Keynes.
- Bus is the main public transport mode, but struggles to be attractive due to difficulties penetrating the residential estates, the availability and low cost of car parking and limited congestion (compared to other large towns) on main routes into the key destinations. Rail is a popular mode of travel for out-commuting from Milton Keynes to London, but is unpopular for local commuting within Milton Keynes and from neighbouring settlements.



- Active travel mode shares are relatively low despite a well-developed Redway network of segregated pedestrian and cycle routes. A number of factors discourage walking and cycling, including concerns over personal safety on the Redway routes, lack of maintenance, lack of direct routing, low density estates resulting in long travel distances and the ease of local travel by car.
- Milton Keynes is home to the Transport Systems Catapult and has been the test bed for a number of emerging transport technologies including autonomous vehicles, real-time traffic monitoring and autonomous deliveries. Milton Keynes Council have a strong appetite to support the development and implementation of innovative transport technologies including encouraging the uptake of electric vehicles the introduction of demand responsive public transport and Mobility as a Service business models.

Our analysis suggests that future growth cannot be easily accommodated under a ‘business as usual scenario’. To achieve the objectives of the Milton Keynes Mobility Strategy will require a step change in levels of travel by non-car modes including public transport and active modes. The development of the Transport Infrastructure Delivery Plan therefore needs to consider how the existing transport assets can be better managed to increase efficiency whilst also delivering schemes that significantly improve the uptake of sustainable travel. New mobility and technology trends will have an important enabling role to play in delivering the planned growth in a sustainable way.

This Evidence Review report demonstrates that Milton Keynes has the local appetite to build upon the national foundations already being established in the future mobility agenda. However, in developing the Transport Infrastructure Delivery Plan, consideration needs to be given to the trajectories of technological change and the fact that the rates of technology adoption are uncertain.

There are a number of plausible future scenarios that could occur in Milton Keynes, depending on wider societal and technological trends which in many cases are outside the control of Milton Keynes Council.

Future mobility trends and models will therefore need to be considered as part of the next stage of the infrastructure planning process to identify what infrastructure aligns with which future plausible scenarios.

# 1. INTRODUCTION

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## 1.1. OVERVIEW

- 1.1.1. WSP have been commissioned by Milton Keynes Council (MKC) to develop a medium-term Transport Infrastructure Delivery Plan (TIDP) to support growth of the city. The TIDP will align with MKC adopted Mobility Strategy and support planned growth identified within Plan MK to 2031 and long-term growth aspirations identified in MK Futures 2050. The TIDP will address current transport infrastructure needs for the known land use planning period to 2031; and ensure transport infrastructure is supportive of the longer-term growth scenarios.
- 1.1.2. Milton Keynes is one of the fastest growing cities in the UK and is strategically located in the centre of the Cambridge-Milton Keynes-Oxford growth arc. With significant population and employment growth and high levels of productivity, the city has been identified by the National Infrastructure Commission (NIC), England's Economic Heartland (EEH) and Centre for Cities as having substantial future growth potential.
- 1.1.3. The success of Milton Keynes has inevitably resulted in the growth of travel demand into and within the city resulting in increased travel times and network congestion at a number of pinch points. Historically, Milton Keynes success has been built on the delivery of good quality low density housing supported by a high capacity grid based road network and relatively high levels of car parking availability. This has resulted in a relatively high level of car dependency for travel into and within Milton Keynes.
- 1.1.4. Milton Keynes is an innovative, forward thinking and pro-growth city that is embracing the digital and technological revolution. There is an understanding that effective delivery of future growth will require new forms of transport connectivity and a smooth transition away from the traditional transport system that has served the city well in the past.
- 1.1.5. It is also recognised that transportation is at the cusp of significant change resulting in uncertainty concerning the future of transport and in particular demand for car travel. The ongoing digitalisation, automation, low emission and sharing transport trends will change how, when and where transport infrastructure and services are provided and accessed in Milton Keynes in the medium and longer-term.
- 1.1.6. The development of the TIDP will therefore take into consideration the need to transition away from a private car based strategy and the disruptive impact emerging transport technologies could have on business and community needs, infrastructure and services within Milton Keynes.

## 1.2. STUDY OBJECTIVE

- 1.2.1. The objective of the project is to provide MKC with a practical TIDP addressing the immediate infrastructure needs for the Local Plan period to 2031; and ensure transport infrastructure is sufficiently adaptable to and supportive of likely longer-term growth scenarios. The TIDP will support the Mobility Strategy objectives set out in Table 1.

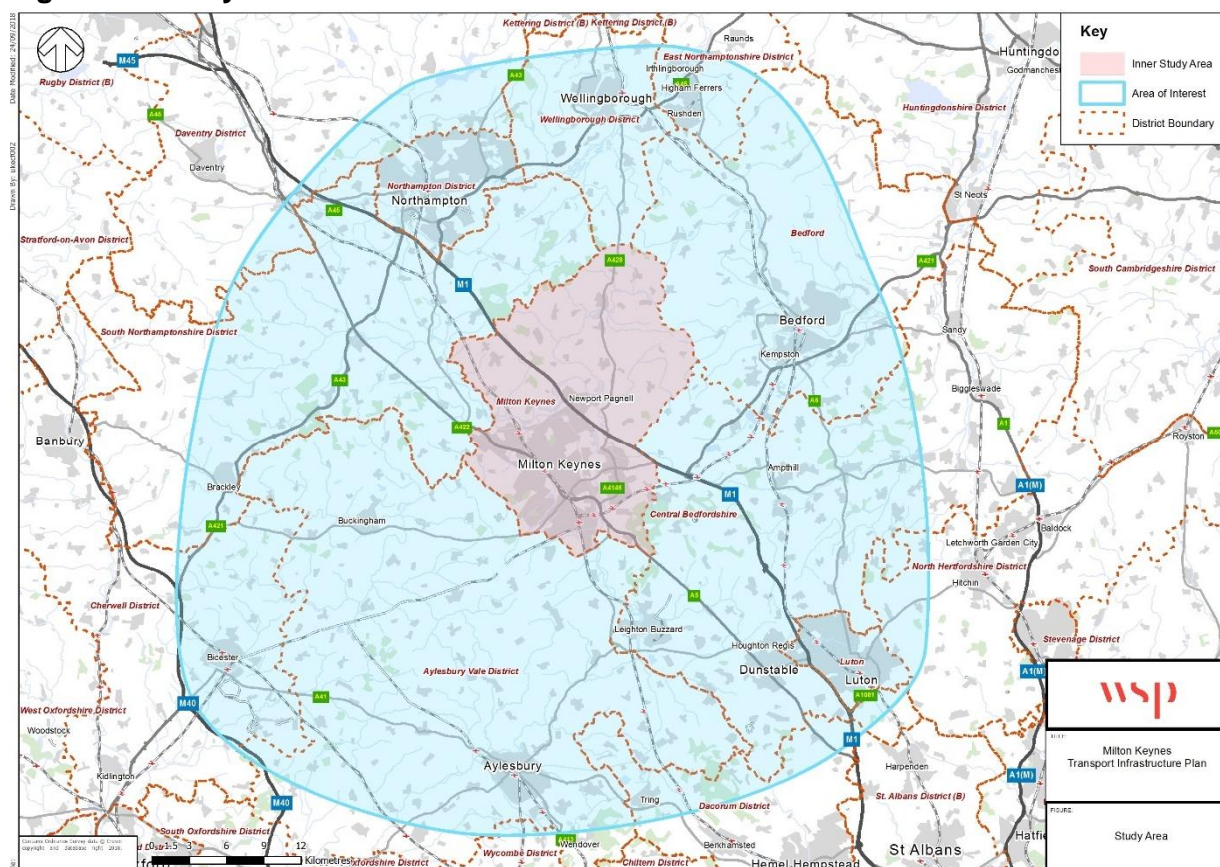
**Table 1 – Milton Keynes Mobility Strategy Objectives**

Ref	Mobility Strategy Objectives
1	Support growth and provide mobility for all – support the growth ambition of Milton Keynes and provide good connectivity throughout the Borough and beyond.
2	Provide an effective network – provide a transport network that is well maintained, free flowing, and operating efficiently at all times.
3	Maximise Travel Choices – maximise the use of technology and innovation to both inform the traveller and to provide travel options.
4	Protect transport users and the environment – the safety of all transport users is a key part of this strategy as is the need to reduce transport pollution and CO2 emissions, protect the natural environment and promote improved public health and wellbeing.

### 1.3. STUDY AREA

1.3.1. The geographical scope of the study area focuses on the Milton Keynes administrative boundary. However, consideration is also given to a wider area of interest due to the large sphere of influence of Milton Keynes has on the surrounding areas as a regional centre for employment, retail, leisure and services. A map of the geographical scope of the study area is shown in Figure 1.

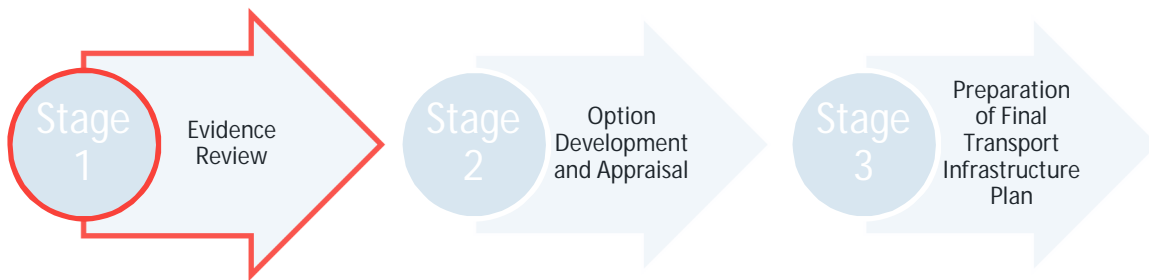
**Figure 1 – Study Area**



## 1.4. STUDY STRUCTURE

- 1.4.1. In developing the TIDP, this study seeks to review previous study work, investment and growth plans and transport technology trends to understand current and future performance/constraints of the Milton Keynes transport infrastructure to inform the development of a long list of conceptual infrastructure options to address the identified issues.
- 1.4.2. The long list of conceptual options, in consultation with stakeholders will be appraised to provide an evaluated and prioritised list of schemes. Once the list of conceptual schemes is agreed a final TIDP will be produced including the programme of schemes, supporting actions, interventions and policies, broad costings and funding opportunities.
- 1.4.3. This study will be undertaken in three main stages. A summary of the three main stages is provided in Figure 2.

**Figure 2 –Development Stages of the Transport Infrastructure Delivery Plan**



## 1.5. PURPOSE OF THIS REPORT

- 1.5.1. The first stage in developing a TIDP is analysing the existing evidence base to identify existing and potential future constraints and opportunities. This Stage 1 Evidence Report summarises the current transport, socio-economic and environmental context of Milton Keynes with a review of previous transport evidence studies and planned levels of growth. It draws together the baseline evidence gathered from various sources and presents the findings, which form the backbone of evidence to inform the development of the long list of conceptual options (Stage 2) and the final TIDP (Stage 3).
- 1.5.2. The key outcomes of this stage of the study are to:
- § Review and present to current socio-economic situation, travel patterns and transport operations within the study area;
  - § Review and present to baseline future situation based on current planned levels of growth; and
  - § Review and present the current thinking on the emergence of new mobility solutions to 2050 as well as environmental and societal trends.

## 1.6. REPORT STRUCTURE

1.6.1. The remainder of this report is structured as follows:

- § **Chapter 2 – Policy Context** – provides a brief overview of the relevant local, regional and national transport and growth policies;
- § **Chapter 3 – Baseline Conditions** – presents an overview of the current socio-economic and environmental context of Milton Keynes along with the current transport context including existing travel options, travel patterns and network operations;
- § **Chapter 4 – Future Conditions** – presents a summary of current and planned growth and transport improvements in Milton Keynes along with the forecast operation of the local transport networks; and
- § **Chapter 5 – Transport Technology Disruptors** – presents an appreciation on the potential disruptive impact of new technologies and wider societal changes; and
- § **Chapter 6 – Summary and Conclusions** – presents a summary of the finding of the evidence review.



## 2. POLICY BACKGROUND

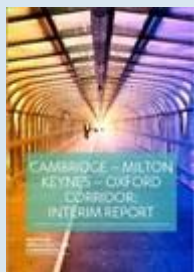
### 2.1. OVERVIEW

2.1.1. This section provides a brief summary of the relevant local policies informing the development of the TIDP. Of importance to the development of the TIDP is the adopted Mobility Strategy 2018-2036 (LTP4), which sets out Milton Keynes transport challenges and ambitions for this period along with 43 initiatives to be delivered in the short-term (2024) and medium-term (2031).

### 2.2. NATIONAL AND REGIONAL POLICY

#### NATIONAL INFRASTRUCTURE COMMISSION

2.2.1. The NIC have funded and produced a series of reports focused on maximising the potential of the Cambridge-Milton Keynes-Oxford (CaMkOx) growth arc.



#### Cambridge-Milton Keynes-Oxford Corridor Interim Report

Central findings include:

- § There is a lack of sufficient and suitable housing in the arc;
- § East-west transport connectivity is poor; and
- § Planning for East West Rail and the Oxford-Cambridge Expressway should be taken forward urgently.



#### Partnering for Prosperity

Central findings include:

- § The rates of house building in the arc need to double if it is to achieve its economic potential;
- § Need to deliver 1 million homes by 2050
- § East West Rail and the Oxford-Cambridge Expressway provide the opportunities to unlock land for new settlements;
- §

2.2.2. The NIC has identified a strategic need to double the delivery of housing in the CaMkOx growth arc, supported by transport infrastructure improvements including East West Rail, the Oxford to Cambridge Expressway, public transport improvements and effective First Mile Last Mile strategies.

2.2.3. The findings of the NIC studies are supported by England's Economic Heartland (EEH) and the South East Midlands Local Enterprise Partnership (SEMLEP). EEH is a collective partnership of local authorities covering the CaMkOx growth arc. EEH are currently producing an overarching Transport Strategy for the corridor and have the ambition to become a Sub-National Transport Body by 2020/21.

## SOUTH EAST MIDLANDS LOCAL ENTERPRISE PARTNERSHIP

2.2.4. SEMLEP Strategic Economic Plan identifies that the South East Midlands is a high growth economy. The Strategic Economic Plan sets out the strategic investments and future actions needed to grow the economy.

	<h3>Strategic Economic Plan</h3> <p>Central findings include:</p> <ul style="list-style-type: none"> <li>§ There are seven priorities; growing business, people and places in a way that promotes social inclusion, equality and environmental sustainability;</li> <li>§ Growing places includes support for improved east-west connectivity as well as local connectivity; and</li> <li>§ Unlock growth through its £265m Local Growth Fund including growing Bletchley Station and Funding Autonomous Vehicle Innovation at Cranfield University.</li> </ul>
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## HIGHWAYS ENGLAND

2.2.5. Highways England is responsible for the Strategic Road Network (SRN). Locally to Milton Keynes the SRN is formed of the M1, A421 and A5. The M1 provides national, regional and local connectivity into Milton Keynes. Access into Milton Keynes is provided by two junctions, Junction 13 with the A421 and Junction 14 with the A509. The A421 routes east from the M1 towards Bedford and the A1. The A5 routes north-south through Milton Keynes connecting with Luton and M1 to the south and Birmingham to the north. The A43 to the north of Milton Keynes is also owned and operated by Highway England. Investment in the SRN is set out in the Road Investment Strategy 2015/16 – 2019/20 (RIS).

	<h3>Road Investment Strategy</h3> <p>Relevant Committed schemes include:</p> <ul style="list-style-type: none"> <li>§ M1 Junctions 13-19 – upgrading to Smart Motorway (under construction)</li> <li>§ A43 Abthorpe junction upgrade (complete) and A5 Towcester relief road.</li> <li>§ A5-M1 Link Road – new junction 11A on the M1 north of Luton plus an A5 Link Road (complete).</li> </ul>
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### Strategic Infrastructure Opportunities

**Headline:** Milton Keynes is strategically located at the heart of the CaMkOX arc, and will benefit from the committed East West Rail, planned Oxford to Cambridge Expressway and M1 SMART Motorway. East West Rail and the Oxford to Cambridge Expressway provide substantial opportunities for Milton Keynes to unlock growth to the south of Milton Keynes, and consider new, relocated and station transport hub redevelopment opportunities.

## 2.3. LOCAL POLICY

### MILTON KEYNES COUNCIL PLAN (2016 – 2020)

- 2.3.1. The Corporate Plan provides a framework for the way in which the Council works with its partners. It is a driving factor in delivering the Core Strategy, as well as drawing upon existing strategies and research to set out short to medium term improvements (2-4 years).

	<p><b>Council Plan</b></p> <p>A set of sixteen priority themes are identified to deliver the Council Plan objectives. For transport, the priority themes are:</p> <ul style="list-style-type: none"> <li>§ 4: We recognise the value of our road network, and we understand that this is an area that is very important to the quality of life for citizens and the efficiency and productivity of our businesses.</li> <li>§ 12: Milton Keynes is built on great connectivity and mobility. We want to ensure a transport system fit for the challenges of the future so that the economy can continue to grow and people can move about with ease.</li> </ul>
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### MOBILITY STRATEGY FOR MILTON KEYNES 2018 TO 2036 (LTP4)

- 2.3.2. The LTP4 provides a strategy for Milton Keynes to maintain, improve and develop the transport system up to 2036, whilst highlighting how Milton Keynes could begin investing in the short term to deliver the transport vision set out in MK Futures 2050.

	<p><b>Mobility Strategy for Milton Keynes</b></p> <p>The Mobility Strategy outlines the ambitions of Milton Keynes to accommodate the growth in travel demand. The objectives of the strategy are to:</p> <ul style="list-style-type: none"> <li>§ <b>Support Growth and enhance connectivity</b> – support the growth ambition of Milton Keynes and provide good connectivity throughout the borough and beyond.</li> <li>§ <b>Provide an effective network</b> – provide a network that is safe, well maintained, free flowing, and operating efficiently at all times.</li> <li>§ <b>Maximise Travel Choices</b> – maximise the use of technology and innovation to both inform the traveller and to provide mobility options.</li> <li>§ <b>Protect transport users and the environment</b> – the safety of transport users is a key part of this strategy as is the need to reduce CO2 emissions, protect the natural environment and promote improved public health and wellbeing.</li> </ul>
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- 2.3.3. The outcomes from implementing the strategy are to:

- § Support growth by achieving reliable journey times, working collaboratively with Highways England and Network Rail and encourage new and more open regulatory arrangements;
- § Provide an effective network through the use of integrated urban traffic management, proactive asset management and a well maintained and safe network for all users;

- § Maximise travel choices through the provision of integrated journey planning on a variety of technology platforms, encouraging transport innovation and technology, exploiting Mobility as a Service (MaaS) and delivering seamless integration between modes; and
- § Protect transport users and the environment by encouraging the use of active modes, encouraging the use of low emission modes and ensuring the safety of all travellers.

2.3.4. Meeting these LTP4 objectives and achieving these outcomes will be done by delivering a number of short, medium and long-term interventions. The Mobility Strategy outlines 43 initiatives that will support growth and maintain and improve the transport network to ensure it operates efficiently. The TIDP will build upon the 43 initiatives identified in the LTP4 Mobility Strategy. The 43 initiatives are summarised in Table 2.

**Table 2 - Mobility Strategy Initiatives**

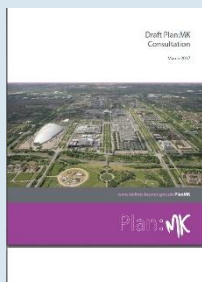
Maintain the Current Transport System	Improving Public Transport	Travelling More Sustainably	Increasing use of technology
Urban Traffic Management Control System	New Park and Ride sites	Promote sustainable travel	Smart Sensors
Freight Quality Partnership	Premium bus routes	Electric vehicle charging infrastructure	Autonomous last mile deliveries
Freight Consolidation Centres	Expand local bus network and introduce bus lanes	Access to cycles	Trialling future technology
Collaborate with neighbouring authorities (Park and Rides, AVRT)	Retail core shuttle buses	Improved cycle and powered two wheeler facilities	MaaS Mobility Planning App
Strategic Highway Infrastructure Positions	Demand Responsive Transport	Cycle training	Public Transport payment options
Grid Road Expansion	Micro Metro	Partner with local businesses	Bus application for user devices
East West Rail Connectivity	Quality Transport Partnership	Travel Planning	Improved superfast broadband
Future Transit Corridors	Optimise public transport/mass transit in new developments	Incentivisation	
Local Highway Infrastructure	Expanding capacity at Central, Bletchley and Wolverton stations	Encouraging sustainable logistics	
Redway upgrade and extension	Rail Service Policy Position		
Parking supply	Devolved Transport Powers		

Review parking			
Improve public realm and wayfinding			
Road safety			
Safe urban driving courses (HGV's)			

**PLAN:MK**

- 2.3.5. Plan:MK is the proposed Local Plan that sets out the vision and framework for the future development of Milton Keynes. The Plan:MK is currently in the draft phase and sets out the proposed approach and draft policies for growth through preferred strategies until 2031.
- 2.3.6. The Plan provides the spatial policies for strategic development and ways to support necessary transport infrastructure and sustainable mobility via road and public transport networks. Plan:MK sets out a strategy to deliver **26,500 homes and 28,00-32,000 new jobs between 2016-2031**. Currently there are 20,603 dwellings already committed and therefore only an additional 4,650 dwellings are required through new allocations. The spatial strategy for Milton Keynes is as follows:
  - § **Strategic Developments Within the Existing Urban Area:** This will see the completion of all existing city grid squares, the Eastern and Western Expansion Areas and the Strategic Land Allocation.
  - § **Central Milton Keynes and Campbell Park residential area** will now see the delivery of some 1,900 dwellings in addition to the approximate 2,450 dwellings which are already committed.
  - § **Land at Eaton Leys:** Land at Eaton Leys is allocated and has outline permission for a primarily residential development of up to 600 dwellings and associated facilities;
  - § **South East Milton Keynes:** Plan:MK recognises the available and deliverable land to the south-east of the existing urban area around the settlements of Wavendon, Woburn Sands and Bow Brickhill and the development opportunities that this provides. Plan:MK allocates land in this area to provide a total of 3,000 dwellings.
  - § **Urban Infill:** a number of small to medium sized non-strategic sites for housing development, that are all located within the existing urban area.
  - § **Regeneration:** additional homes maybe provided through estate regeneration, but these will be additional to the housing identified in Plan:MK. Locations could include Wolverton and Bletchley.
  - § **Brownfield sites:** a number of very small sites could come forward;
  - § **Land east of the M1:** Land is allocated east of the M1, south of Newport Pagnell for a strategic reserve site after 2031. The site could come forward prior to 2031 if an infrastructure bid is successful to provide upfront infrastructure funding.





### Plan MK

The Plan:MK includes the following transport strategies:

- § The provision of a dedicated public transport route(s) connecting the Eastern Expansion Area with central Milton Keynes. The route will be designed to be capable of upgrading to mass transit characteristics, when necessary.
- § Proposals for public transport, pedestrian and cycle routes that will provide convenient, direct, safe and clear routes to central Milton Keynes and Westcroft District Centre.
- § Reduce car use by maximising opportunities for sustainable travel patterns and by locating development close to public transport nodes and routes.
- § To improve the connectivity of transport networks
- § Secure the delivery of, or financial support for, bus services, and walking and cycling facilities, and other forms of smart mobility to encourage sharing.

2.3.7. These strategies will help to provide access to new transport opportunities for existing residents, thereby reducing increases in traffic growth and reducing pollution levels, but still providing services for those who cannot drive. Plan:MK is expected to be adopted in Spring 2019.

## 2.4. NIC SUBMISSION – CALL FOR EVIDENCE FOR FIRST LAST MILE TRAVEL

### STRATEGY FOR FIRST LAST MILE

2.4.1. This strategy document was produced in response to an NIC call for evidence on first and last mile travel. It was produced while the LTP4 Mobility Strategy was in development, and provides an illustrative pathway for transport improvements to deliver the growth ambitions included in the MK Futures 2050 work, and also to give a direction of travel emerging from the Mobility Strategy.



### Strategy for First Last Mile Travel

The key objectives identified in this document are the need to:

- § Put in place transport solutions which remove the risk of congestion, promote sustainable transformational growth and ensure the region's capability.
- § Ensure development of transport systems which will be the examples of others worldwide.
- § Ensure that the first/last mile infrastructure schemes provide a basis for the future potential directions of growth for the city out to 2050.

2.4.2. This document identifies the transport aims to stabilise current journey times; increase public transport, cycling and walking; and suggests the provision a sub-regional transit system based on Advanced Very Rapid Transit (AVRT) network which fits a range of personal travel options including autonomous pod fleets, electric car and bike share, and prioritised autonomous local bus services.

2.4.3. The document provides a pathway to achieving the MK Future 2050 vision. Phase 1: 2017-2024 includes:

- § Reducing congestion at key junctions and routes;
- § Connecting the existing cycleways (Redways) to commuting routes to improve cycling to work choices;
- § Building capacity within the existing road network for a future prioritised mass transit system;
- § In collaboration with Cambridge and Oxford carry out innovation, feasibility and concept development for AVRT mass transit approaches and pilot the concept;
- § Investment in interchanges and Rapid Mass Transit corridors connecting to EWR and EWX;
- § Expanding capacity for Central, Bletchley and Wolverton stations;
- § Outline and Strategic Business Cases for long term strategic infrastructure;
- § Potential for a “Fast Track” development option for key pipeline sites via a Housing Infrastructure Fund (HIF) bid; and
- § Transformation model - accelerate new mobility options to effect switch from the car (capital and revenue).

2.4.4. The subsequent phases include:

- § Connecting to First Last Mile - Phase 2: 2025-2031
  - § Expand Phase 1 work to increase capacity and mode-share to newly improved EWR hubs;
  - § Delivery of mass transit systems – AVRT or similar– Bletchley – Central MK, Winslow and EEA to Central MK, Growth East of the M1 and WEA to Central MK; and
  - § Development of detailed business cases for increased mass transit investment.
- § Futures 2050 delivery - Phase 3: 2031-2050
  - § Continuation of Phase 1 & 2 programmes;
  - § Maximising development of high-speed infrastructure; and
  - § Synchronising movement within the EWR, EWX and HS2 configurations.

## 2.5. MK FUTURES 2050

2.5.1. MK Futures 2050 “Making a Great City Greater” is an aspirational report produced by the MK Futures 2050 Commission to provide a strong starting point on how to secure a clear future for the city. The report lists Six Big Projects that: would meet the primary challenges facing the city; provide direct benefits for the people and businesses; and contribute to driving economic growth and accommodating population growth. The vision is underpinned by Six Big Projects that the Commission believes that collectively are essential to deliver the 2050 vision.



### Milton Keynes Future 2050 Commission

Project Four is proposed to improve transport in Milton Keynes:

- § Project Four: Smart, Shared, Sustainable Mobility, everyone who lives, works, studies or does business in the city is able to move freely and on-demand by harnessing the flexibility of the city’s grid roads and Redways (page 39, Milton Keynes Futures 2050 Commission Report).

2.5.2. The report envisages that new intelligent systems such as ride-sharing apps, and in the longer term, driverless cars and other technologies will enable commuters to share transport. This will help reduce the number of individual vehicles on the road.

- 2.5.3. To make this vision work, there is a need to establish a new collaborative mobility partnership comprising public, private and other providers of transport, with investment for city-wide travel integration systems, low-emission shared transport provision and transformative new mobility systems.
- 2.5.4. A series of research papers underpin the final MK Futures 2050 report and more detailed look into long-term opportunities and threats facing Milton Keynes. The two most relevant papers are:
- § Transport and Structure of the City – shows the future trends in transportation including the move to de-carbonise the transport system, through the use of electric cars and smart technologies; and
  - § Intelligent On-Demand Mobility – considers the challenges facing Milton Keynes related to provision of bus services and improved passenger satisfaction, improving walking and cycling infrastructure etc.
- 2.5.5. The Innovative Mobility Strategy – Strategy for 2050 study, published in November 2017, follows up the MK Futures 2050 Commissions’ work and produces a roadmap of measures that Milton Keynes Council could implement to achieve its aims for 2050.
- 2.5.6. Another important project of the Six, is Project One – Growth and Strategy, that looks at how Milton Keynes can benefit from access to knowledge-intensive jobs, a highly-skilled workforce and bigger market for services if transport links were improved. Five key evidence documents were prepared to support the strategies for MK Futures:

**Scale and Directions of Growth:**

- § The Paper responds to the recommendations of the MK Futures Report, by examining the opportunities and options for accommodating levels of growth.
- § Growth options should reflect joint thinking around land use and transportation to deliver the vision for 2050 objectives; the preferred directions and scale of growth are those which reflect strategic transport investment already happening and can build on it.

**Innovative Mobility Roadmap:**

- § Reviews the projections of future mobility industry commentators to identify where the smart mobility market may be leading Milton Keynes. It also compares anticipated smart mobility impacts with the MK Futures 2050 Commission’s objectives
- § Opportunities, challenges, enablers, disablers and unknowns were identified that are currently facing the delivery of Smart, Shared, Sustainable Mobility and sets out a roadmap of measures that Milton Keynes Council could implement to achieve its aims for 2050.

**Future Communities and Meeting Housing Need:**

- § The Report covers a range of ideas of future housing neighbourhoods and the opportunities for transport to make them better connected. The use of Transit Oriented Development schemes would make urban areas more walkable, pedestrian-oriented and encourage the use of public transport.

**Building on a Culture of Innovation:**

- § The Report makes recommendations for how Milton Keynes can effectively enable the transition to a healthy, thriving and sustainable future and to meet the ambitious target of becoming a near zero carbon city by 2050.

§ Scenarios were generated to see how different areas within Milton Keynes could be transformed to facilitate zero carbon living by: promoting active travel; creating more public transport options; integrated mobility; and links to the Oxford to Cambridge Corridor.

### Future of Employment and Workforce Structure

§ The Report looks at centres of growth for employment over various timescales and how Milton Keynes can capture the benefits of these and the strategic opportunities for transport infrastructure and investment.

## MILTON KEYNES 2050 STRATEGIC GROWTH STUDY

2.5.7. To achieve the MK Futures vision there is a need to consider the transport infrastructure required to support a population of 500,000 by 2050. David Lock Associates are currently developing an MK2050 Strategic Growth Strategy.

2.5.8. The initial work has resulted in a series of pre-2025 and post 2025 strategic infrastructure considerations as follows:

### § Pre- 2025:

- § Study the need for new M1 junctions;
- § Grade separated junctions on the A5;
- § New link Road from A422 to H1 Ridgeway;
- § Extension of the H1 Ridgeway over the A5;
- § Enhancements to Milton Keynes Central Station and Hospital;
- § New (Salden Chase)/ Relocated (Woburn Sands) Stations on East-West rail;
- § Bletchley E-W Rail Chord;
- § Bletchley Station redevelopment;
- § Central MK Mass Rapid Transit (MRT);
- § MRT/BRT routes to Eaton Leys and Oakgrove;
- § New Park and Ride sites
- § Olney Bypass

### § Post 2025:

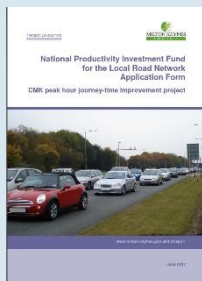
- § New M1 Junction 14A
- § M1 Junction 14 Upgrade
- § A5-A509 Link Road;
- § Re-aligned A5 to bypass Potterspury
- § New Park and Ride sites;
- § Link Road to Expressway;
- § Milton Keynes mass Rapid Transit Scheme – 6 radial routes.

#### Infrastructure Opportunities

**Headline:** Milton Keynes has ambitious planned housing and employment growth proposals. The local planning policy and 2050 futures programme makes it clear that Milton Keynes needs to transition away from its high level of private car dependency and develop attractive public transport and active travel measures including embracing new technology and innovative solutions. The local vision provides opportunities to develop innovative public transport schemes, enhanced walk and cycle infrastructure and improve the efficiency of the grid-road network whilst also embracing emerging connected and autonomous technologies.

## 2.6. CURRENT MILTON KEYNES TRANSPORT FUNDING BIDS AND PROJECTS

### NATIONAL PRODUCTIVITY INVESTMENT FUND FOR THE LOCAL ROAD NETWORK



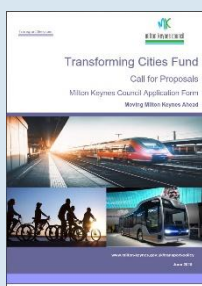
#### Peak Hour Journey Time Improvement Project

The objective of this National Productivity Investment Fund (NPIF) is to improve the peak hour journey-times in central Milton Keynes by enabling efficient use of existing highway to accommodate current and future travel demand. Current peak hour journey times, particularly for buses are unreliable due to congestion at key junctions. This project will implement an Urban Traffic Management Control System (UTMC) and bus priority measures at key pinch-point junctions.

- 2.6.1. This bid was successful and a £2.1 million project is underway for delivery by March 2020. The main outcome of the project is to decrease lost productive time, and enable fast access to existing key businesses, employment and economic sites with more reliable journey times, and unlocking economic and job creation opportunities.

### TRANSFORMING CITIES FUND – MOVING MILTON KEYNES AHEAD

- 2.6.2. The MK Futures 2050 Commission defines a long-term vision for the city and funding has been sought to enable mode shift from car commuter journeys to more sustainable transport modes and transform connectivity in key commuter routes and improve the intra-city transport network.



#### Moving Milton Keynes Ahead

The key focus of this bid is on improvements primarily along the north-south V7 Saxon Street corridor in Milton Keynes linking Bletchley town and railway station, Central Milton Keynes, and Wolverton town and railway station. The rationale for this is:

- § The significant concentration of employment in central Milton Keynes and its future growth.
- § The transformational connectivity that East West Rail will deliver to Bletchley with faster & more frequent journeys to Oxford and Cambridge.
- § Support the redevelopment plans for Bletchley which East West Rail and its planned new eastern station access will be the catalyst for.
- § Support the regeneration and potential densification of existing council owned estates, which experience high levels of deprivation.
- § Support planned improvements to bus interchange provision and routing in Central Milton Keynes.
- § Enhance first/last mile connectivity from Wolverton, Bletchley and Milton Keynes Central rail stations.
- § Deliver a key public transport corridor that will be served in future years by rapid bus and park and ride sites.
- § Follow the route of an existing Super Redway route planned for enhancement to encourage commuter cycling.



- 2.6.4. Widespread support for this bid was received from local MPs, EEH, local businesses and developers. Unfortunately, the bid was unsuccessful, however the TIDP will consider the opportunities for corridor improvements.

## **2.7. SUMMARY**

- 2.7.1. The policy review demonstrates that Milton Keynes is strategically located at the heart of the CaMkOx growth arc and will benefit from the committed and planned East West Rail and Cambridge to Oxford Expressway transport schemes which will substantially improve strategic and regional east-west connectivity. The policy review also demonstrates that Milton Keynes is a pro-growth, innovative and forward-thinking authority which wants to build on its recent successes by delivering sustainable development that embraces new technology, high quality public transport and encourages active travel along with low carbon vehicle technologies.
- 2.7.2. The policy review shows that there are two overlapping transport workstreams in progress including the LTP4 Mobility Strategy and MK2050 Futures. The LTP4 (including the first last mile evidence base) has used an evidence base of existing transport challenges to identify potential initiatives and outcomes. The Futures 2050 adopts an approach of outlining a future state and working back.
- 2.7.3. The TIDP needs to take into consideration the initiatives identified in these two workstreams and take a holistic view of the infrastructure requirements over the next 10-15 years to support planned growth whilst also considering longer-term growth aspirations including the potential disruptive impacts of technology and societal changes (Chapter 5).

## 3. BASELINE CONDITIONS

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### 3.1. OVERVIEW

- 3.1.1. This section provides a summary review of the existing baseline evidence that will be used to inform the development of the TIDP. This section provides a brief comparative analysis of the recent performance of Milton Keynes in the context of the wider Cambridge-Milton Keynes-Oxford growth arc and then focuses on the borough itself.

### 3.2. REGIONAL CONTEXT: CAMBRIDGE-MILTON KEYNES-OXFORD GROWTH ARC

- 3.2.1. Milton Keynes is strategically located at the centre of the CaMkOx Growth Arc. The growth arc is of vital economic importance to the UK. The National Infrastructure Commission (NIC), backed by Central Government, support NIC ambitions to deliver 1 million new homes in the corridor by 2050.
- 3.2.2. New transport infrastructure is vital to achieving this vision including the delivery of East-West Rail and the Oxford-Cambridge Expressway. Both these strategic transport schemes will significantly enhance east-west connectivity to Milton Keynes. Milton Keynes is therefore well placed to support the ambitious economic and housing growth aspirations of the NIC.
- 3.2.3. England's Economic Heartland (EEH) are currently developing a Strategic Transport Strategy for the corridor. WSP were commissioned to produce a detailed evidence base to inform the development of the strategy. This section benchmarks the social, economic and transport performance of Milton Keynes in the context of the CaMkOx arc, demonstrating its strategic importance within the wider sub-region.

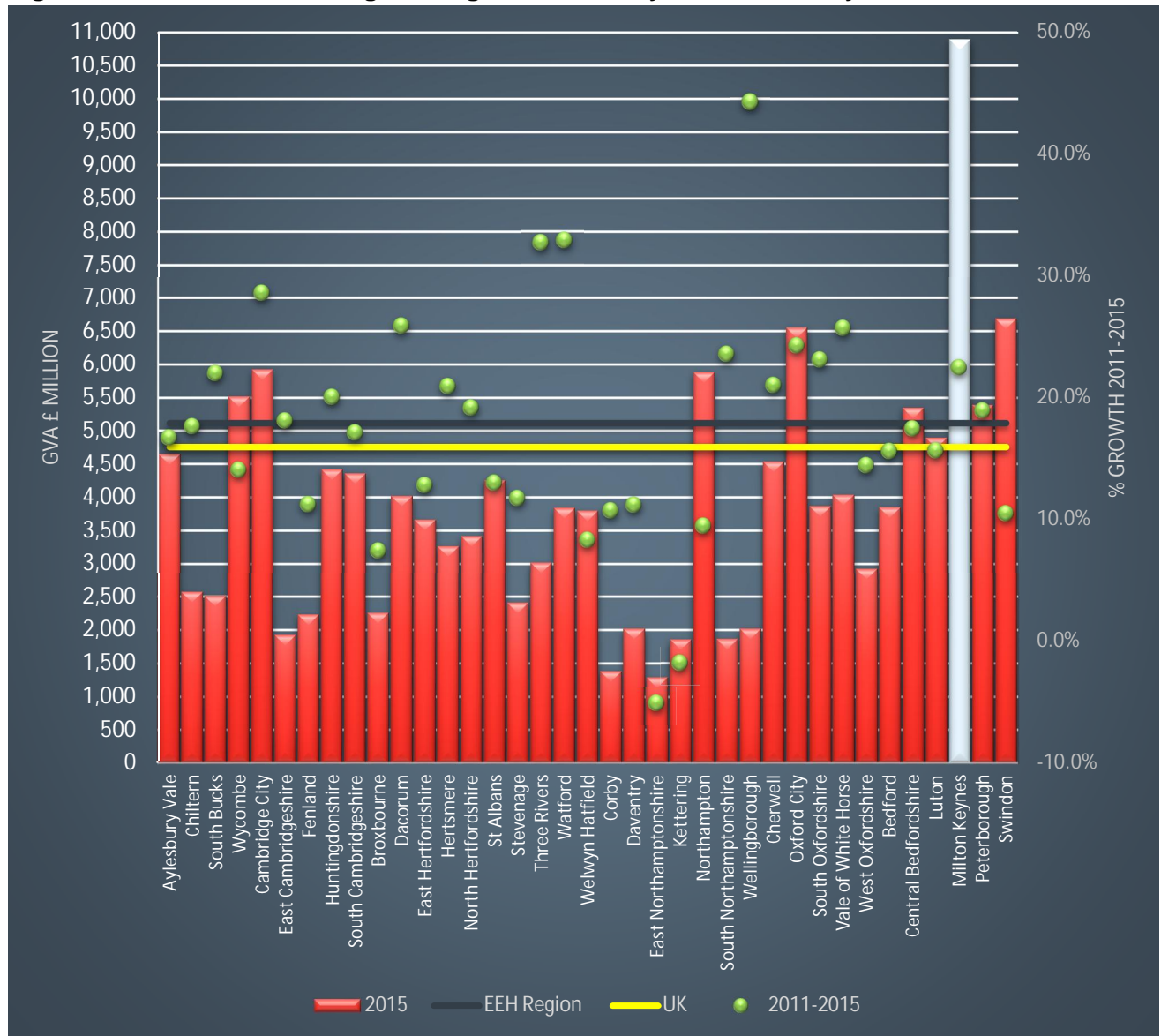
#### WHY MILTON KEYNES MATTERS TO THE SUCCESS OF THE CAMKOX ARC

- 3.2.4. Milton Keynes is one of the most successful cities in the CaMkOx arc and the UK performing strongly in a range of socio-economic indicators including population growth, housing delivery, productivity and job growth. Milton Keynes recent performance puts the city in a strong position to continue to grow and deliver both its Local Plan aspirations but also support the long-term aspirations of the NIC and Milton Keynes 2050 Futures.

#### A STRONG, DIVERSE AND GROWING ECONOMY

- 3.2.5. Milton Keynes is one of the most productive and innovative cities in the CaMkOx arc and the UK, with key strengths in advanced manufacturing, logistics, Information and Communication Technology, Finance and Business Services.
- 3.2.6. Figure 3 shows that **Milton Keynes has the most productive economy in the CaMkOx growth arc** with a Gross Value Added (GVA) of £10.5bn in 2015. GVA is a key indicator of economic growth and measures the value added to goods and services, quantifying the productivity of the economy. Figure 3 also shows that the economy has performed strongly in the last 5 years with 22.4% growth compared to an average growth of 17.9% in the CaMkOx arc and 15.9% nationally.
- 3.2.7. **Milton Keynes has the second highest GVA per head (£41,582 in 2015) within the CaMkOx**, with only Cambridge having a higher GVA per head of £45,204. The GVA per head is significantly higher than the CaMkOx arc of £27,923 and the national average of £37,361.

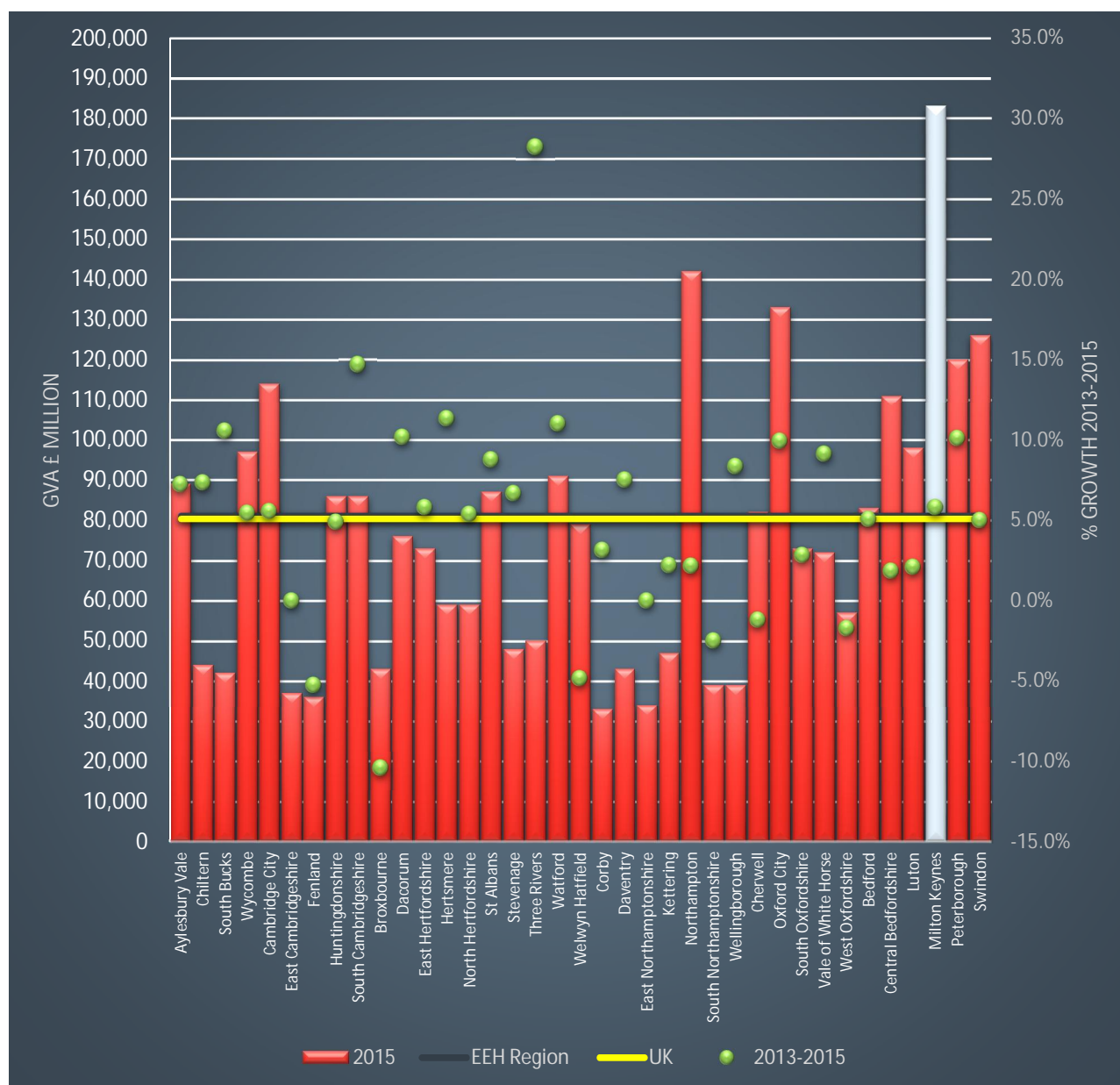
**Figure 3 – GVA and Percentage Change 2011-2015 by Local Authority**



Source: Office for National Statistics Gross Value Added (Income Approach) 2011 to 2016

3.2.8. Figure 4 below shows that **Milton Keynes has the highest number of jobs** out of all the local authorities in the CaMkOx arc. In 2015 the total number of jobs was 183,000 compared to Northampton (142,000), Oxford City (133,000), Swindon (126,000), Peterborough (120,000) and Cambridge (113,000). Job growth in Milton Keynes was 5.8% (2013-2015) which was slightly above the growth rate for the CaMkOx arc (5.3%) and UK (5.1%). However, Milton Keynes was outperformed by 15 other CaMkOx arc Local Authorities with locations including South Cambridgeshire, Watford, Peterborough, Oxford growing at a faster rate.

**Figure 4 – Number of Jobs and Percentage Change 2013-2015**

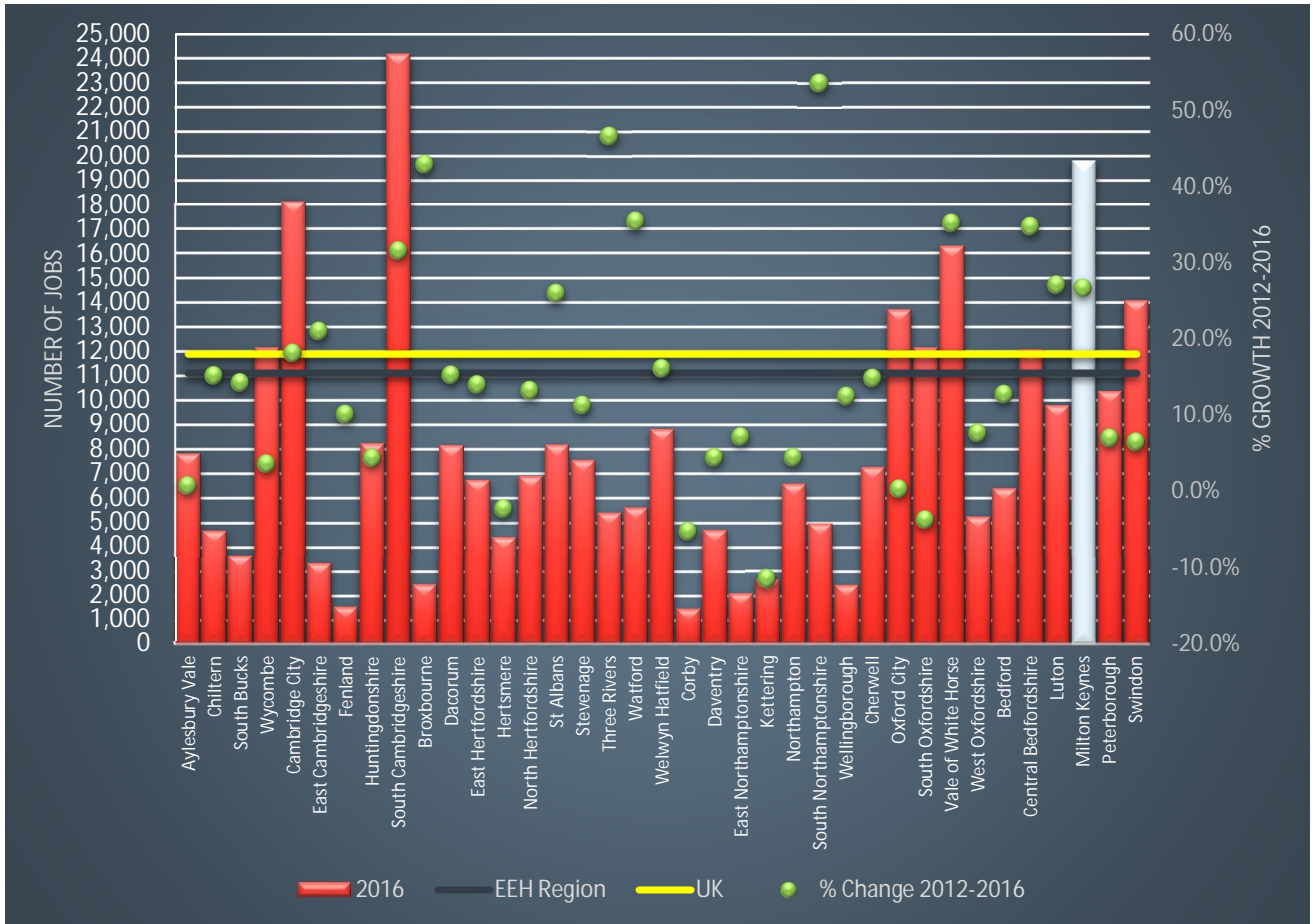


Source: Office for National Statistics BRES 2015 (Nomis September 2017)

- 3.2.9. Job density is also a useful indicator of labour demand and can have an important influence on commuter travel patterns. Job density is shown as the number of jobs in an area divided by the working age population (people aged 16-64). Locations with a job density greater than 1.0 therefore have more jobs than working aged residents.
- 3.2.10. **Milton Keynes has the fourth highest job density ratio** (1.09) in the CaMkOx arc, with only Watford (1.45), Cambridge (1.22) and Oxford (1.17) having higher ratios.
- 3.2.11. Some of the CaMkOx arcs recent success can be ascribed to its strengths in the ‘Knowledge Economy’: Growing the Knowledge Economy sector is important as it attracts high-value, high-skilled jobs in innovative sectors such as life sciences, advanced manufacturing and scientific research.

3.2.12. Figure 5 shows that **Milton Keynes has the second highest number of jobs in the Knowledge Economy** out of all the local authorities in the CaMkOx arc. In 2016 the total number of Knowledge related jobs was 19,815, with only South Cambridgeshire having a higher number (24,150). Milton Keynes has also outperformed the wider CaMkOx arc and the UK in delivering job growth in the Knowledge Sector with 26.6% increase in jobs from 2012-2016 compared to 15.5% and 18.0% in the CaMkOx arc and the UK respectively. Across the CaMkOx arc, Milton Keynes is ranked 9<sup>th</sup> in terms of growth in Knowledge Jobs during this period out of 37 districts.

**Figure 5 – Number of Knowledge Jobs and Percentage Change 2012-2016**



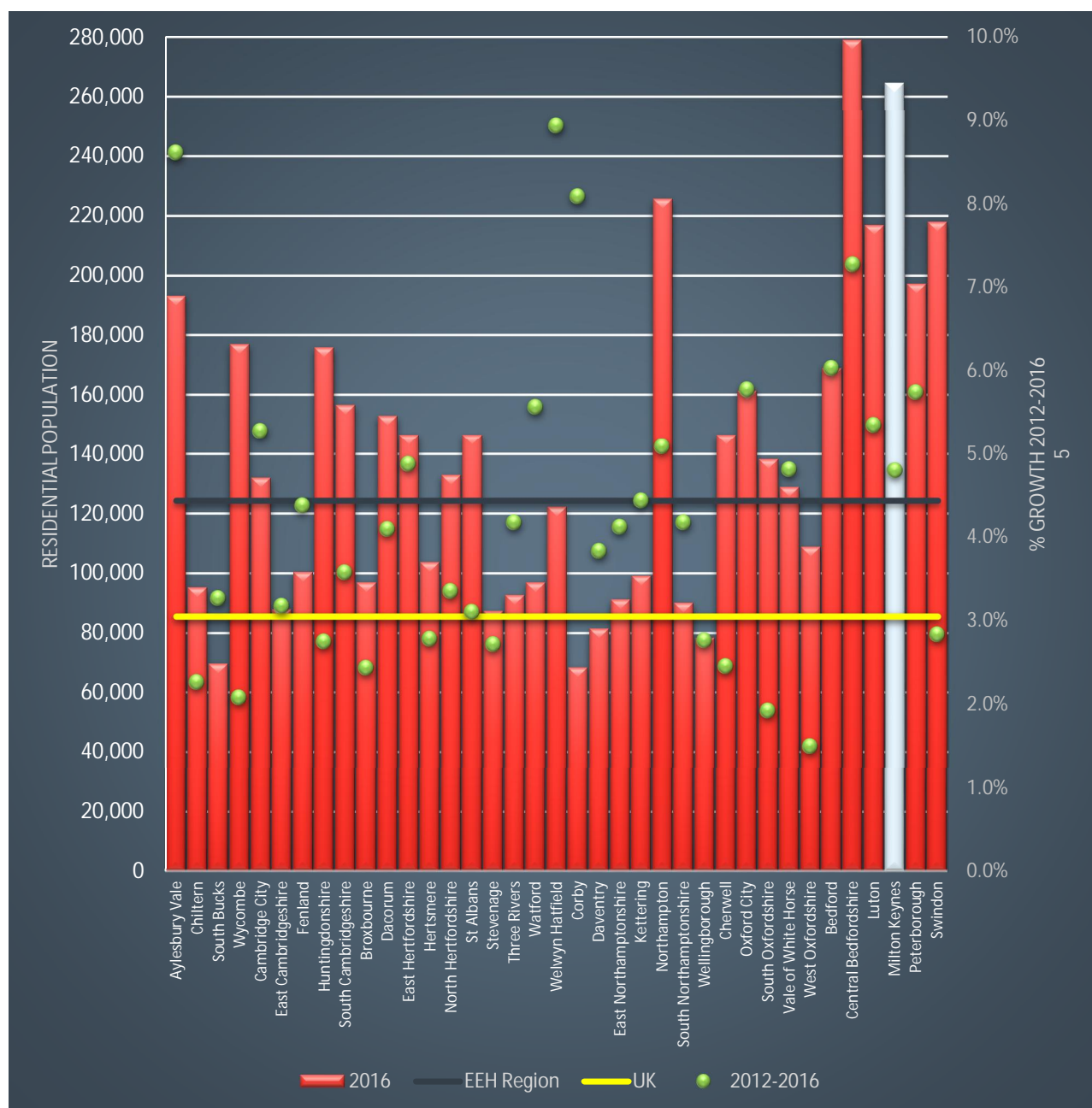
Source: Office for National Statistics BRES 2015 (Nomis September 2017)

### AN ATTRACTIVE PLACE TO LIVE AND WORK

3.2.13. **Milton Keynes is the second most populated local authority in the CaMkOx arc** and the fourth largest Built-Up Area, with only the Built-Up Areas of Northampton, Luton and Swindon having larger residential populations. Milton Keynes is one of the most attractive places to live in the CaMkOx arc. It has seen some of the fastest household and population growth rates in the CaMkOx arc, directly linked to the high levels of dwelling delivery and the relatively high levels of affordability. Figure 6 shows that the residential population of Milton Keynes has grown by 4.8% between 2012-2016, outperforming the wider CaMkOx arc (4.4%) and the UK (3.1%).



**Figure 6 – Number of Residents and Percentage Change 2012-2016**

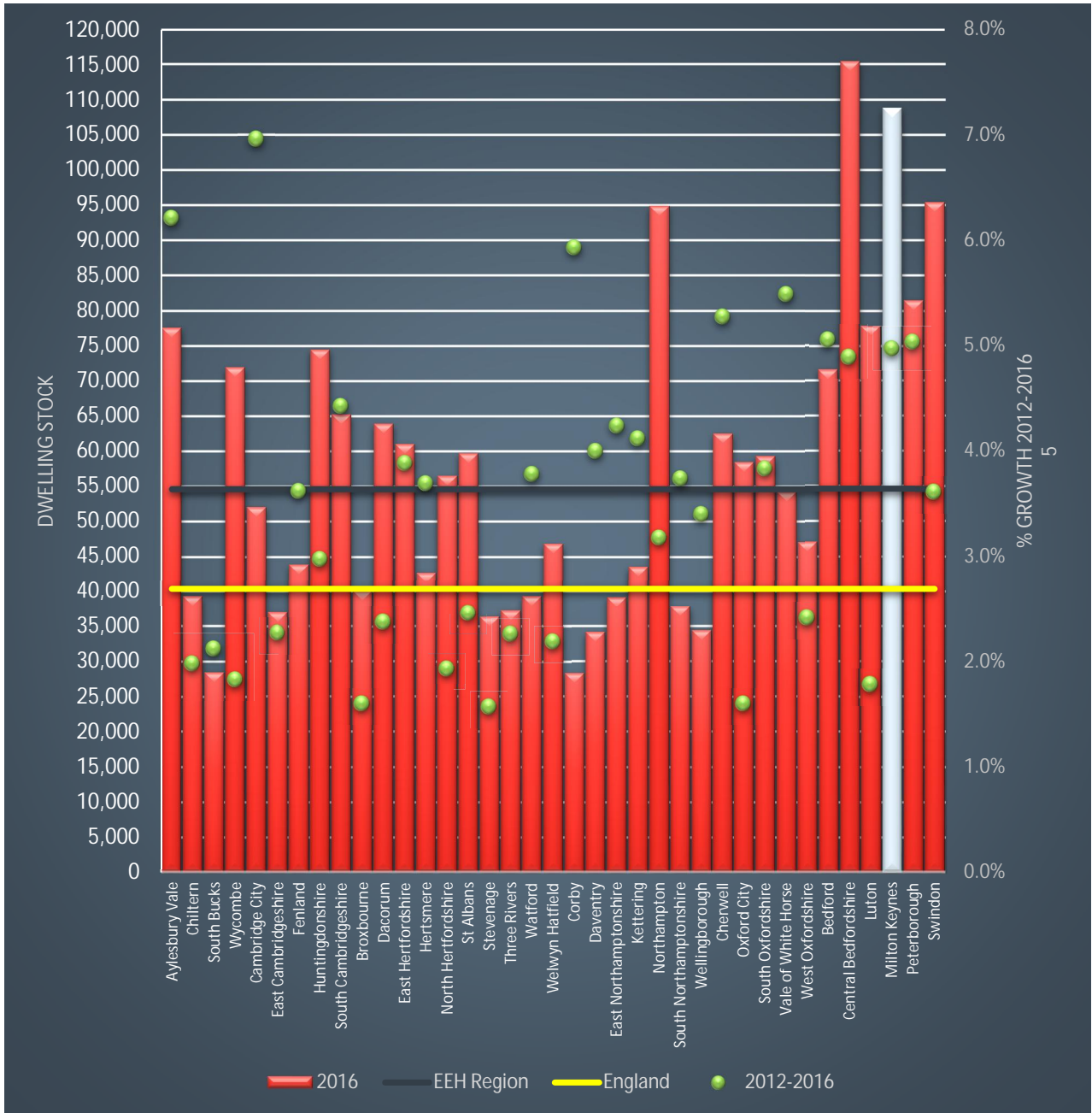


Source: Office for National Statistics Annual Population Survey (Nomis September 2017)

3.2.14. Figure 7 shows that **Milton Keynes has the second largest stock of dwellings in the CaMkOx arc** and has performed strongly in delivery. Milton Keynes (5.0% dwelling growth 2012-2016) has outperformed the CaMkOx arc (3.6%) and England (2.7%). Milton Keynes is ranked 8<sup>th</sup> out of the CaMkOx arc in housing delivery in the period 2012-2016, but second in total delivery of housing, contributing 5,150 new dwellings between 2012 and 2016.



**Figure 7 – Number of Dwelling and Percentage Change 2012-2016**



Source: Department for Communities and Local Government Dwelling Stocks Survey 2012 to 2016

- 3.2.15. Milton Keynes has performed strongly in housing delivery and remains a relatively affordable location within the CaMkOx arc. Milton Keynes is ranked 25<sup>th</sup> out of 37 local authorities that make-up the region with a median house price 8.4 times higher than the median annual resident earnings. This compares favourably to a number of local authorities that have house median house prices over 10 times higher than median annual earnings, including districts in Hertfordshire, Buckinghamshire, Cambridge and Oxford.

**Infrastructure Opportunities**

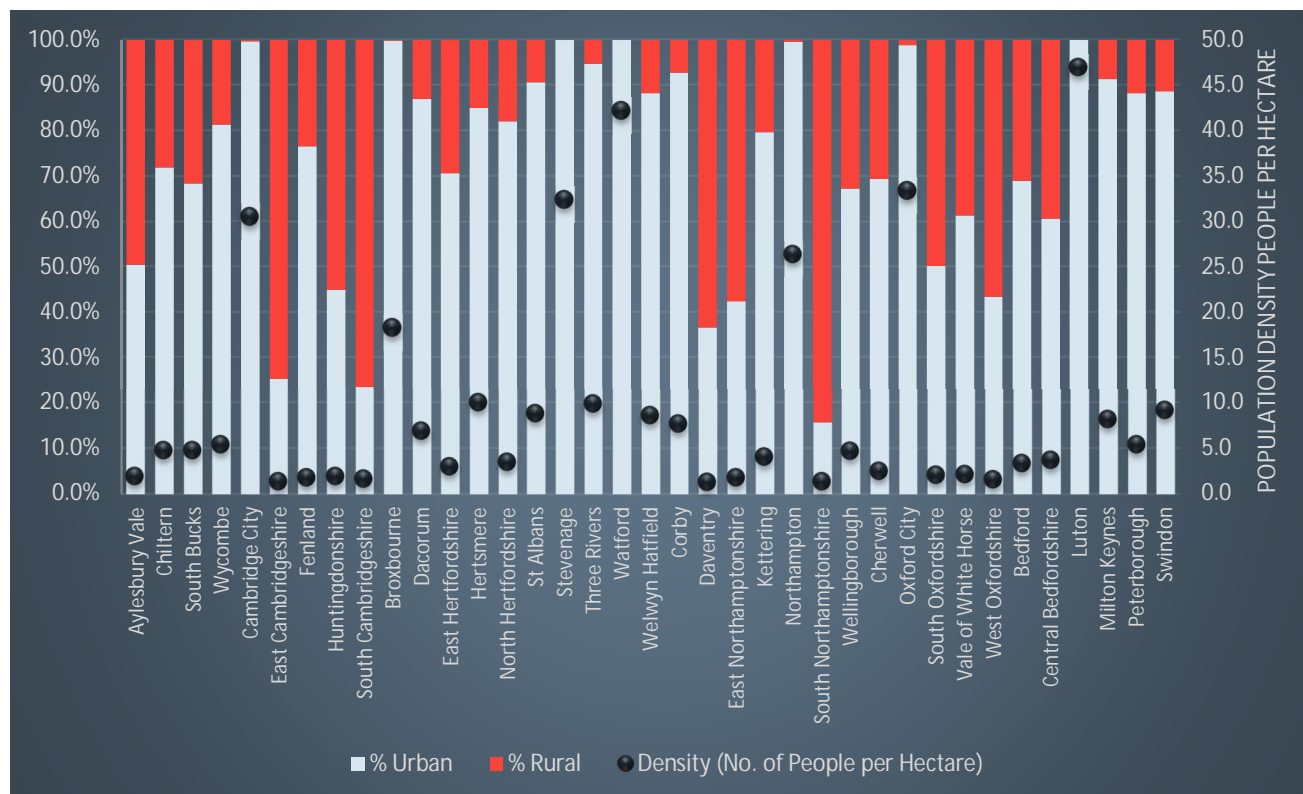
**Headline:** Milton Keynes benefits from having the largest and most productive economy in the CaMkOX arc, with more jobs than working age population. Milton Keynes also has a strong track record in housing delivery and remains a relatively affordable location within the CaMkOx arc. Milton Keynes therefore has a vital role to play in delivering housing and economic growth and therefore cross-boundary infrastructure connectivity along with local housing and employment connectivity will continue to be vital in supporting both local and regional growth aspirations.

**COMPARATIVE TRAVEL PATTERNS**

3.2.16. There are a number of spatial planning factors that have had a significant influence on travel patterns in Milton Keynes. The planned nature of the city, with its high capacity grid road network combined with low cost and plentiful car parking has permitted unconstrained use of the car. The segregated Redways pedestrian and cycle routes have not proved to be as popular as originally envisaged due to concerns over personal safety issues around maintenance and the ease of travel by private car. Bus services have also struggled to operate on a commercially viable basis due to the low density suburban residential developments, resulting in long journey times and indirect routes.

3.2.17. Figure 8 shows that the **borough of Milton Keynes is classified as 91% Urban yet it only has a population density of 8 people per hectare**. Other densely urbanised districts in the CaMkOx corridor including Oxford, Northampton, Cambridge, Broxbourne, Luton, Watford and Stevenage all have population densities above 18 people per hectare, with the densest populations occurring in Luton (47 people per hectare).

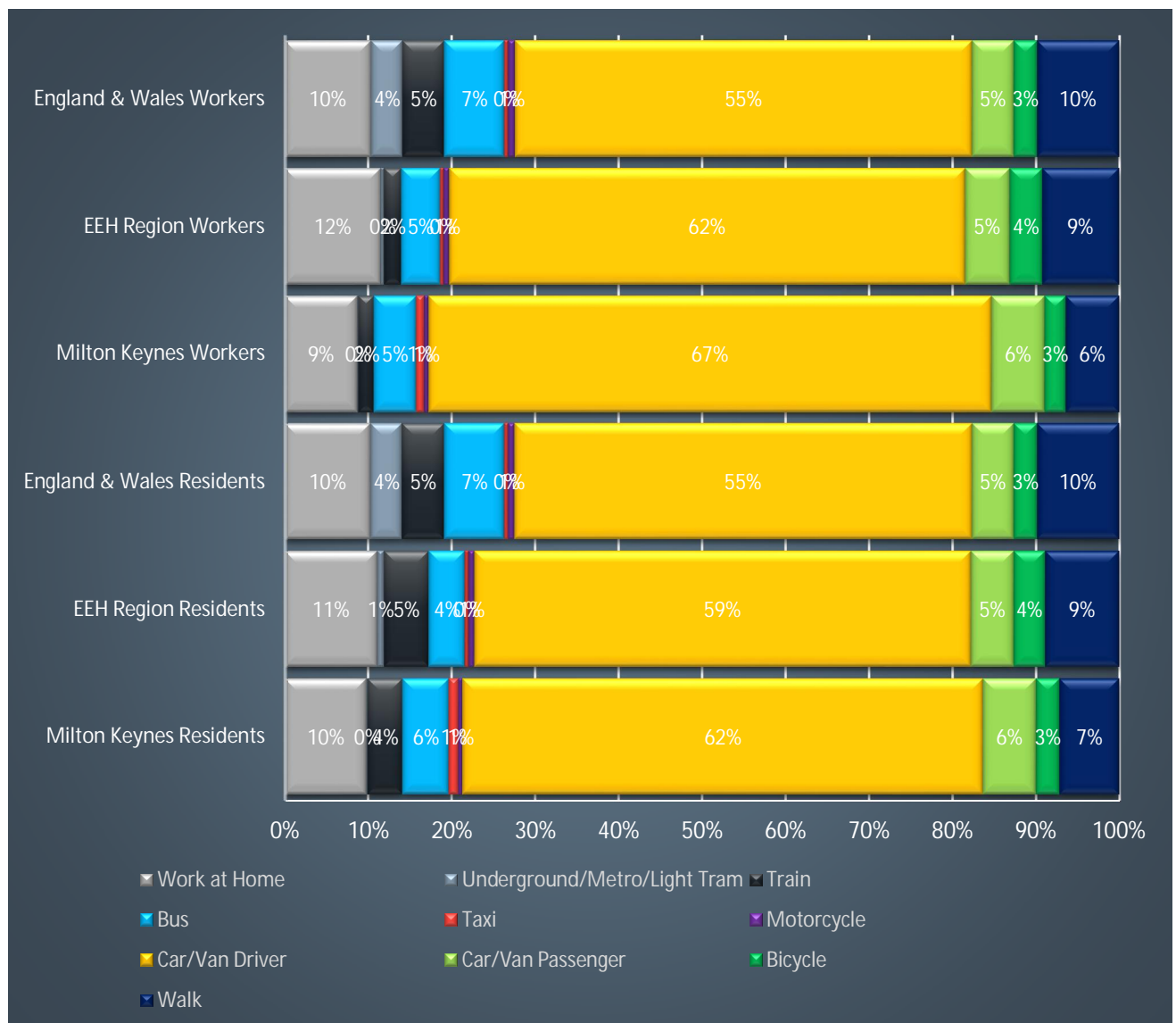
**Figure 8 – Percentage Urban/Rural Resident Population Split and Population Density by District**



Source: 2011 Census Table KS101EW

- 3.2.18. The low residential density and high vehicle capacity typology of Milton Keynes has inevitably contributed to higher levels of car use for trips into and within Milton Keynes compared to the wider CaMkOx arc. Figure 9 shows that 62% of residents in Milton Keynes commute to work by car/van compared to 59% in the wider CaMkOx arc and 55% nationally. For the Workplace population, 67% of people working in Milton Keynes drive to work compared to 62% in the CaMkOx arc and 55% nationally.
- 3.2.19. The main difference in the commuting patterns of Milton Keynes' resident population and workforce population is travel by train. **Only 2% of people working in Milton Keynes commute by train compared to 4% of residents, suggesting there is scope for improvement.** Active travel by Milton Keynes residents is 3% and 7% for cycling and walking respectively. This lower than the average for the CaMkOx arc and suggests there is potential to increase active travel for movements within Milton Keynes.

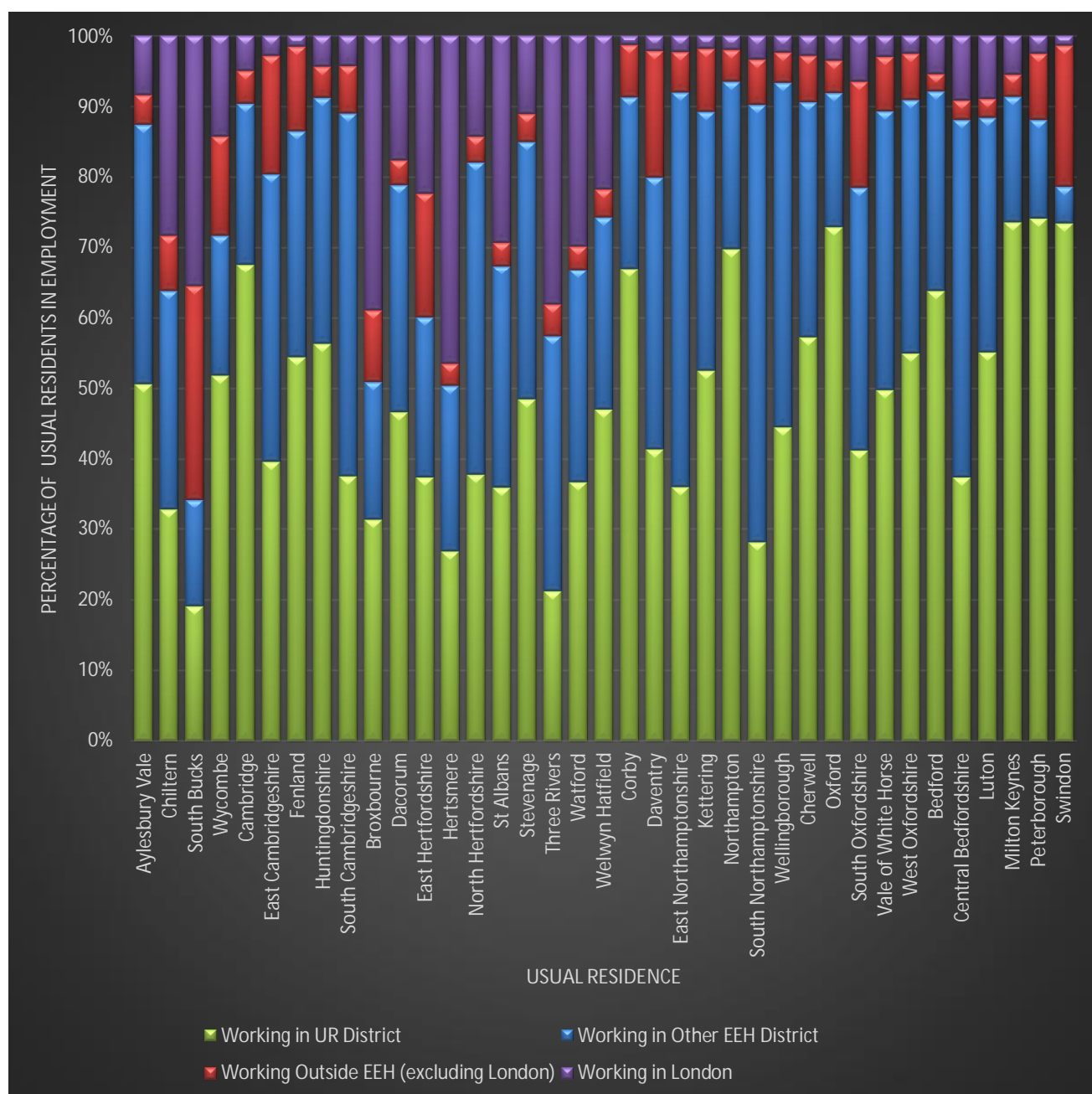
**Figure 9 – Usual Resident and Workplace Population Journey to Work Mode Share (Excluding Other)**



Source: 2011 Census Table QS703EW and WP703EW

- 3.2.20. Figure 9 shows that walking and cycling levels are 7% and 3% respectively for Milton Keynes residents. Within Milton Keynes 15% of residents travel less than 2km to work (reasonable walking distances) and 40% travel less than 5km (reasonable cycling distance). This suggests that there is significant potential for modal shift to active modes for short commuting trips within Milton Keynes.
- 3.2.21. Within the wider CaMkOx arc, the Milton Keynes district has a high level of resident commuting self-containment. Figure 10 shows that **74% of Milton Keynes residents live and work within the district**. This is equal highest with Peterborough and Swindon and demonstrates there are substantial opportunities to improve local resident trip making within Milton Keynes by sustainable modes.

**Figure 10 – Workplace of Usual Residents in Employment by District**

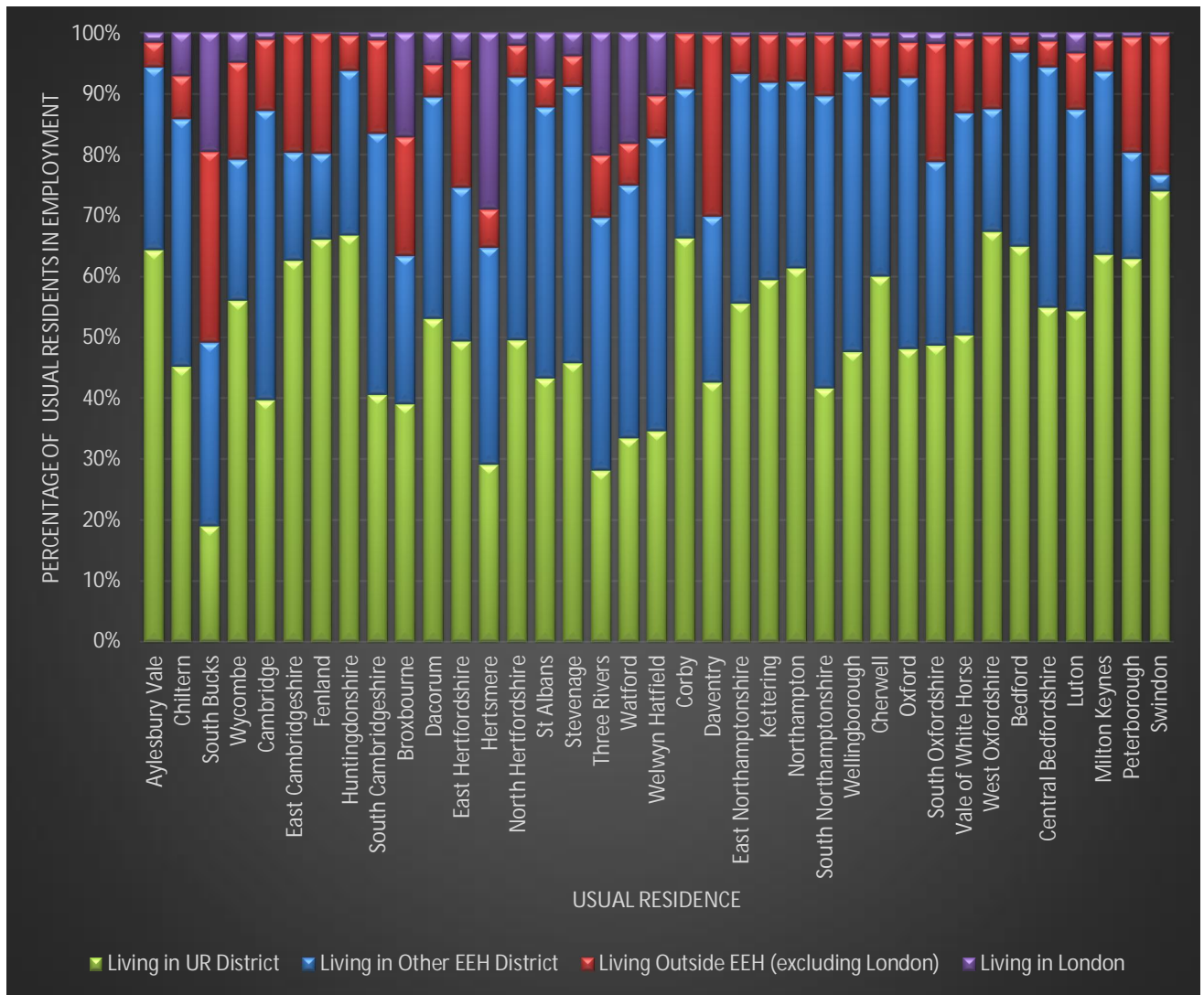


Source: 2011 Census Table WU03UK



3.2.22. Figure 11 shows the broad location of residents who work in each of the CaMkOx arc districts. Figure 11 shows that Milton Keynes compares well against other districts in the CaMkOx arc for levels of workforce self-containment. Figure 11 shows that 64% of the Milton Keynes workforce lives within the district. The district is therefore ranked in the top 10 of districts in the CaMkOx arc for the proportion of workers living and working in the same district. A high proportion of self-containment is important for providing opportunities for commuting journeys to be undertaken by sustainable modes. Figure 11 also highlights that 36% of the Milton Keynes workforce commutes into the district, with the majority (30%) commuting from districts within the CaMkOx arc.

**Figure 11 – Home Location of Workers by District**



Source: 2011 Census Table WU03UK

**Infrastructure Challenges**

**Headline:** Milton Keynes is one of the most urbanised districts in the CaMkOx arc but has a relatively low residential density. The spatial typology of low density residential development combined with high capacity road infrastructure and surface car parking has encouraged relatively high levels of car use compared to the wider CaMkOx arc. Milton Keynes has relatively high levels of resident/worker self-containment compared to other districts in the CaMkOx arc contributing to a high proportion of people travelling less than 5km to work, demonstrating that there is substantial potential for modal shift to sustainable modes of travel if attractive infrastructure can be provided.

### 3.3. MILTON KEYNES

#### OVERVIEW

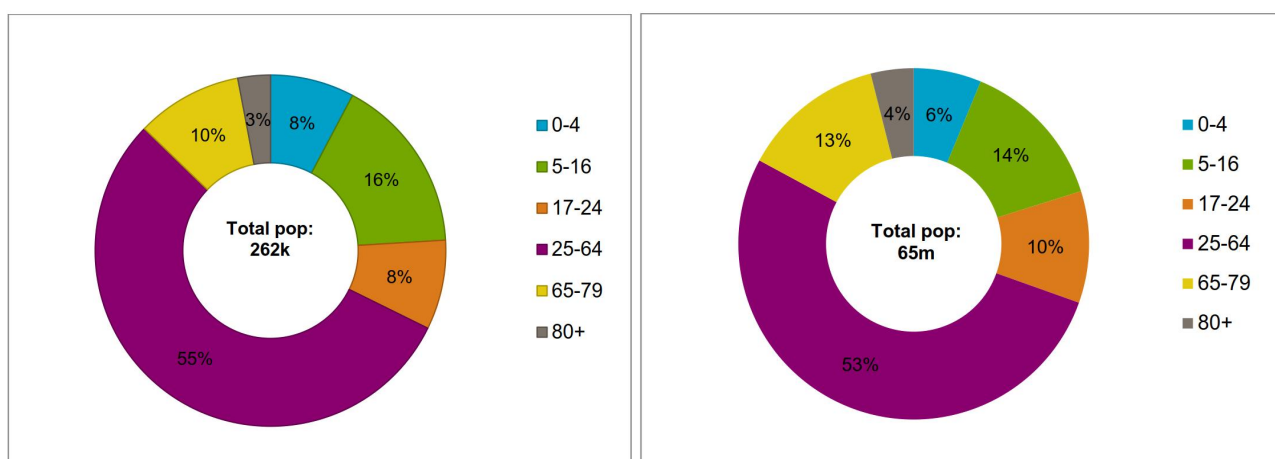
- 3.3.1. The ‘new town’ of Milton Keynes is located adjacent to the western side of the M1 (between Junctions 13 and 14, circa 30 miles north of the M25) and in 2015 had a population of approximately 261,000 people, 55% of whom were aged 25-64 (2% higher than UK average). The city which is built around a network of grid roads has key connections to both the SRN, via the M1, and the UK rail network via the West Coast Main Line between London, Birmingham, northern England and Scotland.
- 3.3.2. The unique grid road network was designed to transport people and goods quickly through the town, and a network of foot/cycle paths (Redways) provide traffic free routes for pedestrians and cyclists. This has enabled users to enjoy relatively reliable, quick journey times and low levels of congestion and the availability of parking has facilitated the growth of the town since its inception in 1967.
- 3.3.3. Milton Keynes is one of the fastest growing areas in the UK and whilst growth rates have generally slowed across the UK, productivity per worker and employment growth in Milton Keynes has overtaken Cambridge. Forecasts predict that the population of Milton Keynes will rise to over 300,000 by the early 2030’s and has ambitions to grow to 500,000 by 2050.

#### SOCIO-ECONOMIC CONTEXT

##### Population

- 3.3.4. The population of the Milton Keynes district in 2015 (ref: 2016/2017 Milton Keynes Population Bulletin) was approximately 261,000, having risen by nearly 5% (4.67%) from the 2011 census. The population bulletin suggested that Milton Keynes has a relatively young demographic with 55% of the population aged 25-64 (compared to a UK average of 53%). The proportion of under 16 years olds within Milton Keynes is also slightly greater than the UK average and the proportion of over 64 year old less than the UK average suggesting that town attracts a younger demographic. Figure 12 shows the age demographic of Milton Keynes and the the UK.

**Figure 12 – Milton Keynes and UK Age Demographic**



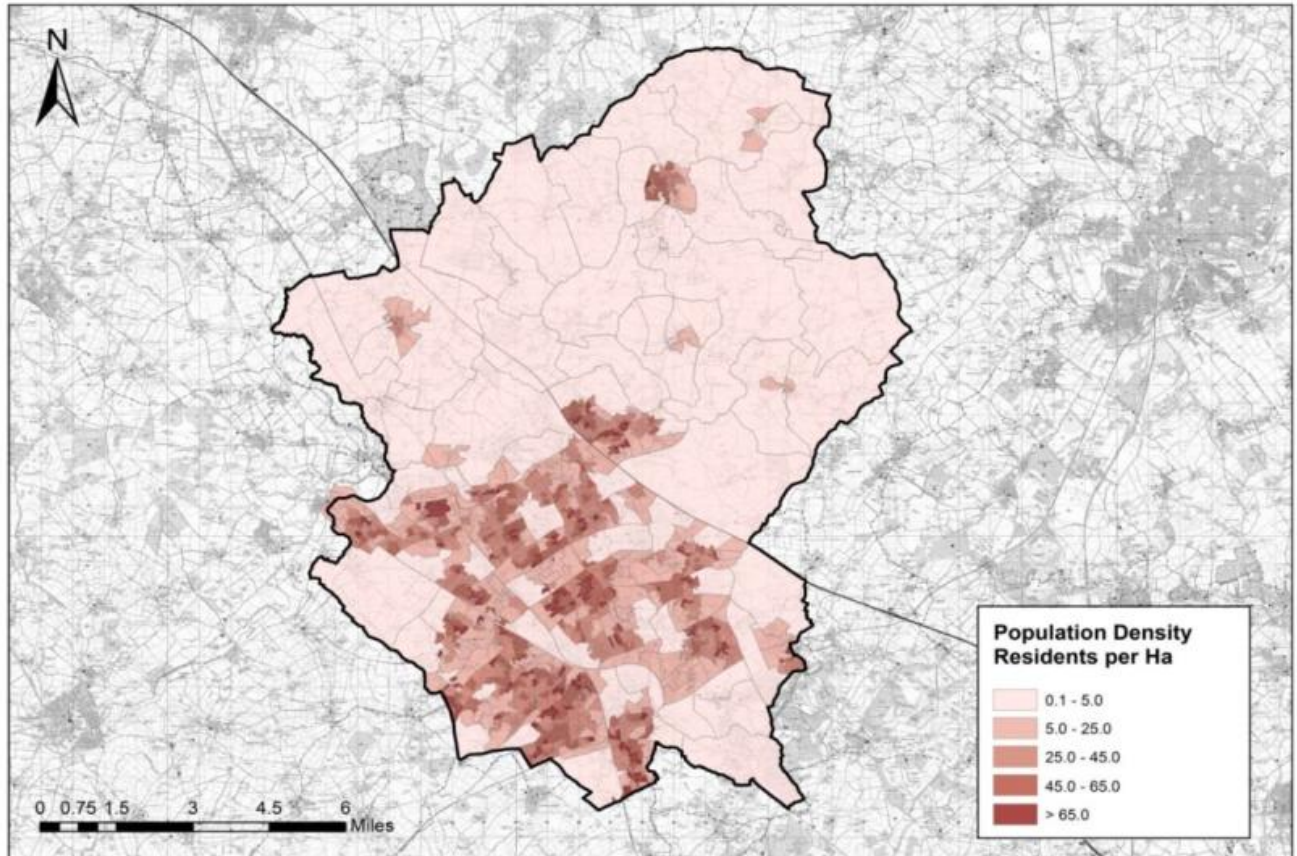
Source: Mobility Strategy 2018-2036 Evidence Base



### Population Distribution

3.3.5. Figure 13 based on data from the 2011 census shows that residential population density of Milton Keynes. Figure 13 shows that the residential population is concentrated in the urban area of Milton Keynes, with the northern area of the district predominately rural in nature. The areas within Milton Keynes with low residential densities are mainly employment locations or areas of public open space. It is important to understand the existing population distribution due to the influence on existing movement patterns.

**Figure 13 - Population Density per Hectare**



Source: Mobility Strategy 2018-2036 Evidence Base

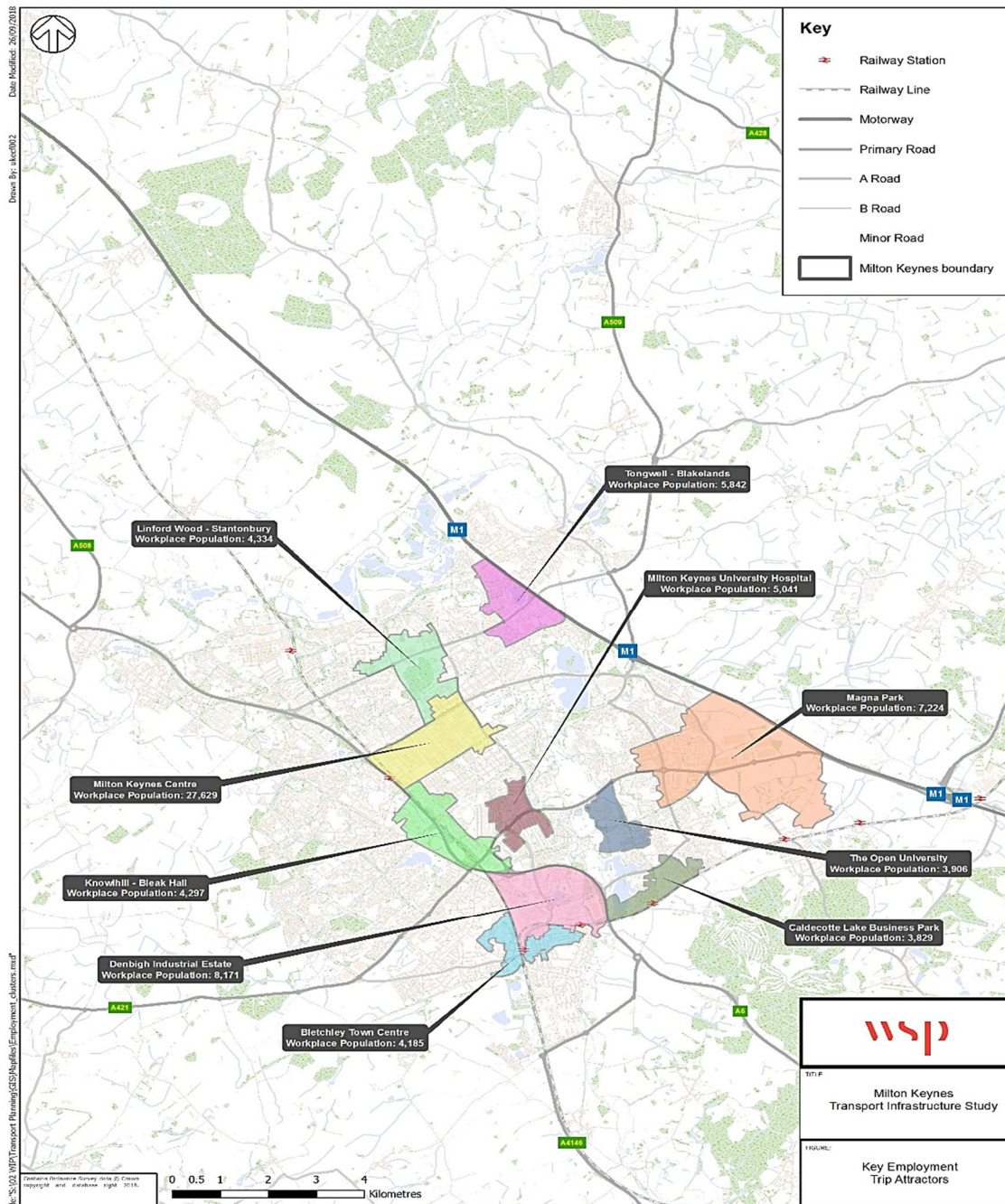
**Infrastructure Opportunities**

**Headline:** The borough of Milton Keynes is dominated by the urban area of Milton Keynes. As described earlier, the relatively low residential density of Milton Keynes has contributed to challenges in delivering attractive public transport routes. There are spatial planning opportunities to **concentrate denser development along new public transport corridors, interchange hubs and central Milton Keynes**. Delivering non-car transport infrastructure for the rural communities in the borough is challenging due to cuts to bus subsidies. However, there are growing opportunities for rural transport schemes to be delivered by **Community Interest Companies** including rural car clubs, rural electric vehicle charging points, car-sharing, and cycle/electric bike share schemes.

## Employment Distribution

3.3.6. Figure 14 shows the top 10 employment destinations in Milton Keynes based on the 2011 Census workplace population.

**Figure 14 – Workplace Population – Top 10 Locations**



Source: 2011 Census Workplace Population

3.3.7. Figure 14 shows that the main employment area is located within central Milton Keynes with a workplace population of 27,600. The other main employment areas arrange in size from 4,000 to 8,000 people and are located along the M1 corridor, Milton Keynes Hospital, Bletchley, Linford Wood and Knowhill. There is limited employment outside of the Milton Keynes urban area.



**Employment Infrastructure opportunities**

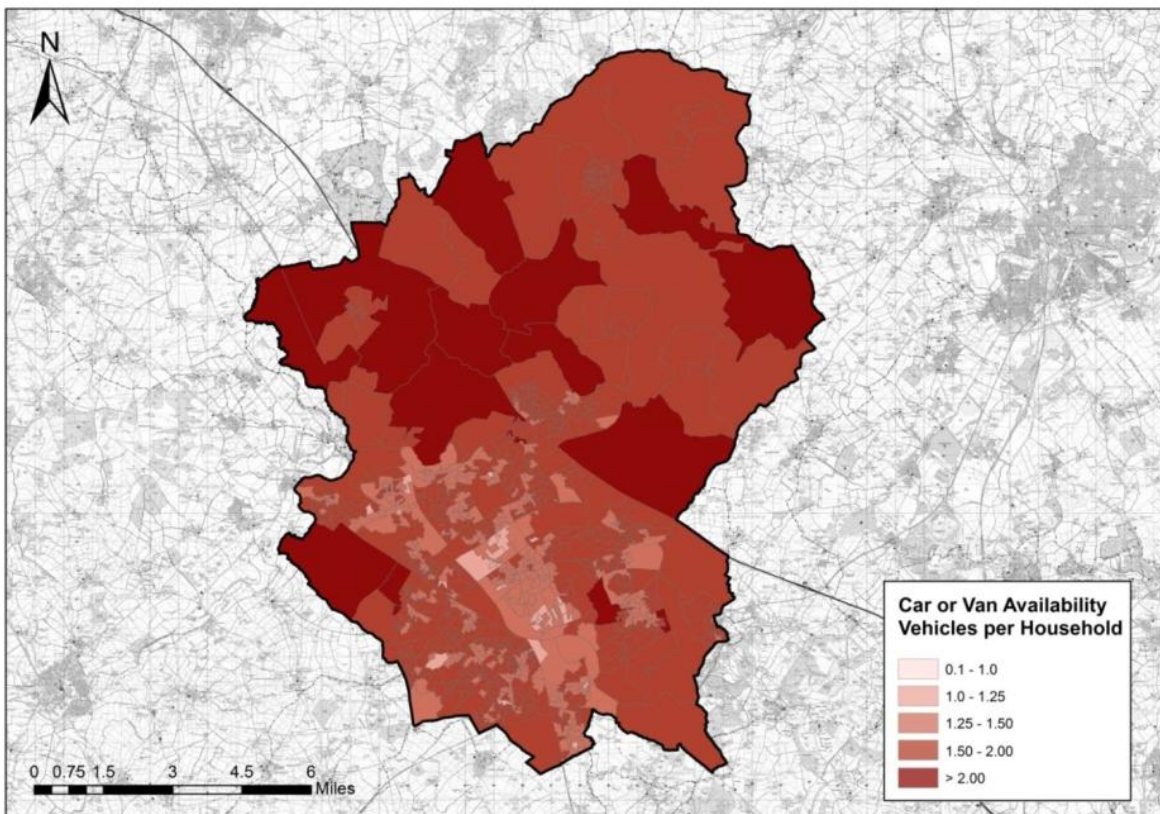
**Headline:** Employment in the borough of Milton Keynes is concentrated in central Milton Keynes which is supported by a high availability of surface car parking. Central Milton Keynes is accessible by rail, bus, walking and cycling and has substantial opportunities to encourage non-car access.

In addition, there are large industrial and logistics developments to the east (M1 corridor) and south (Bletchley). These developments generate large volumes of HGV movements requiring good highway access. **The high proportion of industrial and logistics employment can result in a large number of shift working, resulting in difficulties in accessing work by traditional rail and bus services.** Demand responsive public transport, Travel Planning, car sharing all provide opportunities to improve non-car access to the strategic employment sites.

**Car Ownership**

3.3.8. Figure 15 shows the car ownership level per household within the Milton Keynes district. As would be envisaged, where amenities (retail, educational, social, leisure and employment opportunities) are within an acceptable walking or cycling distance and where public transport opportunities are more abundant, within Central Milton Keynes (CMK), car ownership levels are lower. However, it is noted that many of these areas have key retail or employment zones and their resident populations are lower.

**Figure 15 – Car Ownership Levels**



Source: Mobility Strategy 2018-2036 Evidence Base

3.3.9. Figure 15 shows that where travel options are reduced, such as in the rural areas to the east and west of the Olney corridor, car ownership is at its greatest.

3.3.10. It is worth noting that although car ownership in CMK compared to the district is relatively lower, it could still be considered high, an average of 1.0-1.5 cars per household despite the extents of the available amenities and sustainable travel opportunities. Furthermore, when compared to the average within the rest of England car ownership within the district is 7% higher (81% as oppose to 74%).

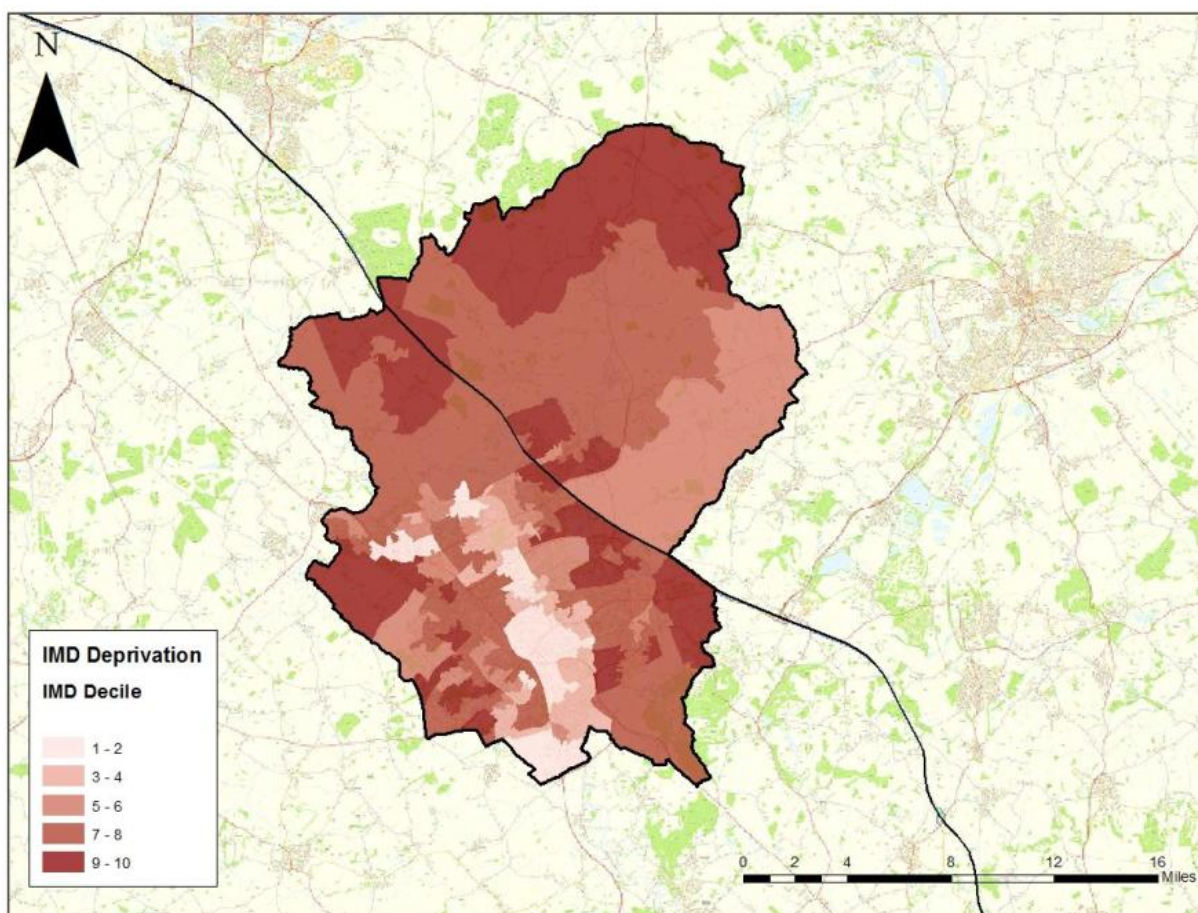
**Infrastructure Opportunities**

**Headline:** Car ownership levels within the district are relatively high due in part to the low density suburban residential developments, high capacity grid road network and low cost and plentiful car parking provision. A high proportion of residents and workers in Milton Keynes have engrained car-based travel behaviours that will be difficult to challenge. However, **there are substantial opportunities to drive modal shift due to the high levels of self-containment and through the delivery of high quality cycling and public transport infrastructure supported by a comprehensive review of parking charges and provision.**

**Deprivation**

3.3.11. Figure 16 shows the extent of deprivation within the Milton Keynes district: where an Index of 1 represents an area which is deprived and an index of 10 represents an area which is not. It is noted however that many of the areas which are the more deprived end of the scale are areas which have large leisure, retail or other employment zones.

**Figure 16 – Indices of Multiple Deprivation**



Source: Mobility Strategy 2018-2036 Evidence Base



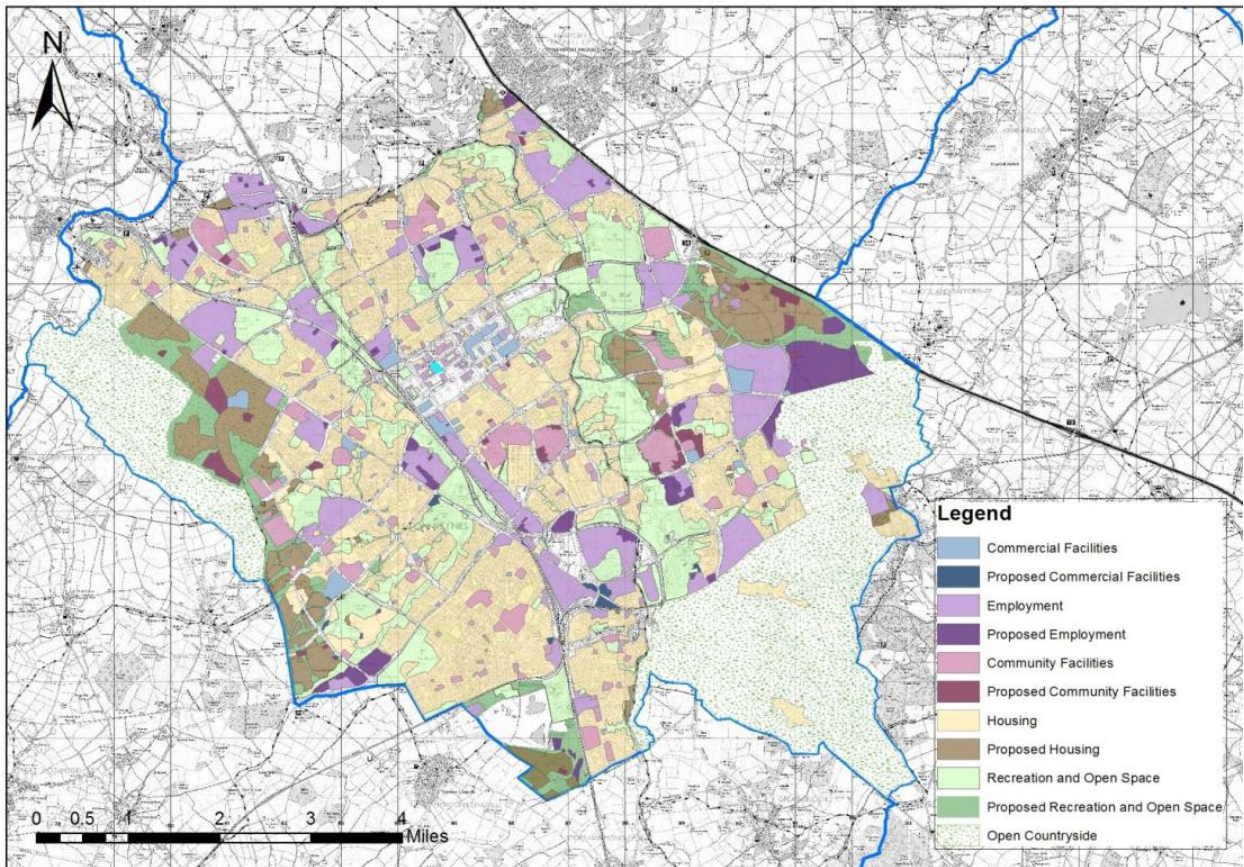
**Transport Poverty Infrastructure Opportunities**

**Headline:** Good access to employment, health and education opportunities help address social deprivation. There are a range of transport infrastructure opportunities to address deprivation including offering reduced public transport fares, personalised travel planning, community bike hire/loan schemes and moped/scooter loan schemes.

**Land Use**

3.3.12. Figure 17 Indicates the extents of the existing and proposed land uses within the Milton Keynes district. As suggested by the residential and employment densities (Figures 13 and 14) employment is generally well integrated with residential areas within the town. Employment is concentrated in central Milton Keynes, alongside the West Coast Main Line and the M1 corridors. Figure 17 also shows that community and recreational open spaces are also well integrated. Committed housing developments are focused in strategic extensions of the existing urban area to the east, south and west of Milton Keynes, building on the existing spatial and infrastructure strategies.

**Figure 17 – Land Uses Within Milton Keynes**



Source: Mobility Strategy 2018-2036 Evidence Base

**Infrastructure Challenges**

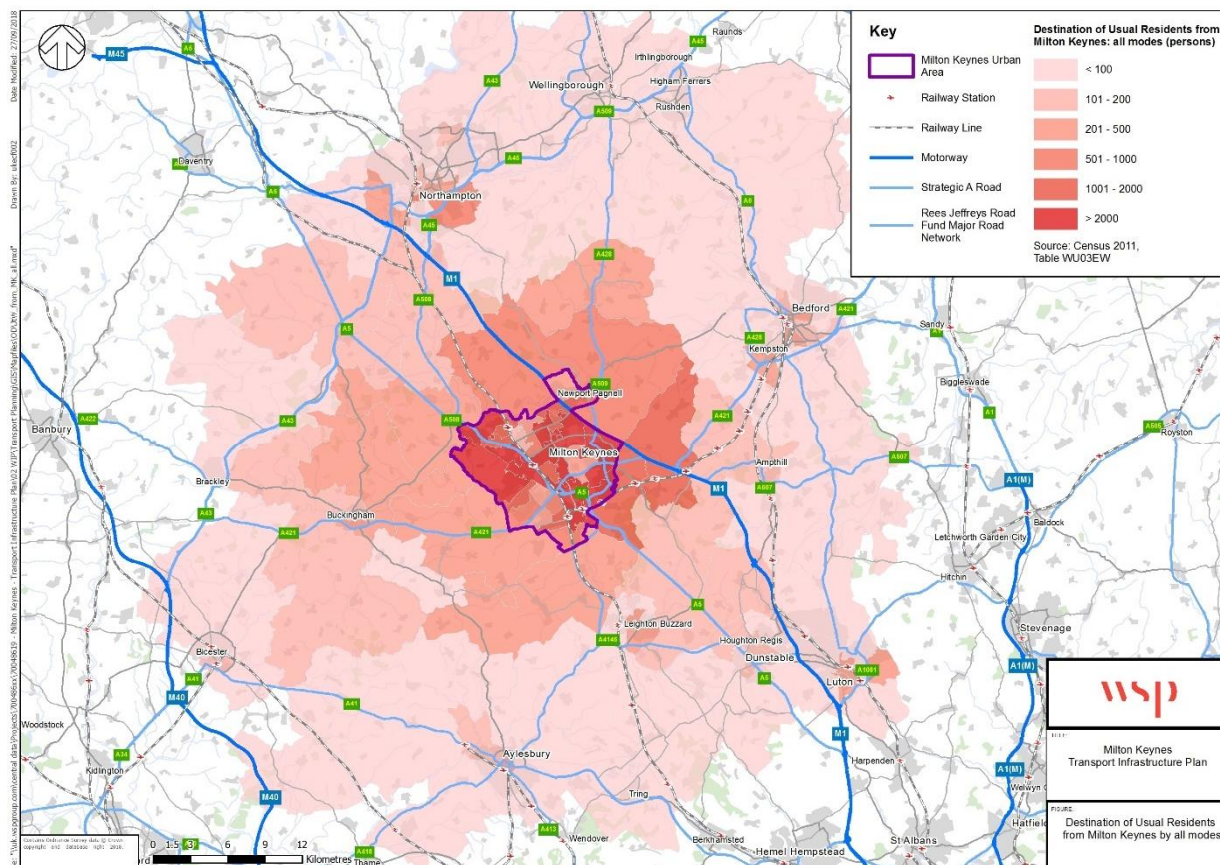
**Headline:** Employment is focused in central Milton Keynes and a series of large parks around Bletchley, the M1 Corridor and Wolverton and new residential developments are focused on strategic expansion sites. The public transport network is radial in nature (focused on central Milton Keynes) resulting in infrastructure challenges for undertaking orbital movements to the peripheral employment sites by sustainable modes of travel.

## TRAVEL PATTERNS

### Usual Residents

- 3.3.13. Figure 18 shows the regional travel catchment of residents living in Milton Keynes. It highlights that a substantial proportion of commuting by residents is self-contained within Milton Keynes with the main destinations in central, eastern and western Milton Keynes. Outside of Milton Keynes the main employment destinations are Northampton, Marston Vale, Bedford, Leighton Buzzard and Luton.

**Figure 18 – Destination of Commuters living in Milton Keynes (All Modes)**

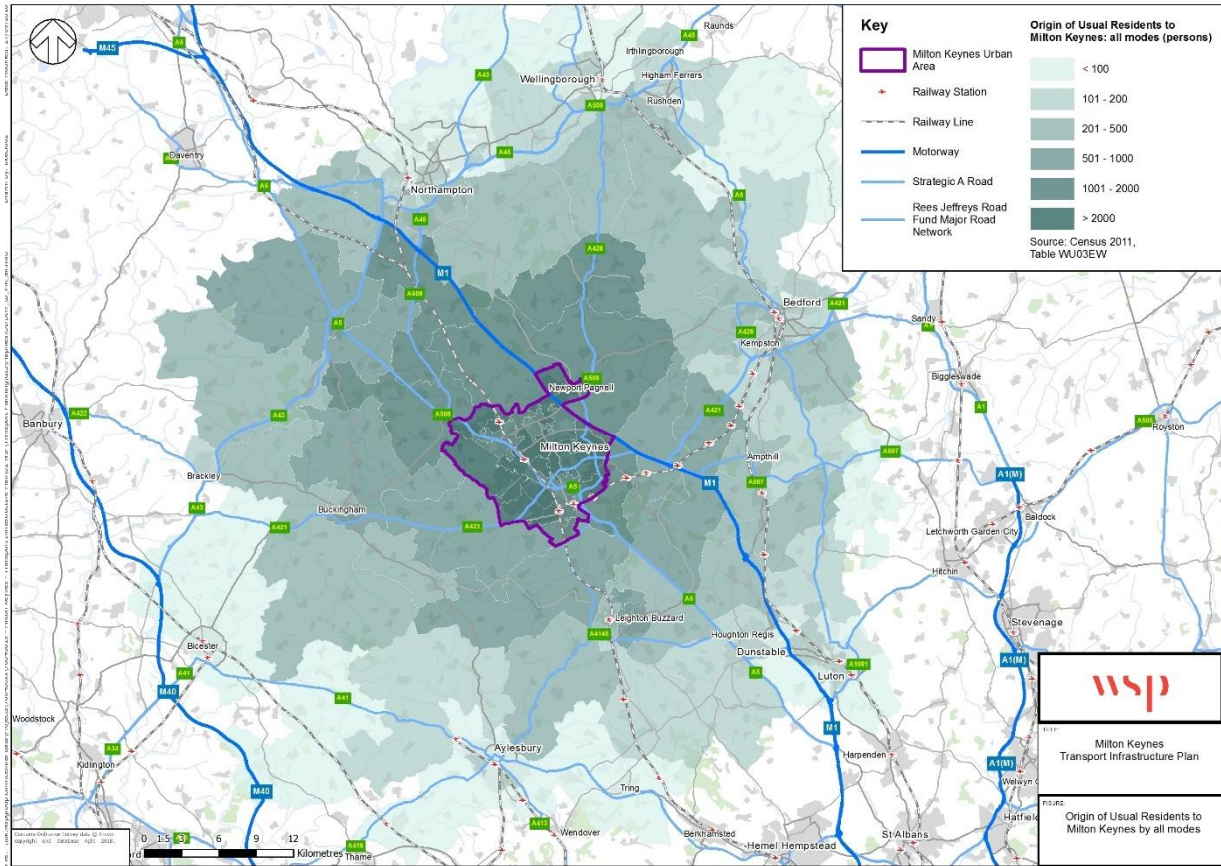


### Workplace Population

- 3.3.14. Figure 19 shows the regional travel catchment of workers in Milton Keynes. It highlights that a substantial proportion of workers also live within Milton Keynes. The main in-commuting flows are from the predominately rural areas surrounding Milton Keynes along the A428, M1, A508 and A5 corridors.



**Figure 19 – Origin of Commuters working in Milton Keynes (All Modes)**



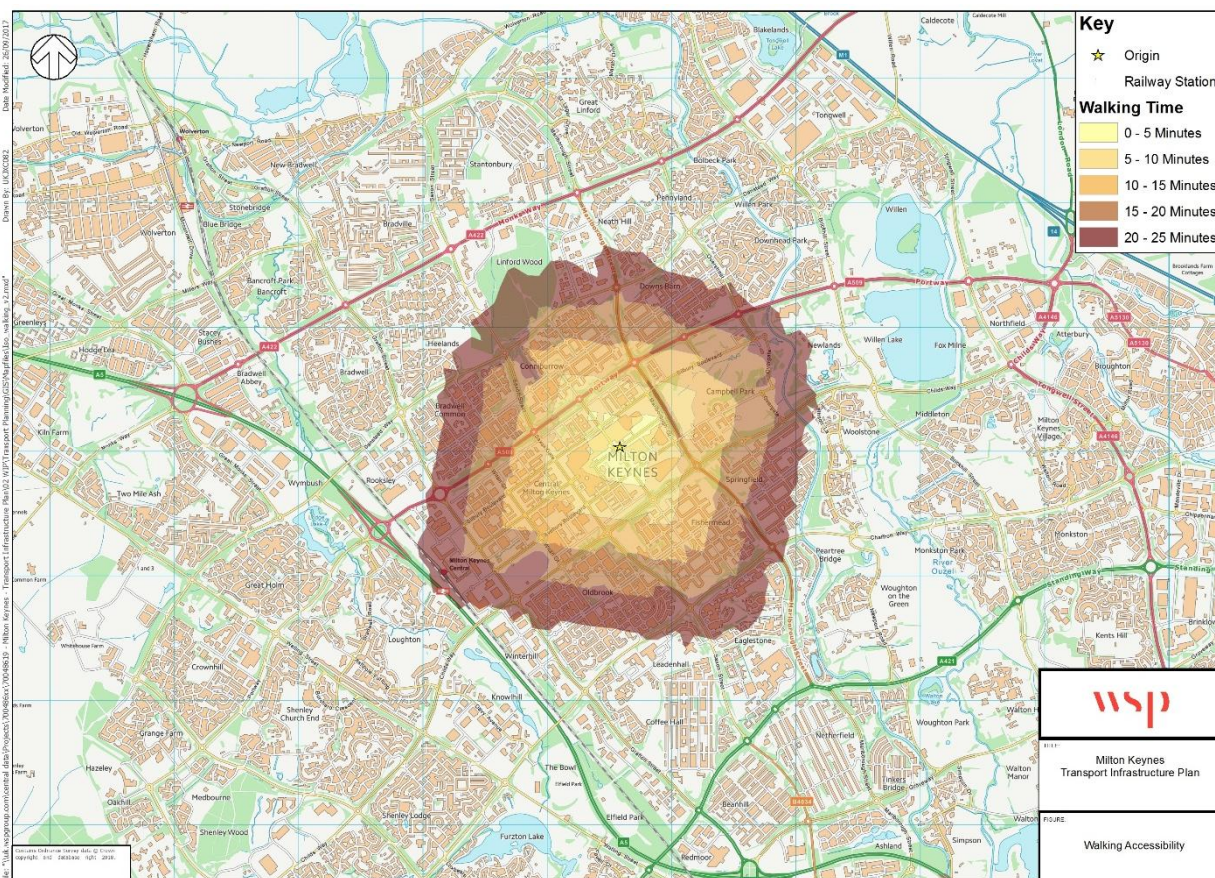
## ACTIVE TRAVEL

### Walking

- 3.3.15. The low-density typology of Milton Keynes means that walking only offers a realistic travel mode to local community facilities, schools, local shops, residents living in close proximity to employment centres (Figure 20) and as part of longer distance public transport trips from bus stops and the rail stations.



**Figure 20 – Central Milton Keynes Walking Catchment**



3.3.16. The Redways provided segregated walking routes but concerns have been raised with personal safety. The central Milton Keynes district pedestrian environment is dominated by surface car parking and the grid road system which is difficult to navigate on foot (Figure 21). There are substantial opportunities to improve the pedestrian environment, wayfinding, at-grade crossing provision across the urban area (Figure 21).

**Figure 21 – Central Milton Keynes Public Realm Opportunities**



Source: Google Earth and National Association of City Transportation Officials



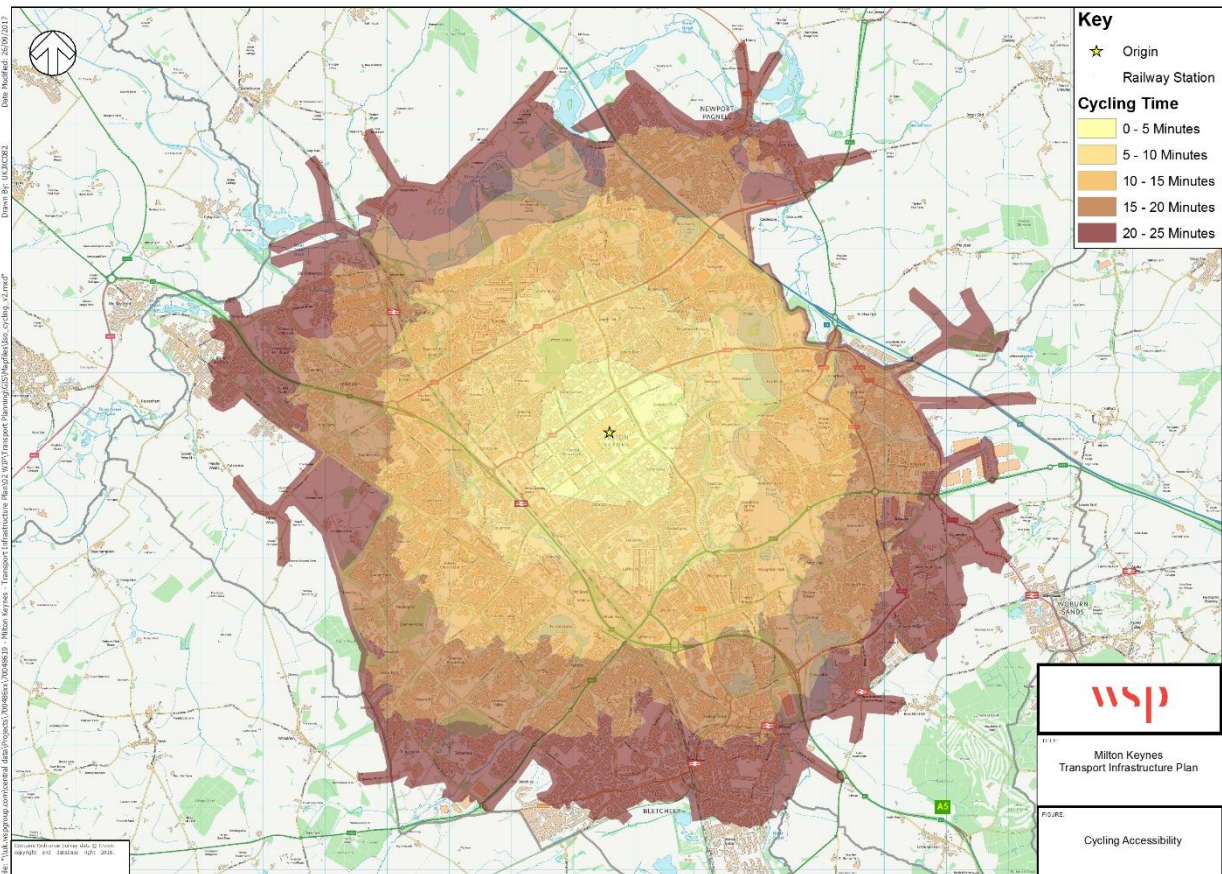
**Pedestrian Infrastructure Challenges**

**Headline:** The low density spatial typology of Milton Keynes means walking is typically only a viable option for trips to local community facilities, bus stops and employment centres (generally within 2 km). Sections of the Redway segregated network does not conform to the current design recommendations provided by the Manual for Streets, often being poorly overlooked, indirect and confined. The public realm in central Milton Keynes is car dominated with opportunities to provide enhanced place and people friendly infrastructure.

**Cycling**

3.3.17. Milton Keynes benefits from a segregated network of walking and cycling paths called the Redway network. Despite the provision of the segregated network, cycle commuting levels by residents are relatively low and no better than the national average. Figure 22 shows a 25 minute cycling catchment for central Milton Keynes. It shows that the whole of the urban area is within 25 minutes cycle, yet only 3% of the resident's cycle to work.

**Figure 22 – Central Milton Keynes Cycling Catchment**



- 3.3.18. There are a number of reasons why the existing Redways network is under-utilised including:
- § The ease at which short commuting trips can be undertaken by private car;
  - § Existing Redways are indirect and therefore unattractive to commuters who want direct high-quality routes;
  - § Safety concerns, large sections of the Redways route through areas of dense vegetation and are not well overlooked or well lit;
  - § Way finding signage is poor; and

- § Poor penetration into central Milton Keynes;
- § Alternative on-street cycling is unattractive to the vehicle and high speed dominated street network.

3.3.19. Work is being undertaken to improve and extend the existing Redway network to provide more direct Super Route Network. However, to be attractive to cyclists the routes need to be direct, lit, high quality and priority provided over side roads and across busy junctions. The cycle superhighway infrastructure delivered in London and being developed in Manchester and Birmingham demonstrates what can be achieved when high quality segregated on-street infrastructure is provided (Figure 23).

**Figure 23 – Examples of Segregated On-Street Cycling Infrastructure**



Images: Left Embankment London. Right: A38 Cycle Super Highway, Birmingham (currently under construction)

3.3.20. In June 2016 Santander Cycle Hire scheme was launched in Milton Keynes. The scheme is run by Nextbike and initially deployed 300 bikes at 40 docking stations. However, recent articles in press (August 2017) have highlighted heavy vandalism as a key threat to the viability of the scheme. Extensive vandalism has occurred to over half the bikes leading to reviews of the locations of the docking stations and the need to close docking stations in locations of high vandalism. With the recent example of MoBike dockless bikes pulling out of Manchester due the vandalism and theft, bike sharing in Milton Keynes could be under threat.

**Cycling Infrastructure Challenges**

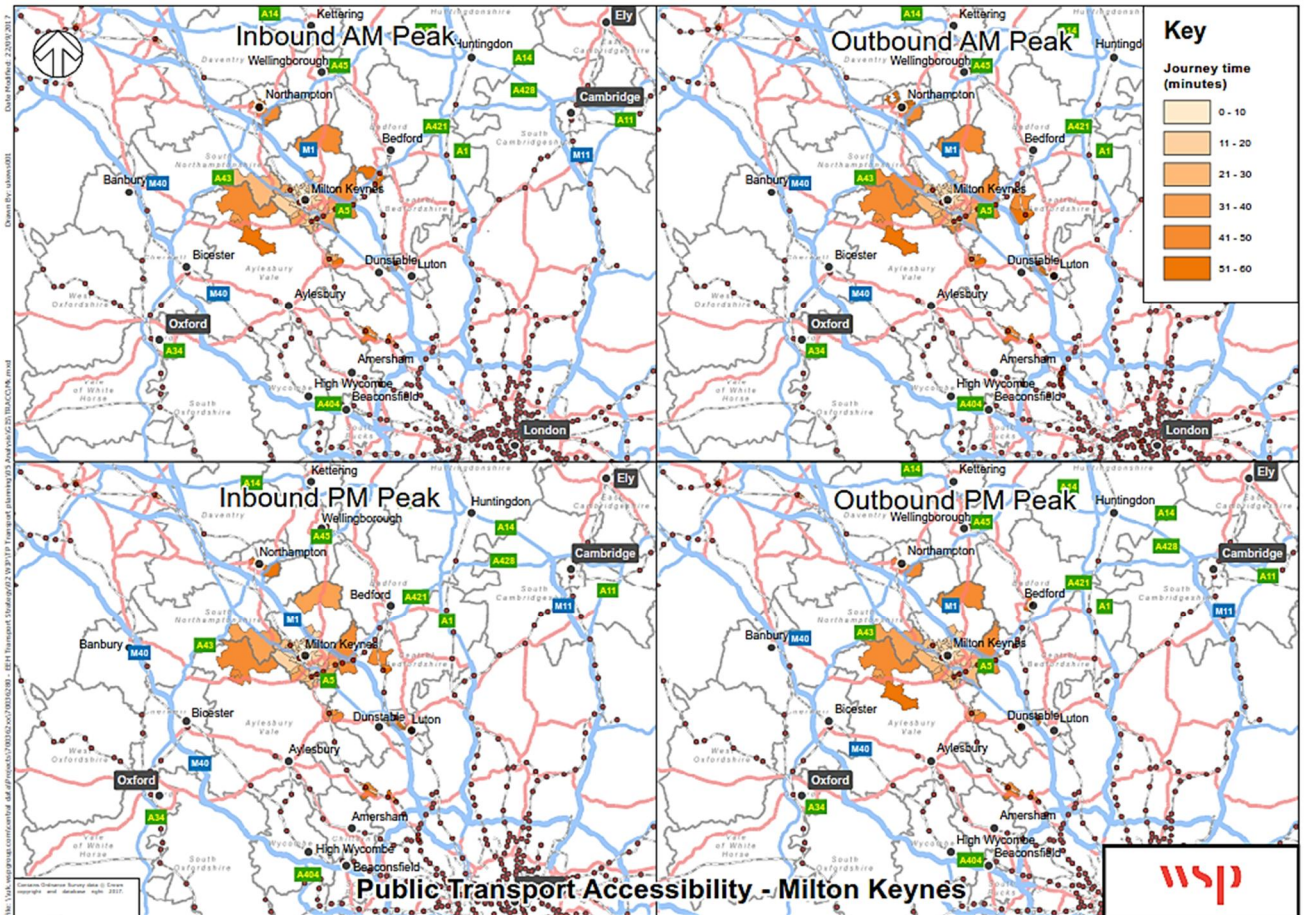
**Headline:** The ease of car travel and concerns with personal security and directness of the Redways has meant cycling have not become a popular mode of travel within Milton Keynes. Given the wide road infrastructure **there are significant opportunities to provide direct high quality segregated on-road cycle routes to key destinations including through central Milton Keynes.**

**PUBLIC TRANSPORT ACCESSIBILITY**

3.3.21. Figure 24 shows the public transport accessibility of Milton Keynes. TRACC has been used to demonstrate the locations within 60 minutes travel time by public transport.



**Figure 24 – Sixty Minute Public Transport Catchment of Central Milton Keynes**



3.3.22. Figure 24 shows that in the AM and PM peak hour, central Milton Keynes can be accessed from the wider Milton Keynes urban area, Northampton, Leighton Buzzard, Marston Vale rail corridor and areas in south Northamptonshire within 60 minutes. Figure 24 highlights the lack of high quality public transport connectivity east beyond Bedford, south towards Luton and west towards Oxford.

### Rail Infrastructure

3.3.23. The district of Milton Keynes is served by the West Coast Main Line (Virgin Trains, London Midland and Southern services) and the Marston Vale Railway Bedford to Bletchley line (West Midlands Trains). Table 3 summarises the annual usage of the 6 stations in Milton Keynes.

**Table 3 - Annual Station Usage 2015/16**

Station	Passengers	% Growth 2011/12-2015-16
Milton Keynes Central	6,835,570	23%
Bletchley	1,062,872	25%
Bow Brickhill	43,016	28%
Fenny Stratford	27,416	29%
Woburn Sands	44,674	-6%
Wolverton	426,314	18%

Source: Office for Rail Regulation

- 3.3.24. Milton Keynes Central is the fourth busiest rail station in the CaMkOx arc and along with Bletchley, Bow Brickhill, Fenny Stratford and Woburn Sands has experienced relatively high levels of passenger growth compared to Woburn Sands and Wolverton.
- 3.3.25. At Milton Keynes Central there is a large bus interchange, taxi rank, drop-off and extensive private vehicle parking that creates a very vehicle dominated public realm. The car park currently provides over 900 parking spaces, with an additional 700 spaces to be added, resulting in increased car travel to the station.
- 3.3.26. The Bletchley Station is located to the west of the mainline and has relatively poor sustainable transport connectivity to the surrounding local area. The stations on the Marston Line are relatively small with limited car and cycle parking provision and limited sustainable transport connections from the surrounding areas.
- 3.3.27. The Marston Vale Line connects Bedford with Bletchley. There is no direct rail connection that permits trains to route from the Marston Vale line, north towards Milton Keynes Central and Wolverton.

**Rail Infrastructure Opportunities**

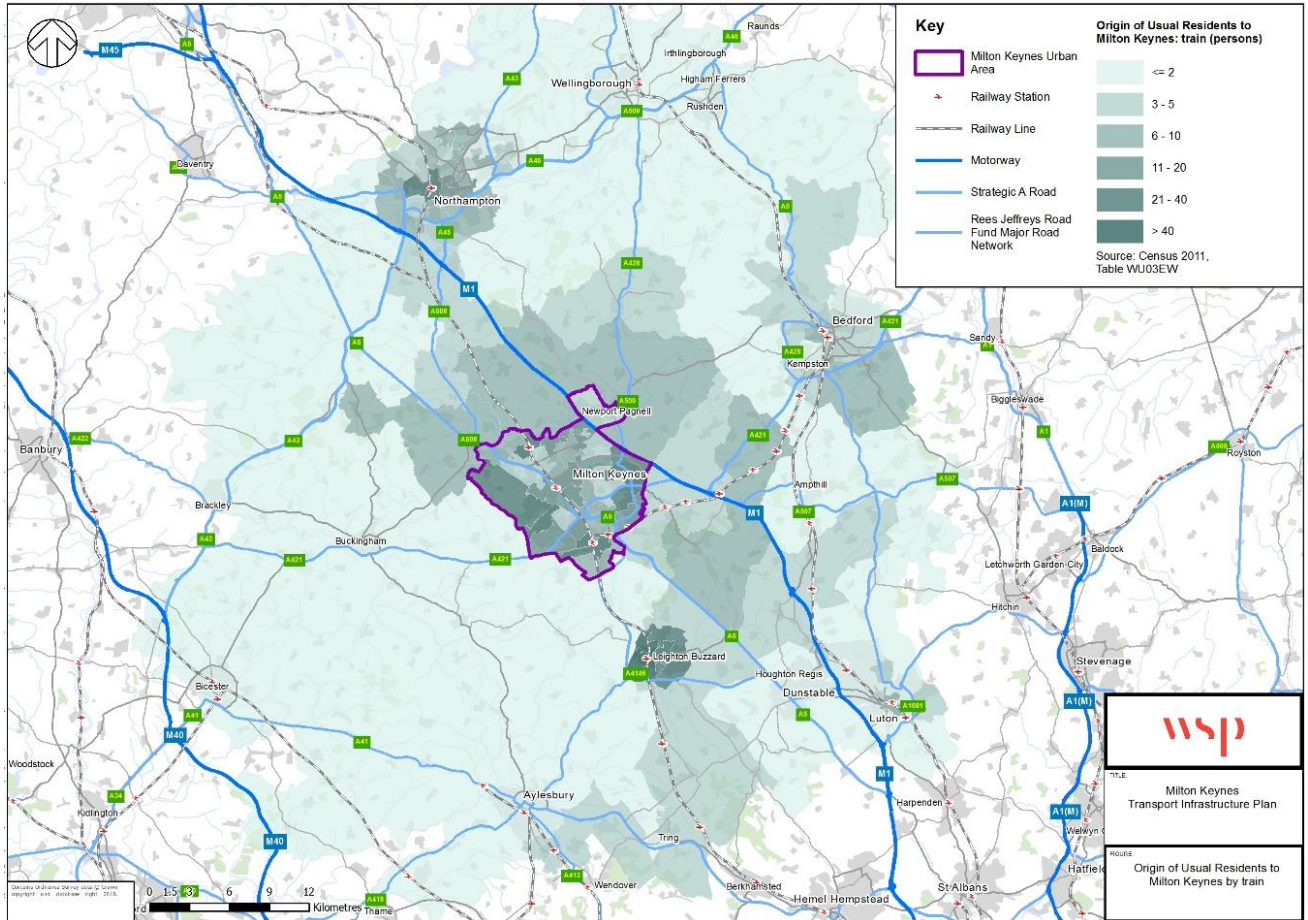
**Headline:** All of the existing stations in Milton Keynes have opportunities to improve accessibility through the provision of enhanced cycle parking, walk and cycle routes, bus connectivity and wayfinding information. Connecting the Marston Vale line to Milton Keynes Central would open up new local commuting opportunities by rail. East West Rail provides opportunities for new stations and sustainable travel options into Milton Keynes.

**Rail Services**

- 3.3.28. Milton Keynes Central provides high frequency and fast services into London Euston, popular with London commuters. For local trips the existing rail services appears to be less attractive. Figure 25 shows the origins of rail commuters into Milton Keynes. Figure 25 shows the main rail commuter flows are from Northampton and Leighton Buzzard, but are relatively small in scale. There is also limited rail commuting from Bedford. Figure 25 clearly shows the lack of east-west rail connectivity towards Buckingham and Bicester and east of Bedford which will be addressed by East West Rail.



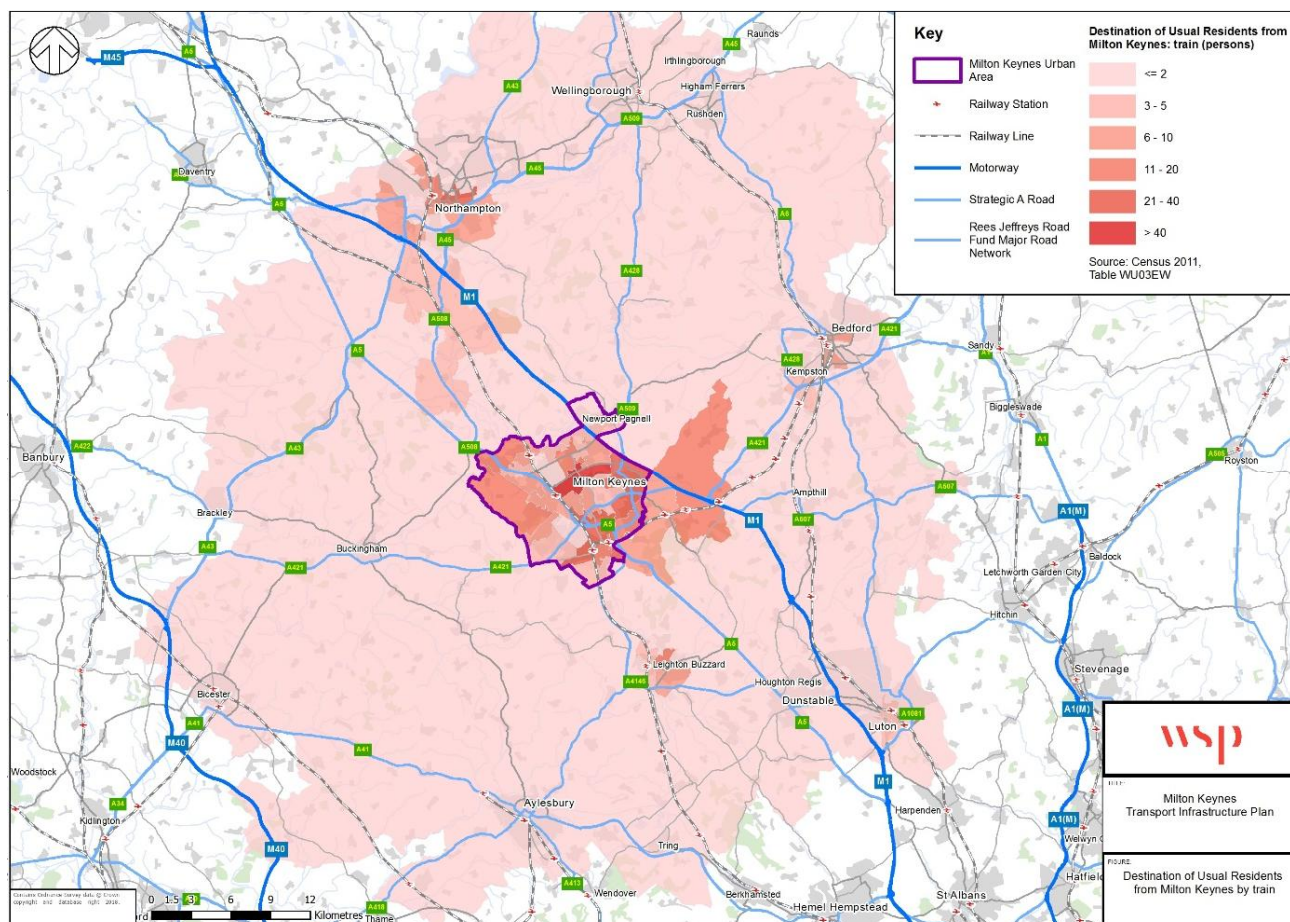
**Figure 25 – Origin of Rail Commuters into Milton Keynes**



3.3.29. Although Figure 25 shows there are opportunities for local commuting by rail, the number of journeys are typically low. For example, the 2011 Census shows that:

- § From Northampton, 208 people commute by rail to Milton Keynes compared to 3,600 people by car/van.
- § From Bedford and Central Bedfordshire 64 and 228 people commute by rail to Milton Keynes respectively compared to 3,300 and 7,100 people by car; and
- § Within Milton Keynes itself 384 residents commute to work by rail compared to 52,200 by car.

**Figure 26 – Destination of Milton Keynes Residents Commuting by Rail**



3.3.30. Figure 26 shows there is some existing local out-commuting by rail from Milton Keynes to surrounding towns, but again this is relatively small in scale. For example, the 2011 Census suggests that:

- § From Milton Keynes 76 people commute to Northampton by rail compared to 1,800 people by car;
- § From Milton Keynes 34 and 53 people commute by rail to Bedford and Central Bedfordshire respectively compared to 1,800 and 3,500 people by car.

3.3.31. A review of the existing train timetables shows that:

- § Trains on the Marston Vale line operate at an hourly frequency;
- § There are 2-3 trains per hour at the peak times between Northampton and Leighton Buzzard and Milton Keynes Central.

**Rail Infrastructure Opportunities**

**Headline:** The 2011 Census suggests there are relatively high levels of rail commuting from Milton Keynes to London, but low levels of local commuting when compared to car travel. **There are substantial opportunities to encourage local rail travel through improved station access and maximising the benefit of East West rail for residents and workers.**



### Bus Infrastructure

- 3.3.32. In Central Milton Keynes there is a bus interchange located outside the station with additional bus stops on Midsummer Boulevard. There are also bus stations in Bletchley and Coachway Park and Ride located at Junction 14 of the M1. The Coachway is served by long distance coaches and the Park and Ride has a 350 space car parking capacity served by bus routes 300, 25 and C1.
- 3.3.33. The main hub for buses is therefore central Milton Keynes, including the bus facility at the Central rail station and along Midsummer Boulevard. Midsummer Boulevard benefits from bus lanes in each direction, with access restricted to buses, bicycles and taxis only from 0730-0930 hours and 1630-1830 hours Monday to Sunday. Access to the bus stops along Midsummer Boulevard and the surrounding public realm is generally poor and unattractive. Bus services also have to ‘dog leg’ around centre MK via Saxon Gate and Lower Ninth Street.
- 3.3.34. Apart from the bus lanes in central Milton Keynes there are limited bus priority measures in Milton Keynes. The high capacity urban dual carriageways mean that congestion is not a significant issue on most routes resulting in limited delays to bus movements. Peak congestion does occur at a number of junctions in central and wider Milton Keynes so there are opportunities to introduce bus priority measures and sections of bus lane/high occupancy vehicle lanes in the future.
- 3.3.35. The close proximity of the central rail station, shopping centre interchange with the main employment and leisure hub combined with the five wide dual carriageway roads servicing central Milton Keynes means there are substantial opportunities to improve public transport priority in this area through the provision of bus only links pedestrianisation and technology options such as people movers (Figure 27). The wide grid road network provides the opportunity to introduce a comprehensive mass public transport scheme, for example Bus Rapid Transit (BRT).

**Figure 27 – Potential BRT and Bus Technology Opportunities**



Source: Miovision and ZF

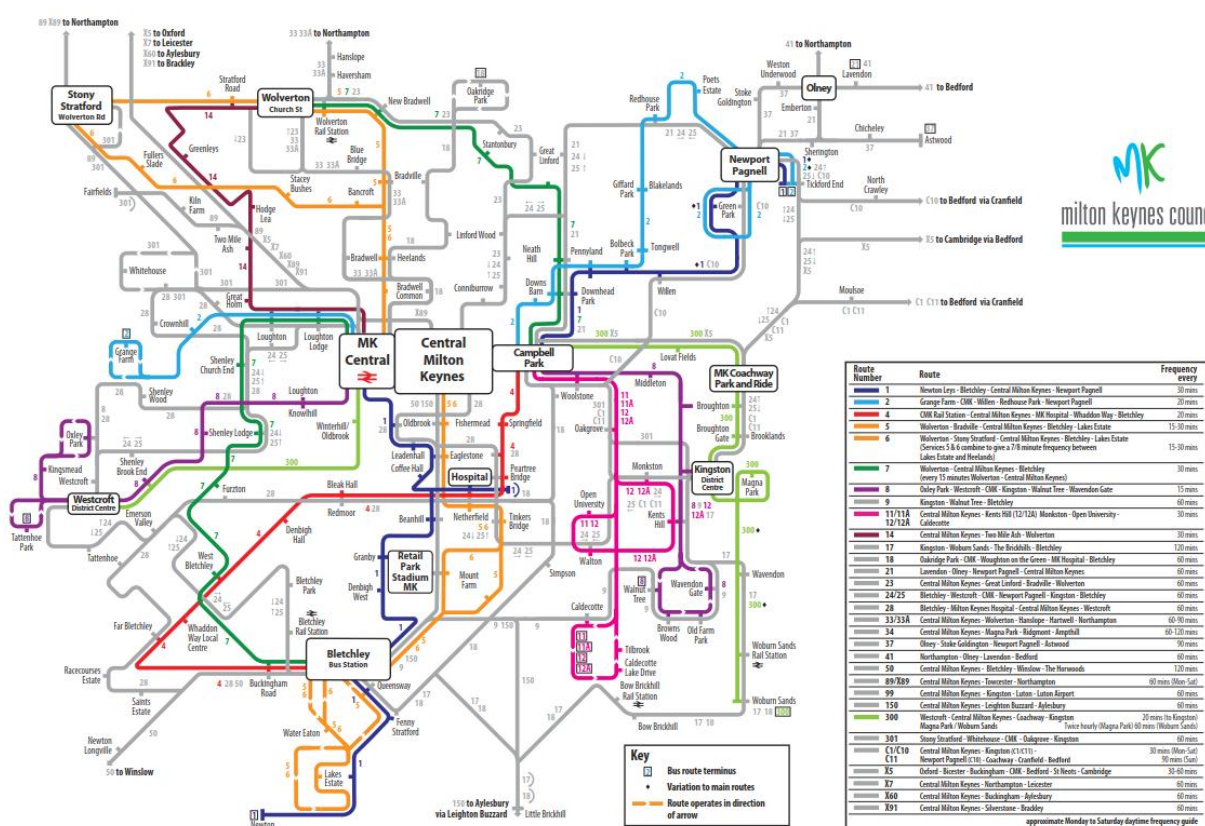
**Bus Infrastructure Opportunities**

**Headline:** Central Milton Keynes is the main bus hub, accommodating radial routes from the city. The spacious dual carriageway central grid road network provides **substantial opportunities to provide improved public transport access including bus only links, people movers, enhanced public realm and bus priority infrastructure and measures.** The wide grid road network also provides the opportunity to introduce BRT schemes along key corridors.

## Bus Services

3.3.36. The Milton Keynes bus network comprises mostly radial routes (Figure 28), connecting the residential estates through central Milton Keynes to estates on the opposite side. The bright coloured urban bus services typically operate at a frequency of 15-30 minutes, whereas the grey routes operate at an hourly frequency. The existing bus offer does provide good connectivity into central Milton Keynes, however, it does not offer an attractive option for orbital routes. For example, to travel from Bletchley to Magna Park (a distance of approximately 5 miles) by car takes approximately 15 minutes by car but 45 minutes to an hour by bus due to the need to interchange in central Milton Keynes.

Figure 28 – Milton Keynes Bus Map

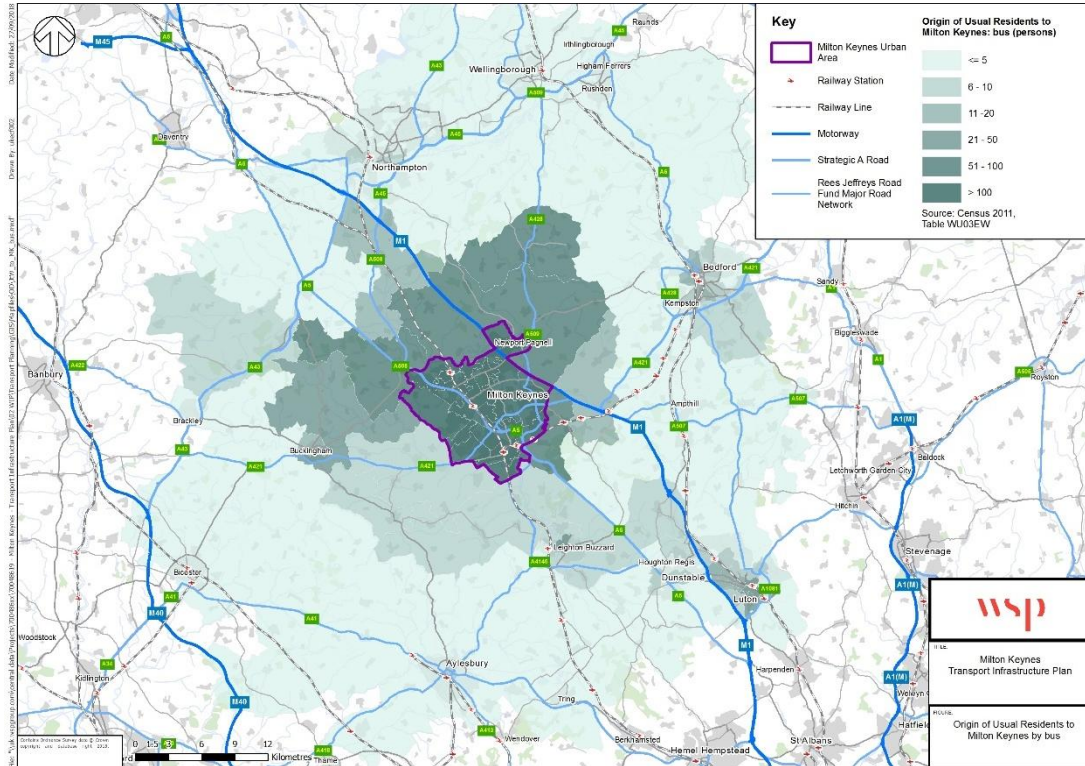


Source: Milton Keynes Council 2018

3.3.37. Figure 29 shows the origins of bus commuters into Milton Keynes. Figure 29 shows the majority of bus commuting occurs within Milton Keynes. The main in commuting from outside of Milton Keynes is from locations along the A509 corridor towards Olney, the A508 towards Stoke Bruerne and the A5 corridor towards Potterspury.

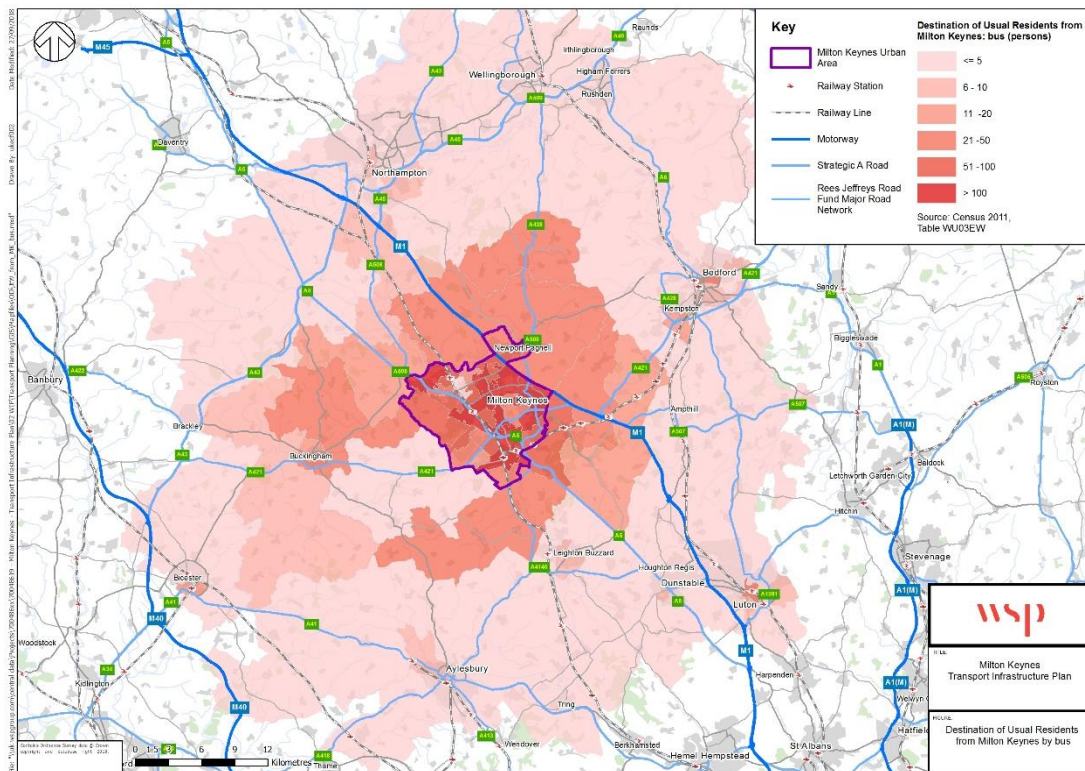


**Figure 29 – Origin of Bus Commuters into Milton Keynes**



3.3.38. Reviewing the 2011 Census data shows that 5,700 internal trips to work were undertaken by bus, compared to 52,200 by car. This demonstrates that there are substantial opportunities to improve the bus service offer to encourage modal shift.

**Figure 30 – Destination of Milton Keynes Residents Commuting by Bus**



3.3.39. Figure 30 shows that the main destination of Milton Keynes residents by bus include:

- § Central Milton Keynes;
- § Wolverton;
- § Eaglestone West (Milton Keynes Hospital);
- § Bletchley; and
- § Eastern Milton Keynes.

<p><b>Bus Infrastructure Opportunities</b></p>	<p><b>Headline:</b> Central Milton Keynes is served by a radial bus offer running on fixed routes. This works well for people wanting to access central Milton Keynes but does not encourage bus access to the more dispersed employment sites. <b>There are opportunities to review the bus service offer taking into consideration demand responsive services (Arriva Click), minibus options (Stagecoach Little and Often) to better match the services to travel requirements supported by integrated ticketing.</b></p>
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## HIGHWAY NETWORK

3.3.40. In general, levels of congestion on the road network within Milton Keynes are not severe due to the high capacity, high speed grid road network of urban dual carriageways. The main points of congestion are predominately due to junction capacity in the peak travel periods. Figures 31 and 32 show the junctions operating with over 85% ratio of traffic volumes to capacity in the 2016 Milton Keynes SATURN Highway Model (MKMM).

**Figure 31 – MKMM AM 2016 – Junctions over 85% Ratio of Volume to Capacity**



3.3.41. Figure 31 shows that the most congested junctions are Junction 14 of the M1 and the V6 Grafton Street/Standing Way roundabout. Other corridors with congested junctions include the A509, B4034 V8 Marlborough Street, Standing Way and V6 Grafton Street.



**Figure 32 – MKMM PM 2016 – Junctions over 85% Ratio of Volume to Capacity**



- 3.3.42. Figure 32 shows that in the PM peak hour there are fewer congested junctions compared to the AM peak hour. The main locations for congestion are shown along the B4034 V8 Marlborough Street, A4146 Tongwell Street, Standing Way and V6 Grafton Street.
- 3.3.43. The evidence suggests that currently there are pinch points on the current network at key junctions on the grid network and M1 SRN. However, prolonged and severe congestion is not prevalent across the network when compared to many similar sized cities across the CaMkOx arc.
- 3.3.44. The unique high capacity grid road network within Milton Keynes, including wide urban dual carriageways with 60mph and 70mph speed limits segregated from the residential suburbs, results in a vehicle dominated street environment with limited frontage development activation. This has resulted in a road network that actively encourages local car travel with limited ‘sticks’ such as severe congestion to push people onto sustainable modes including bus, rail and active modes.
- 3.3.45. The main grid network of dual carriageways provides a purely vehicle movement function. They contribute little to non-car movement and place functions as recommended by the Manual for Streets guidance. However, there are good examples around the UK of where urban dual carriageways have been improved to provide improved movement and place functions (A15 Bourges Boulevard, Peterborough). In addition, the unique and wide dual carriageway boulevards provide substantial cross-sections, providing opportunities to introduce segregated public transport corridors, bus lanes, and segregated cycle routes (A38 Birmingham).

**Figure 33 – Urban Dual Carriageway Opportunities**



Source: Atkins and National Association of City Transportation Officials

**Highway Infrastructure Opportunities**

**Headline:** The Milton Keynes grid system has served the city well, but has created a car dominated local environment. There is congestion at pinch points in the peak periods, but congestion overall is limited compared to other cities. Careful consideration needs to be given to pursuing a strategy of improving highway capacity for general traffic given the vision to encourage modal shift and low carbon travel. Pinch point improvement could focus on enhancing public transport priority. In many respects congestion is a sign of a high performing local economy and is also the 'stick' required to push people towards alternative modes of travel. There is the opportunity to reconsider the movement functions of the dual carriageway grid network with the unique ability to be able to accommodate segregated public transport routes and cycle routes.

**CAR PARKING**

This evidence review has demonstrated that car is the dominant mode for commuting into and within Milton Keynes, including central Milton Keynes. There are approximately 21,000 publicly available spaces within central Milton Keynes with an additional 4,000 private spaces belonging to businesses which are used by employees and visitors. Table 4 compares the parking capacity for central Milton Keynes with neighbouring towns; both public (in the centres only) and Park and Ride spaces. Milton Keynes has the highest parking supply per capita and per job.



**Table 4 – Parking Capacity**

Station	2015 Total Jobs	2015 Total Population	Public Car Spaces	Park and Ride	Parking Spaces per Job
Milton Keynes	166,000	261,800	21,000	350	0.13
Northampton	124,000	212,100	4,000		0.03
Oxford	120,000	159,600	2,250	5,403	0.02
Peterborough	105,000	193,700	7,000		0.07
Cambridge	100,000	130,900	3,300	5,393	0.03
Luton	87,000	214,700	4,000		0.05

Source: Mobility Strategy2018-2036 Evidence Base

- 3.3.46. Short and long-term parking charges in Milton Keynes are also substantially lower than those levied in neighbouring and comparable cities. Table 5 summaries comparative parking charge information.

**Table 5 – Parking Charges**

Station	Standard Tariff (£ per Hour)	Premium Tariff (£ per hour)	Long Stay Tariff (All Day)
Central Milton Keynes	0.50	2.00	10.00
Northampton	0.00	N/A	7.00
Oxford	3.50	4.00	25.00
Peterborough	1.00	1.50	6.00
Cambridge	2.00	2.30	24.00
Luton	0.90	2.40	N/A

Source: Mobility Strategy2018-2036 Evidence Base

- 3.3.47. The relatively high number of surface car parking spaces in central Milton Keynes available at low cost is a major contributor to the popularity of private car travel for commuting into the area. The evidence base review has also identified variations in surface parking utilisation. On weekdays the standard parking and long-stay parking is almost full, with capacity available towards Saxon Gate. At weekends the reverse occurs with high utilisation at the eastern end of central Milton Keynes close to the shopping centre and low levels of utilisations towards the station.

3.3.48. Central Milton Keynes parking also has a relatively complex parking type (short stay, long stay, public, private, premium) and a variable tariff arrangement. Combined with relatively poor signage and variable message information can lead to long search patterns for visitors and during peak periods. It should also be noted that the extensive areas of surface car parking are located in the most sustainable location in Milton Keynes and could accommodate substantial mixed-use development.

**Car Parking  
Infrastructure  
Opportunities**

**Headline:** Car parking costs and availability, particularly in central Milton Keynes will have a substantial influence on the effectiveness of the future transport strategy including the attractiveness of public transport. **The most effective way to reduce car-use is to cap or reduce car parking supply or reduce its attractiveness.** However, this will require a bold shift from the current strategy of providing plentiful surface car parking. Careful consideration needs to be given to future car park pricing, provision and the objective to encourage modal shift. The uptake of electric vehicles could be supported in the short term through the increase in electric vehicle charging at key destinations including central Milton Keynes.

## 4. FUTURE CONDITIONS

### 4.1. OVERVIEW

4.1.1. This section of the evidence report draws together evidence from a variety of sources to understand the current and planned population, housing and employment growth within Milton Keynes along with the planned and proposed transport schemes and potential future transport conditions.

### 4.2. GROWTH AND SUSTAINABLE TRAVEL AMBITIONS

4.2.1. The Mobility Strategy for Milton Keynes 2016-2036 (LTP4) Mobility for All (March 2018) sets out a series of mode shift targets. These are summarised in Table 6.

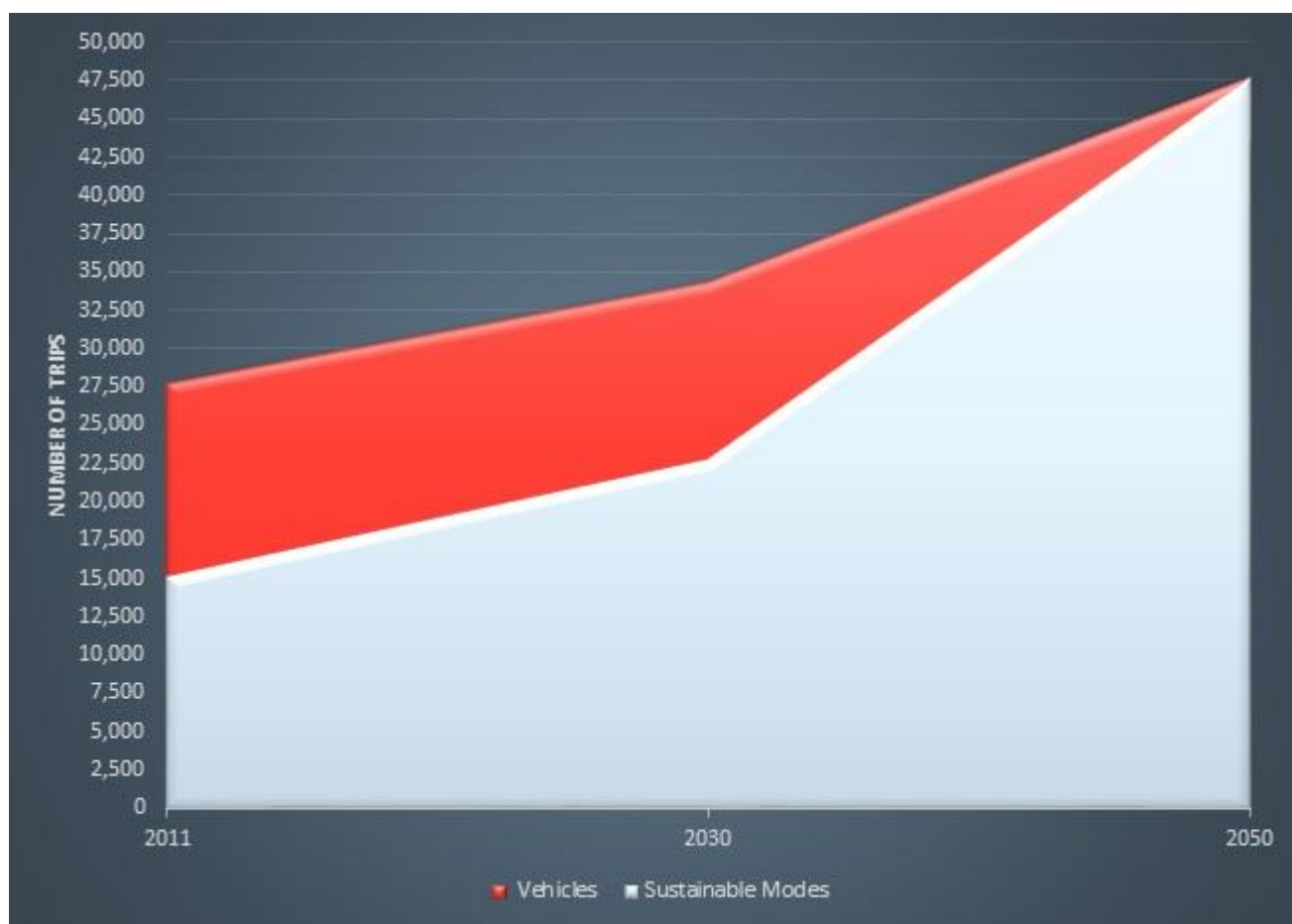
**Table 6 - Mobility Strategy Mode Shift Targets**

Journey Type	Journey to work by Car/Other Modes (%)		
	2011 (Actual)	2030 (Target)	2050 (Target)
Residents who live and work within the Milton Keynes urban area	65 / 35	60 / 40	50 / 50
Residents who live within the borough of Milton Keynes (outside the urban area) and work within the urban area	80 / 20	70 / 30	55 / 45
Residents who live within the urban area of Milton Keynes and work outside the borough	85 / 15	80 / 20	60 / 40

Source: Milton Keynes Mobility Strategy

- 4.2.2. WSP have undertaken a high-level assessment of the additional travel demand that could be generated as a result of the LTP4 mode share targets. Analysis of the 2011 Census Travel to Work data has been undertaken to produce a set of baseline mode shares for the following scenarios:
- § Urban Milton Keynes: Residents who live and work in the urban area of the borough of Milton Keynes;
  - § Intra-borough: Residents who live within the borough of Milton Keynes (outside the urban area) and work within the urban area; and
  - § Inter-borough (Excluding London): Residents who live within the urban area of Milton Keynes and work outside the borough.
- 4.2.3. For the purposes of this assessment it is assumed that the population of Milton Keynes is 300,000 in 2030 and 500,000 in 2050. The number of residents undertaking each of these journey types in 2030 and 2050 have been estimated by factoring the 2011 Census data. The mode split targets have then been applied to the predicted number of residents undertaking each movement type in 2030 and 2050. A summary of this high-level assessment is provided in Figures 34 to 36 below.

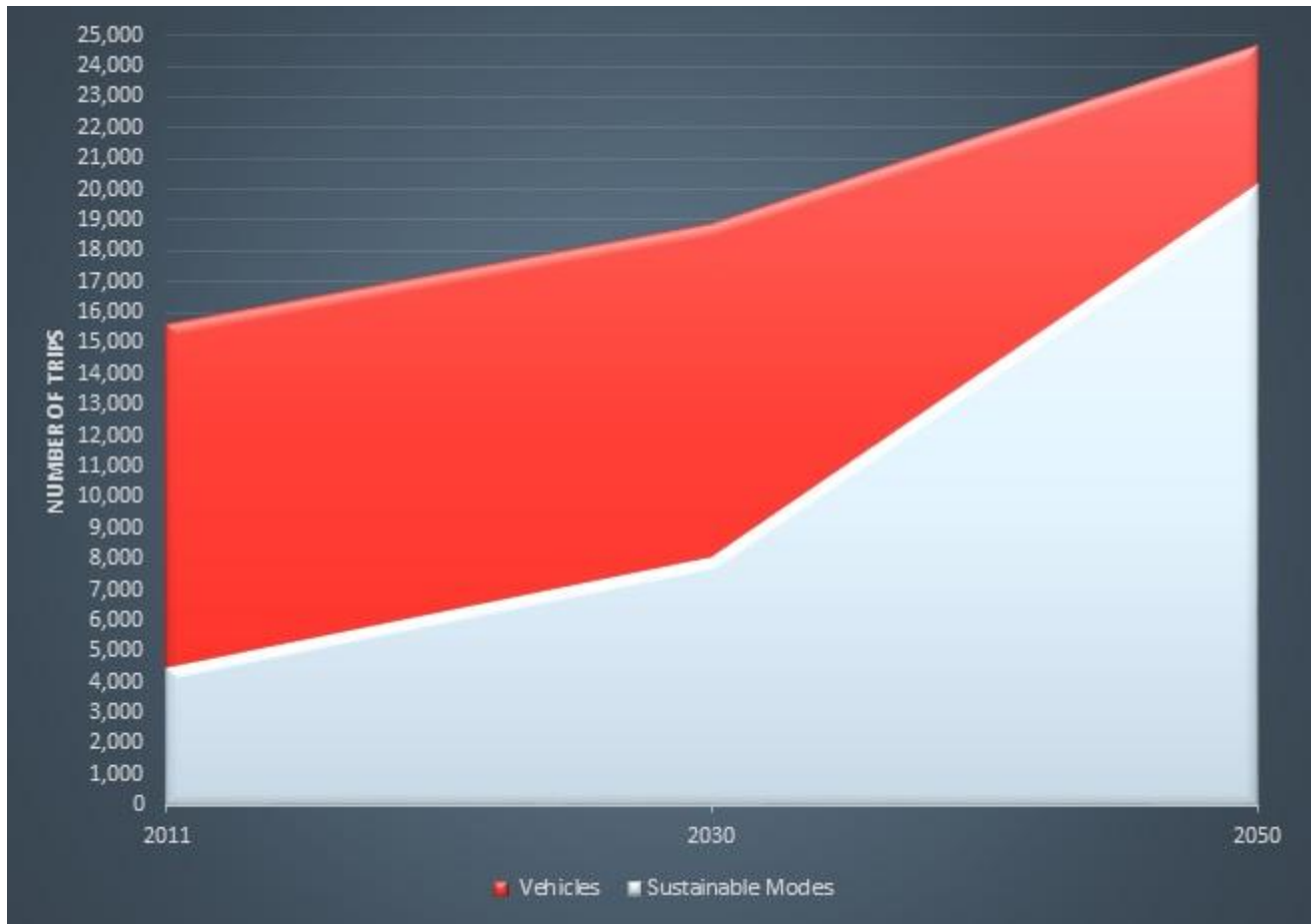
**Figure 34 – Internal Urban Milton Keynes – Estimated Trips in 2030 and 2050**



- 4.2.4. Figure 34 shows that currently approximately 27,500 people who live in urban Milton Keynes drive to work. Applying the population growth assumptions and Mobility Strategy mode shift targets results in a predicted vehicle travel demand within urban Milton Keynes of 34,400 in 2030 and 47,700 in 2050. Assuming the current travel trends continue, achieving the Mobility Strategy mode splits could result in an increase of 6,600 and 20,000 additional urban resident vehicle movements within Milton Keynes by 2030 and 2050 respectively. To achieve the sustainable mode splits targets, an additional 7,800 and 32,600 trips will need to be undertaken by non-private vehicle modes.
- 4.2.5. This high-level analysis suggests that achieving the Mobility Strategy mode split targets for urban Milton Keynes commuting will result in substantial increases in vehicle movements, putting pressure on the existing road network and parking facilities. The additional sustainable travel demand by residents within urban Milton Keynes is sufficient to fill 97 and 407 double decker buses by 2030 and 2050 respectively, and therefore will require substantial uptake of walking, cycling and public transport travel within the built-up area. Figure 34 also shows that the level of sustainable travel will need to increase substantially between 2030 and 2050 to achieve a 50/50 mode split target.

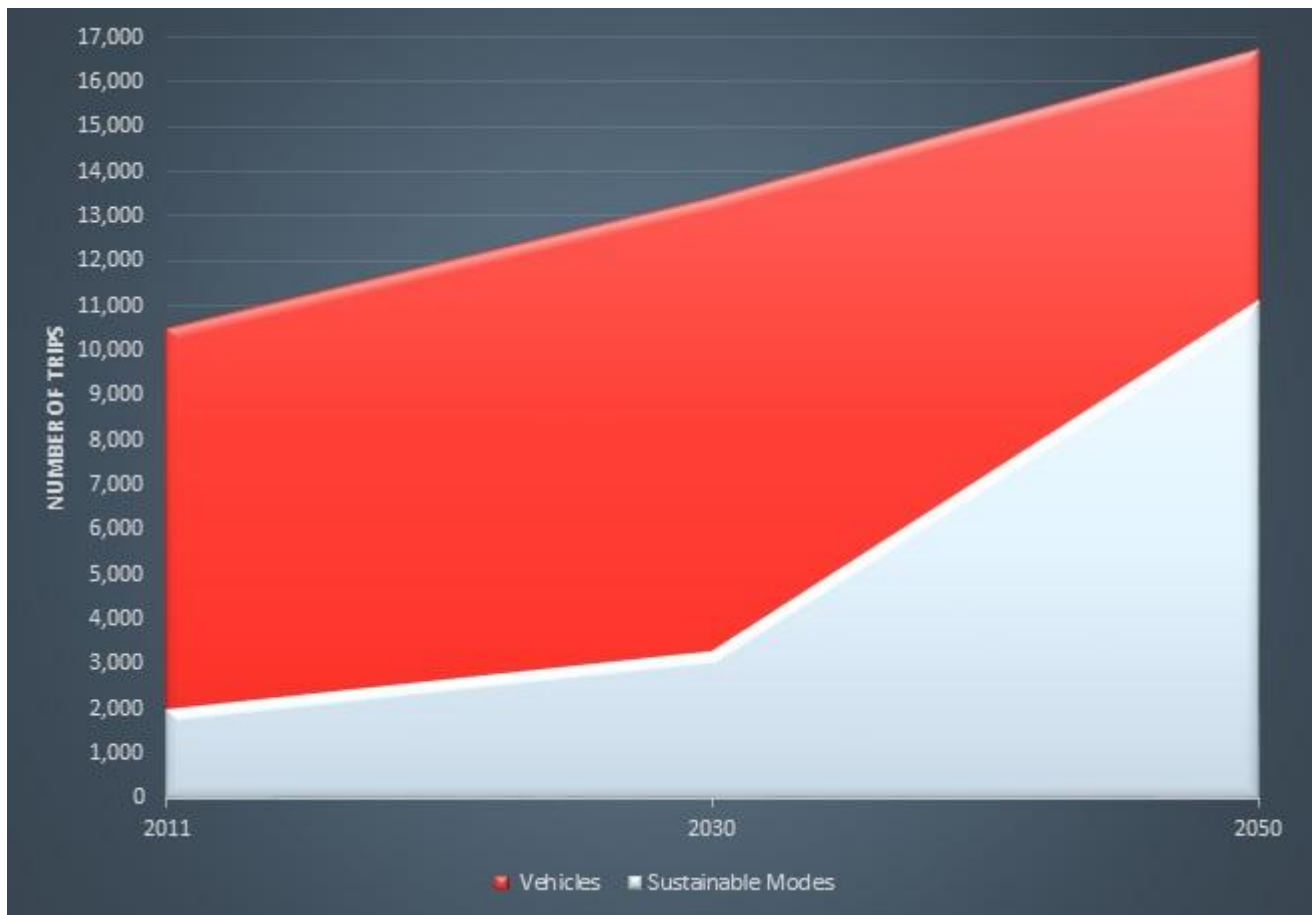


**Figure 35 – Intra-Borough – Estimated Trips in 2030 and 2050**



- 4.2.6. Figure 35 shows that currently approximately 15,600 people who live in the borough of Milton Keynes (outside the urban area) drive to work in the urban area. Applying the population growth assumptions and Mobility Strategy mode shift targets results in a predicted vehicle travel demand into urban Milton Keynes of 16,150 in 2030 and 24,700 in 2050. Assuming the current travel trends continue, achieving the Mobility Strategy mode splits could result in an increase of 3,200 and 9,000 additional vehicle movements into urban Milton Keynes. To achieve the sustainable mode splits, an additional 3,600 and 15,700 trips will need to be undertaken by non-private vehicle modes.
- 4.2.7. This high-level analysis suggests that achieving the Mobility Strategy mode split targets for intra-borough commuting will result in relatively large increases in vehicle movements into urban Milton Keynes, putting pressure on the existing radial routes and parking facilities.
- 4.2.8. Figure 35 shows that substantial increases in sustainable travel into urban Milton Keynes will need to be achieved, particularly by 2050. The additional sustainable travel demand results in a predicted 79% and 347% increase in travel demand by 2030 and 2050, sufficient to fill 45 and 196 double decker buses respectively. Achieving an additional 15,700 trips into urban Milton Keynes by sustainable modes will require substantial uptake of cycling and public transport travel from the more rural wards to the urban wards.

**Figure 36 – Inter-Borough (Excluding London) – Estimated Trips in 2030 and 2050**



- 4.2.9. Figure 36 shows that currently approximately 10,500 people who live in urban Milton Keynes drive to work outside the borough (excluding London). Applying the population growth assumptions and Mobility Strategy mode shift targets results in a predicted vehicle travel demand out of urban Milton Keynes of 13,400 in 2030 and 16,800 in 2050. Assuming the current travel trends continue, achieving the Mobility Strategy mode splits could result in an increase of 2,900 and 6,200 additional vehicle movements out of urban Milton Keynes. To achieve the sustainable mode splits, an additional 1,300 and 9,100 trips will need to be undertaken by non-private vehicle modes.
- 4.2.10. This high-level analysis suggests that achieving the Mobility Strategy mode split targets for inter-borough commuting will result in increased vehicle movements out of urban Milton Keynes, putting pressure on the existing radial road network. The additional sustainable travel demand is sufficient to fill 16 and 114 double decker buses by 2030 and 2050 respectively, and therefore will require some improvements by 2030 and substantial improvements by 2050.

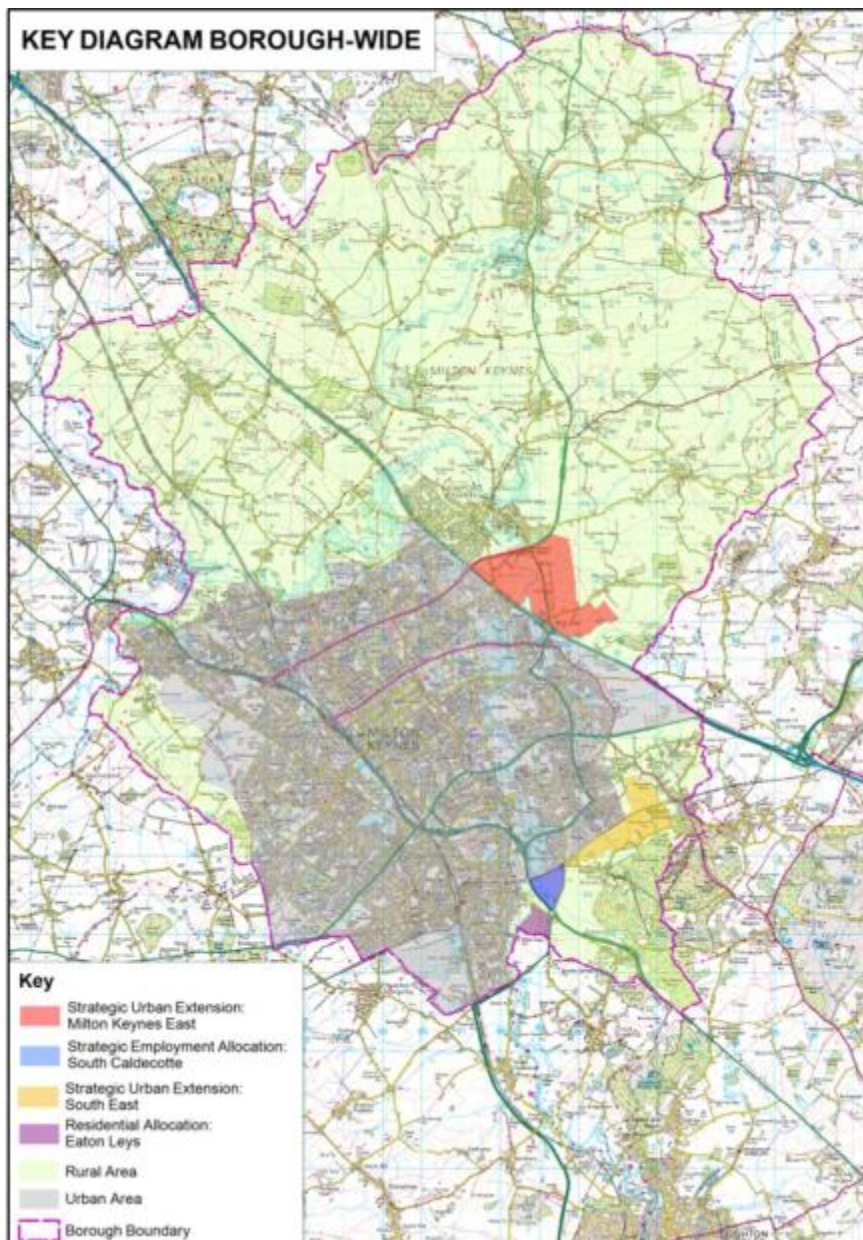
**Infrastructure Challenges**

**Headline:** This high-level analysis demonstrates that accommodating population growth and achieving the mobility strategy mode split targets could result in substantial increases in vehicle travel demand within and into urban Milton Keynes by 2030 and 2050 resulting in implications for car parking management and network operation. The analysis also demonstrates that there will need to be a step change in sustainable travel both internally and externally to achieve the targets set out in the Mobility Strategy.

### 4.3. COMMITTED DEVELOPMENTS

- 4.3.1. The aim of the TIDP is to provide a practical transport infrastructure delivery plan to address the short-term needs for the known land use planning period to 2031, whilst ensuring the proposed infrastructure is adaptable to support longer term societal and technology scenarios.
- 4.3.2. The planned development is set out in the draft Plan MK. As identified in Section 2, Plan:MK sets out a strategy to deliver **26,500 homes and 28,000-32,000 new jobs between 2016-2031**. There are already 20,603 dwellings already committed and therefore Plan:MK includes the strategy for delivering an additional 4,650 dwellings through new allocations. The spatial strategy is summarised in Figure 37.

**Figure 37 – New Allocation Strategic Growth Sites**



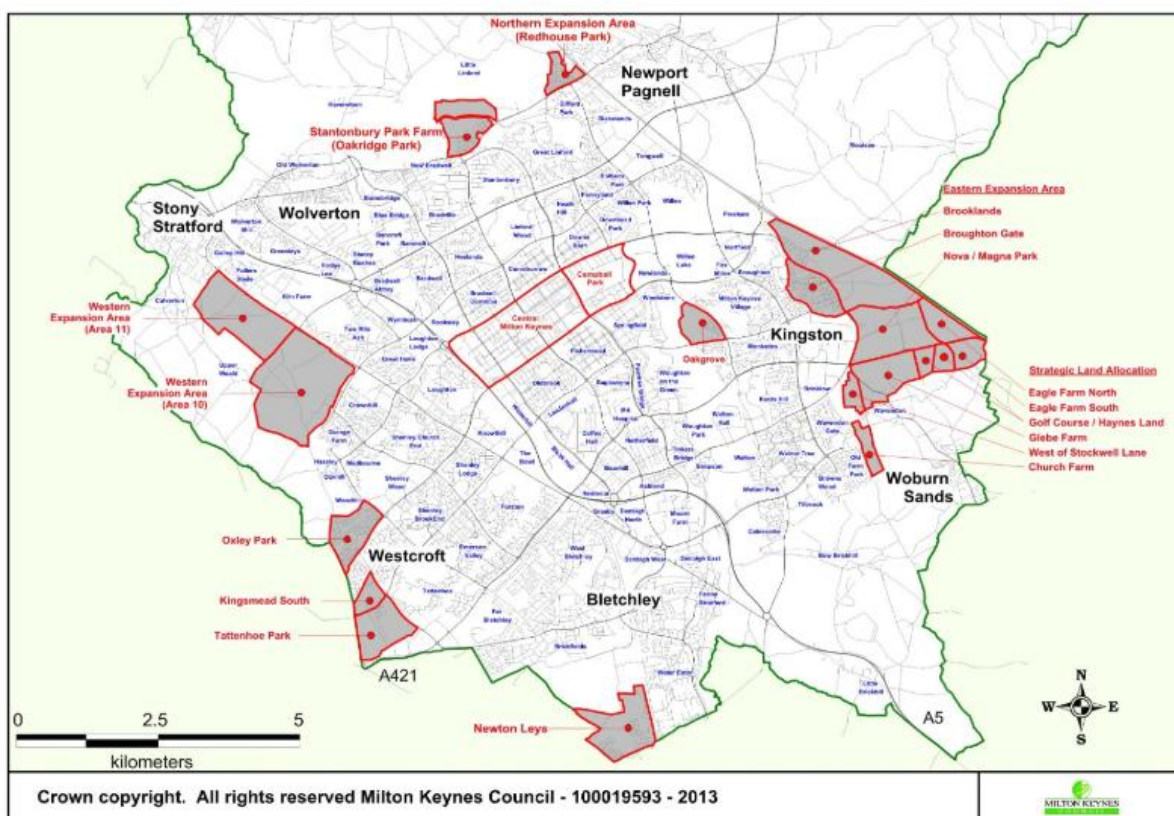


4.3.3. Figure 37 shows that the spatial strategy is to focus the additional allocation within or adjacent to the existing urban area. The main development areas are:

- § Central Milton Keynes – Campbell Park – additional 1,900 dwellings
- § Land at Eaton Leys – 600 dwellings
- § South East Milton Keynes – number of dwellings to be finalised; and
- § Milton Keynes East – post 2031.

4.3.4. The locations of the major development sites contributing 21,000 new homes to Milton Keynes is shown in Figure 38.

**Figure 38 – Allocated Strategic Growth Sites**



4.3.5. The major growth sites form urban extensions to the existing Milton Keynes urban area. This spatial strategy has served Milton Keynes well in the past and continues to deliver good quality housing on greenfield sites. Milton Keynes remains a relatively ‘new town’ and therefore there are limited opportunities for brownfield high density redevelopments in central locations. However, in the longer-term there may be opportunities for denser mixed-use and comprehensive estate redevelopment schemes in central Milton Keynes, which provided the greatest opportunities for sustainable development.

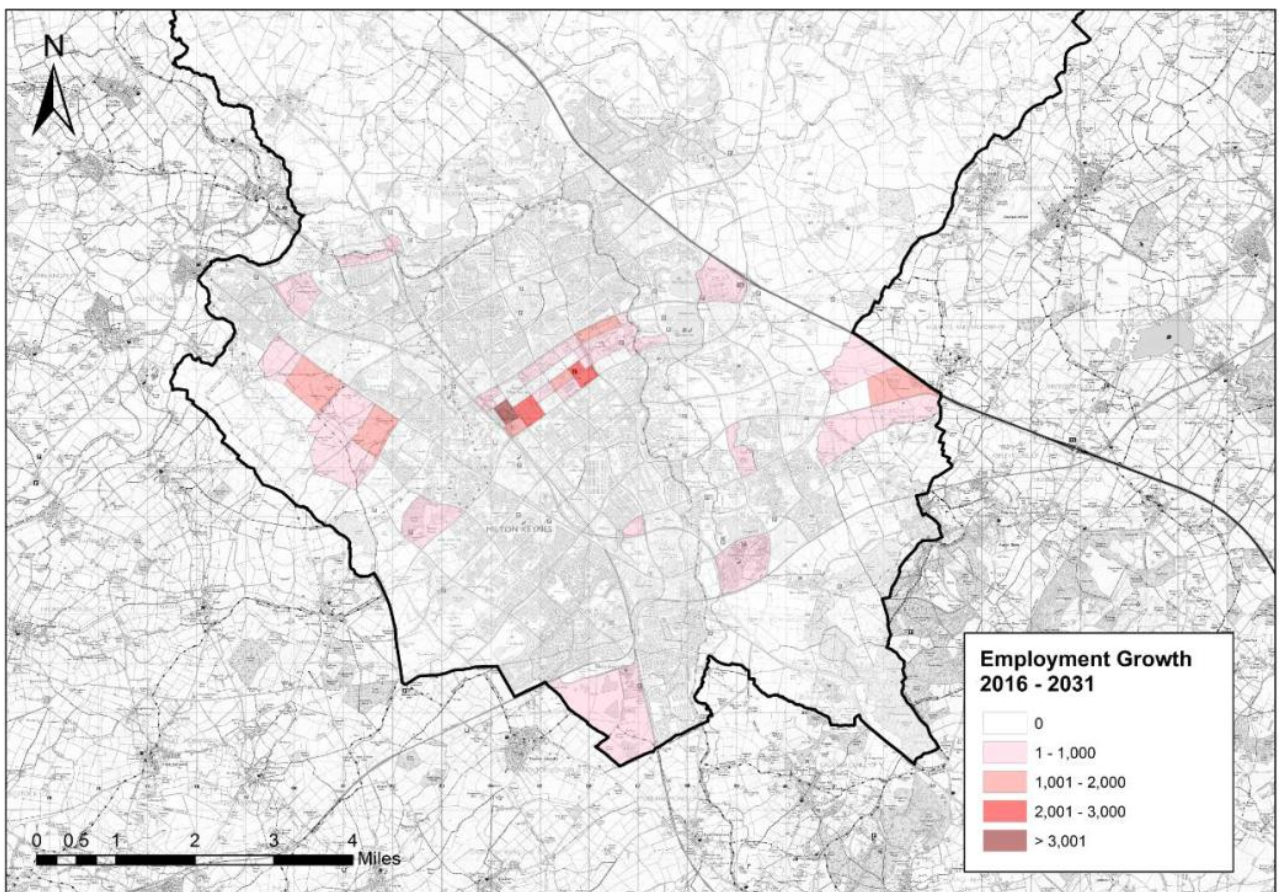
4.3.6. The current spatial strategy of focusing development in large urban extensions does create challenges for encouraging sustainable travel. Residential travel planning will have a key role to play along with the integration of good quality pedestrian and cycle links to local rail stations and local facilities and services. Given the travel distances from the peripheral urban extensions to the main employment sites, high quality public transport has a key role to play in connecting new residents with the Milton Keynes retail, health, education and employment centres.



**Headline:** Encouraging sustainable travel in the short to the medium term from urban extensions will require a balanced strategy of encouraging the uptake of travel sharing, electric vehicle use, cycling through extended and direct routes and public transport through fixed or demand responsive services that penetrate each strategic site.

4.3.7. Figure 39 shows where employment growth will be focused in Milton Keynes. Figure 39 shows that employment growth will be focused on central Milton Keynes, Magna Park, Newton Leys and land west of the A5.

**Figure 39 – Employment Growth Sites**



Source MKMMM

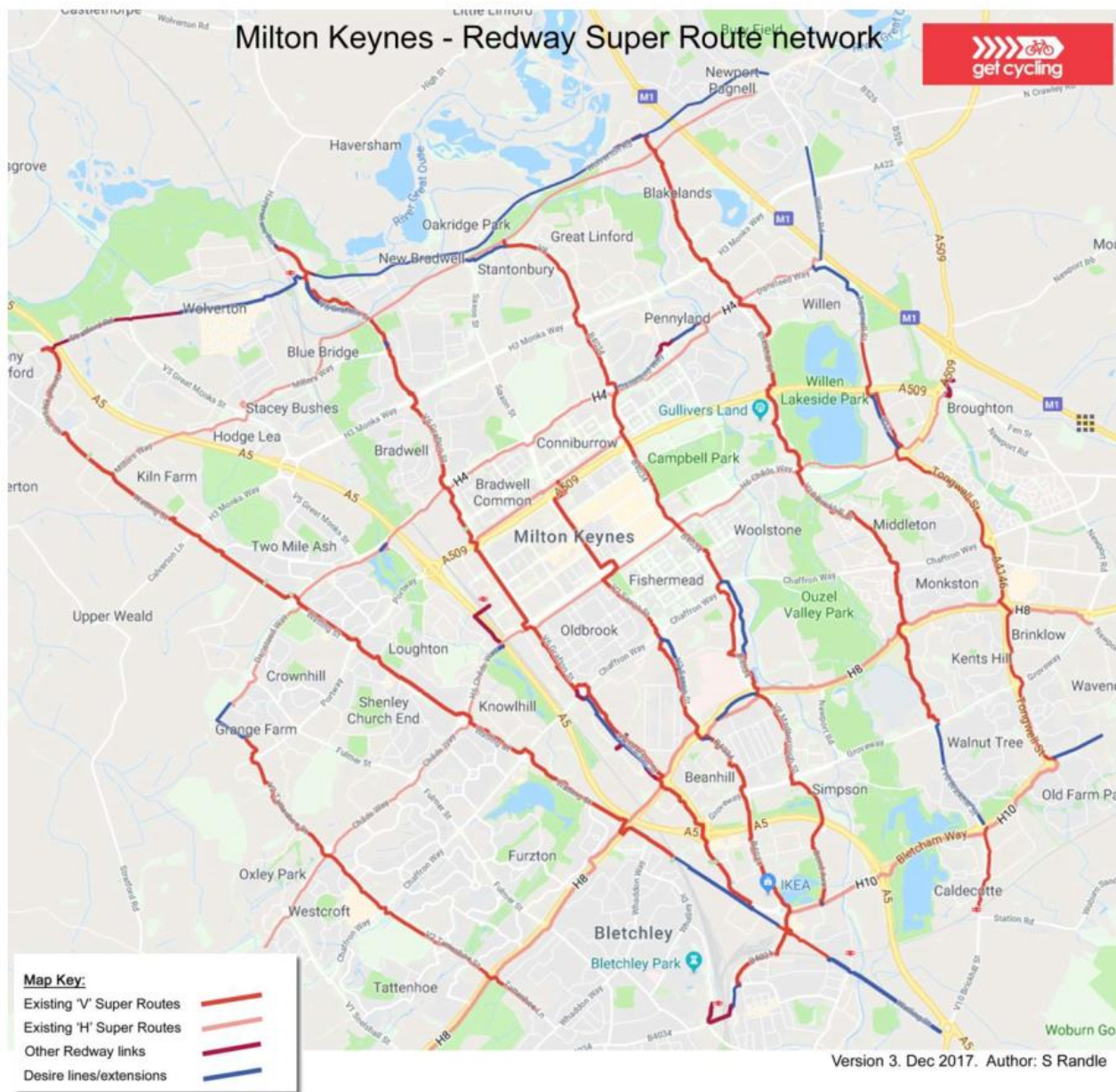
## 4.4. COMMITTED TRANSPORT SCHEMES

### LOCAL AUTHORITY SCHEMES

#### Cycling Schemes

4.4.1. MKC are implementing a 13 Redway Super Routes alongside the existing grid roads (Figure 40). The routes will have improved wayfinding signage, improved surfacing, lighting and vegetation clearance.

**Figure 40 – Redway Super Route Network**



**Cycle Infrastructure Opportunities**

**Headline:** Creating the Redway Super Routes is a positive step forward for cyclists in Milton Keynes. In the short term there is an opportunity to implement **automatic cycle counters** to monitor levels of use before and after the improvement to demonstrate whether the Super Routes are attracting more cyclists or whether alternative infrastructure provision should be considered.

## Road Schemes

- 4.4.2. Table 7 summarises a list of highway improvement schemes identified during WSP EEH evidence base review work.

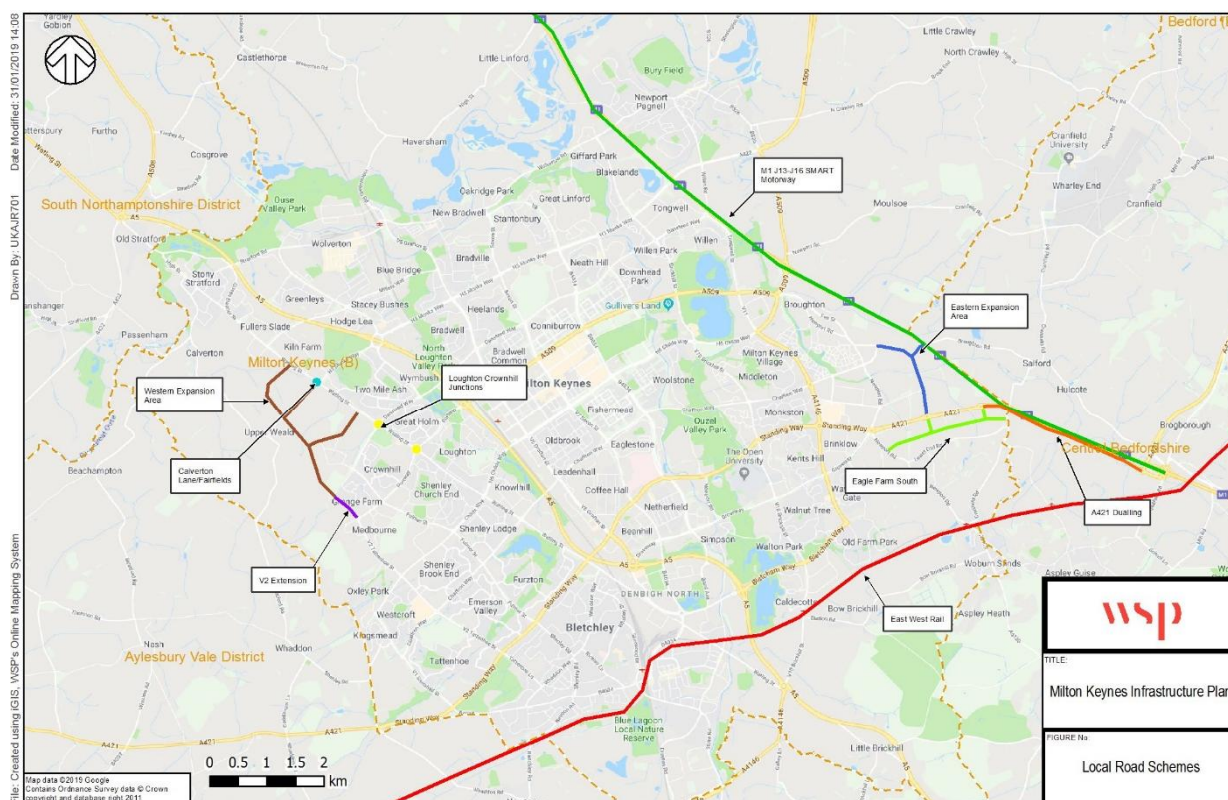
**Table 7 – Committed Transport Schemes in Milton Keynes**

Scheme Name	Location	Cost	Construction Period	Opening	Funding
A421 Dualling	Eagle Farm Roundabout to Junction 13	31.0m	2018-2020	2020	LGF and Local Authorities
Crownhill & Loughton Junctions	Milton Keynes West	6.0m	2020-2025	2020-2025	Milton Keynes Tariff
Broughton Brook Crossing and Feb Street Completion	MK Eastern Expansion Area	4.0m	2019-2020	2020	Milton Keynes Tariff/ Developer Funding
Calverton Lane/Fairways Junction consolidation	MK Western Expansion Area	1.5m	2019-2020	2020	Milton Keynes Tariff/ Developer Funding
H10 Extension	Old Farm Park/Wavendon Gate, SE Milton Keynes	4.5m	2019-2020	2020	Milton Keynes Tariff/ Developer Funding
V2 Extension	Hazeley/Grange Farm, Milton Keynes West	2.5m	2020-2021	2021	Milton Keynes Tariff

- 4.4.3. Figure 41 summarises the location of planned highway improvements within Milton Keynes. The Western Expansion Area road links shown indicatively on Figure 41 are expected to be complete and open by 2025 and the Eastern Expansion Area road network will be complete once the Broughton Crossing/Fen Street scheme identified in Table 7 is complete.



**Figure 41 – Local Road Schemes**



## STRATEGIC ROAD NETWORK

- § Under construction:
  - § M1 Junctions 13-19 - upgrading the M1 to Smart Motorway between Junction 13 (Milton Keynes South) and Junction 19 (M6 Catthorpe interchange). Coupled with other improvements, this is an important link in the ‘smart spine’ linking London and the North West.
- § Completed
  - § A43 Abthorpe Junction – improvement to the Abthorpe junction on the A43 near Towcester in Northamptonshire.
  - § A5-M1 Link Road - a new Junction 11A on the M1 north of Luton plus a road linking to the A5 north of Dunstable. This will effectively serve as a diversion for the A5 through Dunstable, allowing strategic traffic to bypass the town. The scheme creates the capacity for major development at Houghton Regis and the developer has agreed to provide part of the funding.
- § Planned:
  - § A5 Towcester relief road, this supports the Towcester southern extension and helps remove traffic from the centre of the town.



§ Newly committed as part of the RIS:

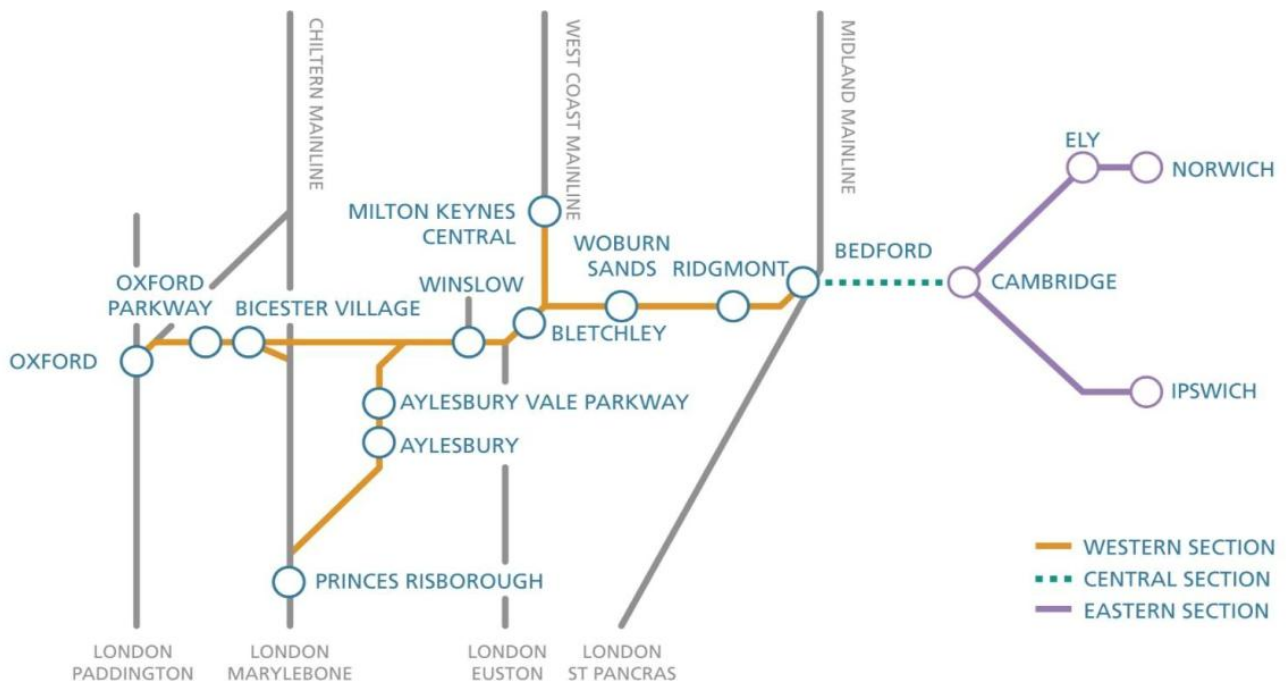
- § A428 Black Cat to Caxton Gibbet - improvement of the A428 near St Neots, linking the A421 to Milton Keynes with the existing dual carriageway section of the A428 to Cambridge, creating an Expressway standard link between the two cities via Bedford. The scheme is expected to include significant improvements to the Black Cat roundabout, where the A1 currently meets the A421;

4.4.4. RIS1 also resulted in the commissioning of strategic studies for the Oxford to Cambridge Expressway. The Oxford to Cambridge Expressway.

## RAIL NETWORK

4.4.5. East West Rail will re-establish the rail link between Milton Keynes and Oxford (Figure 42) to the west and Cambridge in the east. The re-establishment of the rail link will provide a step-change in east-west public transport connectivity into Milton Keynes.

**Figure 42 – East West Rail**



4.4.6. A Transport and Works Act Order (TWAO) was submitted to the Secretary of State for Transport on the 27 July 2018 for the Western section (Oxford to Bedford). If the planning application is successful it is anticipated that construction could start in 2019 with trains operating from 2023. Currently it is anticipated that the route will be served by the following new services:

- § Bedford to Oxford – Due to open in 2023 and would serve Bedford, Ridgmont, Woburn Sands, Bletchley, Winslow, Bicester Village, Oxford Parkway, Oxford and potentially continue to Reading. The route frequency is anticipated to be 1 train per hour in each direction;
- § Oxford to Milton Keynes – Due to open in 2023 and would serve Milton Keynes, Bletchley, Winslow, Bicester Village, Oxford Parkway, Oxford and potentially continue to Reading. The route frequency is anticipated to be 2 trains per hour in each direction;

§ Milton Keynes to Aylesbury – Due to open in 2024 and would serve Milton Keynes, Bletchley, Winslow, Aylesbury Vale Parkway, Aylesbury, Princes Risborough, High Wycombe and potentially continue to London Marylebone. The route frequency is anticipated to be 1 train per hour in each direction;

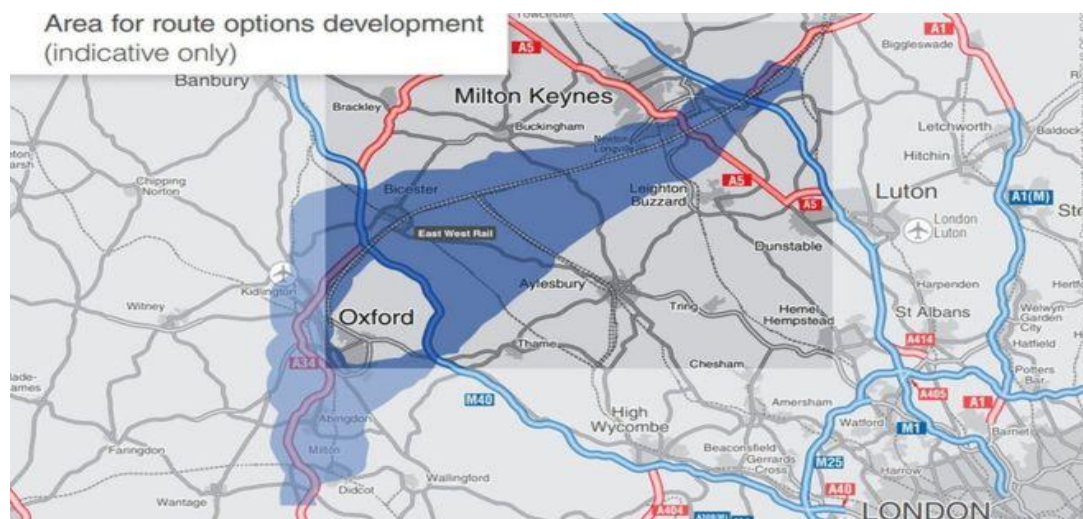
4.4.7. The central section will connect Bedford with Cambridge providing a continuous rail link between Oxford, Milton Keynes and Cambridge. Work is continuing to identify the preferred route of the central section. No confirmed date is available when this section will open, however following the creation of the East West Railway Company, the Secretary of State has asked for this to be accelerated to the ‘mid 2020s’.

<p><b>EWR Infrastructure Opportunities</b></p>	<p><b>Headline:</b> EastWest Rail in the short to medium term provides excellent opportunities to redevelop Bletchley Station to support local interchange movements and economic development and improve public transport travel into Milton Keynes from Oxford, Aylesbury and in the longer term Cambridge.</p>
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## 4.5. PLANNED TRANSPORT IMPROVEMENTS

4.5.1. The Oxford to Cambridge Expressway is a proposed dual-carriageway linking Oxford, Milton Keynes and Cambridge. The scheme proposes construction of a new dual carriageway road between Oxford and Milton Keynes within the broad corridor shown in Figure 43. The section from Milton Keynes to Cambridge will utilise the existing A421 and A428. The A428 is subject to a separate upgrade scheme to a dual carriageway standard from Cambourne to St Neots.

**Figure 43 – Oxford-Cambridge Expressway Preferred Corridor**



4.5.2. The preferred corridor will result in the Expressway routing to the south of Milton Keynes through to Woburn area. This is an environmentally sensitive area and therefore the exact route will need careful consideration of the existing local constraints. However, the route to the south of Milton Keynes has the potential to support substantial housing and economic development, including around Bletchley, Caldecotte and Leighton Buzzard.

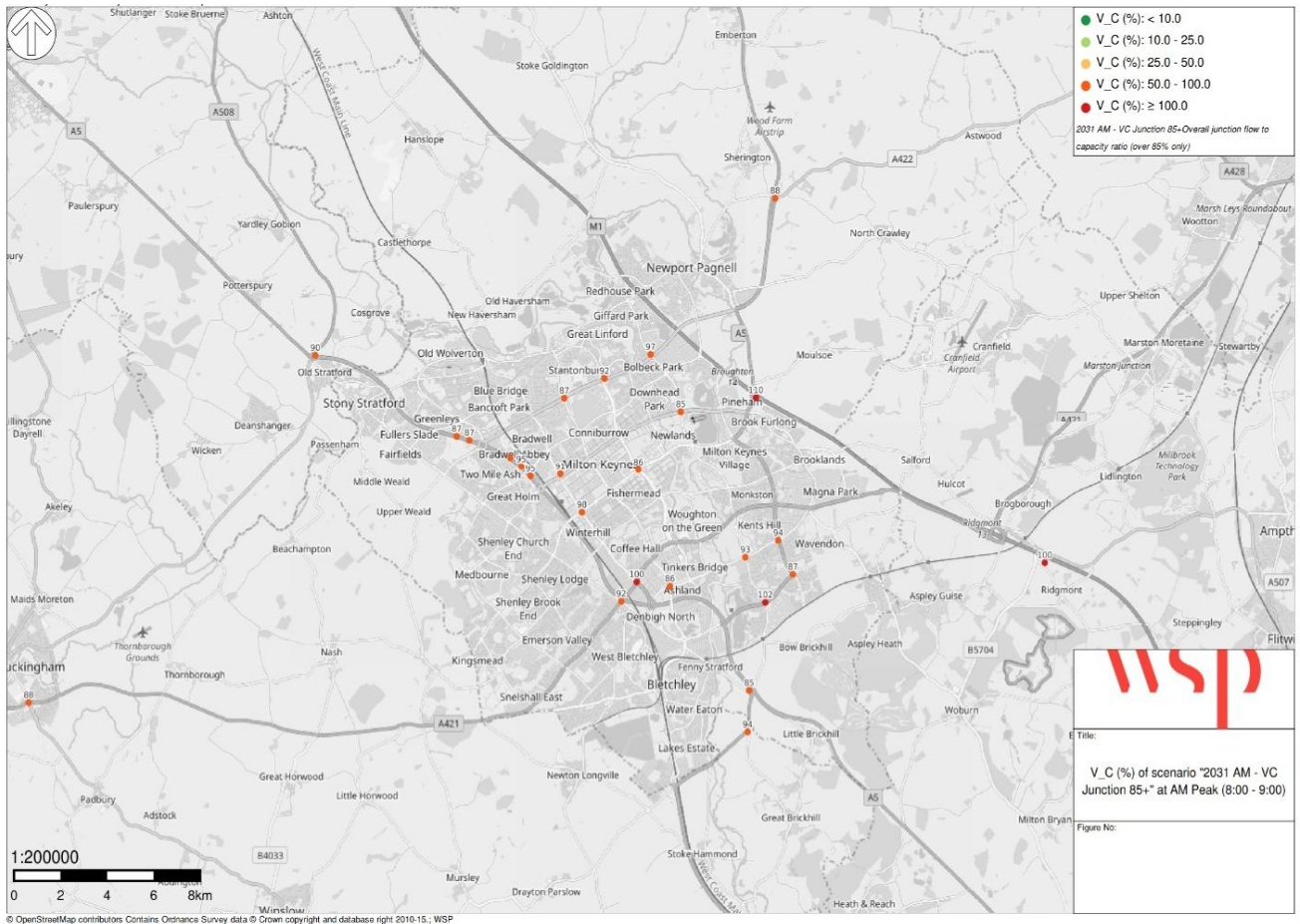
4.5.3. The current programme is for public consultation to be undertaken in Autumn 2019 with a preferred route to be announced in 2020. Construction is predicted to begin in 2025 with an opening date of 2030.

**Headline:** The Expressway will increase the labour catchment of Milton Keynes, making it easier to commute from Oxford and Cambridge. It also provides opportunities for strategic growth in southern Milton Keynes and reduced HGV and through traffic movements along the A421 within the existing urban area.

## 4.6. PREDICTED HIGHWAY CONDITIONS

4.6.1. MKC have provided 2031 Scenario 2B 2031 model runs. These have been used to identify forecast pinch points on the highway network with Milton Keynes. Figure 44 and 45 show the locations of junctions with RFC's over 85%.

**Figure 44 – MKMM AM 2031 – Junctions over 85% Ratio of Volume to Capacity**



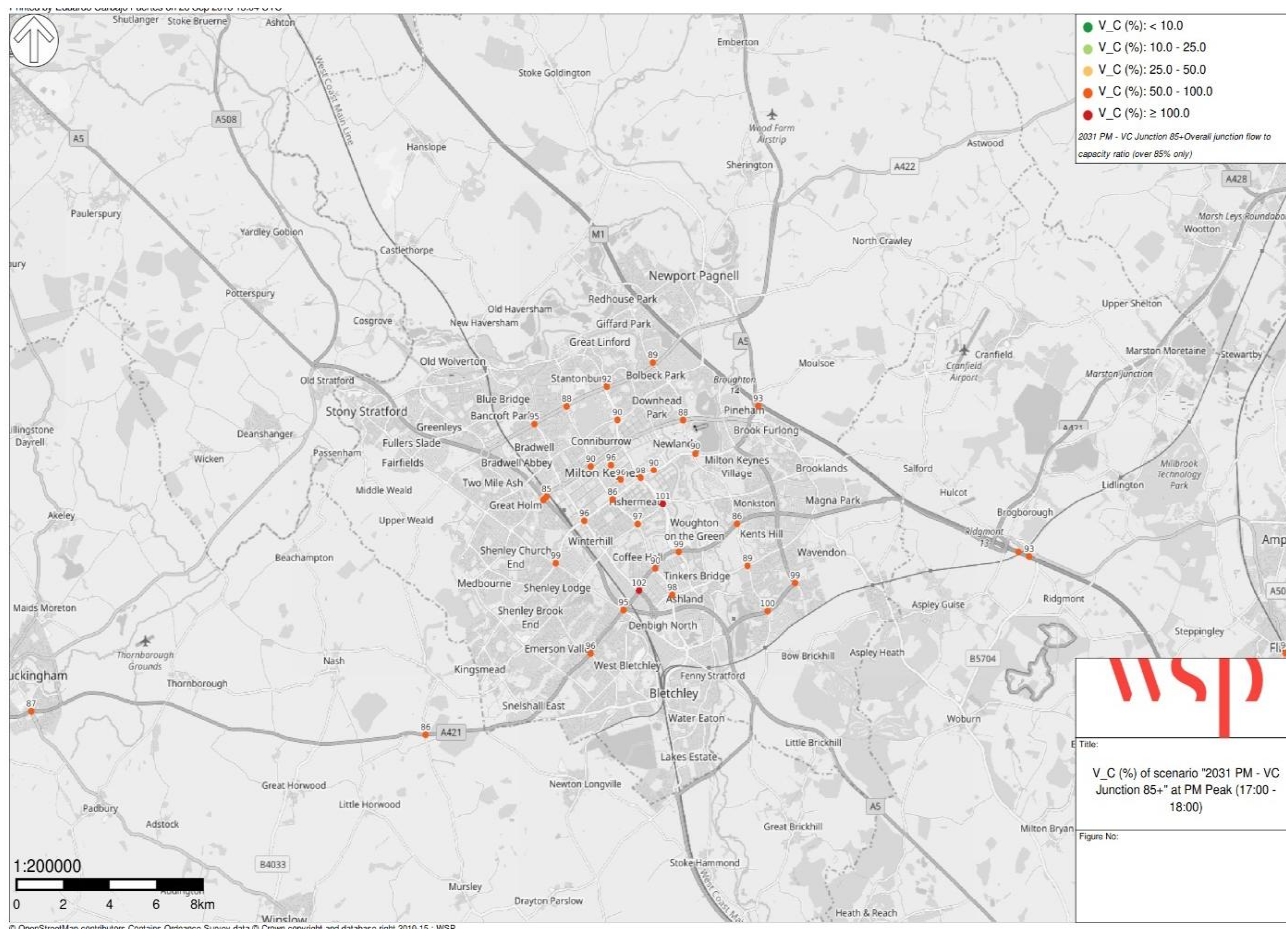
4.6.2. Figure 44 shows that only three junctions within Milton Keynes are predicted to be operating over its theoretical maximum capacity in the AM 2031 Peak Hour:

- § Junction 14 of the M1;
- § V6 Grafton Street/Standing Way roundabout; and
- § V10 Brickhill Street/ Bletcham Way roundabout.

4.6.3. In addition, there are a number of junctions with capacity issues, these are predominately located along the A5 corridor, A509 corridor and Tongwell Street.



**Figure 45 – MKMM PM 2031 – Junctions over 85% Ratio of Volume to Capacity**



- 4.6.4. Figure 45 shows that only two junctions within Milton Keynes are predicted to be operating over its theoretical maximum capacity in the PM 2031 Peak Hour:
  - § V6 Grafton Street/Standing Way roundabout; and
  - § B4034/Chaffron Way roundabout.
- 4.6.5. In addition, there are a number of junctions with capacity issues, these are predominately located along the A421 corridor (which could potentially be relieved by the Expressway), A509 corridor, and the H6 Childs Way.
- 4.6.6. Figures 46 and 47 show the changes in forecast junction delay in seconds to identify which junctions are predicted to be impacted by planned growth.



**Figure 46 – MKMM Difference in Junction Delay AM 2031 minus 2016**



4.6.7. Figure 46 shows the junctions in the AM peak hour where delays are predicted to increase by more than 10 seconds from 2016 to 2031. The locations where delays are predicted to increase by more than 50 seconds during this period include:

- § Watling Street/Standing Way Roundabout;
- § Watling Street/Childs Way Roundabout;
- § V8 Marlborough Street/Chaffron Way Roundabout;
- § V11 Tongwell Street/A4146 Bletcham Way Roundabout
- § A509/Brickhill Street;
- § H4 Danstead Way/Delaware Drive;
- § Brickhill Street/H3 Monks Way; and
- § Junction 14 of the M1.

4.6.8. Given the high number of roundabout junctions that make-up the main grid road network within Milton Keynes, overall the planned growth to 2031 is predicted to have a relatively minor impact on the operation of the network, with the main impacts focused at a relatively low number of pinch point junctions.

**Figure 47 – MKMM Difference in Junction Delay PM 2031 minus 2016**



4.6.9. Figure 47 shows the junctions in the PM peak hour where delays are predicted to increase by more than 10 seconds from 2016 to 2031. The locations where delays are predicted to increase by more than 50 seconds during this period include:

- § V6 Grafton Street/H6 Childs Way Roundabout;
- § V6 Grafton Street/Silbury Boulevard Roundabout;
- § V7 Saxon Gate/H6 Childs Way Roundabout;
- § Secklow Gate/Avebury Boulevard Signal Controlled Crossroads South;
- § Secklow Gate/Avebury Boulevard Signal Controlled Crossroads North;
- § M1 Junction 14;
- § A5/A508 Roundabout – Old Stratford; and
- § A507/Bedford Road T-Junction.

4.6.10. Figure 45 shows that in the PM peak hour the most substantial increases in junction delays are predicted to occur in and around central Milton Keynes. This suggests that the main impact is increased vehicle demand leaving central Milton Keynes in the PM peak hour impacting on the central signal controlled and roundabout junctions.

**Business as Usual Infrastructure Challenges**

**Headline:** A **business as usual scenario** has been modelled using SATURN, assuming increased traffic growth based on existing travel patterns. If this approach is used to plan highway infrastructure improvements then a number of pinch points are likely to require highway capacity improvement in the future.



## 5. FUTURE MOBILITY AND TECHNOLOGY TRENDS

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### 5.1. LOCAL OVERVIEW

- 5.1.1. Like many places in the UK, Milton Keynes anticipates significant change over the coming decades and as such the Milton Keynes Mobility Strategy 2018 to 2036 presents its ambitions to accommodate growth in travel demand:
- § Stabilise average journey times and ensure they remain competitive while promoting the development of smart shared sustainable mobility for all;
  - § Provide a fully integrated and accessible public transport system - “Mobility as a Service” (MaaS);
  - § Develop and promote a ‘First Last Mile’ culture for future technologies such as autonomous and connected vehicles and sustainable connectivity; and
  - § Ensure transport infrastructure is configured to enable the city’s future development and growth in travel demand to be accommodated based on the council’s ‘First Last Mile’ Strategy.
- 5.1.2. The strategy also details a number of objectives (as illustrated below) together with a number of desirable outcomes;
- § **Support Growth and provide mobility for all** – support the growth ambition of Milton Keynes and provide good connectivity throughout the Borough and beyond;
  - § **Provide an effective network** – provide a transport network that is well maintained, free flowing, and operating efficiently at all times;
  - § **Maximise Travel Choices** – maximise the use of technology and innovation to both inform the traveller and to provide travel options; and
  - § **Protect transport users and the environment** – the safety of all transport users is a key part of this strategy as is the need to reduce transport pollution and CO2 emissions, protect the natural environment and promote improved public health and wellbeing.
- 5.1.3. The strategy also details a number of interventions to address future needs including specifically the use of technology. These potential interventions are banded into short term (to 2024), medium term (to 2031) and long term (beyond 2031) and include expanding functionality of existing networks and assets as well as future mobility interventions. Technological interventions include:
- Short Term:**
- § **Smart Sensors** – Installation of sensors on network to build up a real-time dataset of traffic and parking demand.
  - § **MaaS Mobility Planning App** – Create an app that enables residents and visitors to plan journeys in real-time using a range of modes, potentially integrating ticketing.
  - § **Public Transport payment options** – Offer a variety of payment options on buses across all operators.
  - § **Improved superfast broadband** – Improve broadband coverage to support demand responsive transport, new models of mobility, real-time journey planning and agile working.
  - § **Bus application for user devices** – Enable easy journey planning by offering an application providing live information across all bus operators.

### Medium Term:

§ **Trialling future technology** – Continue to collaborate, promote and allow the trialling of new transport technologies, such as the driverless pods being trialled in central Milton Keynes.

### Long Term:

§ **Autonomous last mile deliveries** – Collaborative approach to follow and possibly trial autonomous delivery opportunities for the ‘last-mile’ delivery.

5.1.4. The aims of the Last Mile Strategy tie into many of the technological interventions outlined above. The installation of smart sensors for example, has the potential to aid the stabilisation of current journey times by enabling congestion and incident hotspots to be identified and actively managed. Access to public transport in turn is promoted through MaaS Mobility Planning applications and multi-method payment options, reducing the likelihood of asymmetric information and hindered access.

5.1.5. The Last Mile Strategy aim to provide a transit system based on an Advanced Very Rapid Transit (AVRT) network is facilitated by a commitment to the trialling of future technologies, including autonomous last mile deliveries. The sooner new transport technologies are trialled and their suitability assessed for providing part of a range of personal travel options, the sooner they are likely to be implemented.

## 5.2. NATIONAL OVERVIEW

5.2.1. Transport is a means to an end, it connects people with places and the things they need to do, raw materials to manufacturers and goods to market. Over the last twenty years we have seen the explosion of digital technologies opening up new opportunities, new ways of doing things, creating new business opportunities, and this coupled with air quality concerns and move to a low carbon agenda have led to some significant advances.

5.2.2. Arguably the transportation sector has been late to the digitisation agenda but **it is now clear that considerable changes are anticipated over the coming decades which will impact every aspect of how people engage with and access their mobility needs**, needs which in turn serve society and the wider economy.

5.2.3. These changes are not happening in isolation, they are influenced by wider global trends and disruptors which are in turn influenced, in, part by the transportation response to them. It is this complex set of interactions that underpins technological and associated economic change and growth.

5.2.4. There have been a number of significant developments with regards to policy and strategy over recent months which provide the foundations for the Future Mobility agenda:

§ **National Infrastructure Assessment** – The National Infrastructure Commissions report makes recommendations on the infrastructure needs and priorities of the UK. In relation to the future of mobility, the commission commends the Government for positioning the UK as a leader of



connected and autonomous vehicle innovation however recommends that ‘the implications of technological innovation in long term transport planning processes’ are addressed.<sup>1</sup>

- § **Four grand challenges within the Industrial Strategy** –The ‘Future of Mobility’ Grand Challenge outlined in the Industrial Strategy outlines the Government objective to keep the UK at the forefront of transport innovation, stating that ‘we will become a world leader in the way people, goods and services move’. Opportunities to dramatically reduce congestion, carbon emissions, improve customer experience, drive efficiency and enable access for all through innovation in engineering, technology and business models will be encouraged by a flexible regulatory framework, testbed funding and research & development investment.<sup>2</sup>
- § **Regulatory review for Autonomous Vehicles** – In March 2018, as part of the Future Mobility Grand Challenge, the Government commissioned a detailed review of driving laws to ensure the UK continues to offer a conducive environment for developing, testing and driving connected and autonomous vehicles. The review aims to examine any legal obstacles to the widespread introduction of self-driving vehicles and identify where reforms may be required.<sup>3</sup>
- § **Transport Committee call for evidence on Mobility as a Service** – In November 2017, the Transport Committee launched an inquiry into the ‘transformative potential of integrated, multi-mode MaaS apps and overcoming barriers to implementation in UK cities and regions’. The concluding report is still awaited.<sup>4</sup>
- § **Future Mobility call for evidence** – In July 2018, the Government sought views and evidence on the ‘Future of Mobility’ to inform the Future of Mobility Grand Challenge. Analysis of the responses is expected to be published by the end of 2018.<sup>5</sup>
- § **Last mile call for evidence** – In addition to the Future Mobility call for evidence, ‘The Last Mile’ call for evidence was also launched in July 2018. The call aimed to ascertain evidence on the opportunities available to deliver goods more sustainably as well as some of the barriers.<sup>6</sup>
- § **Road to Zero** – In July 2018, the Government outlined its ambition to see at least 50% of new cars and 40% of new vans to be ultra-low emission by 2030. The strategy also sets out plans to

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<sup>1</sup> National Infrastructure Commission (2018). National Infrastructure Assessment. [online] National Infrastructure Commission. Available at: <https://www.nic.org.uk/our-work/national-infrastructure-assessment/> [Accessed 2 Oct. 2018].

<sup>2</sup> Department for Business, Energy and Industrial Strategy (2018). The Grand Challenges. [online] GOV.UK. Available at: <https://www.gov.uk/government/publications/industrial-strategy-the-grand-challenges/industrial-strategy-the-grand-challenges> [Accessed 2 Oct. 2018].

<sup>3</sup> Department for Transport (2018). Government to review driving laws in preparation for self-driving vehicles. [online] GOV.UK. Available at: <https://www.gov.uk/government/news/government-to-review-driving-laws-in-preparation-for-self-driving-vehicles> [Accessed 2 Oct. 2018].

<sup>4</sup> UK Parliament (2018). Mobility as a Service inquiry. [online] UK Parliament. Available at: <https://www.parliament.uk/business/committees/committees-a-z/commons-select/transport-committee/inquiries/parliament-2017/mobility-as-a-service-17-19/> [Accessed 2 Oct. 2018].

<sup>5</sup> Department for Transport (2018). Future of mobility call for evidence. [online] GOV.UK. Available at: <https://www.gov.uk/government/consultations/future-of-mobility-call-for-evidence> [Accessed 2 Oct. 2018].

<sup>6</sup> Department for Transport (2018). The Last Mile – A call for evidence. [online] GOV.UK. Available at: <https://www.gov.uk/government/consultations/the-last-mile-a-call-for-evidence> [Accessed 2 Oct. 2018].

enable massive expansion of green infrastructure and reduce extant vehicle emissions in order to help the government achieve elements of the Industrial Strategy.<sup>7</sup>

5.2.5. In parallel with the above policy and strategy work a number of authorities are commissioning research which is also contributing to the collective body of evidence as to the trajectory of future mobility and technology and its applicability to places in the UK and elsewhere.

### 5.3. MEGA TRENDS

5.3.1. The access and mobility needs of our society are increasingly influenced by a number of mega trends which are shaping many aspects of society which in turn influence how, when and where people will need to travel. These can be categorised broadly as follows and detailed below in the following tables;

- § Demographic challenges
- § Social change
- § Environmental focus
- § Economic shift
- § Political landscape

**Table 8 - Demographic Challenges**

TRENDS	IMPACTS ON ACCESS AND MOBILITY
<p><b>Growing &amp; Ageing Population</b></p> <p><i>Maturity:</i> Emerging</p>	<p><b>Headline:</b> <i>An increasingly ageing population will need to be economically active</i></p> <p>Across the UK our population is growing and indications from ONS data is that it is ageing with Milton Keynes expected to have an over-65 population of 20% by 2036 and 4% over 85. With increasing retirement age, later starts for mortgages and a larger proportion of the population needing to work for longer many people will need to retain access to workplaces. An ageing population will have different expectations and needs of all modes of transport and we will have to consider their vulnerability in design and other assumptions.</p>
<p><b>Health &amp; wellbeing</b></p> <p><i>Maturity:</i> Emerging</p>	<p><b>Headline:</b> <i>Less people are undertaking physical activity and many are suffering ill effects of an unhealthy, inactive lifestyle</i></p> <p>It has been suggested that a combination of factors are leading to a reduction in walking and cycling in some areas. This, coupled with concerns over obesity levels, which has increased from 15% of the UK population to 26% since 1993, has led to an increased focus on growing sustainable travel.<sup>8</sup> An increasing reliance of motorised transport, even for shorter trips, could lead to the danger of widespread ‘fitnessness’ and increased car dependency. Conversely there is a trend towards the ‘quantified self’ with people measuring their daily steps and miles cycled as part of an interest in maintaining a healthier lifestyle.</p>

<sup>7</sup> Department for Transport (2018). Government launches Road to Zero Strategy to lead the world in zero emission vehicle technology. [online] GOV.UK. Available at: <https://www.gov.uk/government/news/government-launches-road-to-zero-strategy-to-lead-the-world-in-zero-emission-vehicle-technology> [Accessed 3 Oct. 2018].

<sup>8</sup> Baker, C. (2018). Briefing Paper: Obesity Statistics. London: House of Commons Library.

<p><b>Loneliness</b></p> <p><i>Maturity:</i> Emerging</p>	<p><b>Headline:</b> <i>Increasing numbers of people, including the older, are living alone with adverse effects</i></p> <p>The impacts of loneliness particularly in the elderly are beginning to be understood. Isolation from family and community can result in poor mental and physical health, with studies indicating that lonely people are more likely to suffer from dementia, heart disease and depression.<sup>9</sup> Severance in communities can also lead to physical isolation. Driven by concerns over an increasing, ageing population, the needs of the lonely (of all ages) will need to be addressed through the changes to the built environment and with specific mobility interventions.</p>
<p><b>Net migration</b></p> <p><i>Maturity:</i> Established</p>	<p><b>Headline:</b> <i>Net migration will continue to fluctuate, region by region, conurbation to conurbation</i></p> <p>In recent years, the population of Milton Keynes has been shaped by modest rates of net in-migration but ongoing political uncertainty could see this change with particular impacts in certain towns and cities where migrant labour has been relied upon.<sup>10</sup> These changes may have impacts upon labour markets and associated mobility needs particularly where cost is a driver.</p>
<p><b>Urbanisation</b></p> <p><i>Maturity:</i> Emerging</p>	<p><b>Headline:</b> <i>Cities are growing at a rapid pace</i></p> <p>Residential populations are growing with knock on positive impacts for both daytime and night-time economies but pressures upon healthcare and education needs. Generally, this expansion has been driven by younger people, with the resident population of 20-29 year olds in Milton Keynes increasing by 35% between 2001-2011.<sup>11</sup> Growing resident populations place particular internal pressures on networks however.</p>
<p><b>Social inequality</b></p> <p><i>Maturity:</i> Established</p>	<p><b>Headline:</b> <i>Social inequality still exists within and between areas</i></p> <p>The investment in, and expansion of cities centres, has put pressure on smaller conurbations as well as less desirable areas within city centres and city regions. Any social inequalities impact transport choices with a dependency on traditional public transport modes even though costs may represent a large portion or expenditure.</p>

<sup>9</sup> Valtorta, N., Kanaan, M., Gilbody, S., Ronzi, S. and Hanratty, B. (2016). Loneliness and social isolation as risk factors for coronary heart disease and stroke: systematic review and meta-analysis of longitudinal observational studies. *Heart*, [online] 102(13), pp.1009-1016. Available at: <https://www.ncbi.nlm.nih.gov/pubmed/27091846> [Accessed 2 Oct. 2018].

<sup>10</sup> Milton Keynes Council (2016). Local Economic Assessment 2016. [online] Milton Keynes: Milton Keynes Council. Available at: <https://www.milton-keynes.gov.uk/business/local-economic-assessment-2016> [Accessed 2 Oct. 2018].

<sup>11</sup> Government Office for Science (2014). People in Cities: The Number. [online] London: Government Office for Science. Available at: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/321814/14-802-people-in-cities-numbers.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/321814/14-802-people-in-cities-numbers.pdf) [Accessed 2 Oct. 2018].



**Table 9 - Social Change**

TRENDS	IMPACTS ON ACCESS AND MOBILITY
<p>Acceptance of 'sharing'</p> <p><b>Maturity:</b> Emerging</p>	<p><b>Headline:</b> <i>Many people are increasingly happy to share assets and services if it is convenient and the price is right</i></p> <p>The rise of shared, on demand transportation services such as bike hire, car hire, lift sharing and 'UberPool' type services have tapped into a willingness for people to share assets and services for financial benefit. A global survey carried out by Dalia Research in 2017 documented that 30% of the UK population have used a mobility app to hail, rent or share a ride in some form.<sup>12</sup> Whilst some business models are in their infancy this willingness to 'access' rather than 'own' has the potential to dramatically reduce car dependency in certain conurbations in some use cases.</p>
<p>Expectation of 'immediacy'</p> <p><b>Maturity:</b> Maturing</p>	<p><b>Headline:</b> <i>People want everything on-demand</i></p> <p>With the rise of the internet and increasing levels of almost real-time consumption of everything from information to food, there is an increasing expectation for immediate access to products and services. Online sales for example, accounted for 17.4% of all UK retailing sales in March 2018, increasing from 16.9% in March 2017.<sup>13</sup> With 'Just Eat' and 'Deliveroo' type fast food deliveries and 'Amazon Prime' type 1 hour deliveries, there are a myriad of extra transportation trips meeting demand.</p>
<p>'Customer' centricity</p> <p><b>Maturity:</b> Established</p>	<p><b>Headline:</b> <i>The customer is always right</i></p> <p>Transportation has been late in recognising users of networks as customers but with the rise of feedback and sentiment analysis via social media (Twitter and Facebook) and other channels (such as the GrumpNow app), customers now have near real time relationships with network and service operators across all modes. The Department for Transport has realised the great benefits of real-time mapping at times of major incidents and disruption and has announced it is investing £10 million to create a real-time map of traffic jams, however they will have to overcome the challenge of providing consistent information and messaging.<sup>14</sup></p>
<p>Rise of the 'experience' economy</p> <p><b>Maturity:</b> Emerging</p>	<p><b>Headline:</b> <i>People are buying less 'stuff' but spending more doing things</i></p> <p>A number of retailers have described a shift from customers consuming products to more disposable income being spent on 'experiences'. This is resulting in a shift within our retail centres, towns and cities with a focus on leisure rather than shopping activities with an associated rise in food, drink and leisure activities. The 2018, PwC analysis of high street composition in turn revealed that Milton Keynes suffered a net loss of seven retail stores on the high street in 2017 but reported that 'some parts of the leisure sector are thriving, with beauty product stores, speciality coffee shops...all opening a number of new premises in the region'.<sup>15</sup> Driven in part by the convenience of online shopping this</p>

<sup>12</sup> Dunn, J. (2017). Most people in America still don't use ride-hailing apps like Uber. [online] Business Insider. Available at: <http://uk.businessinsider.com/uber-lyft-ride-hailing-apps-car-ownership-chart-2017-3> [Accessed 2 Oct. 2018].

<sup>13</sup> Office for National Statistics (2018). Retail sales, Great Britain. [online] Ons.gov.uk. Available at: <https://www.ons.gov.uk/businessindustryandtrade/retailindustry/bulletins/retailsales/march2018> [Accessed 2 Oct. 2018].

<sup>14</sup> French, K. (2018). Drivers will beat traffic jams through new app which maps UK's most congested roads, minister vows. [online] The Telegraph. Available at: <https://www.telegraph.co.uk/news/2018/09/01/drivers-will-beat-traffic-jams-new-app-maps-uks-congested-roads/> [Accessed 3 Oct. 2018].

<sup>15</sup> PwC (2018). Milton Keynes high street store openings at highest level in three years, but closures also at the highest level from 2015, as digital demands and appetite for experiences continue to redefine high streets. [online] Available at: <https://www.pwc.co.uk/who-we->

	may however lead to a gradual shift in leisure trips closer to a more 7 day, near 24/7 model.
<p>Need for life-long learning</p> <p><b>Maturity:</b> Emerging</p>	<p><b>Headline:</b> <i>Changes in technology mean a career for life may not exist</i></p> <p>With rapid changes in digital technologies and automation there may be a need for learning to be undertaken throughout or at regular intervals during an elongated (due to trends described above) work life. Employees are increasingly aware of the rapidly changing, impermanent nature of jobs and the need to make oneself indispensable. A survey by Investec in turn found more than half of British employees were planning a career change in the next five years.<sup>16</sup> This may result in changes to how, when and where learning is undertaken with subsequent impacts upon digital and physical access.</p>

**Table 10 – Environmental Focus**

TRENDS	IMPACTS ON ACCESS AND MOBILITY
<p>Climate change</p> <p><b>Maturity:</b> Established</p>	<p><b>Headline:</b> <i>Climate change and associated weather events will increasingly impact the UK</i></p> <p>Major weather events such as extreme heat waves and flooding, impact the reliability and resilience of our digital, energy and transport networks and services. Milton Keynes for example has been identified as a ‘hotspot’ for having the greatest potential for the urban heat island effect.<sup>17</sup> With a predicted increase in extreme weather events in the UK attributed to climate change, impacts of events such as heatwaves on vulnerable areas are likely to be exacerbated.<sup>18</sup> The relationship between weather and network operations is well established but designing-in resilience may be required to avoid closures of key links or in those areas prone to flooding for example, not just during prolonged rainfall but at times of extreme events.</p>
<p>Air quality</p> <p><b>Maturity:</b> Established</p>	<p><b>Headline:</b> <i>Air quality is impacting urban areas and at key locations on the network</i></p> <p>Road based transport is one of the biggest contributors to poor air quality, the recent opening of smart motorways demonstrates how increasing capacity and air quality demands currently compete. Emerging trends away from diesel and petrol propulsion (as seen through policy initiatives in places like Paris and London, the consideration of Low and Ultra Low Emission Zones and the phasing out of diesel rail vehicles) coupled with commercially viable environmentally alternatives could see reductions start to occur as the fleet changes. Between August 2017-2018 there was a 32.6% increase in the number of electric vehicle registrations in the UK, indicating an increasing preference for alternative propulsion vehicles.<sup>19</sup> This will not negate the need for interventions in some</p>

are/regional-sites/midlands/press-releases/milton-keynes-high-street-store-openings-at-highest-level-in-three-years-but-closures-also-at-the-highest-level-from-2015.html [Accessed 2 Oct. 2018].

<sup>16</sup> Barrett, H. (2018). Plan for five careers in a lifetime. [online] Ft.com. Available at: <https://www.ft.com/content/0151d2fe-868a-11e7-8bb1-5ba57d47eff7> [Accessed 2 Oct. 2018].

<sup>17</sup> ClimateUK (2012). A Summary of Climate Change Risks for South East England. [online] Climate South East. Available at: <https://www.arun.gov.uk/download.cfm?doc=docm93jjm4n1708.pdf&ver=1350> [Accessed 3 Oct. 2018].

<sup>18</sup> Bourke, I. (2018). A new age of extreme weather: the dangerous consequences of Britain’s heatwave. [online] Newstatesman.com. Available at: <https://www.newstatesman.com/politics/uk/2018/07/new-age-extreme-weather-dangerous-consequences-britain-s-heatwave> [Accessed 3 Oct. 2018].

<sup>19</sup> SMMT. (2018). August - EV registrations. [online] Available at: <https://www.smmmt.co.uk/2018/09/august-ev-registrations/> [Accessed 2 Oct. 2018].

	places but policy levers such as the Electric Vehicle Experience Centre in Milton Keynes, which is the first of its kind, that offer free education and advice as well as the chance to test drive a range of ULEV cars, may provide an acceleration of benefits. <sup>20</sup> The link between air quality, place-making and health is important when considering future interventions and mitigating impacts.
<p>Role of renewables</p> <p><b>Maturity:</b> Maturing</p>	<p><b>Headline:</b> <i>Wind, wave and solar power will reduce reliance on carbon derived fuels.</i></p> <p>Alternative forms of electricity generation, storage and consumption are undoubtedly having an impact on the energy market and whilst electric propulsion is commercially viable for cars and vans, small goods vehicle technology is in its infancy and HGVs even less developed. On the railways hybrid, battery and hydrogen technologies are being tested to supplement areas of electrification. Policy interventions such as planned bans on petrol and diesel road and rail vehicles will potentially accelerate renewable alternatives but growth will result in challenges to energy generation, storage and distribution networks.</p>
<p>Scarcity of resources</p> <p><b>Maturity:</b> Emerging</p>	<p><b>Headline:</b> <i>There won't be enough rare earth metals to sustain technological need.</i></p> <p>With the rise of smartphone and battery propulsion a number of commentators have speculated about the availability and cost of the constituent materials that are needed in new technology. A single tesla for example, requires about 15lbs of lithium and cheap, thin solar panels require tellurium which is one of the rarest elements on Earth.<sup>21</sup> Many companies are examining their supply chains to allow for the repurposing of batteries and other items from heavy duty to lighter duties over their lifespans as well as the recycling and reclaiming of materials. Whilst such concerns aren't unique to the Milton Keynes they will influence supply and demand for new solutions.</p>
<p>Low carbon energy</p> <p><b>Maturity:</b> Emerging</p>	<p><b>Headline:</b> <i>Adoption of low carbon energy sources reduces reliance on other geographies.</i></p> <p>A variety of low carbon energy sources for transportation are being developed, electric vehicles are described above, and hydrogen propulsion is also gaining interest and investment. Small Modular Reactors for example, similar in form to the nuclear reactors used to power submarines could power local communities and the technology is expected to be commercially available for construction within 10 years.<sup>22</sup> These alternative energy sources require changes to distribution infrastructure and delivery models which will impact mobility take-up and efficiencies.</p>

<sup>20</sup> EV Experience Centre (2018). Home - EV Experience Centre. [online] EV Experience Centre. Available at: <https://evexperiencecentre.co.uk/> [Accessed 2 Oct. 2018].

<sup>21</sup> Than, K. (2018). Critical minerals scarcity could threaten renewable energy future. [online] Stanford Earth. Available at: <https://earth.stanford.edu/news/critical-minerals-scarcity-could-threaten-renewable-energy-future> [Accessed 3 Oct. 2018].

<sup>22</sup> Hicks, M. and Miller, J. (2018). Small Modular Nuclear Reactors. PostNote. [online] London: Houses of Parliament: Parliamentary Office of Science & Technology. Available at: <https://researchbriefings.parliament.uk/ResearchBriefing/Summary/POST-PN-0580> [Accessed 3 Oct. 2018].

**Table 11 – Economic Shift**

TRENDS	IMPACTS ON ACCESS AND MOBILITY
<p>Rise of the 'gig' economy</p> <p><b>Maturity:</b> Emerging</p>	<p><b>Headline:</b> <i>People will have multiple jobs being paid for the tasks they undertake</i></p> <p>Over recent years there has been a rise in the 'gig' economy where individuals are paid for the tasks they undertake rather than being traditionally 'salaried'; it is estimated that 2.8 million people in the UK currently work within it.<sup>23</sup> This shift, which is the subject of political challenge at the moment, may result in increased trip making depending upon the location and type of 'gigs' undertaken. An obvious example is the rise in home shopping deliveries which are undertaken but white and 'grey' vans ('grey' being cars being used as vans) with drivers paid by the item. These single item short trips are impact local areas shifting what might have been walk, cycle or short car trips to commercial trips.</p>
<p>'New' business models</p> <p><b>Maturity:</b> Emerging</p>	<p><b>Headline:</b> <i>Disruptive business models will change the way businesses and markets work</i></p> <p>The rise in digital technologies has seen numerous disruptive business models emerge in everything from fast food, to holidays and hotels, to the taxi trade. For example, since February 2016 aggregator delivery companies such as Deliveroo, Just Eat and UberEats, have increased the number of takeaway orders by more than 20% in the UK.<sup>24</sup> Whilst impacts in the mobility space have been limited thus far, it is reasonable to expect further new entrants with different offers and ideas as to how mobility can be provided. Some business model solutions may be only applicable for a short period of time or adapt to provide additional functionality or services.</p>
<p>Impact of automation</p> <p><b>Maturity:</b> Emerging</p>	<p><b>Headline:</b> <i>Automation will hollow out manufacturing and administrative jobs</i></p> <p>There have been several studies and projections over the last year estimating the impacts of automation (both robotic and digital artificial intelligence) on the existing jobs market, such as PwCs analysis that up to 30% of existing UK jobs are susceptible to automation.<sup>25</sup> The next generation of robotic solutions are already displacing manufacturing and warehousing jobs and AI is undertaking decision based tasks in the financial and legal sectors. Projections estimate that these changes could be significant in some sectors, directly impact land use and associated trip making.</p>
<p>On-demand manufacturing</p> <p><b>Maturity:</b> Emerging</p>	<p><b>Headline:</b> <i>Products will be made on demand to meet customer needs on a just in time basis</i></p> <p>As an extension of the above the capabilities of 3D printing and on-demand manufacturing are rapidly increasing. Plastics, metals and even food can now be 3D printed, some products such as books are produced on demand. More than two-thirds of house-building companies in the UK are investing in industrial pre-fabrication and</p>

<sup>23</sup> Giambone Law. (2018). What Next for the Gig Economy?- Giambone Law. [online] Available at: [https://www.giambrone.com/site/library/articles/what-next-for-the-gig-economy?utm\\_source=Mondaq&utm\\_medium=syndication&utm\\_campaign=View-Original](https://www.giambrone.com/site/library/articles/what-next-for-the-gig-economy?utm_source=Mondaq&utm_medium=syndication&utm_campaign=View-Original) [Accessed 2 Oct. 2018].

<sup>24</sup> The NPD Group (2018). The unstoppable rise of the takeaway delivery phenomenon means the market is now worth £4.2 billion. [online] The NPD Group. Available at: <https://www.npdgroup.co.uk/wps/portal/npd/uk/news/press-releases/the-unstoppable-rise-of-the-takeaway-delivery-phenomenon-means-the-market-is-now-worth-4-2-billion-up-73-in-a-decade/> [Accessed 3 Oct. 2018].

<sup>25</sup> PwC (2017). Up to 30% of existing UK jobs could be impacted by automation by early 2030s, but this should be offset by job gains elsewhere in economy - Press room. [online] Pwc.blogs.com. Available at: [http://pwc.blogs.com/press\\_room/2017/03/up-to-30-of-existing-uk-jobs-could-be-impacted-by-automation-by-early-2030s-but-this-should-be-offse.html](http://pwc.blogs.com/press_room/2017/03/up-to-30-of-existing-uk-jobs-could-be-impacted-by-automation-by-early-2030s-but-this-should-be-offse.html) [Accessed 2 Oct. 2018].



	modular techniques using off-site factories for rapid production. These developments could alter the traditional movements of raw materials and products but could also lead to re-manufacturing where logistics and high-speed digital networks converge.
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**Table 12 – Political Landscape**

TRENDS	IMPACTS ON ACCESS AND MOBILITY
Devolution of decision making <b>Maturity:</b> Established	<b>Headline:</b> <i>More decisions will be made at the regional or city level</i> Devolution could have particular positive impacts where powers are granted. The Government is increasingly supportive of Sub-national Transport Bodies (STBs) such as England’s Economic Heartland as outlined in the Transport Investment Strategy and aims to ‘open up government decision making to ensure that infrastructure investment takes account of regional transport strategies’. <sup>26</sup> However transport must be considered in concert with energy, healthcare, education and other primary needs as the mobility will become facilitators (or inhibitors) to economic and social prosperity
Globalisation of markets <b>Maturity:</b> Established	<b>Headline:</b> <i>Markets will become increasingly global</i> With an increasingly global marketplace and consumer desire to have near instant access to products (including food), fast, reliable and resilient connectivity to ports and airports will be crucial. For example, in 2017, less than half of the food consumed in the UK was supplied domestically. <sup>27</sup> As conurbations expand it will be essential that those flows are kept moving, particularly in relation to food and critical health related consumables, will be essential.
Protectionism of markets <b>Maturity:</b> Established	<b>Headline:</b> <i>An increasing desire to shop and trade locally</i> Conversely there is a growing movement relating to production and consumption of products and services at a local level as part of a desire to consume ‘artisanal’ or ‘different’ products from those supplied within an increasingly global market place. These local supply chains may be small and diverse with variable supplier and customer trip making needs. Although this trend can be seen in both cities and rural areas, involving everything from start-ups in fashion to local farm shops across the UK, Milton Keynes is identified by Bira as a town with one of the lowest percentage of independent retailers in the UK at 27.5%. <sup>28</sup>

5.3.2. The rate of change of some of these trends will vary enormously from place to place and whilst some may induce significant change others will not. Many if not all on the trends described above either directly or indirectly influence the mobility agenda and decisions by communications providers, vehicle manufacturers, network operators and service providers.

<sup>26</sup> Department for Transport (2017). Transport Investment Strategy. Moving Britain Ahead. [online] London: Department for Transport. Available at: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/624990/transport-investment-strategy-web.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/624990/transport-investment-strategy-web.pdf) [Accessed 3 Oct. 2018].

<sup>27</sup> Department for Environment Food and Rural Affairs (2018). Food Statistics in your pocket 2017 - Global and UK supply. [online] GOV.UK. Available at: <https://www.gov.uk/government/publications/food-statistics-pocketbook-2017/food-statistics-in-your-pocket-2017-global-and-uk-supply> [Accessed 2 Oct. 2018].

<sup>28</sup> Bira (2017). Increase of independent openings subdued by a rise in closures - bira. [online] Bira: The Voice of Independent Retailers. Available at: <https://bira.co.uk/increase-independents-rise-closures-uk/> [Accessed 2 Oct. 2018].

## TAKING A CITIZEN AND BUSINESS CENTRIC APPROACH

- 5.3.3. Traditionally transportation has primarily considered the needs and demands of the AM and PM peak periods considering the ‘commute’ as being the key concern. With Milton Keynes aspiration that transport is an enabler to the economy it is therefore an imperative that we consider all areas where access and mobility contribute to fundamental economic and social activities, namely;
- § Employment opportunities;
  - § Educational attainment;
  - § Healthcare needs;
  - § Goods and services, retail and leisure;
  - § Raw materials, crops, products & waste;
  - § Tourism; and
  - § Social interactions.
- 5.3.4. The mobility needs of these various segments vary greatly and technology will have a role to play in meeting both digital and physical access needs to them all. By adopting a people and business centric approach to the overall needs of the transport network right through the week we can truly consider the expectations and demands placed upon it. Generational priorities will also vary between people undertaking activities in these areas and this is a key consideration in enabling mobility equity, this being of vital importance considering future economic needs and activities of an ageing population.
- 5.3.5. Considering these areas within a wider mobility agenda there will be opportunities to not only improve access and mobility through the use of technology but to also improve place-making and the built environment through careful and considered planning. The following paragraphs outline the potential mobility needs, challenges and opportunities for each of the areas listed in the context of ongoing change in Milton Keynes and enabling economic activity and growth.
- 5.3.6. **Employment Opportunities:** Access to employment, the commute, will continue to have the largest impact across all modes however ‘digital as a mode’ will have an increasing role to play in some sectors of the job market, offering the opportunity to not commute for at least part of the time although this may result in other trips making use of additional time. Between 2012 and 2016 the proportion of employees working flexi-time in the UK rose by over 12% and some projections predict that half of the UK workforce could be working remotely from 2020.<sup>29</sup> A relaxation of traditional ‘9 to 5’ working hours is already starting to result in longer ‘peak hours’ with a lengthening of the ‘shoulders’. Looking ahead working from home (or hub), virtualisation and digital collaboration will all have a role to play in providing alternatives to the commute but it will continue to be driven by the location and form of jobs which are governed by national and global trends and needs.

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<sup>29</sup> Gough, O. (2017). Half of the UK workforce to work remotely by 2020. [online] Small Business. Available at: <http://smallbusiness.co.uk/half-uk-workforce-remotely-2020-2540827/> [Accessed 2 Oct. 2018].

- 5.3.7. **Educational attainment:** Access to education is vital in equipping people with the skills they need to meet the needs of the Milton Keynes' economy. With ongoing changes in the education sector offering digital access to courses and course modules, such as through the E-Learning Platform at the Milton Keynes College the need to travel to facilities is changing. With projected changes in the jobs market due to automation and AI there will be a potential need for life-long learning with regular re-skilling becoming the norm for some people. Digital and physical access to educational opportunities will be ever more vital with particular needs for those unable to travel or in areas of lesser physical connectivity.
- 5.3.8. **Healthcare needs:** Our growing, ageing population is going to need access to quality healthcare. The number of people aged 60 or over in Milton Keynes for example is estimated to increase by 75% between 2011-2026.<sup>30</sup> There are already pressures on the social care system in terms of care provision which is providing an impetus for digital and remote healthcare provision for some conditions. The use of automation, sensors and AI in caring will help in part reduce the need for human intervention but there will still be considerable transportation needs for social, patient care and home visit needs. The role of healthcare technology and mobility solutions working collaboratively will be a key part of the solution.
- 5.3.9. **Goods and services, retail and leisure:** Reliable, resilient and timely access to goods and services (particularly food) is crucial to economic performance. The retail and services sectors have seen seismic shifts of the last two decades with the advent of home shopping (home delivery, click and collect) and digital access to services (banking, local authority services etc.). These changes have seen significant behavioural change by consumers with convenience being a key factor in decision making. Trip making has been impacted with a shift from consumer trips to retailer led trips however this revolution hasn't negated the need for people to visit 'bricks and mortar' retail establishments to browse, compare and in many cases still purchase. Retailers have recognised this trend with a move to a more 'experience' led approach where food, drink and other activities are embedded within the 'shopping' experience. Within the service sector online access has impacted the need for a 'high street' presence in many places but human interactions are still crucial for many transactions especially for those uneasy or unable to engage with online solutions. Trip making will continue to evolve particularly as retailers move to longer opening hours with ever more diverse offers. It should also be noted that the logistics industry is evolving rapidly to meet demands with 24/7 operations, locational trends and automation in warehousing impacting trip making.
- 5.3.10. **Raw materials, crops, products and waste:** Although less than 10% of Milton Keynes residents are employed in agriculture and manufacturing, the sectors are key to economic performance.<sup>31</sup> The movement of crops from field, to processing to retailers is essential in maintain food resilience (particularly in dense urban centres) and is increasing reliant on a complex supply chain extending

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<sup>30</sup> Downes, S. (2013). MK to be OAP capital of the UK. [online] Miltonkeynes.co.uk. Available at: <https://www.miltonkeynes.co.uk/news/mk-to-be-oap-capital-of-the-uk-1-5504261> [Accessed 3 Oct. 2018].

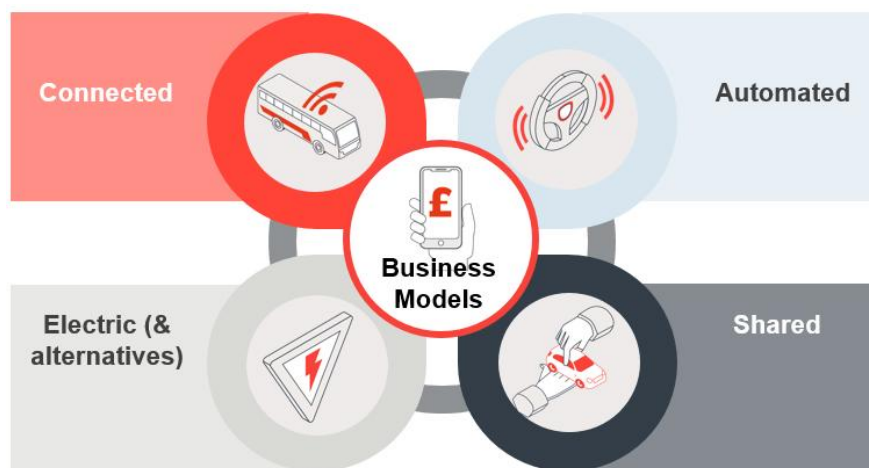
<sup>31</sup> MKInsight (2014). Milton Keynes Theme Report - 2011 Census Economic Activity in Milton Keynes. [online] Milton Keynes: Research and Intelligence, Milton Keynes Council. Available at: <http://mkinsight.org/wp-content/uploads/2016/11/DC00096-Economic-Theme-Report.pdf> [Accessed 3 Oct. 2018].

well beyond the Milton Keynes and the UK via our ports and airports. Similar manufacturing supply chains are complex bringing together remotely sourced raw materials together for product and onward transshipment. Changes in manufacturing may impact where, when and how manufacturing takes place with on-demand solutions being applicable for some low volume products. Access to a reliable and resilient network is essential in keeping supply chains, many of which operate on a just-in-time basis, functioning effectively.

- 5.3.11. **Tourism:** Tourism is an essential part of the economy. Major cities, national parks and world heritage sites attract people from across the globe. Hassle free access to tourist attractions such as Bletchley Park by all modes is vital in maintaining competitive advantage. Airports and ports in the South East provide outward journey opportunities not only for tourism but for business purposes and international connectivity is well established. How the regions network serves these needs is important and technology will have a role to play in simplifying wayfinding, ticketing and payments as well as enabling access.
- 5.3.12. **Social interactions:** It is important not to forget the inherent need for social interactions when considering mobility. The human need to be with family and friends, to share, learn and gossip is a factor that drives ad-hoc trip making. Whilst social media and digital technologies can replace face-to-face interactions, they also streamline planning, community cohesion and allow people to come together more easily than ever before. Mobility is crucial for social interaction whether it be via digital, sustainable or motorised modes.

## 5.4. MOBILITY TRENDS

- 5.4.1. As described above many mega trends are having a direct bearing on changes within the mobility sector capitalising upon technological trends that are rapidly emerging within the sector itself. In turn some of the anticipated changes and benefits with these technology trends will have wider impacts on society and the economy. We have broadly grouped these trends into 5 principles as illustrated below.



- 5.4.2. The following pages provide an overview of the primary trends in technology change that are expected over the coming decades within Milton Keynes and beyond. The rate of success with these solutions will vary, the applicability to different socio-geographic areas will also vary and the rate at which they penetrate the market has yet to be determined or fully understood. Some trends are already established in the market place but have yet to reach maturity, others are at the beginning of their gestation and ultimately deployment.



- 5.4.3. These key trends are already delivering changes through widespread commercial application, selective deployment through trials or academic and industrial research. The UK government is investing in many of the areas to encourage innovation, R&D, and enable positioning and differentiation within the global marketplace.
- 5.4.4. It should be noted that these trends are all occurring in their own right. In some use cases they are developing interdependently, in others they are not. The market is moving fast with long established and new entrants pushing the boundaries not only of technological possibility and also how they might be deployed and commercialised.

**Table 13 – Connected Technology Trends**

<b>CONNECTED – movement of data between people, other people, vehicles, assets and systems</b>	
<p>Digital connectivity is already underpinning many of our daily activities where access to communications networks (fixed or mobile) is possible. Music, video and other services are now available on the move and journey planning is readily available to all. Equipping the transportation network (road and rail) with high quality, continuous digital connectivity will aid the delivery of capacity, safety and productivity benefits. It will also provide the foundations (in some use cases) for autonomous functionality. Digital connectivity will be essential in providing the digital backbone that will allow many other innovations to be fully developed.</p>	
Rate of change	<ul style="list-style-type: none"> <li>§ Digital connectivity continues to progress with faster broadband speeds over copper and fibre connections</li> <li>§ The progression from 3G to 4G (although this is incomplete in many corridors)</li> <li>§ Emerging 5G technology and roll out to 2025, and ongoing thereafter</li> </ul>
Applicability	<ul style="list-style-type: none"> <li>§ All areas, urban, inter-urban and rural</li> <li>§ Homes, hubs, businesses and people on the move</li> </ul>
Benefits	<ul style="list-style-type: none"> <li>§ Improved safety through sharing of traffic / movement data</li> <li>§ Using 'big data' to manage supply and demand</li> <li>§ Improved productivity on the move</li> <li>§ Enhanced customer and user experience on the move</li> <li>§ Access to goods, services and activities irrespective of location</li> <li>§ Improved personal and community connectivity</li> <li>§ Reduced 'traditional' infrastructure needs (information, signals, signage etc.)</li> </ul>
Dis-benefits	<ul style="list-style-type: none"> <li>§ Cost of access / functionality precludes those with low incomes</li> <li>§ Danger of digital inequity, particularly in hard to reach and/or rural areas</li> <li>§ Potential reduction in face-to-face human interactions</li> <li>§ Resilience of digital networks, key to maintaining service</li> <li>§ No escape from always 'being connected'</li> <li>§ Dependence upon (in some cases) 3<sup>rd</sup> party communications infrastructure</li> </ul>
Interdependencies	<ul style="list-style-type: none"> <li>§ Roll out and priorities largely dictated by private companies and commercial drivers</li> <li>§ Land and access to Local Authority, Highways England and Network Rail estates to achieve full coverage in all corridors</li> </ul>

Risks	<ul style="list-style-type: none"> <li>§ Public acceptance of a ‘connected’ culture</li> <li>§ Privacy concerns and the right to ‘opt-out’</li> <li>§ Cyber security particularly in relation to payments</li> <li>§ Resilience of networks and ‘up time’</li> <li>§ Risk of underserved ‘dark’ places and areas</li> </ul>
Impetus	<ul style="list-style-type: none"> <li>§ Communications agenda driven by public expectations and met by telecommunications companies</li> <li>§ Vehicle manufacturers driving connected vehicle agenda to differentiate in the market place, to deliver bundled services (for instance infotainment) and to deliver safety benefits, but with a primary focus of increasing and sustaining sales.</li> </ul>

**Table 14 – Automated Technology Trends**

**AUTOMATED - replacement of ‘mundane’ human tasks with technology**

The automated agenda is gathering pace. Within the transport sector autonomous trains have been commercially viable for some time (Dockland Light Rail being a UK example) and advances in computing power and sensor capabilities have led to well publicised advancements in road technology. Whilst full autonomy (Level 5) may well be some way off (2030 and beyond), lower scale applications (Autonomous Emergency Braking, self-parking, lane follow/keep etc.) are available now and manufacturers are suggesting commercialisation of Level 3 vehicles (autonomy with human supervision) in the next few years. There are numerous autonomous vehicle trials in the UK including UK Autodrive trial of self-driving pods in Milton Keynes. Freight vehicle platooning trials are due to commence in 2018 on the Highways England network and autonomous ‘droids’ are delivering groceries in South London. Vehicle automation on the roads (and ultimately the railways) will significantly impact how they function and perform as well as having potential impacts on place-making and utilisation of space. Automation is also impacting other sectors, the use of Artificial Intelligence for decision making in service, financial and legal sectors could potentially see the elimination of certain types of jobs which will inevitably impact mobility needs. The use of autonomous vehicles and robotics in warehousing is helping drive the home shopping revolution and robots are being developed and deployed in many hazardous environments to improve human safety.

Rate of change	<ul style="list-style-type: none"> <li>§ The Government has stated an expectation of autonomous vehicles being on UK roads by 2021, a date confirmed by some manufacturers. However, it is likely that large scale fleet penetration will occur in the period of 2025 to 2035 and in the case of HGVs and trunk haul freight probably beyond 2035</li> <li>§ Artificial Intelligence in service industries is already starting to develop and is expected to gain pace in the period to 2025</li> <li>§ Automation and robotics in industrial applications will continue over the coming decades</li> </ul>
Applicability	<ul style="list-style-type: none"> <li>§ Pilot deployments of autonomous technologies will take place in urban areas and on the Strategic Road Network (SRN)</li> <li>§ It is likely that the first large scale autonomous deployments will be in urban areas where a commercial case can be made for the investment in vehicles</li> <li>§ Use cases will be varied however the role for autonomy on long distance journeys (SRN and Major Roads Network (MRN)) will appeal to some drivers and applications for shared transit solutions in urban and perhaps rural (where costs could be reduced) are likely to emerge.</li> </ul>

	<ul style="list-style-type: none"> <li>§ Autonomous private vehicle technology is being largely driven by vehicle manufacturers and early adopters by the enthusiastic with the means to engage, situated over a diverse geography (in a similar way to hybrid and more recently electric vehicles).</li> </ul>
Benefits	<ul style="list-style-type: none"> <li>§ Potential safety benefits (between 80% and 95% of vehicle collisions are due to human error, depending on source) as a result of autonomous systems</li> <li>§ Productivity benefits on the move (with high levels of automation)</li> <li>§ Capacity benefits once large scale fleet penetration is established</li> <li>§ Removal of humans from undesirable industrial applications</li> <li>§ Improved access to independent mobility for those currently excluded (the young, the elderly, the disabled)</li> <li>§ Improvements to the built and highway environment due to reduced need for space</li> </ul>
Dis-benefits	<ul style="list-style-type: none"> <li>§ Inequality and social exclusion due to cost of access / ownership of AVs and service models</li> <li>§ Disparity between city and non-city take-up and deployment for ‘public transport’ solutions</li> <li>§ Potential trend to sole-use vehicles and resultant increased traffic</li> </ul>
Interdependencies	<ul style="list-style-type: none"> <li>§ Some autonomous vehicle solutions are dependent upon digital connectivity, others are self-sustaining</li> <li>§ The legislative, regulatory and policy issues for wide-scale deployment are considerable</li> <li>§ Rate of development of detectors / sensors and commercial cost</li> <li>§ Public trust and acceptance</li> </ul>
Risks	<ul style="list-style-type: none"> <li>§ Safety</li> <li>§ Cyber security</li> <li>§ Pace of legislation</li> <li>§ Insurance issues and liabilities</li> <li>§ Testing and homologation</li> </ul>
Impetus	<ul style="list-style-type: none"> <li>§ The autonomous agenda (vehicular, AI and robotics) is largely being driven by commercial entities with their own agendas and needs.</li> <li>§ In the UK, Government is investing heavily in the sector with an aspiration to lead the world</li> </ul>

**Table 15 – Electric (and Alternatives) Technology Trends**

**ELECTRIC & ALTERNATIVES - *decarbonisation of energy production, storage and consumption***

Alternative propulsion systems in transport are rapidly expanding. Hybrid, self-charging and plug-in electric cars are readily available, hybrid, electric and hydrogen buses are on the UK roads and hybrid and battery trains have been tested on the rail network. Fuel cell electric vehicles (FCEV) are due to be available in the next few years and advances in LGV and HGV technologies will see wider deployment of alternative fuelled

freight. E-bike sales are also on the increase with electric bikes being used for personal and commercial cargo use, and the UK could yet experience implementation of shared e-scooter schemes observed in the US. This seismic shift away from fossil fuels, driven in part by policies such as taxation, low emission zones and the planned phasing out of petrol and diesel will lead to new infrastructure needs in terms of electricity generation, distribution and storage (particularly for high load vehicles such as freight) and in the case of hydrogen, new distribution and filling networks. Whilst the benefits are obvious there will be challenges for rapid and wide scale deployment.

Rate of change	<ul style="list-style-type: none"> <li>§ Alternative fuelled vehicles account for 4.7% of sales in 2017, a rise of 36% year in year</li> <li>§ The range of EVs will continue to expand over the period to 2025 and beyond;</li> <li>§ Hydrogen vehicles will come to market in the early 2020s but like EVs in their infancy will be dependent upon availability of re-fuelling facilities</li> </ul>
Applicability	<ul style="list-style-type: none"> <li>§ Private car EVs will be leased / bought by those who can afford them (costs are remain higher than regular vehicles) and have access to or can make access to charging facilities at home and or work</li> <li>§ Commercial fleet take up will be dependent upon duty cycles and the availability of charging infrastructure and in the case of LGV/HGV a suitably resilient grid connection</li> </ul>
Benefits	<ul style="list-style-type: none"> <li>§ Zero emissions at point of use and associated air quality improvements</li> <li>§ Reduced noise at point of use</li> <li>§ Recued maintenance cycles and consumables</li> </ul>
Dis-benefits	<ul style="list-style-type: none"> <li>§ Inequality due to cost and access to charging / fuelling infrastructure</li> <li>§ Street clutter with EV charging infrastructure</li> <li>§ Impacts on and capabilities of local electricity grids</li> <li>§ Need for new hydrogen fuelling infrastructure</li> <li>§ Taxation impacts and associated incentives</li> </ul>
Interdependencies	<ul style="list-style-type: none"> <li>§ Public perception – range anxiety etc.</li> <li>§ Home / workplace / parking charging infrastructure (until all ranges are increased)</li> <li>§ Grid capacity, capabilities and means of payment for energy used for private and commercial use cases</li> <li>§ A network of hydrogen fuelling stations</li> </ul>
Risks	<ul style="list-style-type: none"> <li>§ Public perception and take up</li> <li>§ Commercial availability – vehicles and charging / fuelling infrastructure</li> <li>§ Electrical resilience and capacity in some areas</li> </ul>
Impetus	<ul style="list-style-type: none"> <li>§ Policy move from fossil fuels</li> <li>§ Urban air quality concerns</li> <li>§ Some vehicle manufacturers capturing an early market share</li> <li>§ 'Green' credentials personal and corporate</li> </ul>



**Table 16 – Shared Technology Trends**

<b>SHARED – the sharing of services vs. traditional ‘ownership’</b>	
<p>Sharing of assets between users has been a developing and disruptive trend in transportation over the last few years. Facilitated by digital connectivity solutions match demand (customers) with supply (available assets or journeys) generally via app-based solutions. Many feature on-account payment systems streamlining the customer experience and some encourage feedback or incentivise positive customer behaviours. Shared access to mobility solutions in the form of bike hire, car hire, taxi or pooled transit and bus offer people alternatives to ‘owning’ a car particularly in urban areas where services are accessible the majority of the time. Many shared mobility solutions are blurring traditional transport modes and testing existing regulatory and other frameworks.</p>	
Rate of change	<ul style="list-style-type: none"> <li>§ There are numerous new entrants in this space and this is expected to continue over the period to 2025</li> </ul>
Applicability	<ul style="list-style-type: none"> <li>§ It is expected that shared solutions will be deployed in urban areas where large customer bases exist or people willing to share assets and services</li> <li>§ That said there is potential for shared services to tackle rural challenges with flexible, on-demand type services</li> <li>§ Shared and digital-enabled access to homes and cars will provide flexibility and support new e-commerce delivery services</li> </ul>
Benefits	<ul style="list-style-type: none"> <li>§ Provides alternative to low utilise vehicles (2nd and 3rd cars)</li> <li>§ Reduced dependency on the private car and could potentially reduce overall numbers</li> <li>§ Provides a suite of choices for different mobility needs and circumstances</li> <li>§ Provides sustainable solutions (in the case of bike hire)</li> </ul>
Dis-benefits	<ul style="list-style-type: none"> <li>§ Impact of ‘parked’ assets on the built environment</li> <li>§ Competing suppliers in some areas confuses the overall offer</li> <li>§ Ease of engagement for new or traditional customers</li> <li>§ Dependency of app-based technology may exclude some</li> </ul>
Interdependencies	<ul style="list-style-type: none"> <li>§ Smartphone and app-based access</li> <li>§ Underlying communications and data – assets, systems and customers</li> <li>§ Availability of ‘parking’ during periods of low utilisation</li> </ul>
Risks	<ul style="list-style-type: none"> <li>§ Public acceptance and trust</li> <li>§ Local regulation and licensing</li> <li>§ Demand meeting supply or vice versa</li> </ul>
Impetus	<ul style="list-style-type: none"> <li>§ The market is driving innovation with significant investment by 3rd parties</li> </ul>

**Table 17 – Business Model Trends**

<b>BUSINESS MODELS – <i>new consumer models of access, consumption and payment</i></b>	
<p>With the trends above disrupting the traditional models of booking, paying for and access transport and mobility new business models are starting to emerge offering improved customer choice, flexibility and experience. Largely driven by underlying data aggregation such solutions not only simplify ticketing but also proved tailored and personalised travel information. In addition, bundled energy generation and storage solutions are being offered with new electric vehicles offering a completely different mobility model.</p>	
Rate of change	<ul style="list-style-type: none"> <li>§ New models are emerging, it is expected that some of these will be commercially mature in the period to 2025</li> </ul>
Applicability	<ul style="list-style-type: none"> <li>§ It is expected that new business models are likely to be most relevant to the urban and inter-urban markets particularly into the city regions</li> </ul>
Benefits	<ul style="list-style-type: none"> <li>§ Truly seamless and integrated access to a choice of mobility solutions</li> <li>§ On account, single payment across multiple (or ultimately all) modes</li> <li>§ Improved operator understanding of customer choices</li> <li>§ Potential ability to balance supply and demand across all modes</li> </ul>
Dis-benefits	<ul style="list-style-type: none"> <li>§ Public acceptance and willingness to use</li> <li>§ Privacy and data concerns</li> <li>§ Cyber security and fraud</li> </ul>
Interdependencies	<ul style="list-style-type: none"> <li>§ Digital communications and energy networks</li> <li>§ Open access to fares, timetable and other data</li> <li>§ Access to banking and payment systems</li> </ul>
Risks	<ul style="list-style-type: none"> <li>§ Consistency of deployment</li> <li>§ Ease of use for customer and subsequent uptake</li> <li>§ Willingness of operators to engage</li> </ul>
Impetus	<ul style="list-style-type: none"> <li>§ From private sector mobility disruptors looking to offer something new</li> <li>§ From local authority promoters looking to improve public transport uptake</li> </ul>

5.4.5. Transportation in all its guises is likely to go through considerable change over the coming decades. It is impossible to predict with any degree of certainty when and where these changes will first occur, whether they will ultimately be successful and how long they will take to become the norm. What is clear though is that significant amounts of investment are being made in both the private and public sectors to examine the potential impacts, challenges and opportunities so that networks and services are ‘future ready’.

## 5.5. MODELS OF NEW MOBILITY

- 5.5.1. There are a number of emerging models of mobility which combine many of the technology aspects described above to provide access to existing services, new forms of mobility or entirely new propositions. Some of these models could impact traditional modes of transport, some could supplement them.
- 5.5.2. The market is extremely fluid and there are numerous tech start-ups and investments being made in a whole host of potential mobility solutions for both people and goods. It should be noted that not all of these models will be applicable to the needs of Milton Keynes or indeed acceptable to people or businesses.
- 5.5.3. Similarly, within the context of Milton Keynes future vision, the council could determine that there are certain solutions which it positively wishes to encourage or discourage. The main models of new mobility are outlined in Table 18 below.

**Table 18 - Main Models of New Mobility**

MODEL	OVERVIEW
<b>Mobility as a Service (MaaS)</b> <i>UK example:</i> Whim in Birmingham	MaaS is the integration of multi-modal public and private sector mobility services, delivered through one or more digital platforms. It incorporates travel information, payments, reservation of on-demand/demand responsive modes and/or authentication. MaaS is designed to enable customers to seamlessly access and consume mobility services to undertake end-to-end journeys in accordance with quality, cost and time preferences.
<b>Ride Sharing</b> <i>UK examples:</i> BlaBlaCar, Liftshare	Ride Sharing schemes match drivers and passengers making similar regular or one-off trips. Drivers and passengers register their available / desired trips via a website or app and the service matches logical pairings. Ride Sharing platforms operate at both individual and / or corporate level the latter having the potential to provide significant benefits for large companies where large numbers of employees are travelling to similar locations on similar working or shift patterns.
<b>Ride Sourcing</b> <i>UK examples:</i> Uber, Gett, Arriva Click, Chariot, Citymapper and Slide	Ride Sourcing matches customers with available rides provided by taxis and buses using a variety of operating models. Generally, app based, Ride Sourcing services enable the real-time identification of trips with payment on account via pre-approved payment methods. Ride Sourcing has impacted traditional private hire taxis where previously users would have to phone to book a trip. New entrants, such as Uber, have impacted the trade dramatically in some places. Public transport variants provide users with instant access to on-demand bus services - commonly "Microtransit" minibuses comprising fewer than 16 seats (and therefore being classified as a Private Hire Vehicle in some places) - which provide tailored trips within a defined area or corridor.
<b>Car Sharing</b> <i>UK examples:</i> Zipcar, DriveNow	Car Sharing is the digital evolution of traditional car hire. Rather than going to a specific location to hire a vehicle (cars and vans), they are available at fixed or variable parking locations and are booked, paid for and located via an app based system. Car Sharing schemes provide flexibility for users through variable duration bookings (in some cases by the minute) and access to a variety of vehicles (small, large, electric, ICE). Car Sharing can provide a viable alternative to car ownership and is particularly applicable in urban areas where parking may be unavailable or at a price premium.

<p><b>Bike (and Scooter) Sharing</b></p> <p><i>UK examples:</i> Santander (docked bikes), Mobike &amp; Ofo (dockless bikes)</p>	<p>Bike Sharing schemes, such as the Santander Bike Hire, are well established in the UK including in Milton Keynes. These schemes offer users access to hire bikes generally within urban locations either on-account or via one-off payments. Recent innovations have seen a move from infrastructure heavy 'docked' solutions where bikes must be picked up and returned to fixed locations to 'dockless' schemes where bikes can be picked up and dropped off almost anywhere within defined (including geo-fenced) areas. Whilst not currently approved in the UK a number of Scooter Sharing schemes are in operation in other countries offering an alternative to bike share.</p>
<p><b>Last Mile Logistics Autonomy</b></p> <p><i>UK examples:</i> Amazon Drone trial, Starship</p>	<p>Last Mile Logistics Autonomy brings automated technologies to the last mile distribution sector. A variety of small and large-scale pilots are underway using footway based devices (small automated vehicles with small payloads) and drones (automated vertical lift off and land aircraft with small or medium payloads). Automated vans could give rise to a revolution in home delivery and some hybrid concepts envisage vans and pavement devices / drones operating as a unified system.</p>
<p><b>Trunk Haul Freight Autonomy</b></p> <p><i>UK examples:</i> Planned UK platooning trials</p>	<p>The role of autonomy in the trunk haul freight sector ranges from digital platooning where technology systems link vehicles into a virtual 'road train' with the lead driver undertaking the 'driving' through to fully automated trucks navigating partial or whole routes without human intervention. These technologies are all in their infancy but numerous trials have been undertaken and are underway in various countries to prove the technology and the underlying use cases.</p>

## 5.6. TRAJECTORIES OF CHANGE IN MILTON KEYNES

5.6.1. Considering the above potential changes in the future mobility realm it is important to consider the fact that for many years Milton Keynes has led the way in the UK and continues to be at the cutting edge in respect of many potential technological solutions. The Council's investments and forward thinking coupled with the presence of the Transport Systems Catapult, and the city's proximity to the centres UK automotive research have provided the conditions for innovation

5.6.2. The following pages provide an overview of the broad trajectories of change within the primary pillars of future mobility as well as a commentary on the emerging models.

### CONNECTED

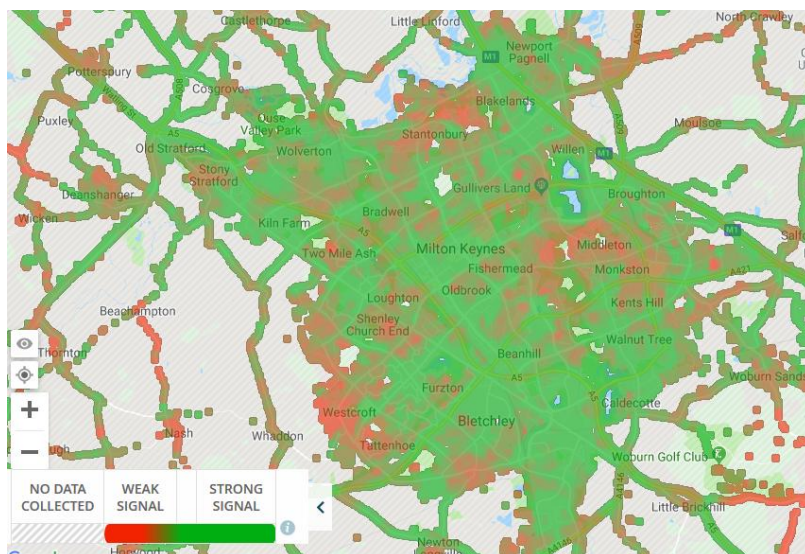
5.6.3. Like many places in the UK Milton Keynes has seen significant investment in its digital communications over recent years. Future combinations of 4G, 5G and broadband connectivity will provide the foundations for many technologies and associated services which will gather pace over the coming years.

5.6.4. The following map provides an overview of 4G connectivity across the city with green denoting strong signal and red weak. It should be noted that whilst mobile connectivity overall is very good that are still patches where signal is weak potentially being a future restriction.

5.6.5. Whilst next generation 5G is being explored in various geographies at the moment it is more infrastructure heavy and potentially, certainly in the early days, costly.



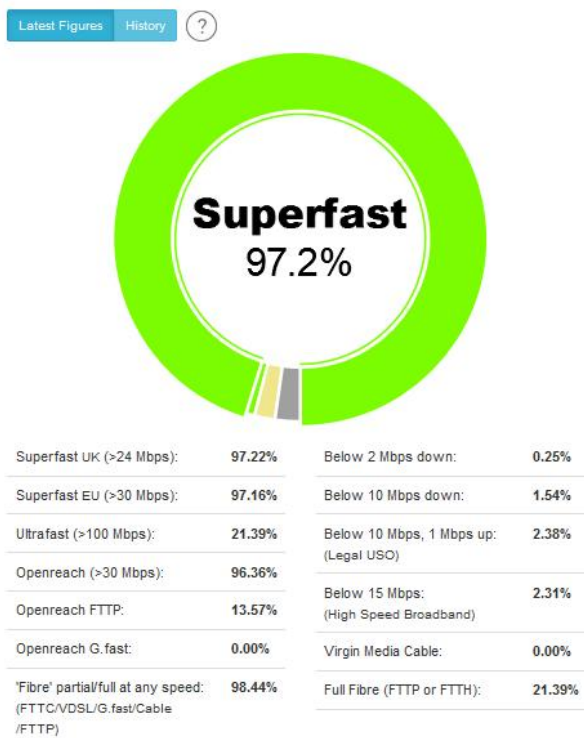
**Figure 48 – 4G Network Coverage**



Source: <https://www.which.co.uk/reviews/mobile-phone-providers/article/mobile-phone-coverage-map> retrieved Oct. 2018

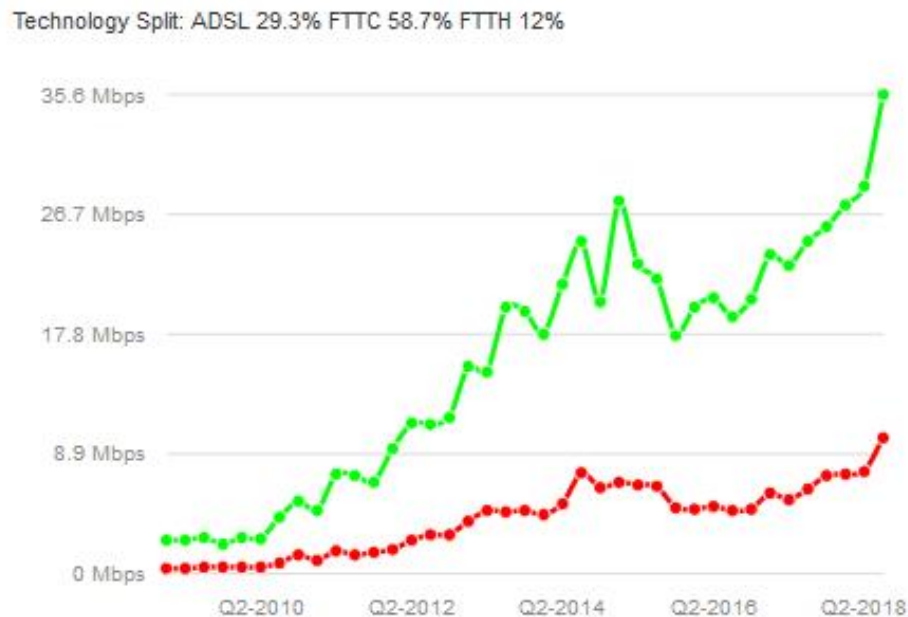
5.6.6. With regards to broadband coverage Figures 49 and 50 provide a current snapshot of current broadband speeds with over 97% of residencies current experiencing superfast speeds of over 24Mbps and 21% over 100Mbps (ultrafast). The Figure 50 shows the split between types of delivery between ADSL – broadband, FTTC – Fibre to Cabinet and FTTH – Fibre to Home with over 70% of addresses having some form of fibre connection.

**Figure 49 – Percentage of Residents Experiencing Superfast Broadband Speeds**



Source: <http://maps.thinkbroadband.com/> retrieved Oct. 2018

**Figure 50 – Types of Broadband Delivery**

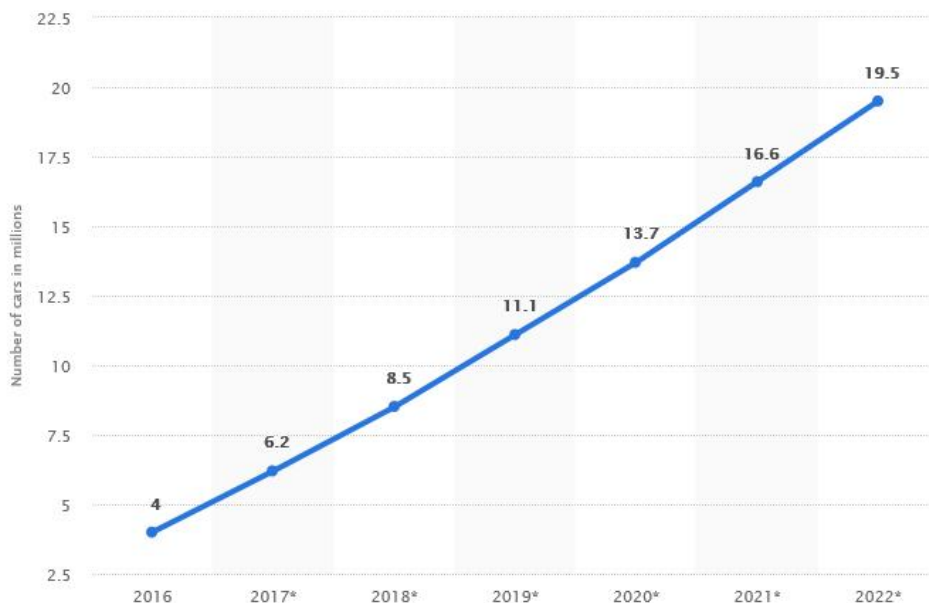


. Source: <http://maps.thinkbroadband.com/> retrieved Oct. 2018

- 5.6.7. Fast, reliable and resilient digital connectivity will be essential in the home, businesses and centres of education and healthcare to enable new access models to services both physically and digitally. Digital connectivity coupled with Internet of Things (IoT) devices could be a major element in catering for an ageing population. The Connected MK programme provides advice for residents and businesses as to how they can capitalise on digital assets to enable home, remote and satellite working.
- 5.6.8. The MK:Smart initiatives' MotionMap app is providing travellers with information on how busy an intended destination is and the transport options available. Its functionality provides the foundations for Mobility as a Service type offerings using time, price and availability data to provide users with travel recommendations.
- 5.6.9. With regards to vehicle connectivity many new models of cars, vans, trucks and buses are now equipped with always-on digital connectivity allowing them to share and receive data on the move. The ability to link vehicles to networks and to each other provides potential benefits in terms of network operations and safety as well as providing enhanced customer and user experience.
- 5.6.10. Recent trials as part of the UK Autodrive programme in Milton Keynes have used V2X (vehicles to everything) connectivity to test innovations such as Electronic Emergency Brake Lights, Emergency Vehicle Warnings, Intersection Collision Warning, In-Vehicle Signage, Green Light Optimal Speed Advisory and Intersection Priority Management.
- 5.6.11. These innovations, if adopted at scale could help maximise performance of the local road network and when coupled with other sensors and IoT devices provide for a truly smart city approach. More than 2000 sensors have already been installed across Milton Keynes with around 1800 oversee car parking spaces and a further 500 monitoring traffic junctions – together providing new insights into asset use and performance.

5.6.12. The Figure 51 provides a projection of anticipated uptake of Connected Vehicle technology between now and 2022 reflecting a normalisation of the technology in new vehicles.

**Figure 51 – Predicted Uptake of Connected Vehicle Technology**



Source@ Statista (connected cars 2016 to 2022):

<https://www.statista.com/statistics/523800/digital-market-outlook-total-number-of-connected-cars-in-the-uk-statistic/>

## **AUTOMATED**

5.6.13. Milton Keynes has been at the centre of the automated / autonomous agenda in the UK. In November 2016 the UK Autodrive commenced marking the start of an ambitious three-year trial of connected and autonomous vehicle technology. One of three projects to have emerged successfully from the UK government’s ‘Introducing Driverless Cars’ competition, UK Autodrive has carried out on-road trials in Milton Keynes and Coventry, using cars provided by project partners Ford, Jaguar Land Rover and Tata Motors European Technical Centre. The programme has also trialled a fleet of lightweight, self-driving ‘pods’ on pavements and other pedestrianised areas within the city.

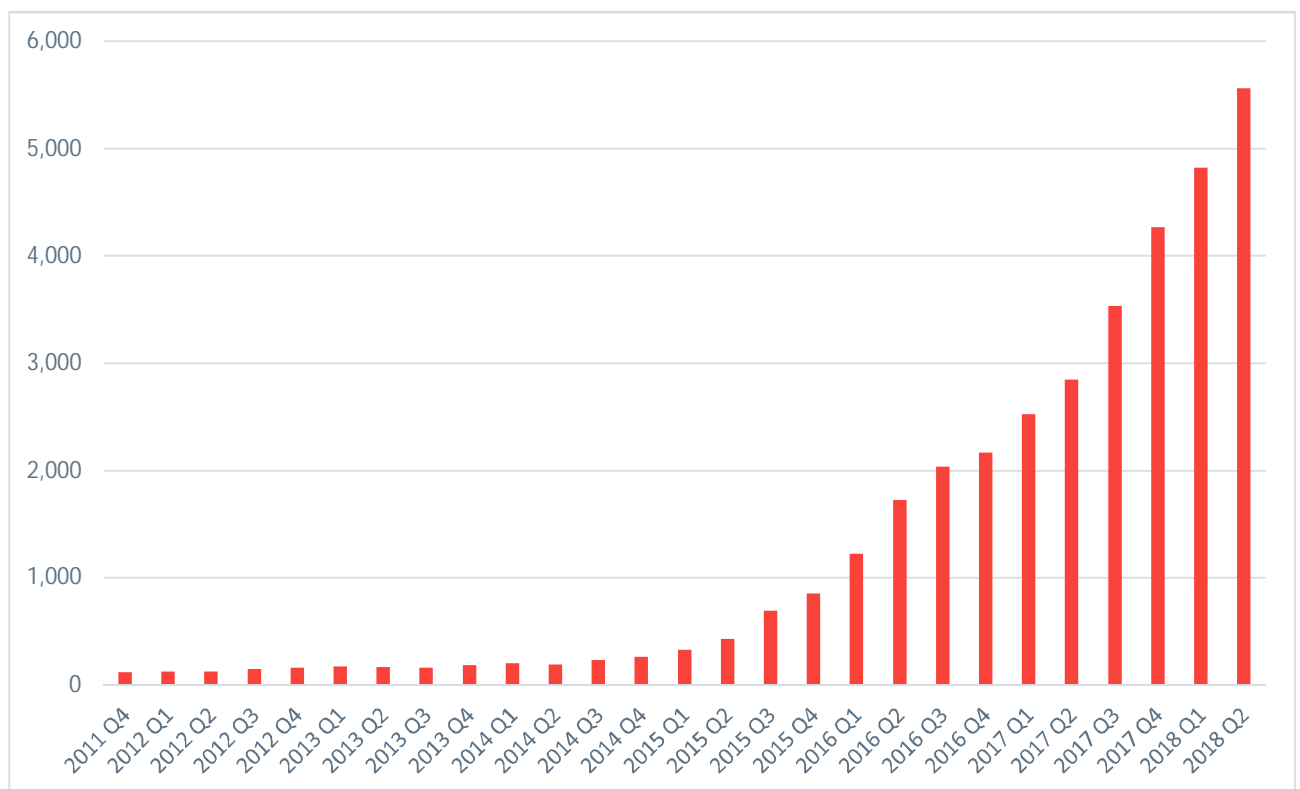
5.6.14. The UK Autodrive project is drawing to a close with a series of reports, including the final project report, final legal and insurance white papers and the final research papers from the Cities Research programme (examining changes in public attitudes towards the technology, the scalability of self-driving vehicle technology and the possible effect that self-driving vehicles might have on congestion levels). As well as looking back on the learnings of UK Autodrive, these reports are also intended to provide guidance and direction for future research and development as connected and autonomous vehicles move closer to the mainstream.

- 5.6.15. As part of the programme Aurrigo, the autonomous vehicle division of RDM Group, has been working with Milton Keynes Council to test a new first/last mile transport solution for local people, shoppers and visitors to the town. A fleet of pods capable of travelling up to 15 miles per hour with a range of 60 miles have been operating from Central Station to Campbell Park and Silbury Boulevard to Avebury Boulevard.
- 5.6.16. A further milestone was reached in October 2018 when demonstrating the world’s first ever multi-connected autonomous ‘swarm’ fleet of vehicles acting intelligently as one.
- 5.6.17. In April 2018, Starship Technologies teamed up with the Co-op to launch a robot delivery service in the Monkston residential area of the city. Using an app, residents can order from a choice of 250 commonly used items in the shop and have their purchases delivered to their door by a pavement device (or robot). The fleet of 12 robots have been reported as breaking a number of world records including one for the greatest number of orders ever documented in a single day.

### ELECTRIC (AND ALTERNATIVES)

- 5.6.18. The electrification agenda is gathering pace right across the UK but few places have seen as dramatic an uptake as Milton Keynes. Figure 52 illustrates new eligible vehicles under the plug-in car/van initiative registered in Milton Keynes from the end of 2011 to date. Over the last year an additional 2,715 plug in EV cars and vans have been registered in Milton Keynes with the current overall fleet of 5,558 vehicles representing 3.5% of the UK total.

**Figure 52 – Plug-in car/van Initiative vehicles registered in Milton Keynes**

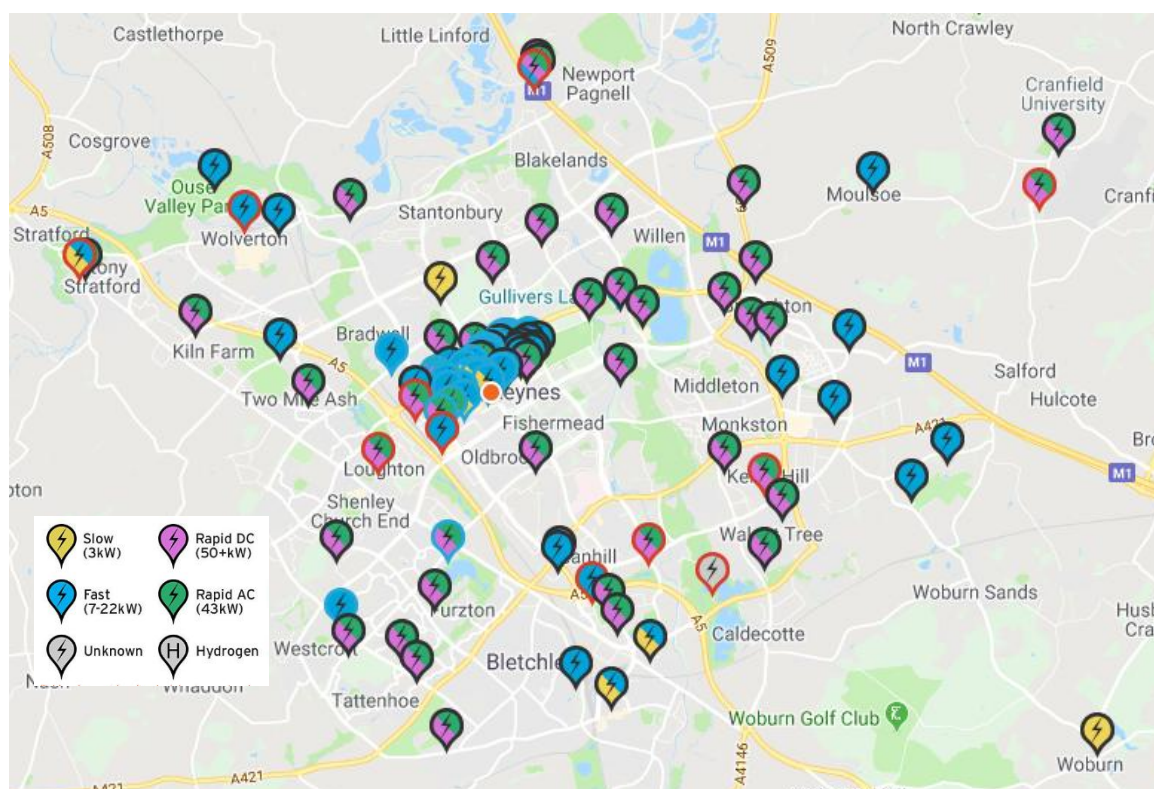


Source: DfT, VEH 0131, Q2 2018 registered new vehicles, Milton Keynes UA



- 5.6.19. Unlike many other areas in the UK, Milton Keynes has seen sustained investment in its electric charging infrastructure providing the ideal conditions for an influencing of the local fleet. Milton Keynes has 300 7kW fast chargers, and 56 rapid chargers which is expected to shortly rise to 64. In addition, an electric vehicle charging station is expected to open soon close to M1 junction 14 featuring eight rapid chargers (50kW) capable of charging a vehicle in around 20 minutes and four superchargers (350kW) that can charge a vehicle in five minutes, another centrally located charging station is being planned.
- 5.6.20. Figure 53 provides an overview map of electric charging facilities and illustrates the density of infrastructure within the city core but also shows the spread around suburban Milton Keynes.

**Figure 53 – Electric Vehicle Charging Facilities Milton Keynes**



Source: Zip Map EV Infrastructure <https://www.zip-map.com/live/> accessed October 2018

- 5.6.21. The unique Electric Vehicle Experience Centre within the centre:mk shopping centre, it's a brand-neutral showroom, providing the public free advice about EVs, the opportunity for free 20-minute test drives, and the longer-term loan of a vehicles for four or seven days. It's fleet of 50 is provided by seven manufacturers: Kia, Renault, BMW, Volkswagen, Volvo, Mitsubishi, and Nissan and refreshed every six months. The centre was set up with funding from the Government's Office for Low Emission Vehicles under a five-year deal and is operated by Chargemaster which also has the council's contract to manage the city's electric vehicle charging points.
- 5.6.22. The first charging point delivered under Milton Keynes Council's 'MK Promise' scheme has recently been installed for use by residents of Wavendon House, a Grade II\* listed former outpost of Bletchley Park. The MK Promise initiative allows local residents to apply for a charging point to be installed free of charge by the council if they do not have private off-street parking, such as within their own driveway.

- 5.6.23. Milton Keynes is also home to a fleet of eight electric buses which operate on the 7 route in the city running seven days a week. The operation is unique in the UK in that it uses inductive charging at the terminus points to 'top up' batteries as vehicles wait between services. It has been estimated that the service is removing approximately 500 tonnes of tailpipe CO2 emissions per year and 45 tonnes of other tailpipe emissions.

### **SHARED**

- 5.6.24. With regards to the sharing agenda the single largest service is the Santander Cycles bike sharing scheme, operated by Next Bike, which has 300 cycles and 40 docking stations across the City providing turn-up-and-go cycle hire.
- 5.6.25. Milton Keynes Council supports car sharing with a permit scheme providing discounted parking rates for those central Milton Keynes employees who car share."
- 5.6.26. Back in 2012 Wolverton, north of Milton Keynes was the first UK community chosen for an electric car club deployment. Hertz launched an electric car club in Milton Keynes back in 2013 using a fleet of Nissan Leafs and eCar provides access to a Renault Kangoo in the City.
- 5.6.27. Uber are providing app based taxi services within the city as well as their Uber Eats service and Virgin Trains recently ran a trail offering Uber trips to and from the railway station as part of an integrated ticketing approach.
- 5.6.28. Liftshare and BlaBlaCar, who both match drivers and passengers, both are active in Milton Keynes.

### **BUSINESS MODELS**

- 5.6.29. With regards to how people pay for an access mobility / transport services the landscape in Milton Keynes is relatively traditional with the exception of two key developments;
- § The Ringo pay-by-phone app provides app-based access to pay for parking across the city, simplifying payment, the booking or permits (residential and business). The service also provides real time information with regards usage which helps reduce the 'hunting' normally associated with parking.
  - § MK Move is the city's multi-trip bus ticket providing users with day, 7-day and 4-week ticketing options issued on vehicle and in travel centres. Whilst the system is paper based it offers users multi-operator access.
- 5.6.30. It is also understood that the newly awarded Milton Keynes Council parking contract is going to open up the selling of council operated parking spaces.

### **UPTAKE OF MOBILITY MODELS**

- 5.6.31. Table 19 provides a commentary of the potential uptake of new and emerging mobility models over and above that described above;

**Table 19 – Potential Uptake of New and Emerging Mobility Models in Milton Keynes**

<b>MODEL</b>	<b>MILTON KEYNES DEVELOPMENTS</b>
<b>Mobility as a Service (MaaS)</b>	The Mobility Strategy makes specific reference to MaaS under its 'Maximising Travel Choices' objective and it is understood that discussions are underway with a MaaS operator with a view to a 2019 launch.
<b>Ride Sharing</b>	Whilst Liftshare and BlaBlaCar and both active in Milton Keynes and the city's car share scheme provides annual parking for £130 per year, there isn't as yet an integrated solution.
<b>Ride Sourcing</b>	Ride sourcing is still in its early stages with Uber taxis. On demand, app driven bus services such as Arriva Click, Citymapper, Ford Chariot or RATP Slide haven't as yet been launched in Milton Keynes. With autonomous vehicles being at the heart of innovation in the City it is conceivable that shared AV services (for city, urban and edge of urban operations) could be implemented earlier than elsewhere.
<b>Car Sharing</b>	Commercial car sharing schemes are currently limited in Milton Keynes and it is unclear as to whether peer to peer services (such as Hiyacar) or any fractional ownership models have been adopted locally.
<b>Bike (and Scooter) Sharing</b>	Bike sharing through the Santander (docked) scheme is well established. Lime electric dockless bikes have started a trial in the city in December 2018. Whilst shared scooters aren't presently street legal in the UK should that change, an expectation could build to capitalise on the segregated infrastructure.
<b>Last Mile Logistics Autonomy</b>	As described above the Starship delivery programme is underway and has received positive press feedback. Whilst Amazon's first drone delivery trial was undertaken in nearby Cambridgeshire there aren't any current plans for local deployments.
<b>Trunk Haul Freight Autonomy</b>	Trunk haul autonomy trials are ongoing under the DfT platooning programme on the Strategic Road Network.

## 5.7. PLAUSIBLE FUTURE SCENARIOS FOR MILTON KEYNES

- 5.7.1. To date, scenario planning for future mobility has largely consisted of selecting two primary drivers of change for any given area to provide the basis of a four-box scenario model with high / low extremes. The limiting factor with such an approach is that only two drivers can be used and the approach provides only for distinct and relatively blunt scenarios.
- 5.7.2. Other geographies have tended to focus on energy, automation or digitisation but with Milton Keynes having already adopted new technology within its Mobility Strategy and the First Last Mile Strategy and already being well progressed within the agenda an alternative, more directly applicable and importantly plausible approach is suggested.

- 5.7.3. We consider the following to be the key, current drivers which will influence future mobility for Milton Keynes, drivers which if used in various combinations could provide for a number of plausible scenarios for the City;
- § **Public acceptance of automation** – public willingness to engage with and use automated and autonomous technologies and vehicles could be key to unlocking improved mobility for those that do not wish to own vehicles, cannot drive or have disabilities. Whilst there is significant investment being made in such technologies a willing public will be an imperative to widescale use.
  - § **Rate of uptake of electric propulsion** – the transition from diesel / electric is underway for cars and vans, is in its early stages for light goods vehicles and buses and in its infancy for heavy goods vehicles. The comparative costs versus traditional fuels will be key to uptake as will the ability to recharge at home, place of business, at depots or destinations. Whilst range anxiety will become less of an issue over time there will still be a need to park and charge vehicles which could impact parking needs and kerb space, particularly when supported by new payment models for EV charging.
  - § **Public willingness to share assets / vehicles** – whilst the public are used to sharing public transport the emerging models of mobility may allow them to share their own or pool cars, share single journeys with others and share assets such as bikes and scooters. Differences in generational response may be a key driver in this field with the young perhaps not being wedded to traditional models of ‘ownership’ particularly with regards to the private car. With the rise of personal leasing, fractional and other ownership models coming to the fore the private, personal fleet could well decrease being replaced with private, shared, and highly utilised vehicles.
  - § **Balancing walking / cycling with powered modes** – whilst new models of mobility may be attractive, may unlock access and mobility for those previously excluded there is an inherent danger that walking and cycling are replaced by personal and other mobility solutions. Given Milton Keynes’ permeable nature and its existing infrastructure there will be a need to balance sustainable with powered (in whatever form) modes.
  - § **Openness and digitisation of the city and its assets** – a digital representation of the city provides a platform for digital-enabled mobility innovations. Today’s parking booking and management systems while already sophisticated are evolving into kerbside management products as operators look to code highway sections with the relevant usage restrictions. The implications are significant as a future with AVs will also require a digitised roadway as part of an HD map governing road rules.
- 5.7.4. Full scenario planning is outside the scope of this study, but we suggest the following could be plausible scenarios within which to consider future infrastructure needs. These provide two radical futures (1 and 2) and an extension of current trajectories (3);
- § **Scenario 1: Sustainable MK** – a focus on walking and cycling (human powered and e-bike) for all purposes including deliveries, supplemented by publicly accessed services including some AV and shared assets / solutions for the most socially excluded groups
  - § **Scenario 2: Autonomous, seamless and shared MK** – capitalising on all forms of electric autonomous vehicles to providing digitally enabled, seamless, shared door to door trips for across the growing city, with private and public access
  - § **Scenario 3: Mobility choices MK** – providing a variety of personal, private and shared transport solutions which recognises the city’s unique highway capacity, layout and assets



These scenarios could lead to significantly different fleets on the roads of Milton Keynes, which vehicles being used in new and innovative ways all of which could potentially increase or decrease congestion.

5.7.5. Each of these scenarios could provide a framework within which to consider future interventions and to assess their suitability in meeting future outcomes as well as addressing perennial network and other concerns. The following provides an overview of the potential impacts of new mobility models and technologies;

- § **Congestion** – the sharing of vehicles could lead to reduction in private vehicle miles driven but with a corresponding increase in fleet miles. The worst-case scenario exists in an era of cheap, single occupancy vehicles used all forms of movement which could worsen network congestion.
- § **Air quality** – with a move to electrification local air quality could improve significantly, the speed of uptake will be dependent upon cost and availability of infrastructure but could take decades considering vehicle fleet renewal rates and availability for heavy duty use cases such as HGVs
- § **Network capacity** - it has been suggested by some that during the transition to full autonomy over the coming decades that highway capacity could worsen due to a mixed fleet being unable to fully realise the promised benefits.
- § **Journey time reliability** – with a move towards a digitally connected and automated network it is theoretically possible to provide for more reliable journeys through real time and predictive analysis and control. Such measures though will be dependent upon large scale equipping of the fleet which will take time to occur.
- § **Mass rapid transit** has the potential to contribute to all scenarios, providing for emission free trunk haul transit within a sustainable MK, potentially being part of an integrated autonomous future and providing MK residents with a new choice of fast connectivity between key centres.
- § **Managing supply and demand** – taking an eco-system approach to mobility (private and public, for all modes) under a Mobility as a Service model it will become possible to balance supply and demand across all networks to manage mobility for Milton Keynes' needs. With other measures to manage access and encourage behaviours it may be possible to manage transportation in a holistic manner.
- § **Land Use planning** - the impacts of future mobility will require an advancement of the traditional development planning control process and future-proofed design considerations. New policy approaches to land use planning will recognise a more accurate and real-time accessibility index (e.g. trip rates, modal share), allow for flexible design of the urban realm and could potentially invigorate new areas for development.
- § **Digital infrastructure needs** – digital infrastructure will be an essential part of many of the technology solutions and many of the future mobility models. How mobility based digital needs are balanced with wider personal and business needs will need careful consideration.
- § **Energy requirements** – with a move to electrification both with the mobility / transport sector and across the built environment the energy needs of future Milton Keynes will need detailed consideration. The balancing of capacity on the grid with local generation, storage and use will be part of considering how a future mobility eco-system works.
- § **Redundancy of assets** – finally there is an inherent danger that infrastructure becomes redundant especially if linked with proprietary solutions or business models.

5.7.6. We suggest that future mobility needs to be considered in the round, linking it to the needs of citizens and business and recognising its interconnectivity with support assets and networks. This can be summarised as follows;



## 5.8. SUMMARY

- 5.8.1. Through the Mobility and First Last Mile Strategies, Milton Keynes has the local building blocks to build upon the national foundations already being actively established in the future mobility agenda. The trajectories of change and rates of adoption are uncertain, but with a focused approach to a number of plausible scenarios it may be possible to anticipate changes and plan accordingly.
- 5.8.2. Future mobility trends and models should be considered as part of the infrastructure planning process recognising that it represents only an end state and the problems of today and the problems we anticipate in the near term still need addressing.

## 6. SUMMARY AND CONCLUSIONS

### 6.1. EVIDENCE BASE

6.1.1. A wide range of evidence has been reviewed in this report to demonstrate our understanding of the existing and future transport challenges and opportunities facing Milton Keynes along with the potential future societal and technology trends. A summary of the key findings is provided below.



Milton Keynes is strategically located at the heart of the Cambridge-Milton Keynes-Oxford growth corridor and has an important role to play in delivering housing and economic growth in this nationally important corridor.



Milton Keynes has performed well in delivering housing and employment growth resulting in the largest economy within the Cambridge-Milton Keynes-Oxford growth corridor. The spatial typology of Milton Keynes, including low density housing estates, high capacity grid road network and plentiful car parking have proved popular with local residents, visitors and workers alike.



The grid road network combined with cheap and plentiful parking has encouraged a high car dependency for trips within and into Milton Keynes. The continued growth in car travel demand has resulted in congestion at a number of pinch points and increasing demand for car parking in central Milton Keynes at peak times



Public transport, although increasing in popularity, has struggled to provide an attractive alternative to the car. The existing radial, fixed route bus offer into central Milton Keynes does not offer an attractive service to the dispersed employment locations and residents in low density housing estates and rural locations.



Active travel by residents and workers in Milton Keynes is low despite a comprehensive Redway segregated walking and cycling network. There are a number of factors contributing to the low uptake of walking and cycling including concerns over safety in using the segregated routes, poor maintenance, lack of consistent wayfinding, indirect routes which are unattractive to commuters and the ease of local travel by car.



Milton Keynes has a high level of self-containment which provides the opportunity for modal shift if attractive alternatives to the private car can be developed and implemented. To support the ambitious planned and long-term growth plans, investment will be required in a range of parking, highway, public transport and active travel infrastructure to encourage modal shift to accommodate a substantial increase in travel demand. Infrastructure improvements are also required to maximise the benefits from East West Rail and the Cambridge-Oxford Expressway.



Over the Local Plan period, technology will have an increasingly important role to play in encouraging new forms of mobility. Milton Keynes Council has a strong appetite in supporting the development and implementation of innovative transport technologies including encouraging the uptake of electric vehicles and investigating the potential for demand responsive public transport and Mobility as a Service business models.

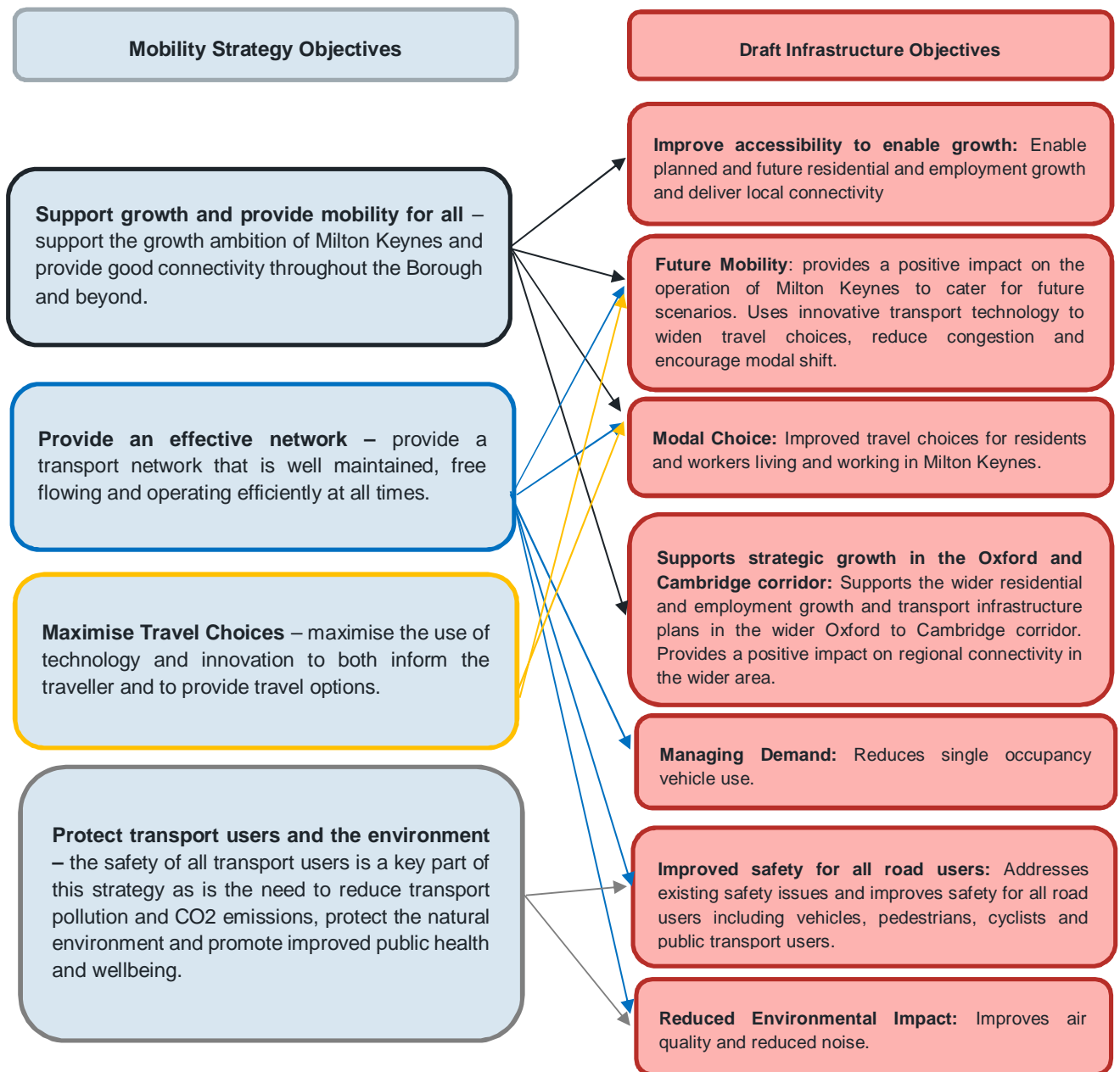


There are substantial opportunities in Milton Keynes in the short term for encouraging a switch to low emission and electric public and private vehicle use, given the spatial typology of the urban area. In the medium to long term there could be substantial opportunities to encourage the update of active travel and public transport, depending on a number of factors including societal changes (sharing), technology uptake (demand responsive public transport, autonomous public transport), level of infrastructure investment (high quality and direct walk and cycle routes, bus priority measures), parking restraint/controls and the land-use planning strategies.

## 6.2. INFRASTRUCTURE OBJECTIVES

- 6.2.1. The next stage of the project involves identifying a long list of infrastructure schemes that can address the identified issues. This long list will then need to be appraised against an agreed set of **infrastructure objectives** and **potential future mobility scenarios to produce a prioritised short list of schemes** that will be incorporated in the TIDP.
- 6.2.2. An important element of appraising the long list is the developed and refined of the infrastructure objectives. A DRAFT set of objectives is providing in Figure 54. These have been developed from the evidence base review and mapped against the Mobility Strategy Objectives. The DRAFT objectives will be developed and refined in Stage 2 of the study in consultation with the project team and stakeholders.

**Figure 54 – Mobility Strategy and Draft Infrastructure Objective Mapping**

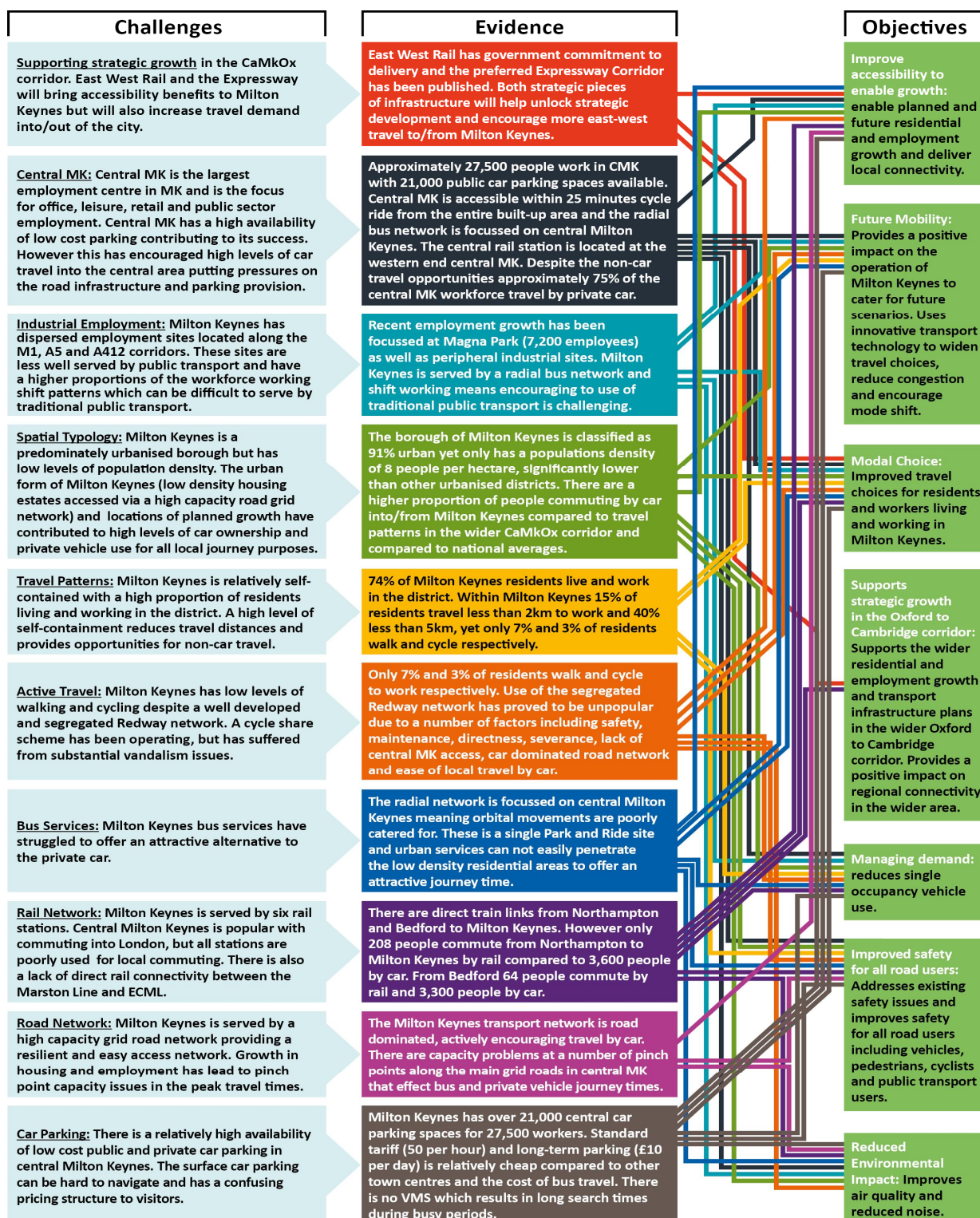




## 6.3. SUMMARY

6.3.1. Figure 55 provides an overall summary of the main transport challenges, the supporting evidence base and the DRAFT infrastructure objectives identified in this report.

**Figure 55 – Evidence Base Summary: Transport Challenges, Evidence and infrastructure Objectives**

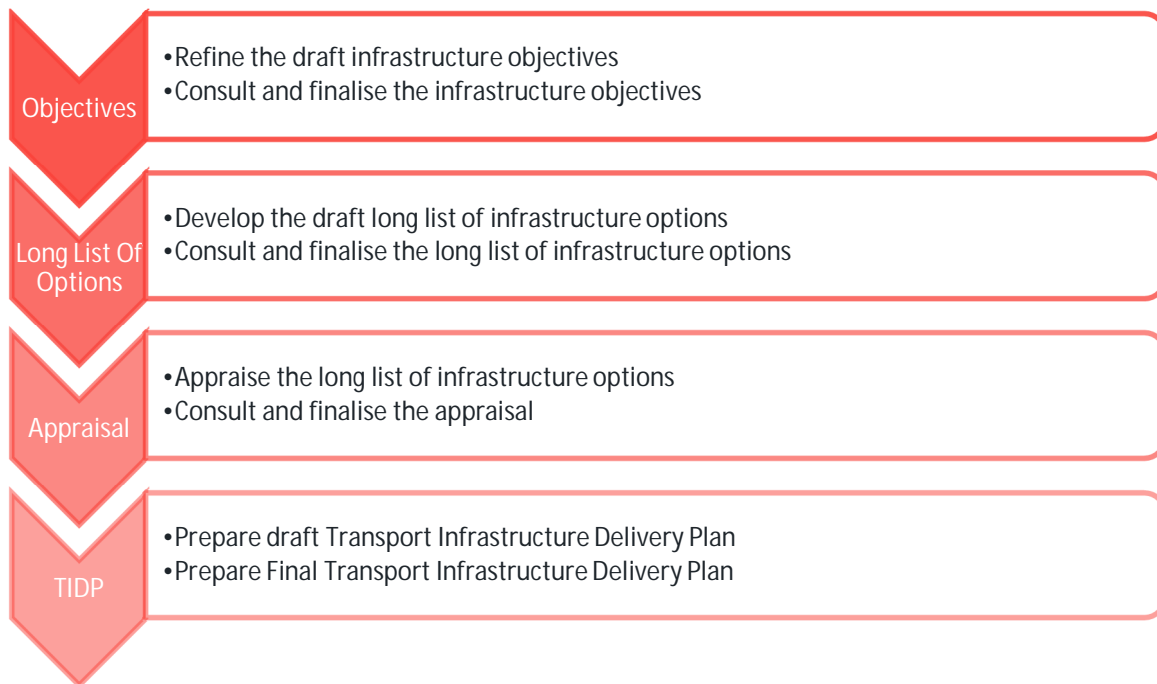


## 6.4. CONCLUSIONS

- 6.4.1. The spatial typology of Milton Keynes has served the city well in the past creating a popular place to live, shop and work. With easy access by car, the high capacity grid road network has encouraged a high dependency on private vehicles for short local trips and in/out-commuting. The biggest challenge in accommodating planned and long-term growth in a sustainable way will be encouraging modal shift to public transport and active travel. Attractive alternatives need to be developed through the design and implementation of high quality transport infrastructure that encourages non-car travel for all journey purposes rather than focusing on increasing vehicle capacity.
- 6.4.2. Technology has an increasingly important role to play in encouraging environmentally friendly and sustainable travel. There are substantial opportunities within Milton Keynes to test and implement innovative transport solutions that would encourage more sustainable travel patterns to develop.
- 6.4.3. Spatial planning also has a key role to play in the longer-term with substantial opportunities to densify development along corridors and central areas where there are substantial opportunities to encourage active and sustainable travel.

## 6.5. NEXT STEPS

- 6.5.1. The next steps of the study are summarised below.



- 6.5.2. Having summarised the current transport, socio-economic and environmental context of Milton Keynes, the future mobility and technology trends and DRAFT infrastructure objectives in this Evidence Review report, the next step is the refine the infrastructure objectives and develop the initial long list of conceptual infrastructure options in consultation with the project team and stakeholders.
- 6.5.3. The long list of options will then be appraised, with the best performing infrastructure schemes from the appraisal taken forward and presented in the draft and final Transport Infrastructure Delivery Plan.



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